

# **SYLVANIA TUBE SUBSTITUTION MANUAL**

**Quick references for substitutions of  
critical Radio and Television Tubes**



**A Technical Publication of  
SYLVANIA ELECTRIC PRODUCTS INC.  
EMPORIUM, PENNA.**

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# GENERAL TUBE CLASSIFICATIONS

The following classified listing has been prepared to assist service technicians and engineers in selecting substitutions for types not listed in the charts or when a major change in power supply is undertaken.

The characteristics selected for listing do not mean that the others are not important. The intention is to enable the user to select a group of possible tubes and then eliminate those which for other reasons may be undesirable.

The classifications into which the types have been grouped are those which our experience has found most useful. Television, of course, being so new, has required the addition of two groups of scanning tubes and the high voltage rectifiers. Other television tube functions have been included with the corresponding radio receiving types. One exception is the television converter tube which being usually a high frequency duo-triode is listed with the H.F. triodes.

As an example of its use let us consider the selection of an F.M. diode triode to replace Type 7K7. The first thing to note is that 7K7 has the diode cathodes separate from the triode cathode. This limits the selection immediately and brings up the possibility of using separate diodes, either in a tube, using a miniature if there are space limitations, or germanium crystals. To find the nearly direct replacements run down the column for amplification constant in the diode triodes; since the 7K7 has a  $\mu$  of 70, select those having a value between 50 and 100 and having 6.3 volt heaters. There are 20 of these, but a quick check of the basing diagrams in the Sylvania Receiving Tubes Characteristics Chart eliminates all but 6S8GT and 6T8 (Type 7X7 has one separate diode and one on the triode cathode.) If none of these are available the separate diode alternatives must be considered. If that is the case all 20 of the selected types in the diode triode table as well as the high  $\mu$  types in the general purpose triodes can be tried.

| AMPLIFIERS (REMOTE CUT-OFF R-F) |     |      |             |                      | Type         | Ef   | If    | Style    | Gm                   | AMPLIFIERS (SHARP CUT-OFF RF) |      |       |         |                      |
|---------------------------------|-----|------|-------------|----------------------|--------------|------|-------|----------|----------------------|-------------------------------|------|-------|---------|----------------------|
| Pentodes — Tetrodes             |     |      |             |                      | 6U7G         | 6.3  | 0.30  | ST-12    | 1500                 | Pentodes — Tetrodes           |      |       |         |                      |
| Type                            | Ef  | If   | Style       | Gm                   |              |      |       |          |                      | Type                          | Ef   | If    | Style   | Gm                   |
| 1A4P                            | 2.0 | 0.06 | ST-12       | 625<br>725           | 7A7          | 6.3  | 0.30  | Lock-in  | 2350<br>2000         | 1AE4                          | 1.25 | 0.10  | Min.    | 1550                 |
| 1A4T                            | 2.0 | 0.06 | ST-12       | 625<br>650           | 7AH7         | 6.3  | 0.15  | Lock-in  | 3300                 | 1AF4                          | 1.4  | 0.025 | Min.    | 825<br>950           |
| 1AB5                            | 1.2 | 0.13 | Lock-in     | 1100<br>1350         | 7B7          | 6.3  | 0.15  | Lock-in  | 1675<br>1750         | 1B4P                          | 2.0  | 0.06  | ST-12   | 560<br>650           |
| 1D5GP                           | 2.0 | 0.06 | ST-12       | 625<br>725           | 7H7          | 6.3  | 0.30  | Lock-in  | 4000                 | 1E5GP                         | 2.0  | 0.06  | ST-12   | 560<br>650           |
| 1D5GT                           | 2.0 | 0.06 | ST-12       | 625<br>650           | 7T7          | 6.3  | 0.3   | Lock-in  | 4900<br>4000         | 1L4                           | 1.4  | 0.05  | Min.    | 925<br>1025          |
| 1P5GT                           | 1.4 | 0.05 | GT          | 750                  | 12BA6        | 12.6 | 0.15  | Min.     | 4300<br>4400         | 1LC5                          | 1.4  | 0.05  | Lock-in | 750<br>775           |
| 1SA6GT                          | 1.4 | 0.05 | GT          | 750<br>950<br>970    | 12BD6        | 12.6 | 0.15  | Min.     | 2000<br>2350         | 1LG5                          | 1.4  | 0.05  | Lock-in | 800<br>800<br>1050   |
| 1T4                             | 1.4 | 0.05 | Min.        | 700<br>900           | 12K7GT       | 12.6 | 0.15  | GT       | 2350<br>2000         | 1LN5                          | 1.4  | 0.05  | Lock-in | 800                  |
| 6AB7                            | 6.3 | 0.45 | Metal       | 3500                 | 12SG7        | 12.6 | 0.15  | Metal    | 4100<br>4700<br>4000 | 1N5GT                         | 1.4  | 0.05  | GT      | 750                  |
| 6BA6                            | 6.3 | 0.30 | Min.        | 4200<br>4400         | 12SK7/GT     | 12.6 | 0.15  | Metal/GT | 2300<br>2000         | 1U4                           | 1.4  | 0.05  | Min.    | 900                  |
| 6BD6                            | 6.3 | 0.30 | Min.        | 2000<br>2350         | 14A7         | 12.6 | 0.15  | Lock-in  | 2350<br>2000         | 3E6                           | 1.4  | 0.10  | Lock-in | 2100<br>1800         |
| 6BJ6                            | 6.3 | 0.15 | Min.        | 3600<br>3650         | 14H7         | 12.6 | 0.15  | Lock-in  | 4000                 | 6AC7                          | 6.3  | 0.45  | Metal   | 6750                 |
| 6D6                             | 6.3 | 0.30 | ST-12       | 1500<br>1600         | 26A6         | 26.5 | 0.07  | Min.     | 2000<br>4000         | 6AG5                          | 6.3  | 0.30  | Min.    | 4750<br>5100<br>5000 |
| 6E7                             | 6.3 | 0.30 | ST-12       | 1500<br>1600         | 34 . .       | 2.0  | 0.06  | ST-14    | 560<br>600<br>620    | 6AH6                          | 6.3  | 0.45  | Min.    | 9000                 |
| 6K7/G                           | 6.3 | 0.30 | Metal/ST-12 | 1650<br>1450         | 35/51        | 2.5  | 1.75  | ST-14    | 1020<br>1050         | 6AJ5                          | 6.3  | 0.175 | Min.    | 2750                 |
| 6K7GT                           | 6.3 | 0.30 | GT          | 1650<br>1450         | 35S/51S      | 2.5  | 1.75  | ST-14    | 1020<br>1050         | 6AK5                          | 6.3  | 0.175 | Min.    | 5000<br>4300<br>5100 |
| 6R6G                            | 6.3 | 0.3  | ST-12       | 1160                 | 39/44        | 6.3  | 0.30  | ST-12    | 960<br>1000<br>1050  | 6AM6                          | 6.3  | 0.30  | Min.    | 7500                 |
| 6S7/G                           | 6.3 | 0.15 | Metal/ST-12 | 1250<br>1750         | 58/58S       | 2.5  | 1.0   | ST-12    | 1500<br>1600         | 6AS6                          | 6.3  | 0.175 | Min.    | 3500                 |
| 6SD7GT*                         | 6.3 | 0.30 | GT          | 3350<br>3600         | 58AS         | 6.3  | 0.40  | ST-12    | 1500<br>1600         | 6AU6                          | 6.3  | 0.30  | Min.    | 3900<br>4450<br>5200 |
| 6SG7*                           | 6.3 | 0.30 | Metal       | 4100<br>4700<br>4000 | 78           | 6.3  | 0.30  | ST-12    | 1275<br>1100<br>1450 | 6BC5                          | 6.3  | 0.30  | Min.    | 4900<br>6100<br>5700 |
| 6SG7GT*                         | 6.3 | 0.30 | GT          | 4100<br>4700<br>4000 | 5590*        | 6.3  | 0.15  | Min.     | 2000                 | 6BH6                          | 6.3  | 0.15  | Min.    | 3400<br>4600         |
| 6SK7/GT                         | 6.3 | 0.30 | Metal/GT    | 2350<br>2000         | 5725         | 6.3  | 0.175 | Min.     |                      | 6C6                           | 6.3  | 0.30  | ST-12   | 1185<br>1225         |
| 6SS7                            | 6.3 | 0.15 | Metal       | 1950<br>1850         | 9001*        | 6.3  | 0.15  | Min.     | 1400                 | 6CB6                          | 6.3  | 0.30  | Min.    | 6200                 |
|                                 |     |      |             |                      | *Semi-remote |      |       |          |                      | 6D7                           | 6.3  | 0.30  | ST-12   | 1185<br>1225         |
|                                 |     |      |             |                      |              |      |       |          |                      | 6J7                           | 6.3  | 0.30  | Metal   | 1225                 |
|                                 |     |      |             |                      |              |      |       |          |                      | 6J7G                          | 6.3  | 0.30  | ST-12   | 1225                 |

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## Amplifiers (Sharp cut-off RF) Cont'd

| Type     | Ef   | If    | Style       | Gm    |
|----------|------|-------|-------------|-------|
| 6J7GT    | 6.3  | 0.30  | GT          | 1225  |
| 6SE7GT   | 6.3  | 0.30  | GT          | 3100  |
| 6SH7     | 6.3  | 0.30  | Metal       | 3400  |
| 6SH7GT   | 6.3  | 0.30  | GT          | 4000  |
| 6SJ7/GT  | 6.3  | 0.30  | Metal/GT    | 4900  |
| 6W7G     | 6.3  | 0.15  | ST-12       | 4000  |
| 7AB7     | 6.3  | 0.15  | Lock-in     | 1575  |
| 7AD7     | 6.3  | 0.60  | Lock-in     | 1650  |
| 7AG7     | 6.3  | 0.15  | Lock-in     | 1225  |
| 7AJ7     | 6.3  | 0.3   | Lock-in     | 1800  |
| 7AK7     | 6.3  | 0.8   | Lock-in     | 9500  |
| 7C7      | 6.3  | 0.15  | Lock-in     | 4200  |
| 7G7      | 6.3  | 0.45  | Lock-in     | 2275  |
| 7L7      | 6.3  | 0.30  | Lock-in     | 1575  |
| 7V7      | 6.3  | 0.45  | Lock-in     | 6500  |
| 7W7      | 6.3  | 0.45  | Lock-in     | 1225  |
| 12AU6    | 12.6 | 0.15  | Min.        | 1300  |
| 12AW6    | 12.6 | 0.15  | Min.        | 4500  |
| 12J7GT   | 12.6 | 0.15  | GT          | 3000  |
| 12SH7/GT | 12.6 | 0.15  | Metal/GT    | 3100  |
| 12SJ7    | 12.6 | 0.15  | Metal       | 5800  |
| 12SJ7GT  | 12.6 | 0.15  | GT          | 5800  |
| 14C7     | 12.6 | 0.15  | Lock-in     | 3900  |
| 14W7     | 12.6 | 0.225 | Lock-in     | 4450  |
| 15       | 2.0  | 0.22  | ST-12       | 5200  |
| 22       | 3.3  | 0.132 | ST-14       | 5000  |
| 24A/24S  | 2.5  | 1.75  | ST-14       | 5100  |
| 32       | 2.0  | 0.06  | ST-14       | 4750  |
| 36       | 6.3  | 0.30  | ST-12       | 1225  |
| EF50     | 6.3  | 0.30  | Metal/Glass | 6300  |
| 57/57S   | 2.5  | 1.0   | ST-12       | 1185  |
| 57AS     | 6.3  | 0.40  | ST-12       | 1225  |
| 77       | 6.3  | 0.30  | ST-12       | 1100  |
| 1221     | 6.3  | 0.30  | ST-12       | 1250  |
| 1223     | 6.3  | 0.30  | ST-12       | 1185  |
| 1229     | 2.0  | 0.06  | ST-12       | 1225  |
| 1231     | 6.3  | 0.45  | Lock-in     | 5500  |
| 1273     | 6.3  | 0.30  | Lock-in     | 6500  |
| 1280     | 12.6 | 0.15  | Lock-in     | 2275  |
| 5391     | 6.3  | 0.15  | Min.        | 1575  |
| 5654     | 6.3  | 0.175 | Min.        | 5000  |
| 5693     | 6.3  | 0.3   | Metal       | 1650  |
| 5847     | 6.3  | 0.3   | T-6½        | 12500 |
| 5879     | 6.3  | 0.15  | T-6½        | 1000  |
| 5901     | 1.4  | 0.05  | Min.        | 900   |
| 9003     | 6.3  | 0.15  | Min.        | 1800  |

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## CONVERTERS

| Type     | Ef   | If    | Style    | Gc   |
|----------|------|-------|----------|------|
| 1A6      | 2.0  | 0.06  | ST-12    | 275  |
| 1A7GT    | 1.4  | 0.05  | GT       | 300  |
| 1B7GT    | 1.4  | 0.10  | GT       | 250  |
| 1C6      | 2.0  | 0.12  | ST-12    | 350  |
| 1C7G     | 2.0  | 0.12  | ST-12    | 300  |
| 1C8      | 1.25 | 0.04  | T-3      | 325  |
| 1D7G     | 2.0  | 0.06  | ST-12    | 100  |
| 1L6      | 1.4  | 0.05  | Min.     | 275  |
| 1LA6     | 1.4  | 0.05  | Lock-in  | 300  |
| 1LB6     | 1.4  | 0.05  | Lock-in  | 300  |
| 1LC6     | 1.4  | 0.05  | Lock-in  | 250  |
| 1R5      | 1.4  | 0.05  | Min.     | 275  |
| 1U6      | 1.4  | 0.025 | Min.     | 225  |
| 2A7/2A7S | 2.5  | 0.80  | ST-12    | 300  |
| 6A7/6A7S | 6.3  | 0.30  | ST-12    | 260  |
| 6A8      | 6.3  | 0.30  | Metal    | 275  |
| 6A8G     | 6.3  | 0.30  | ST-12    | 550  |
| 6A8GT    | 6.3  | 0.30  | GT       | 360  |
| 6AN7     | 6.3  | 0.23  | T-6½     | 550  |
| 6BA7     | 6.3  | 0.30  | T-6½     | 750  |
| 6BE6     | 6.3  | 0.30  | Min.     | 900  |
| 6D8G     | 6.3  | 0.15  | ST-12    | 950  |
| 6J8G     | 6.3  | 0.30  | ST-12    | 455  |
| 6K8      | 6.3  | 0.30  | Metal    | 475  |
| 6K8G/GT  | 6.3  | 0.30  | ST-12/GT | 325  |
| 6L7      | 6.3  | 0.30  | Metal    | 550  |
| 6L7G     | 6.3  | 0.30  | ST-12    | 290  |
| 7A8      | 6.3  | 0.15  | Lock-in  | 350  |
| 7B8      | 6.3  | 0.3   | Lock-in  | 350* |
| 7J7      | 6.3  | 0.30  | Lock-in  | 375  |
| 7Q7      | 6.3  | 0.30  | Lock-in  | 550  |
| 7S7      | 6.3  | 0.30  | Lock-in  | 280  |
| 12A8GT   | 12.6 | 0.15  | GT       | 290  |
| 12BA7    | 12.6 | 0.15  | T-6½     | 525  |
| 12BE6    | 12.6 | 0.15  | Min.     | 550  |
| 12K8     | 12.6 | 0.15  | Metal    | 900  |
| 12K8GT   | 12.6 | 0.15  | GT       | 950  |
| 12SA7    | 12.6 | 0.15  | Metal    | 455  |
| 12SA7GT  | 12.6 | 0.15  | GT       | 475  |
| 12SY7    | 12.6 | 0.15  | Metal    | 350  |
| 14B8     | 12.6 | 0.15  | Lock-in  | 425  |
| 14J7     | 12.6 | 0.15  | Lock-in  | 450  |
| 14Q7     | 12.6 | 0.15  | Lock-in  | 450  |
| 14S7     | 12.6 | 0.15  | Lock-in  | 360  |
| 26D6     | 26.5 | 0.07  | Min.     | 550  |
| FM1000   | 6.3  | 0.30  | Lock-in  | 280  |
| 1612     | 6.3  | 0.30  | Metal    | 290  |

\*require separate oscillator

## DIODE DETECTORS

### Single and Double

| Type   | Ef   | If    | Style    | Output Current Ma/plate |
|--------|------|-------|----------|-------------------------|
| 1A3    | 1.4  | 0.150 | Min.     | 0.5                     |
| 1R4    | 1.4  | 0.150 | Lock-in  | 1.0                     |
| 2S/4S  | 2.5  | 1.35  | ST-12    | 40.0                    |
| 6AL5   | 6.3  | 0.30  | Min.     | 9.0                     |
| 6AN6   | 6.3  | 0.20  | Min.     | 8.0                     |
| 6BC7   | 6.3  | 0.45  | T-6½     | 12.0                    |
| 6H4GT  | 6.3  | 0.15  | GT       | 4.0                     |
| 6H6/GT | 6.3  | 0.30  | Metal/GT | 8.0                     |
| 7A6    | 6.3  | 0.15  | Lock-in  | 8.0                     |
| 7C4    | 6.3  | 0.15  | Lock-in  | 5.0                     |
| 12AL5  | 12.6 | 0.15  | Min.     | 9.0                     |
| 12H6   | 12.6 | 0.15  | Metal    | 8.0                     |
| 5679   | 6.3  | 0.15  | Lock-in  | 8.0                     |
| 5726   | 6.3  | 0.30  | Min.     | 9.0                     |
| 9006   | 6.3  | 0.15  | Min.     | 5.0                     |

### DIODE-PENTODES

| Type     | Ef   | If    | Style       | Gm   |
|----------|------|-------|-------------|------|
| 1AF5     | 1.4  | 0.025 | Min.        | 500  |
| 1F6      | 2.0  | 0.06  | ST-12       | 600  |
| 1F7G     | 2.0  | 0.06  | ST-12       | 650  |
| 1F7GV    | 2.0  | 0.06  | ST-12       | 650  |
| 1LD5     | 1.4  | 0.05  | Lock-in     | 550  |
| 1N6G     | 1.4  | 0.05  | GT          | 575  |
| 1S5      | 1.4  | 0.05  | Min.        | 800  |
| 1SB6GT   | 1.4  | 0.05  | GT          | 625  |
| 1U5      | 1.4  | 0.05  | Min.        | 665  |
| 2B7/2B7S | 2.5  | 0.80  | ST-12       | 500  |
| 6B8/G    | 6.3  | 0.30  | Metal/ST-12 | 625  |
| 6B8GT    | 6.3  | 0.30  | GT          | 950  |
| 6N8      | 6.3  | 0.30  | T-6½        | 950  |
| 6SF7     | 6.3  | 0.30  | Metal       | 2200 |
| 6SV7     | 6.3  | 0.30  | Metal       | 1975 |
| 7E7      | 6.3  | 0.30  | Lock-in     | 2050 |
| 7R7      | 6.3  | 0.30  | Lock-in     | 3600 |
| 12C8     | 12.6 | 0.15  | Metal       | 1600 |
| 12SF7    | 12.6 | 0.15  | Metal       | 1300 |
| 14E7     | 12.6 | 0.15  | Lock-in     | 2100 |
| 14R7     | 12.6 | 0.15  | Lock-in     | 3000 |

### DIODE TRIODES (DETECTOR-AMPLIFIER)

#### Single Diode Triode Duo Diode Triode Triple Diode Triode

| Type   | Ef  | If   | Style   | μ   |
|--------|-----|------|---------|-----|
| 1B5    | 2.0 | 0.06 | ST-12   | 20  |
| 1H4G   | 2.0 | 0.06 | ST-12   | 9.3 |
| 1H5GT  | 1.4 | 0.05 | GT      | 65  |
| 1H6G   | 2.0 | 0.06 | ST-12   | 20  |
| 1LH4   | 1.4 | 0.05 | Lock-in | 65  |
| 2A6    | 2.5 | 0.80 | ST-12   | 100 |
| 6AQ6   | 6.3 | 0.15 | Min.    | 70  |
| 6AQ7GT | 6.3 | 0.30 | GT      | 70  |
| 6AT6   | 6.3 | 0.30 | Min.    | 70  |
| 6AV6   | 6.3 | 0.30 | Min.    | 100 |
| 6AW7GT | 6.3 | 0.30 | GT      | 80  |
| 6B6G   | 6.3 | 0.30 | ST-12   | 100 |
| 6BD7   | 6.3 | 0.23 | T-6½    | 70  |
| 6BF6   | 6.3 | 0.30 | Min.    | 16  |
| 6BK6   | 6.3 | 0.30 | Min.    | 100 |
| 6BT6   | 6.3 | 0.30 | Min.    | 70  |

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| Diode Triode (Continued) |     |      |          |       | Type   | Ef   | If   | Style   | $\mu$ | Type      | Ef   | If   | Style    | $\mu$ |
|--------------------------|-----|------|----------|-------|--------|------|------|---------|-------|-----------|------|------|----------|-------|
| Type                     | Ef  | If   | Style    | $\mu$ | 6V7G   | 6.3  | 0.30 | ST-12   | 8.3   | 12SQ7/GT  | 12.6 | 0.15 | Metal/GT | 100   |
| 6BU6                     | 6.3 | 0.30 | Min.     | 16.5  | 7B6    | 6.3  | 0.30 | Lock-in | 100   | 12SR7     | 12.6 | 0.15 | Metal    | 16    |
|                          |     |      |          | 16.0  | 7C6    | 6.3  | 0.15 | Lock-in | 85    | 12SW7     | 12.6 | 0.15 | Metal    | 17    |
| 6C7                      | 6.3 | 0.30 | ST-12    | 20    |        |      |      |         | 100   |           |      |      |          | 16    |
| 6Q7                      | 6.3 | 0.30 | Metal    | 70    | 7E6    | 6.3  | 0.30 | Lock-in | 16    | 14B6      | 12.6 | 0.15 | Lock-in  | 100   |
| 6Q7G                     | 6.3 | 0.30 | ST-12    | 70    |        |      |      |         | 16.5  | 14E6      | 12.6 | 0.15 | Lock-in  | 16    |
| 6Q7GT                    | 6.3 | 0.30 | GT       | 70    | 7K7    | 6.3  | 0.30 | Lock-in | 70    |           |      |      |          | 16.5  |
| 6R7                      | 6.3 | 0.30 | Metal    | 16    | 7X7    | 6.3  | 0.30 | Lock-in | 85    | 14X7      | 12.6 | 0.15 | Lock-in  | 85    |
| 6R7GT                    | 6.3 | 0.30 | GT       | 16    |        |      |      |         | 100   |           |      |      |          | 100   |
| 6R8                      | 6.3 | 0.45 | T-6½     | 16    | 12AT6  | 12.6 | 0.15 | Min.    | 70    | 19C8      | 18.9 | 0.15 | T-6½     | 100   |
| 6S8GT                    | 6.3 | 0.30 | GT       | 100   | 12AV6  | 12.6 | 0.15 | Min.    | 100   | 19T8      | 18.9 | 0.15 | Min.     | 70    |
| 6SQ7GT                   | 6.3 | 0.30 | GT       | 16    | 12BF6  | 12.6 | 0.15 | Min.    | 16    | 26BK6     | 26.5 | 0.07 | Min.     | 100   |
| 6SR7/GT                  | 6.3 | 0.30 | Metal/GT | 16    | 12BK6  | 12.6 | 0.15 | Min.    | 100   | 26C6      | 26.5 | 0.07 | Min.     | 17    |
| 6ST7                     | 6.3 | 0.15 | Metal    | 16    | 12BT6  | 12.6 | 0.15 | Min.    | 70    |           |      |      |          | 16    |
| 6SZ7                     | 6.3 | 0.15 | Metal    | 70    | 12BU6  | 12.6 | 0.15 | Min.    | 16.5  | 55/55S    | 2.5  | 1.0  | ST-12    | 8.3   |
| 6T7G                     | 6.3 | 0.15 | ST-12    | 65    |        |      |      |         | 16.0  | 75 or 75S | 6.3  | 0.30 | ST-12    | 100   |
| 6T8                      | 6.3 | 0.45 | T-6½     | 70    | 12Q7GT | 12.6 | 0.15 | GT      | 70    | 85        | 6.3  | 0.30 | ST-12    | 8.3   |
|                          |     |      |          |       | 12S8GT | 12.6 | 0.15 | GT      | 100   | 85AS      | 6.3  | 0.30 | ST-12    | 20    |

| DUO-TRIODES |      |       |          |      |       | Type | Ef | If | Style | Gm | $\mu$ |
|-------------|------|-------|----------|------|-------|------|----|----|-------|----|-------|
| Type        | Ef   | If    | Style    | Gm   | $\mu$ |      |    |    |       |    |       |
| 2C21        | 6.3  | 0.60  | ST-12    | 1375 | 10.4  |      |    |    |       |    |       |
| 2C51        | 6.3  | 0.30  | T-6½     | 5500 | 35.0  |      |    |    |       |    |       |
| 2C52        | 12.6 | 0.30  | GT       | 1900 | 100.0 |      |    |    |       |    |       |
| 3A5         | 1.4  | 0.22  | Min.     | 1800 | 15.0  |      |    |    |       |    |       |
|             | 2.8  | 0.11  |          |      |       |      |    |    |       |    |       |
| 3B7         | 2.8  | 0.110 | Lock-in  | 1900 |       |      |    |    |       |    |       |
|             | 1.4  | 0.220 |          |      |       |      |    |    |       |    |       |
| 3C6         | 1.4  | 0.10  | Lock-in  | 1300 |       |      |    |    |       |    |       |
|             | 2.8  | 0.05  |          | 1300 |       |      |    |    |       |    |       |
|             |      |       |          | 1100 |       |      |    |    |       |    |       |
| 6AE7GT      | 6.3  | 0.50  | GT       | 3000 | 14.0  |      |    |    |       |    |       |
| 6AH7GT      | 6.3  | 0.30  | GT       | 1550 | 16.0  |      |    |    |       |    |       |
|             |      |       |          | 1900 |       |      |    |    |       |    |       |
| 6BQ7        | 6.3  | 0.40  | T-6½     | 6000 | 35.0  |      |    |    |       |    |       |
| 6C8G        | 6.3  | 0.30  | ST-12    |      | 36.0  |      |    |    |       |    |       |
| 6F8G        | 6.3  | 0.30  | ST-12    | 2600 | 20.0  |      |    |    |       |    |       |
| 6J6         | 6.3  | 0.45  | Min.     | 5300 | 38.0  |      |    |    |       |    |       |
| 6N7/GT      | 6.3  | 0.80  | Metal/GT | 3100 | 35.0  |      |    |    |       |    |       |
|             |      |       |          | 3200 |       |      |    |    |       |    |       |
| 6SC7/GT     | 6.3  | 0.30  | Metal/GT | 1325 | 70.0  |      |    |    |       |    |       |
| 6SL7GT      |      |       |          |      |       |      |    |    |       |    |       |
| 6SL7WGT     | 6.3  | 0.30  | GT       | 1600 | 70.0  |      |    |    |       |    |       |
| 6SN7GT      |      |       |          |      |       |      |    |    |       |    |       |
| 6SN7WGT     | 6.3  | 0.60  | GT       | 3000 | 20.0  |      |    |    |       |    |       |
|             |      |       |          | 2600 |       |      |    |    |       |    |       |
| 6SU7GT      | 6.3  | 0.30  | GT       | 1600 | 70.0  |      |    |    |       |    |       |
| 7AF7        | 6.3  | 0.30  | Lock-in  | 2600 | 17.0  |      |    |    |       |    |       |
|             |      |       |          | 1900 | 16.0  |      |    |    |       |    |       |
|             |      |       |          | 2100 |       |      |    |    |       |    |       |
| 7F7         | 6.3  | 0.30  | Lock-in  | 1125 | 70.0  |      |    |    |       |    |       |
|             |      |       |          | 1600 |       |      |    |    |       |    |       |
| 7F8         | 6.3  | 0.30  | Lock-in  | 3300 |       |      |    |    |       |    |       |
| 7N7         | 6.3  | 0.60  | Lock-in  | 3000 | 20.0  |      |    |    |       |    |       |
|             |      |       |          | 2600 |       |      |    |    |       |    |       |
| 12AH7GT     | 12.6 | 0.15  | GT       | 1550 | 16.0  |      |    |    |       |    |       |
|             |      |       |          | 1900 |       |      |    |    |       |    |       |
| 12AT7       | 6.3  | 0.30  | T-6½     | 4000 | 54.0  |      |    |    |       |    |       |
|             | 12.6 | 0.15  |          | 6600 | 62.0  |      |    |    |       |    |       |
|             |      |       |          | 5500 | 55.0  |      |    |    |       |    |       |
| 12AU7       | 12.6 | 0.15  | T-6½     | 2200 | 17.0  |      |    |    |       |    |       |
|             | 6.3  | 0.30  |          | 3100 | 19.5  |      |    |    |       |    |       |
| 12AV7       | 12.6 | 0.225 | T-6½     | 6100 | 37.0  |      |    |    |       |    |       |
|             | 6.3  | 0.450 |          | 8500 | 41.0  |      |    |    |       |    |       |
| 12AX7       | 12.6 | 0.15  | T-6½     | 1250 | 100.0 |      |    |    |       |    |       |
|             | 6.3  | 0.30  |          | 1600 |       |      |    |    |       |    |       |
| 12AY7       | 12.6 | 0.15  | T-6½     | 1750 | 40.0  |      |    |    |       |    |       |
| 12SC7       | 12.6 | 0.15  | Metal    | 1325 | 70.0  |      |    |    |       |    |       |
| 12SL7GT     | 12.6 | 0.15  | GT       | 1600 | 70    |      |    |    |       |    |       |
| 12SN7GT     | 12.6 | 0.15  | GT       | 3000 | 20    |      |    |    |       |    |       |
|             |      |       |          | 2600 |       |      |    |    |       |    |       |
| 12SX7GT     | 12.6 | 0.30  | GT       | 1800 | 21    |      |    |    |       |    |       |
|             |      |       |          | 3000 | 20    |      |    |    |       |    |       |
|             |      |       |          | 2600 |       |      |    |    |       |    |       |
| 14AF7/XXD   | 12.6 | 0.15  | Lock-in  | 2600 | 17    |      |    |    |       |    |       |
|             |      |       |          | 1900 | 16    |      |    |    |       |    |       |
|             |      |       |          | 2100 |       |      |    |    |       |    |       |
| 14F7        | 12.6 | 0.15  | Lock-in  | 1125 | 70    |      |    |    |       |    |       |
|             |      |       |          | 1600 |       |      |    |    |       |    |       |

| Type   | Ef   | If   | Style   | Gm   | $\mu$ |
|--------|------|------|---------|------|-------|
| 14N7   | 12.6 | 0.15 | Lock-in | 3000 | 20    |
|        |      |      |         | 2600 |       |
| 19J6   | 18.9 | 0.15 | Min.    | 1900 | 38    |
| 5608-A | 2.5  | 2.0  | ST-14   | 2200 | 16    |
|        |      |      |         | 2450 | 17    |
| 5687   | 6.3  | 0.90 | T-6½    | 5200 | 16    |
|        | 12.6 | 0.45 |         | 8100 |       |
| 5691   | 6.3  | 0.6  | GT      | 1600 | 70    |
| 5692   | 6.3  | 0.6  | GT      | 2200 | 20    |
| 5694   | 6.3  | 0.8  | ST-14   | 3100 | 35    |
|        |      |      |         | 3200 |       |

| INDICATORS |      |      |       |  | Target Current Ma. |
|------------|------|------|-------|--|--------------------|
| Type       | Ef   | If   | Style |  |                    |
| 2E5        | 2.5  | 0.80 | T-9   |  | 1.0                |
|            |      |      |       |  | 4.0                |
| 6AB5/6N5   | 6.3  | 0.15 | T-9   |  | 2.0                |
| 6AD6G      | 6.3  | 0.15 | T-9   |  |                    |
| 6AF6G      | 6.3  | 0.15 | T-9   |  |                    |
| 6AL7GT     | 6.3  | 0.90 | GT    |  |                    |
| 6E5        | 6.3  | 0.30 | T-9   |  | 1.0                |
|            |      |      |       |  | 4.0                |
| 6T5        | 6.3  | 0.15 | ST-12 |  | 3.0                |
| 6U5        | 6.3  | 0.30 | T-9   |  | 1.0                |
|            |      |      |       |  | 4.0                |
| 1629       | 12.6 | 0.15 | GT    |  | 1.0                |
|            |      |      |       |  | 4.0                |

| MULTI-PURPOSE TUBES |       |       |         |      |                     | Type | Ef | If | Style | Gm | Class |
|---------------------|-------|-------|---------|------|---------------------|------|----|----|-------|----|-------|
|                     |       |       |         |      |                     |      |    |    |       |    |       |
| 1B8GT               | 1.4   | 0.10  | GT      | 275  | Diode-Triode Pent.  |      |    |    |       |    |       |
|                     |       |       |         | 1150 |                     |      |    |    |       |    |       |
| 1D8GT               | 1.4   | 0.100 | GT      | 325  | Diode-Triode Pent.  |      |    |    |       |    |       |
|                     |       |       |         | 925  |                     |      |    |    |       |    |       |
| 2B7                 | 2.5   | 0.80  | ST-12   | 950  | Triode Pentode      |      |    |    |       |    |       |
|                     |       |       |         | 840  |                     |      |    |    |       |    |       |
|                     |       |       |         | 1000 |                     |      |    |    |       |    |       |
| 3A8GT               | 1.4   | 0.10  | GT      | 325  | Diode-Triode Pent.  |      |    |    |       |    |       |
|                     | 2.8   | 0.05  |         | 750  |                     |      |    |    |       |    |       |
| 6AD7G               | 6.3   | 0.85  | ST-14   | 325  | Triode Pentode      |      |    |    |       |    |       |
|                     |       |       |         | 2500 |                     |      |    |    |       |    |       |
| 6B7/S               | 6.3   | 0.30  | ST-12   | 950  | Triode Pentode      |      |    |    |       |    |       |
|                     |       |       |         | 840  |                     |      |    |    |       |    |       |
|                     |       |       |         | 1000 |                     |      |    |    |       |    |       |
| 7G8                 | 6.3   | 0.30  | Lock-in | 2100 | Dual Tetrode        |      |    |    |       |    |       |
| 12B8GT              | 12.6  | 0.30  | GT      | 1800 | Triode Pentode      |      |    |    |       |    |       |
|                     |       |       |         | 2400 |                     |      |    |    |       |    |       |
| 25A7GT              | 25.0  | 0.30  | GT      | 1800 | Rectifier-Pentode   |      |    |    |       |    |       |
| 25B8GT              | 25.0  | 0.15  | GT      | 2000 | Triode Pentode      |      |    |    |       |    |       |
|                     |       |       |         | 1500 |                     |      |    |    |       |    |       |
| 25D8GT              | 25.0  | 0.15  | GT      | 1100 | Triode Pentode      |      |    |    |       |    |       |
|                     |       |       |         | 1900 |                     |      |    |    |       |    |       |
| 28D7/W              | 28.0  | 0.40  | Lock-in | 3400 | Dual Tetrode        |      |    |    |       |    |       |
| 32L7GT              | 32.5  | 0.30  | GT      | 6000 | Rectifier-Beam Amp. |      |    |    |       |    |       |
| 70A7GT              | 70.0  | 0.15  | GT      | 5800 | Rectifier-Beam Amp. |      |    |    |       |    |       |
| 70L7GT              | 70.0  | 0.15  | GT      | 7500 | Rectifier-Beam Amp. |      |    |    |       |    |       |
| 117L7/M7GT          | 117.0 | 0.09  | GT      | 5300 | Rectifier-Beam Amp. |      |    |    |       |    |       |
| 117N7GT             | 117.0 | 0.09  | GT      | 7000 | Rectifier-Beam Amp. |      |    |    |       |    |       |
| 117P7GT             | 117.0 | 0.09  | GT      | 5300 | Rectifier-Beam Amp. |      |    |    |       |    |       |

# SYLVANIA SUBSTITUTION MANUAL

## POWER AMPLIFIERS

Triodes

Pentodes

Beam Amplifiers

Tetrodes

Class B Duo Triodes

| Type   | Ef   | If    | Style   | Power Output Mw. | Type      | Ef   | If    | Style    | Power Output Mw. |
|--------|------|-------|---------|------------------|-----------|------|-------|----------|------------------|
| 1A5GT  | 1.4  | 0.05  | GT      | 100              | 18        | 14.0 | 0.30  | ST-14    | 4800             |
| 1AC5   | 1.25 | 0.04  | T-3     | 115              |           |      |       |          | 11000            |
|        |      |       |         | 450              |           |      |       |          | 18000            |
|        |      |       |         | 600              | 19        | 2.0  | 0.26  | ST-12    | 2100             |
| 1C5GT  | 1.4  | 0.10  | GT      | 700              |           |      |       |          | 1900             |
|        |      |       |         | 200              |           |      |       |          | 1600             |
|        |      |       |         | 240              | 19BG6G    | 18.9 | 0.30  | ST-16    | 50               |
| 1E7G   | 2.0  | 0.24  | ST-12   | 575              |           | 3.3  | 0.132 | T-8      | 130              |
| 1F4    | 2.0  | 0.12  | ST-12   | 310              | 25A6/GT   | 25   | 0.30  | Metal/GT | 900              |
| 1F5G   | 2.0  | 0.12  | ST-12   | 310              |           |      |       |          | 2000             |
| 1G5G   | 2.0  | 0.12  | ST-14   | 250              | 25A7GT    | 25   | 0.30  | GT       | 770              |
| 1G6GT  | 1.4  | 0.10  | GT      | 675              | 25AC5GT   | 25   | 0.30  | GT       | 2000             |
| 1J5G   | 2.0  | 0.12  | ST-14   | 575              | 25B5      | 25   | 0.30  | ST-12    | 2000             |
| 1J6G   | 2.0  | 0.24  | ST-12   | 2100             | 25B6G     | 25   | 0.30  | ST-14    | 2400             |
|        |      |       |         | 1900             |           |      |       |          | 7100             |
|        |      |       |         | 1600             | 25C6G     | 25   | 0.30  | ST-14    | 3600             |
| 1LA4   | 1.4  | 0.05  | Lock-in | 100              |           |      |       |          | 6000             |
|        |      |       |         | 115              | 25L6      | 25   | 0.30  | Metal    | 2100             |
| 1LB4   | 1.4  | 0.05  | Lock-in | 35               |           |      |       |          | 4300             |
|        |      |       |         | 100              | 25L6GT    | 25   | 0.30  | GT       | 2100             |
|        |      |       |         | 200              |           |      |       |          | 4300             |
| 1Q5GT  | 1.4  | 0.10  | GT      | 270              | 25N6G     | 25   | 0.30  | ST-12    | 2000             |
| 1S4    | 1.4  | 0.10  | Min.    | 65               | 26A7GT    | 26.5 | 0.6   | GT       | 3800             |
| 1T5GT  | 1.4  | 0.05  | GT      | 170              |           | 2.0  | 0.13  | ST-12    | 5500             |
| 1W4    | 1.4  | 0.05  | Min.    | 35               | 31        |      |       |          | 185              |
|        |      |       |         | 90               |           |      |       |          | 375              |
|        |      |       |         | 100              | 32L7GT    | 32.5 | 0.30  | GT       | 1000             |
|        |      |       |         | 200              |           | 2.0  | 0.26  | ST-14    | 70               |
| 2A3    | 2.5  | 2.50  | ST-16   | 3500             | 33        |      |       |          | 90               |
|        |      |       |         | 15000            | 35A5      | 35.0 | 0.15  | Lock-in  | 1500             |
| 2A5    | 2.5  | 1.75  | ST-14   | 3200             |           |      |       |          | 1300             |
|        |      |       |         | 4800             | 35B5      | 35.0 | 0.15  | Min.     | 1500             |
|        |      |       |         | 11000            | 35C5      | 35.0 | 0.15  | Min.     | 1500             |
|        |      |       |         | 18000            | 35L6GT    | 35.0 | 0.15  | GT       | 1500             |
| 3A4    | 1.4  | 0.20  | Min.    | 600              |           |      |       |          | 3300             |
|        | 2.8  | 0.10  |         | 700              | 38        | 6.3  | 0.30  | ST-12    | 925              |
| 3B5GT  | 1.4  | 0.10  | GT      | 70               |           |      |       |          | 1050             |
|        | 2.8  | 0.05  |         | 180              | 41        | 6.3  | 0.40  | ST-12    | 1200             |
| 3C5GT  | 1.4  | 0.10  | GT      | 1550             |           |      |       |          | 350              |
|        | 2.8  | 0.05  |         | 1450             | 42        | 6.3  | 0.65  | ST-14    | 4800             |
| 3D6    | 2.8  | 0.110 | Lock-in | 600              |           |      |       |          | 11000            |
|        | 1.4  | 0.220 |         | 1400             | 43        | 25.0 | 0.30  | ST-14    | 900              |
| 3E5    | 1.4  | 0.050 | Min.    | 100              | 45        | 2.5  | 1.50  | ST-14    | 830              |
|        | 2.8  | 0.025 |         | 200              |           |      |       |          | 1600             |
|        |      |       |         | 90               | 46        | 2.5  | 1.75  | ST-16    | 2000             |
|        |      |       |         | 175              | 47        | 2.5  | 1.75  | ST-16    | 2700             |
| 3LE4   | 2.8  | 0.05  | Lock-in | 300              | 48        | 30.0 | 0.40  | ST-16    | 2000             |
|        | 1.4  | 0.10  |         | 325              |           |      |       |          | 3000             |
| 3LF4   | 1.4  | 0.10  | Lock-in | 250              | 49        | 2.0  | 0.12  | ST-14    | 170              |
|        |      |       |         | 270              |           |      |       |          | 3500             |
|        | 2.8  | 0.05  |         | 400              | 50        | 7.5  | 1.25  | ST-16    | 1600             |
|        |      |       |         | 230              |           |      |       |          | 2400             |
|        |      |       |         | 330              |           |      |       |          | 3400             |
| 3Q4    | 1.4  | 0.10  | Min.    | 250              | 50A5      | 50.0 | 0.15  | Lock-in  | 4600             |
|        | 2.8  | 0.05  |         | 270              |           |      |       |          | 2100             |
|        |      |       |         | 240              | 50B5      | 50.0 | 0.15  | Min.     | 4300             |
| 3Q5GT  | 1.4  | 0.10  | GT      | 270              |           |      |       |          | 1900             |
|        | 2.8  | 0.05  |         | 230              | 50C5      | 50.0 | 0.15  | Min.     | 1900             |
| 3S4    | 1.4  | 0.10  | Min.    | 270              | 50C6G     | 50.0 | 0.15  | ST-14    | 3600             |
|        | 2.8  | 0.05  |         | 235              |           |      |       |          | 6000             |
| 3V4    | 1.4  | 0.10  | Min.    | 250              | 50L6GT    | 50.0 | 0.15  | GT       | 2100             |
|        | 2.8  | 0.05  |         | 270              |           |      |       |          | 4300             |
|        |      |       |         | 240              | VT52      | 7.7  | 5.0   | ST-17    | 1000             |
| 4A6G   | 2.0  | 0.12  | ST-12   | 1000             |           | 2.5  | 2.0   | ST-14    | 10000            |
|        | 4.0  | 0.06  |         | 2800             | 59        | 2.5  | 2.0   | ST-16    | 1250             |
| 5A6    | 5.0  | 0.230 | T-6½    | 3100             |           |      |       |          | 3000             |
|        | 2.5  | 0.460 |         | 3200             | 71A       | 5.0  | 0.25  | ST-14    | 125              |
| 6A3    | 6.3  | 1.00  | ST-16   | 1500             |           |      |       |          | 400              |
|        |      |       |         | 1000             |           |      |       |          | 790              |
|        |      |       |         | 700              | 79        | 6.3  | 0.60  | ST-12    | 5500             |
| 6A4/LA | 6.3  | 0.30  | ST-14   | 1500             |           |      |       |          | 8000             |
|        |      |       |         | 3750             | 89        | 6.3  | 0.40  | ST-12    | 300              |
| 6A5G   | 6.3  | 1.25  | ST-16   | 15000            |           |      |       |          | 1500             |
|        |      |       |         | 10000            |           |      |       |          | 3500             |
| 6A6    | 6.3  | 0.80  | ST-14   | 14000            | 182B/482B | 5.0  | 1.25  | ST-14    | 1350             |
|        |      |       |         |                  | 183/483   | 5.0  | 1.25  | ST-14    | 1800             |

# GENERAL TUBE CLASSIFICATIONS

## Power Amplifiers (Cont'd)

| Type  | Ef  | If   | Style | Power Output Mw. |
|-------|-----|------|-------|------------------|
| 210-T | 7.5 | 1.25 | ST-16 | 400              |
|       |     |      |       | 900              |
|       |     |      |       | 1600             |
| 950   | 2.0 | 0.12 | ST-14 | 1000             |
| 1276  | 6.3 | 1.00 | ST-16 | 3200             |
|       |     |      |       | 1500             |
|       |     |      |       | 1000             |
| 5686  | 6.3 | 0.35 | T-6½  | 2700             |
| 5824  | 25  | 0.30 | ST-14 | 4300             |
| 5932  | 6.3 | 0.90 | T-12  | 10800            |

## RECTIFIERS (GENERAL PURPOSE) Including Voltage Doublers

| Type    | Ef   | If   | Style   | Current Output Ma. |
|---------|------|------|---------|--------------------|
| OY4     | ...  | ...  | Metal   | 75                 |
| OY4G    | ...  | ...  | T-7     | 75                 |
| OZ4     | ...  | ...  | Metal   | 90                 |
| OZ4A    | ...  | ...  | Metal   | 110                |
| OZ4G    | ...  | ...  | T-7     | 90                 |
| 1V      | 6.3  | 0.30 | ST-12   | 45                 |
| 2W3GT   | 2.5  | 1.50 | GT      | 55                 |
| 2Z2/G84 | 2.5  | 1.50 | ST-12   | 50                 |
| 5AX4GT  | 5.0  | 2.25 | GT      | 150                |
| 5AZ4    | 5.0  | 2.0  | Lock-in | 125                |
| 5R4GY   | 5.0  | 2.0  | ST-16   | 150                |
|         |      |      |         | 175                |
| 5T4     | 5.0  | 2.0  | Metal   | 225                |
| 5U4G    | 5.0  | 3.0  | ST-16   | 225                |
| 5U4WG   | 5.0  | 3.0  | T-12    | 225                |
| 5V4G    | 5.0  | 2.0  | ST-14   | 175                |
| 5W4     | 5.0  | 1.50 | Metal   | 110                |
| 5W4GT   | 5.0  | 1.50 | GT      | 110                |
| 5X3     | 5.0  | 2.0  | ST-14   | 110                |
|         |      |      |         | 30                 |
| 5X4G    | 5.0  | 3.0  | ST-16   | 225                |
|         |      |      |         | 125                |
| 5Y3GT   | 5.0  | 2.0  | GT      | 125                |
| 5Y4G    | 5.0  | 2.0  | ST-14   | 125                |
| 5Z3     | 5.0  | 3.0  | ST-16   | 225                |
| 5Z4     | 5.0  | 2.0  | Metal   | 125                |
| 5Z4GT   | 5.0  | 2.0  | GT      | 125                |
| 6AX5GT  | 6.3  | 1.2  | GT      | 125                |
| 6AX6GT+ | 6.3  | 2.5  | ST-14   | 250                |
| 6BY5G+  | 6.3  | 1.6  | ST-14   | 175                |
| 6U4GT   | 6.3  | 1.2  | GT      | 125                |
| 6V4     | 6.3  | 0.60 | T-6½    | 90                 |
| 6W4GT   | 6.3  | 1.2  | GT      | 125                |
| 6X4     | 6.3  | 0.60 | Min.    | 70                 |
| 6X5     | 6.3  | 0.60 | Metal   | 70                 |
| 6X5GT   | 6.3  | 0.60 | GT      | 70                 |
| 6X5WGT  | 6.3  | 0.60 | GT      | 70                 |
| 6Y5     | 6.3  | 0.80 | ST-12   | 50                 |
| 6Z4     | 6.3  | 0.60 | ST-12   | 60                 |
| 6Z5     | 6.3  | 0.80 |         | 60                 |
|         | 12.6 | 0.40 | ST-12   | 60                 |
| 6ZY5G   | 6.3  | 0.30 | ST-12   | 40                 |
| 7X6+    | 6.3  | 1.2  | Lock-in | 75                 |
| 7Y4     | 6.3  | 0.50 | Lock-in | 70                 |
| 7Z4     | 6.3  | 0.90 | Lock-in | 100                |
| 12Z3    | 12.6 | 0.30 | ST-12   | 55                 |
| 14Y4    | 12.6 | 0.30 | Lock-in | 70                 |
| 25W4GT  | 25   | 0.30 | GT      | 125                |
| 25X6GT+ | 25   | 0.15 | GT      | 60                 |
| 25Z4    | 25   | 0.30 | Metal   | 125                |
| 25Z6+   | 25   | 0.30 | Metal   | 75                 |
| 25Z6GT+ | 25   | 0.30 | GT      | 75                 |
| 28Z5    | 28.0 | 0.24 | Lock-in | 100                |
| 35W4    | 35.0 | 0.15 | Min.    | 60                 |
|         |      |      |         | 100                |
| 35Y4    | 35.0 | 0.15 | Lock-in | 60                 |
|         |      |      |         | 100                |
| 35Z3    | 35.0 | 0.15 | Lock-in | 100                |
| 35Z4GT  | 35.0 | 0.15 | GT      | 100                |
| 35Z5GT  | 35.0 | 0.15 | GT      | 100                |
| 35Z6G+  | 35.0 | 0.30 | ST-14   | 110                |
| 40Z5/   | 45.0 | 0.15 | GT      | 60                 |
| 45Z5GT  |      |      |         | 100                |
| 45Z3    | 2.5  | 1.50 | ST-14   | 65                 |
| 50AX6G+ | 50.0 | 0.30 | ST-14   | 250                |
| 50Y6GT+ | 50.0 | 0.15 | GT      | 75                 |

| Type     | Ef    | If    | Style | Current Output Ma. |
|----------|-------|-------|-------|--------------------|
| 50Z6G+   | 50    | 0.30  | ST-12 | 250                |
| 80       | 5.0   | 2.0   | ST-14 | 125                |
| 81       | 7.5   | 1.25  | ST-16 | 85                 |
| 82       | 2.5   | 3.0   | ST-14 | 115                |
| 83       | 5.0   | 3.0   | ST-16 | 225                |
| 83V      | 5.0   | 2.0   | ST-14 | 175                |
| 84/6Z4   | 6.3   | 0.50  | ST-12 | 60                 |
| 117Z3    | 117   | 0.04  | Min.  | 90                 |
| 117Z4GT  | 117   | 0.04  | GT    | 90                 |
| 117Z6GT+ | 117.0 | 0.075 | GT    | 60                 |
| 1005/    |       |       |       |                    |

|        |        |      |       |     |
|--------|--------|------|-------|-----|
| CK1005 | 6.3    | 0.1  | Metal | 70  |
| 1274   | 6.3    | 0.60 | GT    | 70  |
| 1275   | 6.3    | 0.60 | ST-16 | 225 |
| 5517/  |        |      |       |     |
| CK1013 | Cold K |      | Min.  | 6   |
| 5931   | 5.0    | 3.0  | T-12  | 225 |

+These types may also be used as voltage doublers.

## RECTIFIERS (HIGH VOLTAGE TV)

| Type    | Ef    | If    | Style | Current Output Ma. |
|---------|-------|-------|-------|--------------------|
| 1B3GT   | 1.25  | 0.20  | GT    | 2.0 Ma.            |
| 1V2     | 0.625 | 0.30  | T-6½  | 0.5 Ma.            |
| 1X2     | 1.25  | 0.20  | T-6½  | 1.0 Ma.            |
| 1Y2     | 1.5   | 0.29  | Min.  | 2.0 Ma.            |
| 1Z2     | 1.5   | 0.30  | Min.  | 2.0 Ma.            |
| 2V3G    | 2.5   | 5.0   | ST-12 | 2.0 Ma.            |
| 2X2 (A) | 2.5   | 1.75  | ST-12 | 7.5 Ma.            |
| 6Y3G    | 6.3   | 0.7   | ST-12 | 7.5 Ma.            |
| 5642    | 1.25  | 0.140 | T-3   | 0.2 Ma.            |

## RELAY TUBES Gas Triodes and Tetrodes

| Type | Ef     | If   | Style | Cath. Ma. |
|------|--------|------|-------|-----------|
| OA4G | Cold K |      | ST-12 | 25        |
| 2A4G | 2.5    | 2.50 | ST-12 | 100 Max.  |
| 2C4  | 2.5    | 0.65 | Min.  | 5         |
| 2D21 | 6.3    | 0.60 | Min.  | 100 Max.  |
| 6D4  | 6.3    | 0.25 | Min.  | 25        |
| 884  | 6.3    | 0.60 | ST-12 | 300 Peak  |
| 885  | 2.5    | 1.50 | ST-12 | 300 Peak  |
| 1267 | Cold K |      | GT    | 25        |
| 2050 | 6.3    | 0.60 | ST-12 | 100 Max.  |
| 2051 | 6.3    | 0.60 | ST-12 | 75 Max.   |

## TV SCANNERS (Horizontal)

| Type    | Ef   | If   | Style | Gm   |
|---------|------|------|-------|------|
| 6AR6G   | 6.3  | 1.20 | T-11  | 5400 |
|         |      |      |       | 4300 |
| 6AU5GT  | 6.3  | 1.25 | GT    |      |
| 6AV5GT  | 6.3  | 1.20 | GT    | 5500 |
| 6BD5GT  | 6.3  | 0.90 | GT    |      |
| 6BG6G   | 6.3  | 0.90 | ST-16 |      |
| 6BQ6GT  | 6.3  | 1.20 | GT    |      |
| 6CD6G   | 6.3  | 2.50 | ST-16 | 7500 |
| 25AV5GT | 25.0 | 0.30 | GT    | 5500 |
| 25BQ6GT | 25.0 | 0.30 | GT    |      |

## TV SCANNERS (Vertical)

| Type   | Ef   | If   | Style   | Gm   |
|--------|------|------|---------|------|
| 6AQ5   | 6.3  | 0.45 | Min.    | 4100 |
|        |      |      |         | 3700 |
| 6BF5   | 6.3  | 1.20 | Min.    | 4200 |
| 6BL7GT | 6.3  | 1.50 | T-9     |      |
| 6K6GT  | 6.3  | 0.40 | GT      | 1500 |
|        |      |      |         | 2300 |
|        |      |      |         | 2100 |
| 6S4    | 6.3  | 0.60 | T-6½    | 4500 |
| 6SL7GT | 6.3  | 0.30 | GT      | 1600 |
| 6SN7GT | 6.3  | 0.30 | GT      | 3000 |
|        |      |      |         | 2600 |
| 6V6GT  | 6.3  | 0.45 | GT      | 3700 |
|        |      |      |         | 4100 |
|        |      |      |         | 3750 |
| 6Y6G   | 6.3  | 1.25 | ST-14   | 7000 |
|        |      |      |         | 7100 |
| 7C5    | 6.3  | 0.45 | Lock-in | 3700 |
|        |      |      |         | 4100 |
|        |      |      |         | 3750 |
| 12BH7  | 12.6 | 0.30 | T-6½    | 6200 |
|        | 6.3  | 0.60 |         | 3100 |

## TRIODES (GENERAL PURPOSE)

| Type     | Ef   | If    | Style           | μ    |
|----------|------|-------|-----------------|------|
| 1C3      | 1.4  | 0.05  | Min.            | 14.5 |
| 1E4G     | 1.4  | 0.05  | GT              | 14.5 |
|          |      |       |                 | 14.0 |
| 1G4GT    | 1.4  | 0.05  | GT              | 8.8  |
| 1LE3     | 1.4  | 0.05  | Lock-in         | 14.5 |
|          |      |       |                 | 14.0 |
| 2C22     | 6.3  | 0.3   | T-9             | 20.0 |
| 6AD5G/GT | 6.3  | 0.30  | ST-12/GT        | 100  |
| 6AE5GT   | 6.3  | 0.30  | GT              | 4.2  |
| 6AF5G    | 6.3  | 0.30  | ST-12           | 7.4  |
| 6C4      | 6.3  | 0.15  | Min.            | 17   |
|          |      |       |                 | 19.5 |
| 6C5/GT   | 6.3  | 0.30  | Metal/GT        | 20   |
| 6F5/GT   | 6.3  | 0.30  | Metal/GT        | 100  |
| 6J4      | 6.3  | 0.40  | Min.            | 55   |
| 6J5/GT   | 6.3  | 0.30  | Metal/GT        | 20   |
| 6K5G/GT  | 6.3  | 0.30  | ST-12/GT        | 70   |
| 6L5G     | 6.3  | 0.15  | ST-12           | 15   |
|          |      |       |                 | 17   |
| 6N4      | 6.3  | 0.20  | Min.            | 32   |
| 6P5      | 6.3  | 0.30  | GT              | 13.8 |
| 6Q4      | 6.3  | 0.48  | T-6½            | 80   |
| 6SF5/GT  | 6.3  | 0.30  | Metal/GT        | 100  |
| 7A4      | 6.3  | 0.30  | Lock-in         | 20   |
| 7B4      | 6.3  | 0.30  | Lock-in         | 100  |
| 12A      | 5.0  | 0.25  | ST-14           | 8.5  |
| 12A4     | 6.3  | 0.60  | T-6½            | 20   |
|          |      |       |                 | 12.6 |
| 12E5GT   | 12.6 | 0.15  | GT              | 13.8 |
| 12F5GT   | 12.6 | 0.15  | GT              | 100  |
| 12J5GT   | 12.6 | 0.15  | GT              | 20   |
| 12SF5/GT | 12.6 | 0.15  | Metal/GT        | 100  |
| 14A4     | 12.6 | 0.15  | Lock-in         | 20   |
| 26       | 1.5  | 1.05  | ST-14           | 8.3  |
| 27, 27S  | 2.5  | 1.75  | ST-12           | 9.0  |
| 30       | 2.0  | 0.06  | ST-12           | 9.3  |
| 37       | 6.3  | 0.30  | ST-12           |      |
| 40       | 5.0  | 0.25  | ST-14           |      |
| 56/56S   | 2.5  | 1.00  | ST-12           | 13.8 |
| 56AS     | 6.3  | 0.40  | ST-12           |      |
| 76       | 6.3  | 0.30  | ST-12           | 13.8 |
| V-99     | 3.3  | 0.063 | T-8             | 6.6  |
| X-99     | 3.3  | 0.063 | T-9             | 6.6  |
| 485      | 3.0  | 1.25  | ST-12           | 12.5 |
| 864      | 1.1  | 0.25  | T-9             | 8.2  |
| 1230     |      |       | Special Type 30 |      |
| 9002     | 6.3  | 0.15  | Min.            | 25   |
| XXL      | 6.3  | 0.30  | Lock-in         | 25   |
|          |      |       |                 | 30   |

## TRIODES H.F. — OSCILLATORS H.F.

### Single Triodes — Duo Triodes

| Type      | Ef   | If    | Style   | Gm    |
|-----------|------|-------|---------|-------|
| 3A5       | 1.4  | 0.22  | Min.    | 1900  |
|           | 2.8  | 0.11  |         |       |
| 6AB4      | 6.3  | 0.15  | Min.    | 5500  |
| 6BQ7      | 6.3  | 0.40  | T-6½    | 6000  |
| 6C4       | 6.3  | 0.15  | Min.    | 2200  |
|           |      |       |         | 3100  |
| 6F4       | 6.3  | 0.225 | Acorn   | 5800  |
| 6J4       | 6.3  | 0.40  | Min.    | 12000 |
| 6J6       | 6.3  | 0.45  | Min.    | 5300  |
| 6L4       | 6.3  | 0.225 | Acorn   | 6400  |
| 6R4       | 6.3  | 0.20  | T-6½    | 5500  |
| 7A4       | 6.3  | 0.30  | Lock-in | 3000  |
|           |      |       |         | 2600  |
| 7E5       | 6.3  | 0.15  | Lock-in | 3000  |
| 7F8, 7F8W | 6.3  | 0.30  | Lock-in | 5200  |
| 12AT7     | 6.3  | 0.30  | T-6½    | 4000  |
|           | 12.6 | 0.15  |         | 6600  |
|           |      |       |         | 5500  |
| 14F8      | 6.3  | 0.30  | Lock-in | 5200  |
| 19J6      | 18.9 | 0.15  | Min.    | 1900  |
| 1293      | 1.4  | 0.11  | Lock-in | 1500  |
| 1626      | 12.6 | 0.25  | ST-12   |       |

## SPECIAL PURPOSE TUBES

| Type  | Ef   | If   | Style                 | Use |
|-------|------|------|-----------------------|-----|
| 6AE6G | 6.3  | 0.15 | ST-12                 |     |
| 6BN6  | 6.3  | 0.3  | Min. Limiter-Disc'r   |     |
| 12BN6 | 12.6 | 0.15 | Min. Limiter-Disc'r   |     |
| 5722  | 4.9  | 1.6  | Min. For Noise Gen.   |     |
| X6030 | 3.0  | 0.6  | Lock-in For Noise Gen |     |

# CIRCUIT MODIFICATIONS REQUIRING ADDITIONAL RESISTORS

This article, originally printed in "Sylvania News," covers the essential information service technicians need to know in order to substitute tubes in series strings when either the voltage or current is different from that of the original tube type.

**S**ERVICE technicians should have little trouble making tube substitutions in AC-DC sets as long as the substitute tube operates on the same current as the original tube. If the voltage is different, a slight change in the series resistor will be required. However, when the tube current is either higher or lower, the resistor changes are more complicated. The principles involved for both cases are explained in the following examples which can be applied to any substitution desired.

Fig. 1 shows a typical 300 ma. filament string including a series resistance of approximately 150 ohms exclusive of the tapped section. The resistor is shown as a tapped resistor since in many cases ballast resistors with the tap

were used. In this case the pilot lamp rating will be less than 300 ma. Many receivers were built in which a 300 ma. pilot lamp was employed and no resistance was shunted across it. For those cases the resistor shunting the pilot light in Fig. 1 may be considered to be open.

Let us now suppose that the 25L6GT/G tube has burned out and that it is impossible to obtain another output tube of this type. Assume that the only power output tube obtainable is the 50L6GT. This tube requires only 150 ma. and, therefore, we must shunt the filament with a resistance which will by-pass 150 ma. of the total heater current. This will require a resistance of 333 ohms. A 300 ohm resistor will be perfectly satisfactory in this application. Originally the total voltage drop across the tubes was 68.9 volts leaving 48.1 volts drop across the series resistor. In the revised circuit the total voltage drop across the filaments of the tubes for proper operation will now be 93.9 volts. This means, therefore that the series resistor must be reduced in value to approximately 80 ohms in order that 300 ma. will flow through the filament string. This series resistor may be in the form of a line cord or actually may be a resistor mounted in the receiver itself. If it is in the line cord, a resistor of from 150 to 175 ohms may be shunted across the cord provided room may be found to locate this resistor. This resistor will, of course, become quite warm and must be placed in such a position that the added heat from the resistor will not cause wax in condensers to melt. If the resistor is mounted in the receiver to begin with, and if a 75 to 80 ohm resistor of the same physical size can be obtained, then it should be substituted for the one which was originally in the receiver.

The same general procedure must be followed if we wish to replace any one of the other tubes in the string with a 150 ma. tube. Fig. 2 illustrates in heavy lines the changes which must be made.

To summarize, there are three things which must be done in making a change of this kind:

1. The filament of the 150 ma. tube must be shunted.

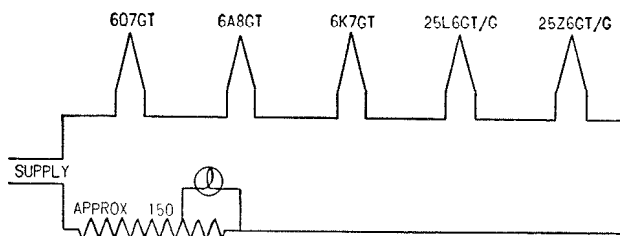


FIG. 1

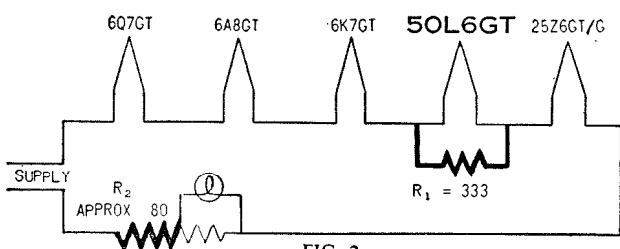


FIG. 2

$$R_1 = \frac{\text{Filament Volts of 150 ma. tube}}{.150}$$

$$R_2 = \frac{120 \text{ minus sum of tube voltages}}{.300}$$



2. The series resistor must be reduced in value so that 300 ma. is still available for the filament string.

3. These resistors must be located in such a place that the added heat will not cause trouble.

Let us now consider the filament string shown in Fig. 3. A great many more receivers are on the market employing a circuit similar to the one shown. This differs from the circuit shown in Fig. 1 in that no series resistor is employed and that the pilot light is lighted from a tap on the 35Z5GT/G filament.

No series resistor is necessary since the sum of the voltages required across the entire filament string is 122.8 volts. A receiver with such a circuit comes in to be repaired and the 50L6GT has an open filament. Let us assume that the only output type available from the jobber is a type 25L6G. This tube requires 300 ma.

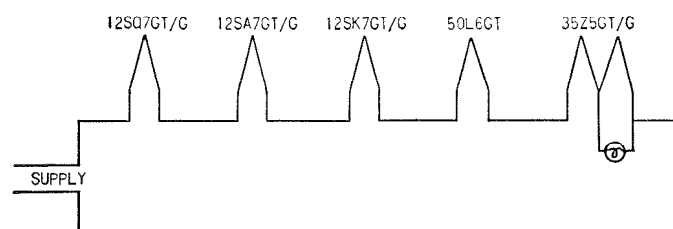


FIG. 3

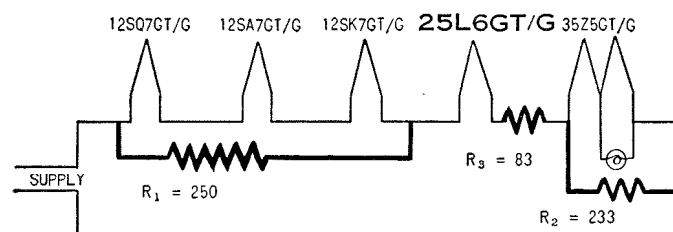


FIG. 4

$$R1 \text{ or } R2 = \frac{\text{Sum of tube voltages across resistor}}{.150}$$

$$R3 = \frac{\text{Old tube volts} - \text{new tube volts}}{.300}$$

filament current. However, it can be employed provided we rewire the circuit in such a manner that 300 ma. can be supplied to the filament of the 25L6GT/G. This can be accomplished by shunting the three 12-volt tubes with a 250 ohm resistor as shown in Fig. 4 and by shunting the 35Z5GT/G with a 233 ohm resistor (250 ohms would be satisfactory).

The sum of the voltages across all of the filaments now adds up to 97.8 volts, therefore, a series resistor must be added to the string so that the total will add up to approximately the line voltage. The value of this resistor should be approximately 83 ohms. This resistor may be added at any place in the string but it must be added in such a position that the total 300 ma. flows through that

resistor. If the tube which has to be replaced is located at either end of the filament string such as the 35Z5GT/G or the 12SQ7GT/G in Fig. 3, then only one shunting resistor would be required. The biggest problem may very well be to find a place for the three resistors which will be required in most instances.

The power dissipated in these resistors will be considerable and precautions must be observed to prevent the heat developed from causing damage to the receiver. The wattage dissipated by a receiver changed over in the manner indicated in Fig. 4 dissipates twice the wattage that the receiver originally was designed for and all of that heat must be gotten rid of so that permanent damage to condensers and other parts in the receiver will not result. As in Fig. 2, the final changes are indicated in Fig. 4 with heavy lines.

The wattage rating of the resistors required in these circuits is found by multiplying the resistor current in amperes by the voltage across the resistor.

$$W = E \cdot I$$

Thus in the example shown as figures 3 and 4 the watts dissipated in R1 will be

$$37.8 \times .150 = 5.7 \text{ Watts}$$

37.8 comes from 3 tubes at 12.6 volts each, and the .150 amperes is the current through the resistor, another .150 amperes flows through the tubes.

Similarly the watts dissipated in R3 will be

$$25 \times .300 = 7.5 \text{ Watts}$$

The wattage rating of a resistor is the amount it can safely dissipate in the open air.

Unfortunately it is nearly always impossible to place these resistors in the open, and for use in confined spaces, like under the chassis, a factor of safety of at least 2 and preferably 3 is necessary, making the above values 15 and 20 Watts respectively.

To summarize, when a 300 ma. tube is used to replace a 150 ma. tube, there are three things which must be observed:

1. Shunt resistors must be added to the 150 ma. tubes in the receiver so that the tube which is being used as a replacement can obtain its full 300 ma.

2. A series resistor which will carry 300 ma. must be added to restore the voltage distribution across the filament string to its original value.

3. The series and shunt resistors must be placed in such a manner that the additional heat now developed in the receiver will not cause permanent damage.

Obviously there are many changes which may have to be made in equipment other than those indicated but the examples given were chosen as typical ones which you no doubt will have to make in the future. It is hoped that these suggestions will save you time in keeping your customers' receivers in condition.

# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 13 |                       | <div>NO CHANGES<br/>FL. VOLTS<br/>FL. CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>ADD CONNECTION<br/>REMOVE CONNECTION<br/>CHANGE BASE<br/>CHANGE PINS<br/>NOTE NO.</div> |   |   |   |   |   |   |   |     |  |
|------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|-----|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                         | B | C | D | E | F | G | H | K   |  |
| 1A4 (P or T) ..                                      | 1A4 (P or T)... A     |                                                                                                                                                                                           |   |   |   |   |   |   |   |     |  |
|                                                      | 1D5G                  |                                                                                                                                                                                           |   |   |   | E | F |   |   |     |  |
|                                                      | 1E5G (P)...           |                                                                                                                                                                                           |   |   |   | E | F |   |   |     |  |
|                                                      | 1LN5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | 1   |  |
|                                                      | 1N5GT                 |                                                                                                                                                                                           | B | C |   | E | F |   |   | 1   |  |
|                                                      | 1LC5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | 1   |  |
|                                                      | 1T4                   |                                                                                                                                                                                           | B | C |   | E | F |   | H | 1   |  |
|                                                      | 1L4                   |                                                                                                                                                                                           | B | C |   | E | F |   | H |     |  |
|                                                      | 34                    |                                                                                                                                                                                           |   |   |   |   | F |   |   |     |  |
|                                                      | 32                    |                                                                                                                                                                                           |   |   |   |   | F |   |   | 1   |  |
| 1A5GT                                                | 1LA4                  |                                                                                                                                                                                           |   |   |   | E |   |   |   | 8   |  |
|                                                      | 1LB4                  |                                                                                                                                                                                           |   |   |   | E |   |   | K |     |  |
|                                                      | 1T5GT                 |                                                                                                                                                                                           |   |   |   |   |   |   | K | 2   |  |
|                                                      | 1N6G                  |                                                                                                                                                                                           |   |   | D |   |   |   | K |     |  |
|                                                      | 1C5GT                 |                                                                                                                                                                                           |   |   |   |   |   |   | K |     |  |
|                                                      | 1Q5GT                 |                                                                                                                                                                                           |   | C |   |   |   |   | K | 2   |  |
|                                                      | 1W4                   |                                                                                                                                                                                           |   |   |   | E |   |   | K | 2   |  |
|                                                      | 3Q5GT                 |                                                                                                                                                                                           |   | C | D |   |   |   | K | 2   |  |
|                                                      | 3D6                   |                                                                                                                                                                                           |   | C |   | E |   |   | K | 2   |  |
|                                                      | 3Q4                   |                                                                                                                                                                                           |   | C |   | E |   |   | K | 2   |  |
|                                                      | 384                   |                                                                                                                                                                                           |   | C |   | E |   |   | K | 2   |  |
|                                                      | 3V4                   |                                                                                                                                                                                           |   | C |   | E |   |   |   | 2   |  |
|                                                      | 1S4                   |                                                                                                                                                                                           |   | C |   | E |   |   | K | 2   |  |
|                                                      | 3LF4                  |                                                                                                                                                                                           |   | C |   | E |   |   | K | 2   |  |
| 1A6                                                  | 1C6                   |                                                                                                                                                                                           |   | C |   |   | F |   |   |     |  |
|                                                      | 1D7G                  |                                                                                                                                                                                           |   |   |   | E | F |   |   |     |  |
|                                                      | 1C7G                  |                                                                                                                                                                                           |   | C |   | E | F |   |   |     |  |
|                                                      | 1A7GT                 |                                                                                                                                                                                           | B | C |   | E | F |   | H | K   |  |
|                                                      | 1LA6                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K   |  |
|                                                      | 1LC6                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K   |  |
| 1A7GT                                                | 1L6                   |                                                                                                                                                                                           |   |   |   | E | F |   | H |     |  |
|                                                      | 1LC6                  |                                                                                                                                                                                           |   |   |   | E | F |   | H | 6   |  |
|                                                      | 1LA6                  |                                                                                                                                                                                           |   |   |   | E | F |   | H |     |  |
|                                                      | 1B7GT                 |                                                                                                                                                                                           |   | C |   |   | F |   |   |     |  |
|                                                      | 1D8GT                 |                                                                                                                                                                                           |   | C | D |   | F |   |   | 9   |  |
|                                                      | 3A8GT                 |                                                                                                                                                                                           |   | C | D |   | F |   |   | 9   |  |
|                                                      | 1R5                   |                                                                                                                                                                                           |   |   |   | E | F |   | H | 11  |  |
| 1B4 (P or T) ..                                      | 32                    |                                                                                                                                                                                           |   |   |   |   | F |   |   |     |  |
|                                                      | 1E5G (P or T)...      |                                                                                                                                                                                           |   |   |   | E | F |   |   |     |  |
|                                                      | 1LN5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H |     |  |
|                                                      | 1LC5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H |     |  |
|                                                      | 1T4                   |                                                                                                                                                                                           | B | C |   | E | F |   | H |     |  |
|                                                      | 1N5GT                 |                                                                                                                                                                                           |   |   |   | E | F |   |   |     |  |
|                                                      | 1P5GT                 |                                                                                                                                                                                           |   |   |   | E | F |   |   |     |  |
| 1B7GT                                                | 1A7GT                 |                                                                                                                                                                                           |   | C |   |   | F |   |   |     |  |
|                                                      | 1LC6                  |                                                                                                                                                                                           |   | C |   | E | F |   |   | 6   |  |
|                                                      | 1LA6                  |                                                                                                                                                                                           |   | C |   | E | F |   |   |     |  |
|                                                      | 3A8GT                 |                                                                                                                                                                                           |   | D |   |   | F |   |   | 9   |  |
| 1B8GT                                                | 1S5 {                 | Adaptor with                                                                                                                                                                              |   |   |   |   |   |   |   |     |  |
|                                                      | 1W4 {                 | 2 Min. sockets                                                                                                                                                                            |   |   |   |   |   |   | H |     |  |
|                                                      | 1U5 {                 | Adaptor with                                                                                                                                                                              |   |   |   |   |   |   |   |     |  |
|                                                      | 1W4 {                 | 2 Min. sockets                                                                                                                                                                            |   |   |   |   |   |   | H |     |  |
| 1C5GT                                                | 1A5GT                 |                                                                                                                                                                                           |   | C |   |   |   |   |   | K 2 |  |
|                                                      | 1LA4                  |                                                                                                                                                                                           |   | C |   | E |   |   |   | K 2 |  |
|                                                      | 1LB4                  |                                                                                                                                                                                           |   | C |   | E |   |   |   | K 2 |  |
|                                                      | 1Q5GT                 |                                                                                                                                                                                           |   |   |   |   |   |   |   | K   |  |
|                                                      | 1S4                   |                                                                                                                                                                                           |   | C |   | E |   |   |   | K   |  |
|                                                      | 1T5GT                 |                                                                                                                                                                                           |   |   |   |   |   |   |   | K 2 |  |
|                                                      | 1W4                   |                                                                                                                                                                                           |   |   |   | E |   |   |   | K 2 |  |
|                                                      | 3D6                   |                                                                                                                                                                                           |   | C |   | E |   |   |   | K   |  |
|                                                      | 3LF4                  |                                                                                                                                                                                           |   | C |   | E |   |   |   | K   |  |
|                                                      | 3Q4                   |                                                                                                                                                                                           |   |   |   | E |   |   |   | K   |  |
|                                                      | 3Q5GT                 |                                                                                                                                                                                           |   |   | D |   |   |   |   | K   |  |
|                                                      | 3S4                   |                                                                                                                                                                                           |   |   |   | E |   |   |   | K   |  |
|                                                      | 3V4                   |                                                                                                                                                                                           |   |   |   | E |   |   |   | K   |  |
| 1C6                                                  | 1A6                   |                                                                                                                                                                                           |   | C |   |   | F |   |   |     |  |
|                                                      | 1C7G                  |                                                                                                                                                                                           |   |   |   | E | F |   |   |     |  |

| For details of changes indicated<br>Refer to page 13 |                       | <div>NO CHANGES<br/>FL. VOLTS<br/>FL. CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>ADD CONNECTION<br/>REMOVE CONNECTION<br/>CHANGE BASE<br/>CHANGE PINS<br/>NOTE NO.</div> |   |   |   |   |   |   |   |                |     |  |
|------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|----------------|-----|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                         | B | C | D | E | F | G | H | K              |     |  |
| 1C6                                                  | 1D7G                  |                                                                                                                                                                                           |   | C |   | E | F |   |   |                |     |  |
| (Continued)                                          | 1A7GT                 |                                                                                                                                                                                           | B | C |   | E | F |   |   | K              |     |  |
|                                                      | 1LA6                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              |     |  |
|                                                      | 1B7GT                 |                                                                                                                                                                                           | B | C |   | E | F |   |   | K              |     |  |
|                                                      | 1LC6                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              | 6   |  |
| 1C7G                                                 | 1A6                   |                                                                                                                                                                                           |   | C |   | E | F |   |   |                |     |  |
|                                                      | 1C6                   |                                                                                                                                                                                           |   |   |   | E | F |   |   |                |     |  |
|                                                      | 1D7G                  |                                                                                                                                                                                           |   | C |   |   | F |   |   |                |     |  |
|                                                      | 1A7GT                 |                                                                                                                                                                                           | B | C |   |   | F |   |   | K              |     |  |
|                                                      | 1LA6                  |                                                                                                                                                                                           | B | C |   | E | F |   |   | K              |     |  |
|                                                      | 1B7GT                 |                                                                                                                                                                                           | B | C |   |   | F |   |   | K              |     |  |
|                                                      | 1LC6                  |                                                                                                                                                                                           | B | C |   | E | F |   |   | K              | 6   |  |
| 1D5G (P or T)                                        | 1A4 (P or T)          |                                                                                                                                                                                           |   |   |   | E | F |   |   |                |     |  |
|                                                      | 34                    |                                                                                                                                                                                           |   |   |   | E | F |   |   |                |     |  |
|                                                      | 1N5GT                 |                                                                                                                                                                                           | B | C |   |   | F |   |   | K              | 1   |  |
|                                                      | 1E5G (P or T)         |                                                                                                                                                                                           |   |   |   |   | F |   |   |                | 1   |  |
|                                                      | 1B4 (P or T)          |                                                                                                                                                                                           |   |   |   |   | F |   |   |                | 1   |  |
|                                                      | 32                    |                                                                                                                                                                                           |   |   |   |   | F |   |   |                | 1   |  |
|                                                      | 1P5GT                 |                                                                                                                                                                                           | B | C |   |   | F |   |   |                |     |  |
|                                                      | 1LN5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              | 1   |  |
|                                                      | 1LC5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              | 6-1 |  |
| 1D7G                                                 | 1A6                   |                                                                                                                                                                                           |   |   |   | E | F |   |   |                |     |  |
|                                                      | 1C7G                  |                                                                                                                                                                                           |   | C |   |   | F |   |   |                |     |  |
|                                                      | 1C6                   |                                                                                                                                                                                           |   | C |   | E | F |   |   |                |     |  |
|                                                      | 1A7GT                 |                                                                                                                                                                                           | B |   |   |   | F |   |   | K              |     |  |
|                                                      | 1LA6                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              |     |  |
|                                                      | 1B7GT                 |                                                                                                                                                                                           | B | C |   |   | F |   |   | K              |     |  |
|                                                      | 1LC6                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              | 6   |  |
| 1D8GT                                                | 1N6G                  |                                                                                                                                                                                           |   |   |   |   |   |   |   |                |     |  |
|                                                      | 1E4G                  |                                                                                                                                                                                           |   |   |   |   |   |   |   |                |     |  |
|                                                      | 1LB4                  |                                                                                                                                                                                           |   |   |   |   |   |   |   |                |     |  |
|                                                      | 1LH4                  |                                                                                                                                                                                           |   |   |   |   |   |   |   |                |     |  |
|                                                      | 1C3                   |                                                                                                                                                                                           |   |   |   |   |   |   |   |                |     |  |
|                                                      | 1W4                   |                                                                                                                                                                                           |   |   |   |   |   |   | H |                | 5   |  |
| 1E4G                                                 | 1G4GT                 |                                                                                                                                                                                           |   |   |   |   |   |   |   | K              |     |  |
|                                                      | 1LE3                  |                                                                                                                                                                                           |   |   |   | E |   |   |   | K              |     |  |
|                                                      | 1N5GT                 |                                                                                                                                                                                           |   |   | D |   | G |   |   | K              | 4   |  |
| 1E5G (P or T)                                        | 1B4                   |                                                                                                                                                                                           |   |   |   | E | F |   |   |                |     |  |
|                                                      | 32                    |                                                                                                                                                                                           |   |   |   | E | F |   |   |                |     |  |
|                                                      | 1N5GT                 |                                                                                                                                                                                           | B | C |   |   | F |   |   | K              |     |  |
|                                                      | 1D5G (P or T)         |                                                                                                                                                                                           |   |   |   |   | F |   |   |                | 1   |  |
|                                                      | 1A4 (P or T)          |                                                                                                                                                                                           |   |   |   | E | F |   |   |                | 1   |  |
|                                                      | 34                    |                                                                                                                                                                                           |   |   |   | E | F |   |   |                | 1   |  |
|                                                      | 1LN5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              |     |  |
|                                                      | 1LC5                  |                                                                                                                                                                                           | B | C |   | E | F |   | H | K              | 6   |  |
| 1E7G                                                 | 2 type 1F5G           |                                                                                                                                                                                           |   |   |   |   |   |   |   |                |     |  |
|                                                      | 2 type 1F4            |                                                                                                                                                                                           |   |   |   |   |   |   |   |                |     |  |
|                                                      | 2 type 1S4            |                                                                                                                                                                                           | B | C |   |   |   |   |   | K              |     |  |
|                                                      | 2 type 1W4            |                                                                                                                                                                                           | B | C |   |   |   |   |   | 2 min. sockets | K   |  |
| 1F4                                                  | 1F5G                  |                                                                                                                                                                                           |   |   |   | E |   |   |   |                |     |  |
|                                                      | 33                    |                                                                                                                                                                                           |   | C |   |   |   |   |   | K              | 2   |  |
|                                                      | 1G5G                  |                                                                                                                                                                                           |   |   |   | E |   |   |   | K              | 2   |  |
|                                                      | 1A5GT                 |                                                                                                                                                                                           | B | C |   | E |   |   |   | K              | 2   |  |
|                                                      | 1C5GT                 |                                                                                                                                                                                           | B | C |   | E |   |   |   | K              | 2   |  |
|                                                      | 1Q5GT                 |                                                                                                                                                                                           | B | C |   | E |   |   |   | K              | 2   |  |
|                                                      | 1LB4                  |                                                                                                                                                                                           | B | C |   | E |   |   |   | K              | 2   |  |
|                                                      | 3D6                   |                                                                                                                                                                                           | B | C |   | E |   |   |   | K              | 2   |  |
|                                                      | 3LF4                  |                                                                                                                                                                                           | B | C |   | E |   |   |   | K              | 2   |  |
| 1F5G                                                 | 1F4                   |                                                                                                                                                                                           |   |   |   | E |   |   |   |                |     |  |
|                                                      | 33                    |                                                                                                                                                                                           |   |   |   | E |   |   |   |                |     |  |
|                                                      | 1G5G                  |                                                                                                                                                                                           |   |   |   |   |   |   |   | K              | 2   |  |
|                                                      | 1A5GT                 |                                                                                                                                                                                           | B | C |   |   |   |   |   | K              | 2   |  |
|                                                      | 1C5GT                 |                                                                                                                                                                                           | B | C |   |   |   |   |   | K              | 2   |  |
|                                                      | 1Q5GT                 |                                                                                                                                                                                           | B | C |   |   |   |   |   | K              | 2   |  |
|                                                      | 1LB4                  |                                                                                                                                                                                           | B | C |   |   |   |   |   | K              | 2   |  |
|                                                      | 3D6                   |                                                                                                                                                                                           | B | C |   |   |   |   |   | K              | 2   |  |

The G, GT or GT/G Types may be used interchangeably when space permits.

# BATTERY TUBE TYPES

| For details of changes indicated<br>Refer to page 13 |                       | <div>NO CHANGES<br/>11L VOLTS<br/>11L CURRENT<br/>CHANGE SOCKET<br/>REALIGN<br/>CAP TO CONNECTION<br/>OR TO CONNECTION<br/>CHANGE PLATE VOLTS<br/>NOTE NO.</div> |   |   |   |   |   |   |   |   |      |
|------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                                                                                                                                | B | C | D | E | F | G | H | K |      |
| 1F5G.....                                            | 1J5G.....             |                                                                                                                                                                  |   |   |   |   |   |   |   | K |      |
| (Continued)                                          | 3LF4.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K | 2    |
| 1F6.....                                             | 1F7G.....             |                                                                                                                                                                  |   |   |   | E | F |   |   |   |      |
|                                                      | 3A8GT.....            | B                                                                                                                                                                | C |   | E | F |   |   |   | K |      |
|                                                      | 1S5.....              | B                                                                                                                                                                | C |   | E | F |   |   |   | K |      |
|                                                      | 1LD5.....             | B                                                                                                                                                                | C |   | E | F |   |   |   | K |      |
| 1F7G.....                                            | 1F6.....              |                                                                                                                                                                  |   |   |   | E | F |   |   |   |      |
|                                                      | 3A8GT.....            | B                                                                                                                                                                | C | D |   | F |   |   |   | K | 9    |
|                                                      | 1S5.....              | B                                                                                                                                                                | C |   | E | F |   |   |   | K |      |
|                                                      | 1LD5.....             | B                                                                                                                                                                | C |   | E | F |   |   |   | K |      |
| 1G4GT.....                                           | 1E4G.....             |                                                                                                                                                                  |   |   |   |   |   |   |   | K |      |
|                                                      | 1LE3.....             |                                                                                                                                                                  |   |   |   | E |   |   |   | K |      |
| 1G5G.....                                            | 1F5G.....             |                                                                                                                                                                  |   |   |   |   |   |   |   | K | 2    |
|                                                      | 1F4.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K | 2    |
|                                                      | 33.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | K | 2    |
|                                                      | 1T5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K | 2    |
|                                                      | 1A5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K | 2    |
|                                                      | 1C5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K |      |
|                                                      | 1Q5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K |      |
|                                                      | 1LA4.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K | 2    |
|                                                      | 1LB4.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K | 2    |
|                                                      | 3D6.....              | B                                                                                                                                                                | C |   | E |   |   |   |   | K |      |
|                                                      | 3LE4.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K | 2    |
|                                                      | 3LF4.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K |      |
|                                                      | 3Q5G.....             | B                                                                                                                                                                | C | D |   |   |   |   |   | K |      |
|                                                      | 1J5G.....             | A                                                                                                                                                                |   |   |   |   |   |   |   |   |      |
| 1G6GT.....                                           | 1J6G.....             | B                                                                                                                                                                | C |   |   |   |   |   |   |   |      |
|                                                      | 19.....               | B                                                                                                                                                                | C |   | E |   |   |   |   |   |      |
|                                                      | 3B7.....              | B                                                                                                                                                                | C |   | E |   |   |   |   |   |      |
| 1H4G.....                                            | 30.....               |                                                                                                                                                                  |   |   |   | E |   |   |   |   |      |
|                                                      | 1E4G.....             | B                                                                                                                                                                | C |   |   |   |   |   |   | K |      |
|                                                      | 1G4GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K |      |
|                                                      | 1LE3.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K |      |
| 1H5GT.....                                           | 1C3.....              |                                                                                                                                                                  |   |   |   | E |   | H |   |   | 5    |
|                                                      | 1H6G.....             | B                                                                                                                                                                | C | D |   |   |   | H | K |   |      |
|                                                      | 1LH4.....             |                                                                                                                                                                  |   |   |   | E |   | H |   |   | 8    |
|                                                      | 3A8GT.....            |                                                                                                                                                                  |   | D |   |   |   | H |   |   | 9    |
|                                                      | 1LD5.....             |                                                                                                                                                                  |   |   |   | E |   | H |   |   | 3    |
| 1H6G.....                                            | 1B5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   |   |      |
|                                                      | 1H5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K | 5    |
|                                                      | 1LH4.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K | 5    |
|                                                      | 3A8GT.....            |                                                                                                                                                                  |   | D |   |   |   |   |   | K | 9-5  |
| 1J5G.....                                            | 1G5G.....             | A                                                                                                                                                                |   |   |   |   |   |   |   |   |      |
|                                                      | 1F5G.....             |                                                                                                                                                                  |   |   |   |   |   |   |   | K |      |
|                                                      | 1F4.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K |      |
|                                                      | 33.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | K |      |
|                                                      | 1A5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K | 2    |
|                                                      | 3LF4.....             | B                                                                                                                                                                | C |   | E |   |   |   |   | K | 2    |
|                                                      | 1C5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K | 2    |
|                                                      | 1Q5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K | 2    |
|                                                      | 3Q5GT.....            | B                                                                                                                                                                | C | D |   |   |   |   |   | K |      |
|                                                      | 3D6.....              | B                                                                                                                                                                | C |   | E |   |   |   |   | K | 2    |
|                                                      | 1D8GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K | 9    |
|                                                      | 1T5GT.....            | B                                                                                                                                                                | C |   |   |   |   |   |   | K |      |
| 1J6G.....                                            | 19.....               |                                                                                                                                                                  |   |   |   | E |   |   |   |   |      |
|                                                      | 1G6G.....             | B                                                                                                                                                                | C |   |   |   |   |   |   |   |      |
|                                                      | 3B7.....              | B                                                                                                                                                                | C |   | E |   |   |   |   |   |      |
| 1L4.....                                             | 1T4.....              |                                                                                                                                                                  |   |   |   |   | F |   |   |   | 1    |
|                                                      | 1U4.....              |                                                                                                                                                                  |   |   |   |   | F |   |   |   | 1    |
|                                                      | 1AF4.....             |                                                                                                                                                                  | C |   |   |   | F |   |   |   |      |
| 1L6.....                                             | 1R5.....              |                                                                                                                                                                  |   | D |   | F |   |   |   |   | 11-6 |
|                                                      | 1LA6.....             |                                                                                                                                                                  |   |   |   | E | F |   |   |   |      |
|                                                      | 1LC6.....             |                                                                                                                                                                  |   |   |   | E | F |   |   |   |      |

| For details of changes indicated<br>Refer to page 13 |                       | NO CHANGES<br>FIL VOLTS<br>FIL CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>CAP TO CONNECTION<br>OR PLATE TO CONNECTION<br>CHANGE PLATE VOLTS<br>NOTE NO. |   |   |   |   |   |   |   |   |     |
|------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|-----|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                                                                                                                                    | B | C | D | E | F | G | H | K |     |
| 1LA4.....                                            | 1A5GT.....            |                                                                                                                                                                      |   |   |   | E |   |   |   |   |     |
|                                                      | 1C5GT.....            |                                                                                                                                                                      |   | C |   | E |   |   |   | K | 2   |
|                                                      | 1Q5GT.....            |                                                                                                                                                                      |   | C |   | E |   |   |   |   | 2   |
|                                                      | 1D8GT.....            |                                                                                                                                                                      |   | C |   | E |   |   |   | K | 9-2 |
|                                                      | 3D6.....              |                                                                                                                                                                      |   | C |   |   |   |   |   |   | 2   |
|                                                      | 3Q5GT.....            |                                                                                                                                                                      |   | C |   | E |   |   |   |   | 2   |
|                                                      | 1LB4.....             |                                                                                                                                                                      |   |   |   |   |   |   |   | K | 2   |
|                                                      | 3LF4.....             |                                                                                                                                                                      |   | C | D |   |   |   |   |   | 2   |
| 1LA6.....                                            | 1A7GT.....            |                                                                                                                                                                      |   |   |   | E | F |   | H |   |     |
|                                                      | 1LC6.....             |                                                                                                                                                                      |   |   |   |   | F |   |   |   | 6   |
|                                                      | 3A8GT.....            |                                                                                                                                                                      |   | C |   | E | F |   |   |   | 9-2 |
| 1LB4.....                                            | 1LA4.....             |                                                                                                                                                                      |   |   |   |   |   |   |   | K | 2   |
|                                                      | 3D6.....              |                                                                                                                                                                      |   | C | D |   |   |   |   | K |     |
|                                                      | 3LE4.....             |                                                                                                                                                                      |   | C | D |   |   |   |   |   | 2   |
|                                                      | 3LF4.....             |                                                                                                                                                                      |   | C | D |   |   |   |   | K | 2   |
|                                                      | 1T5GT.....            |                                                                                                                                                                      |   |   |   | E |   |   |   | K |     |
|                                                      | 1A5GT.....            |                                                                                                                                                                      |   |   |   | E |   |   |   |   |     |
|                                                      | 1C5GT.....            |                                                                                                                                                                      |   | C |   | E |   |   |   | K | 2   |
|                                                      | 1S4.....              |                                                                                                                                                                      |   | C |   | E |   |   |   | K | 2   |
|                                                      | 1W4.....              |                                                                                                                                                                      |   |   |   | E |   |   |   |   |     |
|                                                      | 3V4.....              |                                                                                                                                                                      |   | C |   | E |   |   |   | K |     |
|                                                      | 3Q4.....              |                                                                                                                                                                      |   | C |   | E |   |   |   | K |     |
| 1LC5.....                                            | 1LN5.....             |                                                                                                                                                                      |   |   |   |   | F |   |   | K |     |
|                                                      | 1L4.....              |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
|                                                      | 1N5GT.....            |                                                                                                                                                                      |   |   |   | E | F |   |   |   | 7   |
|                                                      | 1U4.....              |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
|                                                      | 1LG5.....             |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
|                                                      | 3A8GT.....            |                                                                                                                                                                      |   | C |   | E | F |   |   |   | 9-7 |
|                                                      | 5910.....             |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
| 1LC6.....                                            | 1A7GT.....            |                                                                                                                                                                      |   |   |   | E | F |   |   |   | 7   |
|                                                      | 1LA6.....             |                                                                                                                                                                      |   |   |   |   | F |   |   |   | 7   |
|                                                      | 1L6.....              |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
|                                                      | 1R5.....              |                                                                                                                                                                      |   |   |   | E | F |   |   |   | 11  |
|                                                      | 3A8GT.....            |                                                                                                                                                                      |   | C |   | E | F | G |   |   | 9   |
| 1LD5.....                                            | 1S5.....              |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
|                                                      | 1D8GT.....            |                                                                                                                                                                      |   | C |   | E | F |   |   | K | 9-7 |
|                                                      | 1N6G.....             |                                                                                                                                                                      |   |   |   | E | F |   |   | K | 7   |
|                                                      | 1U5.....              |                                                                                                                                                                      |   |   |   | E |   |   |   |   |     |
|                                                      | 1L4.....              |                                                                                                                                                                      |   |   |   | E |   |   |   |   | 5   |
|                                                      | 3A8GT.....            |                                                                                                                                                                      |   | C |   | E | F |   |   |   | 9-7 |
| 1LE3.....                                            | 1G4GT.....            |                                                                                                                                                                      |   |   |   | E |   |   |   | K |     |
|                                                      | 1E4G.....             |                                                                                                                                                                      |   |   |   | E |   |   |   |   |     |
|                                                      | 1D8GT.....            |                                                                                                                                                                      |   |   |   | E |   |   |   | K | 9   |
|                                                      | 1C3.....              |                                                                                                                                                                      |   |   |   | E |   |   |   |   |     |
|                                                      | 1L4.....              |                                                                                                                                                                      |   |   |   | E |   |   |   |   | 4   |
| 1LH4.....                                            | 1H5GT.....            |                                                                                                                                                                      |   |   |   | E |   |   |   |   |     |
|                                                      | 3A8GT.....            |                                                                                                                                                                      |   |   |   | E |   |   |   |   | 9   |
|                                                      | 1LN5.....             |                                                                                                                                                                      |   |   | D |   |   |   |   |   | 3   |
| 1LN5.....                                            | 1N5GT.....            |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
|                                                      | 1LC5.....             |                                                                                                                                                                      |   |   |   |   | F |   |   |   | 6   |
|                                                      | 1L4.....              |                                                                                                                                                                      |   |   |   | E | F |   |   | K |     |
|                                                      | 1U4.....              |                                                                                                                                                                      |   |   |   | E | F |   |   |   |     |
|                                                      | 3A8GT.....            |                                                                                                                                                                      |   | C |   | E | F |   |   |   | 9   |
| 1N5GT.....                                           | 1T4.....              |                                                                                                                                                                      |   |   |   | E | F |   | H |   | 8   |
|                                                      | 1L4.....              |                                                                                                                                                                      |   |   |   | E | F |   | H |   |     |
|                                                      | 1LN5.....             |                                                                                                                                                                      |   |   |   | E | F |   | H |   | 8   |
|                                                      | 1LC5.....             |                                                                                                                                                                      |   |   |   | E | F |   | H |   | 6   |
|                                                      | 1U4.....              |                                                                                                                                                                      |   |   |   | E | F |   | H |   |     |
|                                                      | 3A8GT.....            |                                                                                                                                                                      |   | D |   |   | F |   |   |   | 9   |
| 1N6G.....                                            | 1A5GT.....            |                                                                                                                                                                      |   |   | D |   |   |   |   |   | 5   |
|                                                      | 1D8GT.....            |                                                                                                                                                                      |   | C | D |   |   |   |   |   | 9   |
|                                                      | 1LA4.....             |                                                                                                                                                                      |   |   |   | E |   |   |   |   | 5   |
|                                                      | 1LB4.....             |                                                                                                                                                                      |   |   |   | E |   |   | K |   | 5-2 |
|                                                      | 1Q5GT.....            |                                                                                                                                                                      |   | C | D |   |   |   |   |   | 5-2 |
|                                                      | 1T5GT.....            |                                                                                                                                                                      |   |   | D |   |   |   |   |   | 5-2 |
|                                                      | 1W4.....              |                                                                                                                                                                      |   |   |   | E |   |   | K |   | 5-2 |

The G, GT or GT/G Types may be used interchangeably when space permits.

# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 13 |                       | NO CHANGES                                          | FL. VOLTS | FL. CURRENT | REWIRE SOCKET | CHANGE SOCKET | REALIGN | ADJ. TOP CONNECTION | REWORK TOP CONNECTION | CHANGE BULB OR PLATE VOLTS | NOTE NO. |
|------------------------------------------------------|-----------------------|-----------------------------------------------------|-----------|-------------|---------------|---------------|---------|---------------------|-----------------------|----------------------------|----------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                   | B         | C           | D             | E             | F       | G                   | H                     | K                          |          |
| 1P5GT.....                                           | 1N5GT.....            |                                                     |           |             |               |               | F       |                     |                       |                            | 1        |
|                                                      | 1L4.....              |                                                     |           |             |               | E             | F       |                     |                       |                            | 1        |
|                                                      | 1LG5.....             |                                                     |           |             |               | E             | F       |                     |                       |                            |          |
|                                                      | 1LN5.....             |                                                     |           |             |               | E             | F       |                     |                       |                            | 1        |
|                                                      | 1LC5.....             |                                                     |           |             |               | E             | F       |                     |                       |                            | 1-6      |
|                                                      | 1T4.....              |                                                     |           |             |               | E             | F       |                     |                       |                            | 6        |
|                                                      | 1U4.....              |                                                     |           |             |               | E             | F       |                     |                       |                            | 1        |
|                                                      | 3A8GT.....            |                                                     |           | D           |               |               | F       |                     |                       |                            | 9-1      |
|                                                      | 5910.....             |                                                     |           |             |               | E             | F       |                     |                       |                            | 1        |
| 1Q5GT.....                                           | 1T5GT.....            |                                                     | C         |             |               |               |         |                     |                       | K                          | 2        |
|                                                      | 1C5GT.....            |                                                     |           |             |               |               |         |                     |                       | K                          |          |
|                                                      | 1A5GT.....            |                                                     | C         |             |               |               |         |                     |                       |                            | 2        |
|                                                      | 1D8GT.....            |                                                     | C         |             |               |               |         |                     |                       | K                          | 9-2      |
|                                                      | 3D6.....              |                                                     | C         |             | E             |               |         |                     |                       |                            |          |
|                                                      | 1LA4.....             |                                                     | C         |             | E             |               |         |                     |                       |                            | 2        |
|                                                      | 1LB4.....             |                                                     |           |             | E             |               |         |                     |                       | K                          | 2        |
|                                                      | 1S4.....              |                                                     |           |             | E             |               |         |                     |                       |                            | 6        |
|                                                      | 1W4.....              |                                                     | C         |             | E             |               |         |                     |                       | K                          | 2        |
|                                                      | 3LF4.....             |                                                     |           |             | E             |               |         |                     |                       |                            |          |
| 1R5.....                                             | 1LA6.....             |                                                     |           |             |               | E             | F       |                     |                       |                            | 11       |
|                                                      | 1LC6.....             |                                                     |           |             |               | E             | F       |                     |                       |                            | 11       |
|                                                      | 1L6.....              |                                                     |           | D           |               |               | F       |                     |                       |                            | 11       |
|                                                      | 1A7G.....             |                                                     |           |             |               | E             | F       |                     |                       |                            | 11       |
| 1S4.....                                             | 1A5GT.....            |                                                     | C         |             |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 1LA4.....             |                                                     | C         |             |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 1LB4.....             |                                                     | C         |             |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 1Q5GT.....            |                                                     |           |             |               | E             |         |                     |                       |                            |          |
|                                                      | 1W4.....              |                                                     | C         | D           |               |               |         |                     |                       | K                          | 2        |
|                                                      | 3Q4.....              |                                                     |           | D           |               |               |         |                     |                       | K                          |          |
|                                                      | 3Q5GT.....            |                                                     |           |             |               | E             |         |                     |                       | K                          |          |
|                                                      | 3S4.....              |                                                     |           | D           |               |               |         |                     |                       | K                          |          |
|                                                      | 3V4.....              |                                                     |           | D           |               |               |         |                     |                       | K                          |          |
| 1S5.....                                             | 1L4.....              |                                                     |           |             | D             |               |         |                     |                       |                            | 5        |
|                                                      | 1LD5.....             |                                                     |           |             |               | E             |         |                     |                       |                            | 6        |
|                                                      | 1T4.....              |                                                     |           | D           |               |               |         |                     |                       | K                          | 5        |
|                                                      | 1U4.....              |                                                     |           | D           |               |               |         |                     |                       | K                          | 5        |
|                                                      | 3A8GT.....            |                                                     | C         |             |               | E             |         | G                   |                       |                            |          |
| 1T4.....                                             | 1L4.....              |                                                     |           |             |               |               | F       |                     |                       |                            | 1        |
|                                                      | 1LN5.....             |                                                     |           |             |               | E             |         |                     |                       |                            | 1-7      |
|                                                      | 1LC5.....             |                                                     |           |             |               | E             |         |                     |                       |                            | 1-6      |
|                                                      | 1P5GT.....            |                                                     |           |             |               | E             |         | G                   |                       |                            | 7        |
|                                                      | 1U4.....              |                                                     |           |             |               |               |         |                     |                       |                            | 1        |
|                                                      | 5910.....             |                                                     |           |             |               |               |         |                     |                       |                            | 1        |
| 1T5GT.....                                           | 1A5GT.....            |                                                     |           |             |               |               |         |                     |                       | K                          | 2        |
|                                                      | 1Q5GT.....            |                                                     | C         |             |               |               |         |                     |                       | K                          | 2        |
|                                                      | 1C5GT.....            |                                                     | C         |             |               |               |         |                     |                       | K                          | 2        |
|                                                      | 1D8GT.....            |                                                     | C         |             |               |               |         |                     |                       | K                          | 9        |
|                                                      | 1LA4.....             |                                                     |           |             |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 1LB4.....             |                                                     |           |             |               | E             |         |                     |                       | K                          |          |
|                                                      | 3D6.....              |                                                     |           |             |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 3LF4.....             |                                                     |           |             |               | E             |         |                     |                       | K                          | 2        |
| 1U4.....                                             | 1L4.....              |                                                     |           |             |               |               | F       |                     |                       |                            |          |
|                                                      | 1T4.....              |                                                     |           |             |               |               | F       |                     |                       |                            | 10       |
|                                                      | 1AF4.....             |                                                     | C         |             |               |               | F       |                     |                       |                            |          |
| 3A8GT.....                                           | 1LH4.....             | Requires room for two sockets no single replacement |           |             |               |               |         |                     |                       |                            | H        |
|                                                      | 1LN5.....             | Requires room for two sockets no single replacement |           |             |               |               |         |                     |                       |                            | H        |
|                                                      | 1H5G.....             | Requires room for two sockets no single replacement |           |             |               |               |         |                     |                       |                            | H        |
|                                                      | 1N5G.....             | Adaptor with                                        |           |             |               |               |         |                     |                       |                            | K        |
|                                                      | 1C3.....              | 2 Min. sockets                                      |           |             |               |               |         |                     |                       |                            | K        |
|                                                      | 1L4.....              | Adaptor with                                        |           |             |               |               |         |                     |                       |                            | K        |
|                                                      | 1C3.....              | 2 Min. sockets                                      |           |             |               |               |         |                     |                       |                            | K        |
|                                                      | 1S5.....              |                                                     |           |             |               |               |         |                     |                       |                            | K        |

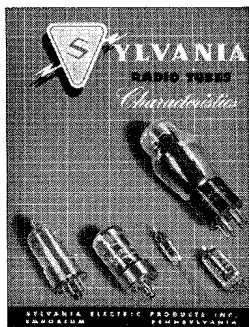
| For details of changes indicated<br>Refer to page 13 |                       | NO CHANGES | FL. VOLTS | FL. CURRENT | REWIRE SOCKET | CHANGE SOCKET | REALIGN | ADJ. TOP CONNECTION | REWORK TOP CONNECTION | CHANGE BULB OR PLATE VOLTS | NOTE NO. |
|------------------------------------------------------|-----------------------|------------|-----------|-------------|---------------|---------------|---------|---------------------|-----------------------|----------------------------|----------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A          | B         | C           | D             | E             | F       | G                   | H                     | K                          |          |
| 3LF4.....                                            | 3V4.....              |            |           |             |               | E             |         |                     |                       |                            |          |
|                                                      | 3Q4.....              |            |           |             |               | E             |         |                     |                       |                            |          |
|                                                      | 3S4.....              |            |           |             |               | E             |         |                     |                       | K                          | 10       |
|                                                      | 3Q5GT.....            |            |           |             |               | E             |         |                     |                       |                            |          |
| 3Q5GT.....                                           | 1Q5GT.....            |            |           |             | D             |               |         |                     |                       |                            |          |
| (At 1.4 Volts only)                                  | 1C5GT.....            |            |           |             | D             |               |         |                     |                       | K                          |          |
|                                                      | 1T5GT.....            |            |           |             | D             |               |         |                     |                       | K                          | 2        |
|                                                      | 3D6.....              |            |           | C           |               | E             |         |                     |                       |                            |          |
|                                                      | 1A5GT.....            |            | C         | D           |               |               |         |                     |                       | K                          | 2        |
|                                                      | 1D8GT.....            |            |           | D           |               |               |         |                     |                       | K                          | 9-2      |
|                                                      | 1LA4.....             |            | C         |             | E             |               |         |                     |                       | K                          | 2        |
|                                                      | 1LB4.....             |            | C         |             | E             |               |         |                     |                       | K                          | 2        |
|                                                      | 1W4.....              |            | C         |             | E             |               |         |                     |                       | K                          |          |
|                                                      | 1S4.....              |            |           |             | E             |               |         |                     |                       | K                          |          |
|                                                      | 3A4.....              |            | C         |             | E             |               |         |                     |                       | K                          |          |
| (At any Volt.)                                       | 3B5GT.....            |            |           |             |               |               |         |                     |                       | K                          |          |
|                                                      | 3LF4.....             |            |           |             | E             |               |         |                     |                       |                            |          |
|                                                      | 3Q4.....              |            |           |             | E             |               |         |                     |                       |                            | 2        |
|                                                      | 3S4.....              |            |           |             | E             |               |         |                     |                       | K                          | 6        |
|                                                      | 3V4.....              |            |           |             | E             |               |         |                     |                       |                            | 2        |
| 3Q4.....                                             | 3V4.....              |            |           |             | D             |               |         |                     |                       |                            |          |
|                                                      | 3S4.....              |            |           |             |               |               |         |                     |                       | K                          |          |
| 3S4.....                                             | 1W4.....              |            | C         | D           |               |               |         |                     |                       | K                          |          |
| (At 1.4 Volts only)                                  | 3A4.....              |            | C         | D           |               |               |         |                     |                       | K                          |          |
|                                                      | 1Q5GT.....            |            |           |             | E             |               |         |                     |                       | K                          | 7        |
|                                                      | 1S4.....              |            |           | D           |               |               |         |                     |                       |                            |          |
|                                                      | 3D6.....              |            | C         |             | E             |               |         |                     |                       | K                          |          |
|                                                      | 1C5GT.....            |            |           |             | E             |               |         |                     |                       |                            | 7        |
|                                                      | 1LB4.....             |            | C         |             | E             |               |         |                     |                       | K                          | 2-7      |
| (At any Volt.)                                       | 3Q4.....              |            |           |             |               |               |         |                     |                       | K                          | 7        |
|                                                      | 3LF4.....             |            |           |             | E             |               |         |                     |                       | K                          |          |
|                                                      | 3Q5GT.....            |            |           |             | E             |               |         |                     |                       | K                          | 7        |
|                                                      | 3V4.....              |            |           |             |               |               |         |                     |                       | K                          | 7        |
| 3V4.....                                             | 3Q4.....              |            |           |             | D             |               |         |                     |                       | K                          |          |
|                                                      | 3S4.....              |            |           |             | D             |               |         |                     |                       | K                          | 10       |
| 19.....                                              | 1J6G.....             |            |           |             |               | E             |         |                     |                       |                            |          |
|                                                      | 1G6GT.....            |            | B         | C           |               | E             |         |                     |                       |                            |          |
| 30.....                                              | 1H4G.....             |            |           |             |               | E             |         |                     |                       |                            |          |
|                                                      | 1E4G.....             |            | B         | C           |               | E             |         |                     |                       | K                          |          |
|                                                      | 1G4GT.....            |            |           |             |               | E             |         |                     |                       | K                          |          |
|                                                      | 1LE3.....             |            | B         | C           |               | E             |         |                     |                       | K                          |          |
| 32.....                                              | 1B4 (P or T).....     |            |           |             |               | F             |         |                     |                       |                            |          |
|                                                      | 1E5G.....             |            |           |             |               | E             | F       |                     |                       |                            |          |
|                                                      | 1LN5.....             |            | B         | C           |               | E             | F       |                     | H                     | K                          | 7        |
|                                                      | 1LC5.....             |            | B         | C           |               | E             | F       |                     | H                     | K                          | 6        |
|                                                      | 34.....               |            |           |             |               | F             |         |                     |                       |                            |          |
|                                                      | 1A4 (P or T).....     |            |           |             |               | F             |         |                     |                       |                            |          |
| 33.....                                              | 1F4.....              |            |           | C           |               |               |         |                     |                       | K                          | 2        |
|                                                      | 1F5G.....             |            |           | C           |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 1G5G.....             |            |           | C           |               | E             |         |                     |                       |                            |          |
|                                                      | 1J5G.....             |            |           | C           |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 1A5GT.....            |            | B         | C           |               | E             |         |                     |                       | K                          | 2        |
|                                                      | 1C5GT.....            |            | B         | C           |               | E             |         |                     |                       | K                          |          |
|                                                      | 1Q5GT.....            |            | B         | C           |               | E             |         |                     |                       | K                          |          |
|                                                      | 1T5GT.....            |            | B         | C           |               | E             |         |                     |                       | K                          | 2        |
| 34.....                                              | 1A4 (P or T).....     |            |           |             |               | F             |         |                     |                       |                            |          |
|                                                      | 1D5G (P or T).....    |            |           |             |               | E             | F       |                     |                       |                            |          |
|                                                      | 1P5GT.....            |            | B         | C           |               | E             | F       |                     |                       | K                          |          |
|                                                      | 1B4 (P or T).....     |            |           |             |               | F             |         |                     |                       |                            | 1        |
|                                                      | 32.....               |            |           |             |               | F             |         |                     |                       |                            | 1        |
|                                                      | 1E5 (G or P).....     |            |           |             |               | E             | F       |                     |                       |                            | 1        |

For 117 volt types sometimes used with Battery Types, see page 24.

The G, GT or GT/G Types may be used interchangeably when space permits.

## NOTES FOR BATTERY TYPES SUBSTITUTIONS

- A. This is shown only when the tubes are directly interchangeable for all published ratings. Unusual operating conditions may require analysis.
  - B. This means that the filament voltage on the substitute tube is different from the required type. In most cases this can be allowed for by use of a small resistor to drop the voltage to that required. In some cases a complete change over of all tubes so as to use a new supply may be advisable. No listing is made for 2.0 volt tubes replacing 1.4 volt tubes because the additional battery and best circuit changes must be determined for each case.
  - C. Indicates that the filament current of the substitute tube differs from that of the required type. If all tubes are used directly from the battery this will affect battery life only, but in many cases a series resistor or ballast may have to be changed, adjusted, or shunted. If in series on an AC-DC set a substitute with no change in current is required.
  - D. Uses the same socket but pin connection is different. Watch out for tie points not used in the former tube which may be used in the substitute tube.
  - E. Requires a different type of socket. Watch out for tie points as in "D".
  - F. Realignment is recommended as good practice in all cases of RF and IF changes.
  - G. Provision must be made for connection to the top cap of the substitute tube which was not originally required.
  - H. The former top cap connection will have to be changed to connect to a base pin or to the side of the adapter when one is used.
  - K. Indicates that the substitute tube operates at a different bias for the applied plate voltage than the original tube. If some of the newer types are substituted good performance and improved battery life can be obtained by reducing the plate voltage to the rating of the new tube and applying its rated bias.
- (1) The use of a sharp cut-off RF pentode in place of a remote cut-off tube may cause great distortion in locations where strong signals are available. If no other substitute is available all tubes on the A.V.C. system should be changed.
  - (2) The optimum load resistance for these types is more than 20% off. If tone is noticeably poor, transformer tap adjustment or a new transformer may be required.
  - (3) Requires addition of screen voltage, resistor and bypass condenser. Select resistor to give screen volts approximately equal to the actual plate volts.
  - (4) This type can be used as a triode by tying screen and suppressor to the plate.
  - (5) A type 1N34 crystal may be used in place of one diode section of the original tube.
  - (6) If voltage at screen is greater than rated value it should be reduced.
  - (7) Screen voltage may be increased for use with this type.
  - (8) Circuit for this substitution is given on last few pages of this booklet.
  - (9) Unused elements should be tied to negative filament.
  - (10) Decrease screen voltage when using this type.
  - (11) This converter substitution is tricky. Some experimentation may be required to find the best connection for each set. Adaptor circuits in the back of this book may help.
- The G, GT, or GT/G types may be used interchangeably where space permits.



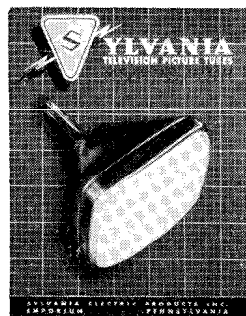
### 211 Receiving Tubes Characteristics Folder

Characteristics of Sylvania tubes and panel lamps with tube base views. **FREE**



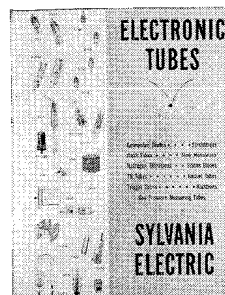
### 213 Transmitting Tubes Characteristics Folder

Characteristics of Sylvania tubes used in amateur and commercial transmitters with tube and base diagrams. **FREE**



### 216 Television Tubes Characteristics Folder

Characteristics of television picture tubes and general purpose cathode ray tubes with base diagrams. **FREE**



### 217 Electronic Tubes Booklet

The latest word on the newest developments in the most modern field of science. Contains characteristics on germanium and silicon crystal diodes, strobotrons, flash tubes, gas pressure measuring and switching tubes, selenium rectifiers, hydrogen thyatrons, rocket tubes and others. **FREE.**



### 221 Subminiature Characteristics Folder

Characteristics of Sylvania Subminiature Tubes with tube and base diagrams. **FREE**

Recent developments in Television and AM-FM radios have necessitated many new tube types. It is Sylvania's policy to provide our service dealer customers with the latest information on new electronic developments.

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# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 18                      |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD CONNECTION<br>REMOVE CONNECTION<br>CHANGE BASE<br>OR PLATE FOR VOLTS<br>NOTE NO. |   |   |   |   |   |   |   |   |     |
|---------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|-----|
| REQUIRED TYPE                                                             | POSSIBLE REPLACEMENTS | A                                                                                                                                                                             | B | C | D | E | F | G | H | K |     |
| 6D8G                                                                      | 7A8                   |                                                                                                                                                                               |   |   |   | E | F |   | H |   |     |
|                                                                           | 14J7                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   |     |
|                                                                           | 14S7                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   |     |
|                                                                           | 14B8                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   |     |
|                                                                           | 12A8GT                |                                                                                                                                                                               | B |   |   |   | F |   |   |   |     |
|                                                                           | 12K8GT                |                                                                                                                                                                               | B |   |   |   | F |   |   |   |     |
|                                                                           | 25B8GT                |                                                                                                                                                                               | B | D |   |   | F |   |   |   | 11  |
| For 300 ma. types see type 6A8G and for procedure see article on page 8.  |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |     |
| 6G6G                                                                      | 12L8GT                |                                                                                                                                                                               | B | D |   |   |   |   |   |   |     |
|                                                                           | 14A5                  |                                                                                                                                                                               | B |   |   | E |   |   | K |   | 2   |
|                                                                           | 35A5                  |                                                                                                                                                                               | B |   |   | E |   |   | K |   | 2   |
|                                                                           | 35L6GT                |                                                                                                                                                                               | B |   |   |   |   |   | K |   | 2   |
|                                                                           | 50A5                  |                                                                                                                                                                               | B |   |   | E |   |   | K |   | 2   |
|                                                                           | 50L6GT                |                                                                                                                                                                               | B |   |   |   |   |   | K |   | 2   |
|                                                                           | 50C6G                 |                                                                                                                                                                               | B |   |   |   |   |   | K |   | 2   |
| For 300 ma. types see type 12A5 and for procedure see article on page 8.  |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |     |
| 6L5G                                                                      | 12J5GT                |                                                                                                                                                                               | B |   |   |   |   |   |   |   |     |
|                                                                           | 14A4                  |                                                                                                                                                                               | B |   |   | E |   |   |   |   |     |
|                                                                           | 14E6                  |                                                                                                                                                                               | B |   |   | E |   |   |   |   | 9   |
|                                                                           | 12J7GT                |                                                                                                                                                                               | B | D |   |   |   | G |   |   | 4   |
|                                                                           | 12SJ7GT               |                                                                                                                                                                               | B | D |   |   |   |   |   |   | 4   |
|                                                                           | 7C7                   |                                                                                                                                                                               |   |   |   | E |   |   |   |   | 4   |
|                                                                           | 14C7                  |                                                                                                                                                                               | B |   |   | E |   |   |   |   | 4   |
|                                                                           | 6W7G                  |                                                                                                                                                                               |   | D |   |   |   | G |   |   | 4   |
| For 300 ma. types see type 6C5G and for procedure see article on page 8.  |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |     |
| 6S7G                                                                      | 6SS7                  |                                                                                                                                                                               |   |   | D |   | F |   | H |   |     |
|                                                                           | 12SK7GT               |                                                                                                                                                                               | B | D |   |   | F |   | H |   |     |
|                                                                           | 12K7GT                |                                                                                                                                                                               | B |   |   |   | F |   |   |   |     |
|                                                                           | 7B7                   |                                                                                                                                                                               |   |   |   | E | F |   | H |   | 6   |
|                                                                           | 14A7/12B7             |                                                                                                                                                                               | B |   |   | E | F |   | H |   | 6   |
|                                                                           | 14E7                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   |     |
|                                                                           | 14H7                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   | 6   |
|                                                                           | 12J7GT                |                                                                                                                                                                               | B |   |   |   | F |   |   |   | 1   |
|                                                                           | 12SJ7GT               |                                                                                                                                                                               | B | D |   |   | F |   | H |   | 1   |
|                                                                           | 7C7                   |                                                                                                                                                                               |   |   |   | E | F |   | H |   | 1   |
|                                                                           | 14C7                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   | 1-6 |
| For 300 ma. types see type 6K7G and for procedure see article on page 8.  |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |     |
| 6T7G                                                                      | 12Q7GT                |                                                                                                                                                                               | B |   |   |   |   |   |   |   |     |
|                                                                           | 12SQ7GT               |                                                                                                                                                                               | B | D |   |   |   |   | H |   |     |
|                                                                           | 7C6                   |                                                                                                                                                                               |   |   |   | E |   |   | H |   |     |
|                                                                           | 14B6                  |                                                                                                                                                                               | B |   |   | E |   |   | H |   |     |
|                                                                           | 14E7                  |                                                                                                                                                                               | B |   |   | E |   |   | H |   | 3   |
|                                                                           | 14R7                  |                                                                                                                                                                               | B |   |   | E |   |   | H |   | 3   |
|                                                                           | 12SF7                 |                                                                                                                                                                               | B | D |   |   |   |   | H |   | 3   |
|                                                                           | 12C8                  |                                                                                                                                                                               | B | D |   |   |   |   |   |   | 3   |
| For 300 ma. types see type 6Q7GT and for procedure see article on page 8. |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |     |
| 6W7G                                                                      | 12J7GT                |                                                                                                                                                                               | B |   |   |   | F |   |   |   |     |
|                                                                           | 12SJ7GT               |                                                                                                                                                                               | B | D |   |   | F |   | H |   |     |
|                                                                           | 12SH7                 |                                                                                                                                                                               | B | D |   |   | F |   | H |   | 6   |
|                                                                           | 7C7                   |                                                                                                                                                                               |   |   |   | E | F |   | H |   |     |
|                                                                           | 14C7                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   |     |
|                                                                           | 12C8                  |                                                                                                                                                                               | B | D |   |   | F |   |   |   | 9   |
|                                                                           | 14R7                  |                                                                                                                                                                               | B |   |   | E | F |   | H |   | 9   |
| For 300 ma. types see 6J7GT and for procedure see article on page 8.      |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |     |
| For use as audio amplifiers types under 6S7G may also be used.            |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |     |
| 7A6                                                                       | 12AL5                 |                                                                                                                                                                               | B |   |   | E |   |   |   |   |     |
|                                                                           | 12H6G                 |                                                                                                                                                                               | B |   |   | E |   |   |   |   |     |
|                                                                           | 14F7                  |                                                                                                                                                                               | B | D |   |   |   |   |   |   | 4   |
|                                                                           | 12SL7GT               |                                                                                                                                                                               | B |   |   | E |   |   |   |   | 4   |

| For details of changes indicated<br>Refer to page 18                                                      |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD CONNECTION<br>REMOVE CONNECTION<br>CHANGE BASE<br>OR PLATE FOR VOLTS<br>NOTE NO. |   |   |   |   |   |   |   |   |    |
|-----------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
| REQUIRED TYPE                                                                                             | POSSIBLE REPLACEMENTS | A                                                                                                                                                                             | B | C | D | E | F | G | H | K |    |
| 7A6.....                                                                                                  | XXD.....              |                                                                                                                                                                               | B |   | D |   |   |   |   |   | 4  |
| (Continued)                                                                                               | 14AF7.....            |                                                                                                                                                                               | B |   | D |   |   |   |   |   | 4  |
|                                                                                                           | 5679.....             |                                                                                                                                                                               |   |   | D |   |   |   |   |   |    |
| For 300 ma. types see 6H6GT and for procedure see article on page 8.                                      |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| 7A8.....                                                                                                  | 14B8.....             |                                                                                                                                                                               | B |   |   | F |   |   |   |   |    |
|                                                                                                           | 14J7.....             |                                                                                                                                                                               | B |   |   | F |   |   |   |   |    |
|                                                                                                           | 14S7.....             |                                                                                                                                                                               | B |   |   | F |   |   |   |   |    |
|                                                                                                           | 12A8GT.....           |                                                                                                                                                                               | B |   |   | F | G |   |   |   |    |
|                                                                                                           | 12K8GT.....           |                                                                                                                                                                               | B |   |   | F | G |   |   |   |    |
|                                                                                                           | 6D8G.....             |                                                                                                                                                                               |   |   | E | F | G |   |   |   |    |
|                                                                                                           | 25B8GT.....           |                                                                                                                                                                               | B |   | E | F | G |   |   |   | 11 |
| For 300 ma. types see 6A8GT and for procedure see article on page 8.                                      |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| 7B7.....                                                                                                  | 7AH7.....             |                                                                                                                                                                               |   |   |   | F |   |   | K |   |    |
|                                                                                                           | 14A7/12B7.....        |                                                                                                                                                                               | B |   |   | F |   |   |   |   |    |
|                                                                                                           | 14H7.....             |                                                                                                                                                                               | B |   |   | F |   |   |   |   | 6  |
|                                                                                                           | 6BJ6.....             |                                                                                                                                                                               |   |   | E | F |   | K |   |   |    |
|                                                                                                           | 6S7G.....             |                                                                                                                                                                               |   |   | E | F | G |   |   |   |    |
|                                                                                                           | 6SS7.....             |                                                                                                                                                                               |   |   | E | F |   |   |   |   |    |
|                                                                                                           | 12SG7.....            |                                                                                                                                                                               | B |   | E | F |   |   |   |   | 6  |
|                                                                                                           | 12SK7G.....           |                                                                                                                                                                               | B |   | E | F |   |   |   |   |    |
|                                                                                                           | 12K7GT.....           |                                                                                                                                                                               | B |   | E | F | G |   |   |   |    |
|                                                                                                           | 5590.....             |                                                                                                                                                                               |   |   | E | F |   |   |   |   |    |
|                                                                                                           | 9001.....             |                                                                                                                                                                               |   |   | E | F |   |   |   |   |    |
| For 300 ma. types see 6K7GT and for procedure see article on page 8. See also types under 7C7 and note 1. |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| 7C6.....                                                                                                  | 6AQ6.....             |                                                                                                                                                                               |   |   |   | E |   |   |   |   |    |
|                                                                                                           | 6SZ7.....             |                                                                                                                                                                               |   |   |   | E |   |   |   |   |    |
|                                                                                                           | 6T7G.....             |                                                                                                                                                                               |   |   |   | E | G |   |   |   |    |
|                                                                                                           | 12AX7.....            |                                                                                                                                                                               | B |   |   | E |   |   |   |   | 5  |
|                                                                                                           | 12BK6.....            |                                                                                                                                                                               | B |   |   | E |   |   |   |   |    |
|                                                                                                           | 12BT6.....            |                                                                                                                                                                               | B |   |   | E |   |   |   |   |    |
|                                                                                                           | 12F5GT.....           |                                                                                                                                                                               | B |   |   | E | G |   |   |   | 5  |
|                                                                                                           | 12Q7GT.....           |                                                                                                                                                                               | B |   |   | E | G |   |   |   |    |
|                                                                                                           | 12SF5GT.....          |                                                                                                                                                                               | B |   |   | E |   |   |   |   | 5  |
|                                                                                                           | 12SQ7GT.....          |                                                                                                                                                                               | B |   |   | E |   |   |   |   |    |
|                                                                                                           | 14B6.....             |                                                                                                                                                                               | B |   |   |   |   |   |   |   |    |
| For 300 ma. types see 6Q7GT and for procedure see article on page 8.                                      |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| 7C7.....                                                                                                  | 6BH6.....             |                                                                                                                                                                               |   |   |   | E | F |   | K |   |    |
|                                                                                                           | 6W7G.....             |                                                                                                                                                                               |   |   |   | E | G |   |   |   |    |
|                                                                                                           | 7AB7.....             |                                                                                                                                                                               |   |   | D |   | F |   |   |   |    |
|                                                                                                           | 7AG7.....             |                                                                                                                                                                               |   |   |   | F |   | K |   |   |    |
|                                                                                                           | 12AU6.....            |                                                                                                                                                                               | B |   |   | E | F |   | K |   |    |
|                                                                                                           | 12C8.....             |                                                                                                                                                                               | B |   |   | E | G |   |   |   | 9  |
|                                                                                                           | 12J7GT.....           |                                                                                                                                                                               | B |   |   | E | G |   |   |   |    |
|                                                                                                           | 12SH7G.....           |                                                                                                                                                                               | B |   |   | E |   |   |   |   | 6  |
|                                                                                                           | 12SJ7GT.....          |                                                                                                                                                                               | B |   |   | E |   |   |   |   |    |
|                                                                                                           | 14C7.....             |                                                                                                                                                                               | B |   |   |   |   |   |   |   |    |
|                                                                                                           | 14R7.....             |                                                                                                                                                                               | B |   | D |   |   |   |   |   | 9  |
|                                                                                                           | 5879.....             |                                                                                                                                                                               |   |   |   | E | F |   | K |   |    |
| For 300 ma. types see 6J7GT and for procedure see article on page 8.                                      |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| For use in audio amplifiers types under 7B7 may also be used.                                             |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| 12A8GT.....                                                                                               | 7A8.....              |                                                                                                                                                                               | B |   |   | E | F |   | H |   | 8  |
|                                                                                                           | 12K8GT.....           |                                                                                                                                                                               |   |   |   | F |   |   |   |   | 11 |
|                                                                                                           | 6D8G.....             |                                                                                                                                                                               | B |   |   | F |   |   |   |   | 11 |
|                                                                                                           | 14B8.....             |                                                                                                                                                                               |   |   |   | E | F |   | H |   | 8  |
|                                                                                                           | 14J7.....             |                                                                                                                                                                               |   |   |   | E | F |   | H |   | 8  |
|                                                                                                           | 14S7.....             |                                                                                                                                                                               |   |   |   | E | F |   | H |   | 8  |
|                                                                                                           | 25B8GT.....           |                                                                                                                                                                               | B |   | E | F |   |   |   |   | 8  |
| For 300 ma. types see 6A8GT and for procedure see article on page 8.                                      |                       |                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |

These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

## -150 MA. SERIES HEATER TYPES

[illegible]

|              |           |   |   |   |   |
|--------------|-----------|---|---|---|---|
| 12BA6.....   | 6BJ6..... | B | D | F |   |
| 7AH7.....    |           | B |   | E | F |
| 12BD6.....   |           |   |   | F | K |
| 12SG7.....   |           |   |   | E | F |
| 12K7GT.....  |           |   |   | E | F |
| 12SK7GT..... |           |   |   | E | F |
| 14A7.....    |           |   |   | E | F |
| 14H7.....    |           |   |   | E | F |

|            |              |        |   |        |        |    |
|------------|--------------|--------|---|--------|--------|----|
| 12BE6..... | 6D8G.....    | B..... | E | F      | G..... | 11 |
|            | 12BA7.....   |        | E | F..... |        |    |
|            | 12K8GT.....  |        | E | F      | G..... | 11 |
|            | 12SA7GT..... |        | E | F..... |        |    |
|            | 12SY7.....   |        | E | F..... |        |    |
|            | 14B8.....    |        | E | F..... |        | 11 |
|            | 14J7.....    |        | E | F..... |        | 11 |
|            | 14Q7.....    |        | E | F..... |        |    |
|            | 14S7.....    |        | E | F..... |        | 11 |

|                   |                    |              |              |              |                |
|-------------------|--------------------|--------------|--------------|--------------|----------------|
| <b>12C8</b> ..... | <b>12SF7</b> ..... | <b>D</b> ... | <b>F</b> ... | <b>H</b>     | <b>K</b> ..... |
|                   | <b>14E7</b> .....  |              | <b>E</b>     | <b>F</b> ... | <b>H</b> ..... |
|                   | <b>14R7</b> .....  |              | <b>E</b>     | <b>F</b> ... | <b>H</b>       |

**For 300 ma. types see 6B8G and for procedure see article on page 8.**

|             |              |        |        |        |
|-------------|--------------|--------|--------|--------|
| 12F5GT..... | 6T7G.....    | B..... | D..... | 9..... |
|             | 7C6.....     | B..... | E..... | H..... |
|             | 12SF5GT..... |        | D..... | H..... |
|             | 12SL7GT..... |        | D..... | H..... |
|             | 12Q7GT.....  |        | D..... | 9..... |
|             | 12SQ7GT..... |        | D..... | H..... |
|             | 14B6.....    |        | E..... | H..... |

**For 300 ma. types see 6F5GT and for procedure see article on page 8.**

|             |              |        |        |        |        |
|-------------|--------------|--------|--------|--------|--------|
| 12J5GT..... | 6C4.....     | B..... | E..... |        |        |
|             | 6L5G.....    | B..... |        |        |        |
|             | 6W7G.....    | B..... | D..... | G..... | 4..... |
|             | 7C7.....     | B..... | E..... |        | 4..... |
|             | 12BF6.....   |        | E..... |        | 4..... |
|             | 12BU6.....   |        | E..... |        | 4..... |
|             | 12J7GT.....  |        | D..... | G..... | 4..... |
|             | 12SJ7GT..... |        | D..... |        | 4..... |
|             | 14A4.....    |        | E..... |        |        |
|             | 14C7.....    |        | E..... |        | 4..... |
|             | 14E6.....    |        | E..... |        | 9..... |
|             | 9002.....    | B..... | E..... | K..... |        |

**For 300 ma. types see 6J5GT and for procedure see article on page 8.**

|             |            |        |            |          |
|-------------|------------|--------|------------|----------|
| 12J7GT..... | 6BH6.....  | B..... | E F G..... | K.....   |
|             | 6W7G.....  | B..... | F.....     |          |
|             | 7AG7.....  | B..... | E F G..... | K.....   |
|             | 7C7.....   | B..... | E F.....   | H..... 8 |
|             | 12AU6..... |        | E F G..... | K.....   |
|             | 12AW6..... |        | E F G..... | K.....   |

|              |   |   |   |   |   |
|--------------|---|---|---|---|---|
| 12C8.....    | D | F |   |   | 9 |
| 12SH7G.....  | D | F | H |   | 6 |
| 12SJ7GT..... | D | F | H |   |   |
| 14C7.....    |   | E | F | H | 8 |
| 14R7.....    |   | E | F | H | 9 |
| 5879.....    | B | E | F | G | K |
| 9003.....    | B | E | F | G | K |

**For 300 ma. types see 6J7GT and for procedure see article on page 8. For use as audio amplifiers types under 12K7G may also be used.**

|             |           |        |        |        |        |
|-------------|-----------|--------|--------|--------|--------|
| 12K7GT..... | 6BJ6..... | B..... | E      | F...H  | K..... |
|             | 6S7G..... | B..... |        | F..... |        |
|             | 6SS7..... | B..... | D..... | F..... | H..... |
|             | 7AH7..... | B..... | E      | F...H  | K..... |

|                                                      |                       |                                                                                                                                                                                     |   |   |   |   |   |   |   |   |  |
|------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|--|
| For details of changes indicated<br>Refer to page 18 |                       | NO CHANGES<br>FIL. VOLTS<br>REWIRE CURRENT<br>CHANGE SOCKET<br>REALIGN<br>2RD CONNECTION<br>ON PLATE OF VOLTS<br>BY WIRE CONNECTION<br>ON PLATE OF VOLTS<br>CHANGE BASE<br>NOTE NO. |   |   |   |   |   |   |   |   |  |
|                                                      |                       | A                                                                                                                                                                                   | B | C | D | E | F | G | H | K |  |
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS |                                                                                                                                                                                     |   |   |   |   |   |   |   |   |  |

|                     |                        |                |                |                |                |                |
|---------------------|------------------------|----------------|----------------|----------------|----------------|----------------|
| <b>12K7GT</b> ..... | <b>7B7</b> .....       | <b>B</b> ..... | <b>E</b>       | <b>F</b> ...   | <b>H</b> ..... |                |
| (Continued)         | <b>12BA6</b> .....     |                | <b>E</b>       | <b>F</b> ...   | <b>H</b>       | <b>K</b> ..... |
|                     | <b>12BD6</b> .....     |                | <b>E</b>       | <b>F</b> ...   | <b>H</b>       | <b>K</b> ..... |
|                     | <b>12SG7</b> .....     | <b>D</b> ..... | <b>F</b>       | <b>H</b>       | <b>K</b> ..... |                |
|                     | <b>12SK7G</b> .....    | <b>D</b> ..... | <b>F</b> ...   | <b>H</b> ..... |                |                |
|                     | <b>14A7/12B7</b> ..... |                | <b>E</b>       | <b>F</b> ...   | <b>H</b> ..... | <b>8</b>       |
|                     | <b>14E7</b> .....      |                | <b>E</b>       | <b>F</b> ...   | <b>H</b> ..... | <b>9</b>       |
|                     | <b>14H7</b> .....      |                | <b>E</b>       | <b>F</b> ...   | <b>H</b> ..... | <b>8-6</b>     |
|                     | <b>25B8GT</b> .....    | <b>B</b> ..... | <b>D</b> ..... | <b>F</b> ..... |                | <b>9</b>       |
|                     | <b>5590</b> .....      |                | <b>E</b>       | <b>F</b> ...   | <b>H</b> ..... |                |
|                     | <b>9001</b> .....      |                | <b>E</b>       | <b>F</b> ...   | <b>H</b>       | <b>K</b> ..... |

**For 300 ma. types see 6K7G and for procedure see article on page 8. See also types under 12J7GT and note 1.**

|             |             |        |        |        |        |         |
|-------------|-------------|--------|--------|--------|--------|---------|
| 12K8GT..... | 7A8.....    | B..... | E..... | F..... | H..... | 8.....  |
|             | 12A8GT..... |        |        | F..... |        | 11..... |
|             | 14J7.....   |        | E..... | F..... | H..... | 8.....  |
|             | 14S7.....   |        | E..... | F..... | H..... | 11..... |
|             | 6D8G.....   | B..... |        | F..... |        | 11..... |
|             | 25B8GT..... | B..... | D..... | F..... |        | 11..... |
|             | 14B8.....   |        | E..... | F..... | H..... | 8.....  |

**For 300 ma. types see type 6K8G and for procedure see article on page 8.**

|             |              |        |        |        |   |
|-------------|--------------|--------|--------|--------|---|
| 12Q7GT..... | 6AQ6.....    | B..... | E..... | H..... |   |
|             | 6T7G.....    | B..... |        |        |   |
|             | 7B4.....     | B..... | E..... | H..... | 5 |
|             | 7C6.....     | B..... | E..... | H..... | 8 |
|             | 12AT6.....   |        | E..... | H..... |   |
|             | 12AV6.....   |        | E..... | H..... |   |
|             | 12BK6.....   |        | E..... | H..... |   |
|             | 12BT6.....   |        | E..... | H..... |   |
|             | 12F5GT.....  | D..... |        |        | 5 |
|             | 12SF5GT..... | D..... |        | H..... | 5 |
|             | 12SF7.....   | D..... |        | H..... | 3 |
|             | 12SQ7GT..... | D..... |        | H..... |   |
|             | 14B6.....    |        | E..... | H..... | 8 |
|             | 14E7.....    |        | E..... | H..... |   |
|             | 14R7.....    |        | E..... | H..... |   |
|             | 14X7.....    |        | E..... | H..... |   |

**For 300 ma. types see type 6Q7GT for procedure  
see article on page 8.**

|              |             |      |           |           |    |
|--------------|-------------|------|-----------|-----------|----|
| 12SA7GT..... | 6D8G.....   | B .. | D ...     | F G ..... | 11 |
|              | 7A8.....    | B .. | E F ..... |           | 11 |
|              | 12A8GT..... |      | D ..      | F G ..... | 11 |
|              | 12K8GT..... |      | D ..      | F G ..... | 11 |
|              | 14B8.....   |      | E F ..... |           | 11 |
|              | 14J7.....   |      | E F ..... |           | 11 |
|              | 14Q7.....   |      | E F ..... |           | 8  |
|              | 14S7.....   |      | E F ..... |           | 11 |

For 300 ma. types see type 6SA7 and for procedure see article on page 8.

|              |              |        |        |        |
|--------------|--------------|--------|--------|--------|
| 12SF5GT..... | 6T7G.....    | B...   | D..... | G..... |
|              | 7C6.....     | B..... | E..... |        |
|              | 12F5GT.....  |        | D..... | G..... |
|              | 12Q7GT.....  |        | D..... | G..... |
|              | 12SL7GT..... |        | D..... |        |
|              | 12SQ7GT..... |        | D..... |        |
|              | 14B6.....    |        | E..... |        |

For 300 ma. types see type 6SF5 and for procedure see article on page 8.

|            |            |   |   |   |
|------------|------------|---|---|---|
| 12SG7..... | 6BJ6.....  | B | E | F |
|            | 7AH7.....  | B | E | F |
|            | 12BA6..... |   | E | F |
|            | 12BD6..... |   | E | F |
|            | 14H7.....  |   | E | F |

These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

**-SYLVANIA SUBSTITUTION MANUAL-**

| For details of changes indicated<br>Refer to page 18                       |                       | NO CHANGES | 11L VOLTS | 11L CURRENT | CHANGE SOCKET | REWIRE SOCKET | REALIGN | ADD CONNECTION | REWORK CONNECTION | CHANGE PLATE CONNECTION | CHANGE PLATE VOLTS | NOTE NO. |
|----------------------------------------------------------------------------|-----------------------|------------|-----------|-------------|---------------|---------------|---------|----------------|-------------------|-------------------------|--------------------|----------|
| REQUIRED TYPE                                                              | POSSIBLE REPLACEMENTS | A          | B         | C           | D             | E             | F       | G              | H                 | K                       |                    |          |
| 12SJ7GT.....                                                               | 6BH6.....             |            | B         |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 6W7G.....             |            | B         |             | D             |               | F       | G              |                   |                         |                    |          |
|                                                                            | 7AG7.....             |            | B         |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 7C7.....              |            | B         |             |               | E             | F       |                |                   |                         |                    | 8        |
|                                                                            | 12AU6.....            |            |           |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 12AW6.....            |            |           |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 12C8.....             |            |           |             | D             |               | F       | G              |                   |                         |                    |          |
|                                                                            | 12J7GT.....           |            |           |             | D             |               | F       | G              |                   |                         |                    |          |
|                                                                            | 12SH7G.....           |            |           |             | D             |               | F       |                |                   |                         |                    | 6        |
|                                                                            | 14C7.....             |            |           |             |               | E             | F       |                |                   |                         |                    | 8        |
|                                                                            | 14R7.....             |            |           |             |               | E             | F       |                |                   |                         |                    |          |
|                                                                            | 5879.....             |            |           |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 9003.....             |            |           |             |               | E             | F       |                |                   |                         |                    |          |
| For use in audio amplifier types under 12SK7GT may also be used.           |                       |            |           |             |               |               |         |                |                   |                         |                    |          |
| For 300 ma. types see type 6SJ7G and for procedure see article on page 8.  |                       |            |           |             |               |               |         |                |                   |                         |                    |          |
| 12SK7GT.....                                                               | 6BJ6.....             |            | B         |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 6S7G.....             |            | B         |             |               |               | F       | G              |                   |                         |                    |          |
|                                                                            | 6SS7.....             |            | B         |             |               |               | F       |                |                   |                         |                    |          |
|                                                                            | 7AH7.....             |            | B         |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 7B7.....              |            | B         |             |               | E             | F       |                |                   |                         |                    |          |
|                                                                            | 12BA6.....            |            |           |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 12B7/14A7.....        |            |           |             |               | E             | F       |                |                   |                         |                    | 8        |
|                                                                            | 12BD6.....            |            |           |             |               | E             | F       |                |                   | K                       |                    |          |
|                                                                            | 12K7GT.....           |            |           |             | D             |               | F       | G              |                   |                         |                    |          |
|                                                                            | 12SG7.....            |            |           |             | D             |               | F       |                |                   | K                       |                    | 6        |
|                                                                            | 14E7.....             |            |           |             |               | E             | F       |                |                   |                         |                    |          |
|                                                                            | 14H7.....             |            |           |             |               | E             | F       |                |                   |                         |                    | 8        |
|                                                                            | 5590.....             |            |           |             |               | E             | F       |                |                   |                         |                    |          |
|                                                                            | 9001.....             |            |           |             |               | E             | F       |                |                   | K                       |                    |          |
| See also types under 12SJ7 and note 1.                                     |                       |            |           |             |               |               |         |                |                   |                         |                    |          |
| For 300 ma. types see type 6K7G and for procedure see article on page 8.   |                       |            |           |             |               |               |         |                |                   |                         |                    |          |
| 12SQ7GT.....                                                               | 6AQ6.....             |            | B         |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 6T7G.....             |            | B         |             | D             |               |         | G              |                   |                         |                    |          |
|                                                                            | 7B4.....              |            | B         |             |               | E             |         |                |                   |                         |                    | 5        |
|                                                                            | 7C6.....              |            | B         |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12AT6.....            |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12AV6.....            |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12BK6.....            |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12BT6.....            |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12F5GT.....           |            |           |             | D             |               |         | G              |                   |                         |                    | 5        |
|                                                                            | 12Q7GT.....           |            |           |             | D             |               |         | G              |                   |                         |                    |          |
|                                                                            | 12SF5GT.....          |            |           |             | D             |               |         |                |                   |                         |                    | 5        |
|                                                                            | 12SF7.....            |            |           |             | D             |               |         |                |                   |                         |                    | 3        |
|                                                                            | 14B6.....             |            |           |             |               | E             |         |                |                   |                         |                    | 8        |
|                                                                            | 14E7.....             |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 14R7.....             |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 14X7.....             |            |           |             |               | E             |         |                |                   |                         |                    |          |
| For 300 ma. types see type 6Q7GT and for procedure, see article on page 8. |                       |            |           |             |               |               |         |                |                   |                         |                    |          |
| 12SR7GT.....                                                               | 6C4.....              |            | B         |             |               | E             |         |                |                   |                         |                    | 5        |
|                                                                            | 6L5G.....             |            | B         |             | D             |               |         |                |                   |                         |                    | 5        |
|                                                                            | 6ST7.....             |            | B         |             |               |               |         |                |                   |                         |                    |          |
|                                                                            | 12BF6.....            |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12C8.....             |            |           |             |               | E             |         | G              |                   |                         |                    | 4        |
|                                                                            | 12E5GT.....           |            |           |             | D             |               |         |                |                   | K                       |                    | 5        |
|                                                                            | 12SF7.....            |            |           |             |               | E             |         |                |                   |                         |                    | 4        |
|                                                                            | 14E6.....             |            |           |             |               | E             |         |                |                   |                         |                    |          |
| For 300 ma. types see type 6R7G and for procedure see article on page 8.   |                       |            |           |             |               |               |         |                |                   |                         |                    |          |
| 14A4.....                                                                  | 6L5G.....             |            | B         |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 6ST7.....             |            | B         |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12J5GT.....           |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 12SR7.....            |            |           |             |               | E             |         |                |                   |                         |                    |          |
|                                                                            | 14E6.....             |            |           |             | D             |               |         |                |                   |                         |                    | 9        |
| For 300 ma. types see type 6J5G and for procedure see article on page 8.   |                       |            |           |             |               |               |         |                |                   |                         |                    |          |

| For details of changes indicated<br>Refer to page 18                      |                       | <div><div>NO CHANGES</div><div>FIL VOLTS</div><div>FIL CURRENT</div><div>REWIRE SOCKET</div><div>CHANGE SOCKET</div><div>REALIGN</div><div>CABLE CONNECTION</div><div>OR. PLATE CONNECTION</div><div>CHANGE BASE OR PLATE VOLTS</div><div>NOTE NO.</div></div> |   |   |   |   |   |   |   |     |  |
|---------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|-----|--|
| REQUIRED TYPE                                                             | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                                                                                              | B | C | D | E | F | G | H | K   |  |
| 14A5                                                                      | 12A6                  |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   |     |  |
|                                                                           | 35A5                  |                                                                                                                                                                                                                                                                | B |   |   |   |   |   |   | K 2 |  |
|                                                                           | 50A5                  |                                                                                                                                                                                                                                                                | B |   |   |   |   |   |   | K 2 |  |
|                                                                           | 50C6G                 |                                                                                                                                                                                                                                                                | B |   |   | E |   |   |   | K 2 |  |
|                                                                           | 6G6G                  |                                                                                                                                                                                                                                                                | B |   |   | E |   |   |   | K 2 |  |
|                                                                           | 35L6GT                |                                                                                                                                                                                                                                                                | B |   |   | E |   |   |   | K 2 |  |
|                                                                           | 50L6GT                |                                                                                                                                                                                                                                                                | B |   |   | E |   |   |   | K 2 |  |
| For 300 ma. types see type 12A5 and for procedure see article on page 8.  |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |
| 14A7                                                                      | 7B7                   |                                                                                                                                                                                                                                                                | B |   |   |   | F |   |   |     |  |
|                                                                           | 14H7                  |                                                                                                                                                                                                                                                                |   |   |   |   | F |   |   | 6   |  |
|                                                                           | 6S7G                  |                                                                                                                                                                                                                                                                | B |   |   | E | F | G |   |     |  |
|                                                                           | 6SS7                  |                                                                                                                                                                                                                                                                | B |   |   | E | F |   |   |     |  |
|                                                                           | 12SK7GT               |                                                                                                                                                                                                                                                                |   |   |   | E | F |   |   |     |  |
|                                                                           | 12SG7                 |                                                                                                                                                                                                                                                                |   |   |   | E | F |   |   | 6   |  |
|                                                                           | 12K7GT                |                                                                                                                                                                                                                                                                |   |   |   | E | F | G |   |     |  |
| For 300 ma. types see type 6K7GT and for procedure see article on page 8. |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |
| 14B6                                                                      | 7C6                   |                                                                                                                                                                                                                                                                | B |   |   |   |   |   |   |     |  |
|                                                                           | 6T7G                  |                                                                                                                                                                                                                                                                | B |   |   | E |   | G |   |     |  |
|                                                                           | 12C8                  |                                                                                                                                                                                                                                                                |   |   |   | E |   | G |   | 3   |  |
|                                                                           | 12Q7GT                |                                                                                                                                                                                                                                                                |   |   |   | E |   | G |   |     |  |
|                                                                           | 12SF7                 |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   | 3   |  |
|                                                                           | 12SQ7GT               |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   |     |  |
| For 300 ma. types see type 6Q7GT and for procedure see article on page 8. |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |
| 14B8                                                                      | 7A8                   |                                                                                                                                                                                                                                                                | B |   |   |   | F |   |   |     |  |
|                                                                           | 14J7                  |                                                                                                                                                                                                                                                                |   |   |   |   | F |   |   |     |  |
|                                                                           | 14S7                  |                                                                                                                                                                                                                                                                |   |   |   |   | F |   |   |     |  |
|                                                                           | 12A8GT                |                                                                                                                                                                                                                                                                |   |   |   | E | F | G |   |     |  |
|                                                                           | 12K8GT                |                                                                                                                                                                                                                                                                |   |   |   | E | F | G |   |     |  |
|                                                                           | 25B8GT                |                                                                                                                                                                                                                                                                | B |   |   | E | F | G |   | 11  |  |
|                                                                           | 6D8G                  |                                                                                                                                                                                                                                                                | B |   |   | E | F | G |   |     |  |
| For 300 ma. types see type 6A8GT and for procedure see article on page 8. |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |
| 14C7                                                                      | 7C7                   |                                                                                                                                                                                                                                                                | B |   |   |   |   |   |   |     |  |
|                                                                           | 6W7G                  |                                                                                                                                                                                                                                                                | B |   |   | E |   | G |   |     |  |
|                                                                           | 12SH7                 |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   | 6   |  |
|                                                                           | 12SJ7GT               |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   |     |  |
|                                                                           | 12J7GT                |                                                                                                                                                                                                                                                                |   |   |   | E |   | G |   |     |  |
| For use as audio amplifiers see also types under 14A7.                    |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |
| For 300 ma. types see type 6J7GT and for procedure see article on page 8. |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |
| 14E6                                                                      | 6C4                   |                                                                                                                                                                                                                                                                | B |   |   | E |   |   |   | 5   |  |
|                                                                           | 6L5G                  |                                                                                                                                                                                                                                                                | B |   |   | E |   |   |   | 5   |  |
|                                                                           | 6ST7                  |                                                                                                                                                                                                                                                                | B |   |   | E |   |   |   |     |  |
|                                                                           | 12BF6                 |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   |     |  |
|                                                                           | 12C8                  |                                                                                                                                                                                                                                                                |   |   |   | E |   | G |   | 4   |  |
|                                                                           | 12E5GT                |                                                                                                                                                                                                                                                                |   |   |   | E |   |   | K | 5   |  |
|                                                                           | 12SF7                 |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   | 4   |  |
|                                                                           | 12SR7                 |                                                                                                                                                                                                                                                                |   |   |   | E |   |   |   |     |  |
| For 300 ma. types see type 6V7G and for procedure see article on page 8.  |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |
| 14J7                                                                      | 6D8G                  |                                                                                                                                                                                                                                                                | B |   |   | E | F | G |   |     |  |
|                                                                           | 7A8                   |                                                                                                                                                                                                                                                                | B |   |   |   | F |   |   |     |  |
|                                                                           | 12A8GT                |                                                                                                                                                                                                                                                                |   |   |   | E | F | G |   |     |  |
|                                                                           | 12B8GT                |                                                                                                                                                                                                                                                                |   |   |   | E | F | G |   |     |  |
|                                                                           | 12K8GT                |                                                                                                                                                                                                                                                                |   |   |   | E | F | G |   |     |  |
|                                                                           | 14B8                  |                                                                                                                                                                                                                                                                |   |   |   |   | F |   |   |     |  |
|                                                                           | 14S7                  |                                                                                                                                                                                                                                                                |   |   |   |   | F |   |   |     |  |
| For 300 ma. types see type 6A8G and for procedure see article on page 8.  |                       |                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |     |  |

**These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.**



## -150 MA. SERIES HEATER TYPES-

| For details of changes indicated<br>Refer to page 18                       |                                                      | NO CHANGES          | FL. VOLTS | FL. CURRENT | REWIRE SOCKET | CHANGE SOCKET | REALIGN | RE-CONNECTION | CAP. TOP CAP | REPLACE TOP CAP | CHANGE WTS | NOTE NO. |
|----------------------------------------------------------------------------|------------------------------------------------------|---------------------|-----------|-------------|---------------|---------------|---------|---------------|--------------|-----------------|------------|----------|
| REQUIRED TYPE                                                              | POSSIBLE REPLACEMENTS                                | A                   | B         | C           | D             | E             | F       | G             | H            | K               |            |          |
| 14Q7.....                                                                  | 6D8G.....                                            |                     | B         |             |               | E             | F       | G             |              |                 |            | 11       |
|                                                                            | 7A8.....                                             |                     | B         |             | D             |               | F       |               |              |                 |            | 11       |
|                                                                            | 12A8GT.....                                          |                     |           |             |               | E             | F       | G             |              |                 |            | 11       |
|                                                                            | 12BA7.....                                           |                     |           |             |               | E             | F       |               |              |                 |            |          |
|                                                                            | 12BE6.....                                           |                     |           |             |               | E             | F       |               |              |                 |            |          |
|                                                                            | 12K8GT*.....                                         |                     |           |             |               | E             | F       | G             |              |                 |            | 11       |
|                                                                            | 12SA7GT*.....                                        |                     |           |             |               | E             | F       |               |              |                 |            |          |
|                                                                            | 12SY7.....                                           |                     |           |             |               | E             | F       |               |              |                 |            |          |
|                                                                            | 14B8.....                                            |                     |           |             | D             |               | F       |               |              |                 |            | 11       |
|                                                                            | 12SY7.....                                           |                     |           |             |               | E             | F       |               |              |                 |            |          |
|                                                                            | 14B8.....                                            |                     |           |             | D             |               | F       |               |              |                 |            | 11       |
|                                                                            | 14J7.....                                            |                     |           |             | D             |               | F       |               |              |                 |            | 11       |
|                                                                            | 14S7.....                                            |                     |           |             | D             |               | F       |               |              |                 |            | 11       |
| For 300 ma. types see type 6SA7 and for procedure see article on page 8.   |                                                      |                     |           |             |               |               |         |               |              |                 |            |          |
| 14R7.....                                                                  | 7B7.....                                             |                     | B         |             | D             |               |         |               |              |                 |            | 5        |
|                                                                            | 7C7.....                                             |                     | B         |             | D             |               |         |               |              |                 |            | 5        |
|                                                                            | 12C8.....                                            |                     |           |             |               | E             |         | G             |              | K               |            |          |
|                                                                            | 12SF7.....                                           |                     |           |             |               | E             |         |               |              | K               |            |          |
|                                                                            | 14A7.....                                            |                     |           |             | D             |               |         |               |              |                 |            | 5        |
|                                                                            | 14C7.....                                            |                     |           |             | D             |               |         |               |              |                 |            | 5        |
|                                                                            | 14E7.....                                            |                     |           |             |               |               |         |               |              | K               |            |          |
|                                                                            | 14H7.....                                            |                     |           |             | D             |               |         |               |              |                 |            | 5        |
| For 300 ma. types see type 6B8G and for procedure see article on page 8.   |                                                      |                     |           |             |               |               |         |               |              |                 |            |          |
| 25B8GT.....                                                                | No good single tube; Types 12SF5 and 12K7G together. |                     |           |             |               |               |         |               |              |                 |            |          |
|                                                                            | 12B8GT.....                                          |                     | B         | C           |               |               | F       |               |              |                 |            |          |
|                                                                            | 6P7G.....                                            |                     | B         | C           | D             |               | F       |               |              | K               |            |          |
|                                                                            | 6F7.....                                             |                     | B         | C           |               | E             | F       |               |              | K               |            |          |
|                                                                            | 12AT6 and                                            | Use adaptor         |           |             |               |               | F       |               | H            |                 |            | 9        |
|                                                                            | 12BA6                                                | with 2 Min. Sockets |           |             |               |               |         |               |              |                 |            |          |
|                                                                            | 12AV6 and                                            | Use adaptor         |           |             |               |               | F       |               | H            |                 |            | 9        |
|                                                                            | 12BD6                                                | with 2 Min. Sockets |           |             |               |               |         |               |              |                 |            |          |
|                                                                            | 12BK6 and                                            | Use adaptor         |           |             |               |               | F       |               | H            |                 |            | 9        |
|                                                                            | 12BA6                                                | with 2 Min. Sockets |           |             |               |               |         |               |              |                 |            |          |
|                                                                            | 12BT6 and                                            | Use adaptor         |           |             |               |               | F       |               | H            |                 |            | 9        |
|                                                                            | 12BD6                                                | with 2 Min. Sockets |           |             |               |               |         |               |              |                 |            |          |
| 25D8GT.....                                                                | 12AT6 and                                            | Use adaptor         |           |             |               |               | F       |               | H            |                 |            | 9        |
|                                                                            | 12BA6                                                | with 2 Min. Sockets |           |             |               |               |         |               |              |                 |            |          |
| Others same as 25B8GT using one of the diodes.                             |                                                      |                     |           |             |               |               |         |               |              |                 |            |          |
| 35A5.....                                                                  | 12A6.....                                            |                     | B         |             |               | E             |         |               |              | K               |            | 2        |
|                                                                            | 14A5.....                                            |                     | B         |             |               |               |         |               |              | K               |            | 2        |
|                                                                            | 50A5.....                                            |                     | B         |             |               |               |         |               |              |                 |            |          |
|                                                                            | 35B5.....                                            |                     |           |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 50B5.....                                            |                     | B         |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 35C5.....                                            |                     |           |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 50C5.....                                            |                     | B         |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 50C6G.....                                           |                     | B         |             |               |               |         |               |              | K               |            |          |
|                                                                            | 35L6GT.....                                          |                     |           |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 50L6GT.....                                          |                     | B         |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 70L7GT.....                                          |                     | B         |             |               | E             |         |               |              |                 |            | 9        |
| For 300 ma. types see type 25L6GT and for procedure see article on page 8. |                                                      |                     |           |             |               |               |         |               |              |                 |            |          |
| 35L6GT.....                                                                | 12A6.....                                            |                     | B         |             |               |               |         |               |              | K               |            | 2        |
|                                                                            | 14A5.....                                            |                     | B         |             |               | E             |         |               |              | K               |            | 2        |
|                                                                            | 35A5.....                                            |                     |           |             |               | E             |         |               |              |                 |            | 8        |
|                                                                            | 50A5.....                                            |                     | B         |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 35B5.....                                            |                     |           |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 50B5.....                                            |                     | B         |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 35C5.....                                            |                     |           |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 50C5.....                                            |                     | B         |             |               | E             |         |               |              |                 |            |          |
|                                                                            | 50C6G.....                                           |                     | B         |             |               |               |         |               |              |                 |            |          |
|                                                                            | 50L6GT.....                                          |                     | B         |             |               |               |         |               |              |                 |            |          |
|                                                                            | 70L7GT.....                                          |                     | B         |             | D             |               |         |               |              |                 |            | 9        |
| For 300 ma. types see type 25L6GT and for procedure see article on page 8. |                                                      |                     |           |             |               |               |         |               |              |                 |            |          |

| For details of changes indicated<br>Refer to page 18                       |                       | NO CHANGES<br>FL. VOLTS<br>FL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD TOP CAP CONNECTION<br>REWORK TOP CAP CONNECTION<br>CHANGE BIAS VOLTS<br>NOTE NO. |   |   |   |   |   |   |   |   |      |
|----------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|------|
| REQUIRED TYPE                                                              | POSSIBLE REPLACEMENTS | A                                                                                                                                                                           | B | C | D | E | F | G | H | K |      |
| 35Y4                                                                       | 70L7GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   | 9-10 |
|                                                                            | 35W4                  |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 50X6                  |                                                                                                                                                                             | B |   | D |   |   |   |   |   | 10   |
|                                                                            | 50Y6GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   | 10   |
|                                                                            | 35Z3                  |                                                                                                                                                                             |   |   | D |   |   |   |   |   | 10   |
|                                                                            | 35Z4GT                |                                                                                                                                                                             |   |   |   | E |   |   |   |   | 10   |
|                                                                            | 35Z5GT                |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 40Z5                  |                                                                                                                                                                             | B |   |   | E |   |   |   |   | 10   |
|                                                                            | 45Z3                  |                                                                                                                                                                             | B | C |   | E |   |   |   |   | 10   |
|                                                                            | 45Z5GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
|                                                                            | 50Z7G                 |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
| 35Z3                                                                       | 70L7GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   | 9    |
|                                                                            | 35W4                  |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 35Y4                  |                                                                                                                                                                             |   |   | D |   |   |   |   |   |      |
|                                                                            | 50Y6GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
|                                                                            | 35Z4GT                |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 35Z5GT                |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 40Z5                  |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
|                                                                            | 45Z3                  |                                                                                                                                                                             | B | C |   | E |   |   |   |   |      |
|                                                                            | 45Z5GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
|                                                                            | 50Z7GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
| 35Z4GT                                                                     | 70L7GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   | 9    |
|                                                                            | 35W4                  |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 35Y4                  |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 50Y6GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   |      |
|                                                                            | 35Z3                  |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 35Z5GT                |                                                                                                                                                                             |   |   | D |   |   |   |   |   |      |
|                                                                            | 40Z5                  |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
|                                                                            | 45Z3                  |                                                                                                                                                                             | B | C |   | E |   |   |   |   |      |
|                                                                            | 45Z5GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   |      |
|                                                                            | 50Z7GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   |      |
| 35Z5GT                                                                     | 70L7GT                |                                                                                                                                                                             | B |   |   |   |   |   |   |   | 9-10 |
|                                                                            | 35Y4                  |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 50Y6GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   | 10   |
|                                                                            | 35Z3                  |                                                                                                                                                                             |   |   |   | E |   |   |   |   | 8-10 |
|                                                                            | 35Z4GT                |                                                                                                                                                                             |   |   |   |   |   |   |   |   | 10   |
|                                                                            | 40Z5                  |                                                                                                                                                                             | B |   |   |   |   |   |   |   |      |
|                                                                            | 45Z3                  |                                                                                                                                                                             | B | C |   | E |   |   |   |   | 10   |
|                                                                            | 45Z5GT                |                                                                                                                                                                             | B |   |   |   |   |   |   |   |      |
|                                                                            | 50Z7GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   |      |
| 45Z5GT                                                                     | 70L7GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   | 10   |
|                                                                            | 35Y4                  |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
|                                                                            | 50Y6GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   | 10   |
|                                                                            | 35Z3                  |                                                                                                                                                                             | B |   |   | E |   |   |   |   | 10   |
|                                                                            | 35Z4GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   | 10   |
|                                                                            | 35Z5GT                |                                                                                                                                                                             | B |   |   |   |   |   |   |   |      |
|                                                                            | 40Z5                  |                                                                                                                                                                             | A |   |   |   |   |   |   |   | 10   |
|                                                                            | 45Z3                  |                                                                                                                                                                             |   | C |   | E |   |   |   |   | 10   |
|                                                                            | 50Z7GT                |                                                                                                                                                                             | B |   | D |   |   |   |   |   | 10   |
| 50A5                                                                       | 12A6                  |                                                                                                                                                                             | B |   |   | E |   |   |   | K |      |
|                                                                            | 14A5                  |                                                                                                                                                                             | B |   |   |   |   |   |   | K |      |
|                                                                            | 35A5                  |                                                                                                                                                                             | B |   |   |   |   |   |   |   |      |
|                                                                            | 50B5                  |                                                                                                                                                                             |   |   | D |   |   |   |   |   |      |
|                                                                            | 50C5                  |                                                                                                                                                                             |   |   | D |   |   |   |   |   |      |
|                                                                            | 50C6G                 |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 35L6GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   |      |
|                                                                            | 50L6GT                |                                                                                                                                                                             |   |   |   | E |   |   |   |   |      |
|                                                                            | 70L7GT                |                                                                                                                                                                             | B |   |   | E |   |   |   |   | 10   |
| For 300 ma. types see type 25L6GT and for procedure see article on page 8. |                       |                                                                                                                                                                             |   |   |   |   |   |   |   |   |      |
| 50B5                                                                       | 35B5                  |                                                                                                                                                                             | B |   |   |   |   |   |   |   |      |
|                                                                            | 35C5                  |                                                                                                                                                                             | B |   | D |   |   |   |   |   |      |
|                                                                            | 50C5                  |                                                                                                                                                                             |   |   | D |   |   |   |   |   |      |

These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 18                       |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD CONNECTION<br>OR MOVE CONNECTION<br>CHANGE BASE<br>OR PLATE VOLTS<br>NOTE NO. |   |   |   |   |   |   |   |   |    |
|----------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
| REQUIRED TYPE                                                              | POSSIBLE REPLACEMENTS | A                                                                                                                                                                          | B | C | D | E | F | G | H | K |    |
| 50C6G.....                                                                 | 12A6.....             | B                                                                                                                                                                          |   |   |   |   |   |   |   | K |    |
|                                                                            | 14A5.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   | K |    |
|                                                                            | 35A5.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   | K |    |
|                                                                            | 50A5.....             |                                                                                                                                                                            |   |   | E |   |   |   |   | K |    |
|                                                                            | 35L6GT.....           | B                                                                                                                                                                          |   |   |   |   |   |   |   | K |    |
|                                                                            | 50L6GT.....           |                                                                                                                                                                            |   |   |   |   |   |   |   | K |    |
|                                                                            | 70L7GT.....           | B                                                                                                                                                                          |   | D |   |   |   |   |   | K | 10 |
| For 300 ma. types see type 25C6G and for procedure see article on page 8.  |                       |                                                                                                                                                                            |   |   |   |   |   |   |   |   |    |
| 50L6GT.....                                                                | 12A6.....             | B                                                                                                                                                                          |   |   |   |   |   |   |   | K | 2  |
|                                                                            | 14A5.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   | K | 2  |
|                                                                            | 35A5.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   |   |    |
|                                                                            | 50A5.....             |                                                                                                                                                                            |   |   | E |   |   |   |   |   | 8  |
|                                                                            | 35B5.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   |   |    |
|                                                                            | 50B5.....             |                                                                                                                                                                            |   |   | E |   |   |   |   |   |    |
|                                                                            | 35C5.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   |   |    |
|                                                                            | 50C5.....             |                                                                                                                                                                            |   |   | E |   |   |   |   |   |    |
|                                                                            | 50C6G.....            |                                                                                                                                                                            |   |   |   |   |   |   |   | K |    |
|                                                                            | 35L6GT.....           | B                                                                                                                                                                          |   |   |   |   |   |   |   |   |    |
|                                                                            | 70L7GT.....           | B                                                                                                                                                                          |   | D |   |   |   |   |   |   |    |
| For 300 ma. types see type 25L6GT and for procedure see article on page 8. |                       |                                                                                                                                                                            |   |   |   |   |   |   |   |   |    |
| 50X6.....                                                                  | 50Y6GT.....           |                                                                                                                                                                            |   |   | E |   |   |   |   |   |    |
|                                                                            | 50Y7GT.....           |                                                                                                                                                                            |   |   | E |   |   |   |   |   |    |
|                                                                            | 50Z7G.....            |                                                                                                                                                                            |   |   | E |   |   |   |   |   |    |
|                                                                            | 117Z6GT.....          | B                                                                                                                                                                          | C |   | E |   |   |   |   |   |    |
| See also types under 50Y6GT for use as a half wave rectifier.              |                       |                                                                                                                                                                            |   |   |   |   |   |   |   |   |    |

| For details of changes indicated<br>Refer to page 18                                        |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD CONNECTION<br>OR MOVE CONNECTION<br>CHANGE BASE<br>OR PLATE VOLTS<br>NOTE NO. |   |   |   |   |   |   |   |   |      |
|---------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|------|
| REQUIRED TYPE                                                                               | POSSIBLE REPLACEMENTS | A                                                                                                                                                                          | B | C | D | E | F | G | H | K |      |
| 50Y6GT.....                                                                                 | 117Z6GT.....          | B                                                                                                                                                                          | C |   |   |   |   |   |   |   | 12   |
|                                                                                             | 50X6.....             |                                                                                                                                                                            |   |   | E |   |   |   |   |   | 10   |
|                                                                                             | 50Z7G.....            |                                                                                                                                                                            |   |   | D |   |   |   |   |   | 12   |
|                                                                                             | 70L7G.....            |                                                                                                                                                                            |   |   | D |   |   |   |   |   | 4    |
| For 300 ma. types see type 25Z6 and for procedure see article on page 8.                    |                       |                                                                                                                                                                            |   |   |   |   |   |   |   |   |      |
| When used as a half-wave rectifier the following will substitute, if load is not too great. |                       |                                                                                                                                                                            |   |   |   |   |   |   |   |   |      |
|                                                                                             | 35Z3.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   |   | 12   |
|                                                                                             | 35Z4GT.....           | B                                                                                                                                                                          |   | D |   |   |   |   |   |   | 12   |
|                                                                                             | 35Z5GT.....           | B                                                                                                                                                                          |   | D |   |   |   |   |   |   | 12   |
|                                                                                             | 45Z5GT.....           |                                                                                                                                                                            |   | D |   |   |   |   |   |   | 12   |
|                                                                                             | 35Y4.....             | B                                                                                                                                                                          |   |   | E |   |   |   |   |   | 12   |
|                                                                                             | 70L7GT.....           | B                                                                                                                                                                          |   | D |   |   |   |   |   |   | 9    |
|                                                                                             | 117Z4GT.....          | B                                                                                                                                                                          | C | D |   |   |   |   |   |   | 12   |
| 50Z7G.....                                                                                  | 50Y6GT.....           |                                                                                                                                                                            |   |   | D |   |   |   |   |   | 10   |
|                                                                                             | 70L7GT.....           | B                                                                                                                                                                          |   | D |   |   |   |   |   |   | 4-10 |
|                                                                                             | 117Z6GT.....          | B                                                                                                                                                                          | C | D |   |   |   |   |   |   | 10   |
| See also type 50Y6GT above.                                                                 |                       |                                                                                                                                                                            |   |   |   |   |   |   |   |   |      |
| 70L7GT.....                                                                                 | 70A7GT.....           |                                                                                                                                                                            |   |   | D |   |   |   |   |   |      |
|                                                                                             | 117P7GT.....          | B                                                                                                                                                                          | C | D |   |   |   |   |   | K | 2    |
|                                                                                             | 117N7GT.....          | B                                                                                                                                                                          | C | D |   |   |   |   |   |   | 2    |
|                                                                                             | 117L7/M7GT.....       | B                                                                                                                                                                          | C | D |   |   |   |   |   |   | 2    |
| XXD.....                                                                                    | 14AF7.....            | A                                                                                                                                                                          |   |   |   |   |   |   |   |   |      |
|                                                                                             | 14F7.....             |                                                                                                                                                                            |   |   |   |   |   |   |   | K |      |
|                                                                                             | 12SL7GT.....          |                                                                                                                                                                            |   |   | E |   |   |   |   | K |      |
|                                                                                             | 12AH7GT.....          |                                                                                                                                                                            |   |   | E |   |   |   |   |   |      |
|                                                                                             | 12SC7.....            |                                                                                                                                                                            |   |   | E |   |   |   |   | K |      |

## NOTES FOR 150 MA., 300 MA., TRANSFORMER AND AUTO TYPES

- This is shown only when the tubes are directly interchangeable for all published ratings. Unusual operating conditions may require analysis.
- This means that the heater voltage on the substitute tube is different from the required type. In most cases this can be taken care of by changing or shorting out a section of the series resistor. In cases where the resistor is in the line cord this is difficult unless the total voltage can be increased enough to make a line resistor unnecessary. In transformer and auto sets this indicates that a series resistor is required to drop the voltage to that required by the substitute tube.
- Indicates that the heater current of the substitute tube is different from the desired tube and that parallel resistors must be used as explained in the article on Page 8. In transformer and auto sets tubes requiring more current should be used cautiously to avoid overloading the filament circuit. When more than one substitution is required in the same set it is sometimes possible for one to require a lower current keeping the total the same.
- In these cases the tube socket is the same but some rearrangement of the connections may be necessary. It may only be necessary to be sure that contacts connected to elements of the substitute tube which are not required in that circuit are not used as tie points.
- Requires a different type of socket. Watch out for tie points as in "D".
- Realignment is recommended as good practice in all cases of RF and IF tube changes.
- Provision must be made for connection to the top cap of the substitute tube which was not originally required.
- The former top-cap connection will have to be changed to connect to a base pin.
- Indicates that the substitute tube operates at a different bias for the applied plate voltage than the original tubes. Self bias circuits give some automatic correction but this should be measured and changed if necessary to prevent early failures.
  - The use of a sharp cut-off pentode in place of a remote cutoff tube may cause great distortion in locations when strong signals are available. If no other substitute can be found all tubes on the A.V.C. system should be changed.
  - The optimum load resistance for these types is more than 20% off. If tone or volume is noticeably poor, transformer tap adjustment or a new transformer may be required.
  - Requires addition of screen voltage, resistor and bypass condenser. Select resistor to give screen volts approximately equal to actual plate volts.
  - This type can be used as a triode by tying screen and suppressor to the plate. As a rectifier tie all grids to plate.
  - A type 1N34 crystal may be used in place of the diode section of the original tube.
  - If voltage at screen is greater than rated value it should be reduced.
  - Screen voltage may be increased for this type.
  - Circuit for this substitution is given on last few pages of this booklet.
  - Unused elements should be connected to chassis or cathode terminal.
  - Pilot lamp may be omitted or provided for by other means.
  - This converter substitution is tricky. Some experimentation may be required to find the best connection for each set. Adaptor circuits in the back of this book may help.
  - Check load current to be sure it is within ratings of substitute tube.

These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

| For details of changes indicated<br>Refer to page 18                                                                                  |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD OR REMOVE<br>CONNECTION<br>CAPACITOR<br>CHANGE BIAS<br>OR PLATE TOP VOLTS<br>NOTE NO. |        |   |   |            |   |   |   |   |        |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|---|------------|---|---|---|---|--------|
| REQUIRED TYPE                                                                                                                         | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                  | B      | C | D | E          | F | G | H | K |        |
| 1V.....                                                                                                                               | 12Z3.....             | B.....                                                                                                                                                                             |        |   |   |            |   |   |   |   |        |
|                                                                                                                                       | 76.....               |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | 4      |
|                                                                                                                                       | 37.....               |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | 4      |
|                                                                                                                                       | 6J5GT.....            |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | 4      |
|                                                                                                                                       | 12A7.....             | B.....                                                                                                                                                                             |        |   |   | E.....     |   |   |   |   | 9      |
|                                                                                                                                       | 14Y4.....             | B.....                                                                                                                                                                             |        |   |   | E.....     |   |   |   |   |        |
| Any type listed under 35Z3 in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.)                        |                       |                                                                                                                                                                                    |        |   |   |            |   |   |   |   |        |
| 6A7.....                                                                                                                              | 6A8GT.....            |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 8      |
|                                                                                                                                       | 6AN7.....             | C.....                                                                                                                                                                             |        |   |   | E.....     |   |   |   |   |        |
|                                                                                                                                       | 6J8G.....             |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 8      |
|                                                                                                                                       | 6K8GT.....            |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 8      |
|                                                                                                                                       | 7B8.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   |        |
|                                                                                                                                       | 7J7.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   |        |
|                                                                                                                                       | 7S7.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   |        |
| Any type listed under 6D8G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.)                        |                       |                                                                                                                                                                                    |        |   |   |            |   |   |   |   |        |
| 6A8G.....                                                                                                                             | 6J8G.....             |                                                                                                                                                                                    |        |   |   | F.....     |   |   |   |   |        |
|                                                                                                                                       | 6K8GT.....            |                                                                                                                                                                                    |        |   |   | F.....     |   |   |   |   |        |
|                                                                                                                                       | 6A7.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 8      |
|                                                                                                                                       | 7B8.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 8      |
|                                                                                                                                       | 7J7.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 8      |
|                                                                                                                                       | 7S7.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   |        |
|                                                                                                                                       | 12B8GT.....           | B.....                                                                                                                                                                             | D..... |   |   | F.....     |   |   |   |   | 8      |
| Any type listed under 6D8G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.)                        |                       |                                                                                                                                                                                    |        |   |   |            |   |   |   |   |        |
| 6AE5GT/G.....                                                                                                                         | 6C5GT.....            |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 6AF5G.....            |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 6J5GT.....            |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 6P5GT.....            |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 7A4.....              |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | K..... |
| Any type listed under 6L5G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) See also type 25AC5GT. |                       |                                                                                                                                                                                    |        |   |   |            |   |   |   |   |        |
| 6AF5G.....                                                                                                                            | 6J5G.....             |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 6C5GT.....            |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 6P5GT.....            |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 7A4.....              |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | K..... |
|                                                                                                                                       | 6AE5GT.....           |                                                                                                                                                                                    |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 76.....               |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | K..... |
| 6B7.....                                                                                                                              | 6B8G.....             |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   |        |
|                                                                                                                                       | 6SF7.....             |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | K..... |
|                                                                                                                                       | 7E7.....              |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   |        |
|                                                                                                                                       | 7R7.....              |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | K..... |
| Any type listed under 12C8 in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.)                        |                       |                                                                                                                                                                                    |        |   |   |            |   |   |   |   |        |
| 6B8G.....                                                                                                                             | 6B7.....              |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   |        |
|                                                                                                                                       | 6SF7.....             | D.....                                                                                                                                                                             |        |   |   |            |   |   |   |   | K..... |
|                                                                                                                                       | 7E7.....              |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   |        |
|                                                                                                                                       | 7R7.....              |                                                                                                                                                                                    |        |   |   | E.....     |   |   |   |   | K..... |
| Any type listed under 12C8 in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.)                        |                       |                                                                                                                                                                                    |        |   |   |            |   |   |   |   |        |
| 6BE6.....                                                                                                                             | 6A8GT.....            |                                                                                                                                                                                    |        |   |   | E F G..... |   |   |   |   | 11     |
|                                                                                                                                       | 7Q7.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   |        |
|                                                                                                                                       | 6SA7GT.....           |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   |        |
|                                                                                                                                       | 6AN7.....             |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 11     |
|                                                                                                                                       | 6D8G.....             | C.....                                                                                                                                                                             |        |   |   | E F G..... |   |   |   |   | 11     |
|                                                                                                                                       | 6J8G.....             |                                                                                                                                                                                    |        |   |   | E F G..... |   |   |   |   | 11     |
|                                                                                                                                       | 6K8GT.....            |                                                                                                                                                                                    |        |   |   | E F G..... |   |   |   |   | 11     |
|                                                                                                                                       | 7A8.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 11     |
|                                                                                                                                       | 7B8.....              |                                                                                                                                                                                    |        |   |   | E F.....   |   |   |   |   | 11     |

| For details of changes indicated<br>Refer to page 18                                                            |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD OR REMOVE<br>CONNECTION<br>CAPACITOR<br>CHANGE BIAS<br>OR PLATE TOP VOLTS<br>NOTE NO. |          |        |        |          |   |        |   |   |        |
|-----------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|--------|----------|---|--------|---|---|--------|
| REQUIRED TYPE                                                                                                   | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                  | B        | C      | D      | E        | F | G      | H | K |        |
| 6BE6.....                                                                                                       | 7J7.....              |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   | 11     |
| (Continued)                                                                                                     | 6BA7.....             |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
|                                                                                                                 | 12BE6.....            |                                                                                                                                                                                    | B C..... |        |        | F.....   |   |        |   |   |        |
|                                                                                                                 | 12SY7.....            |                                                                                                                                                                                    | B C..... |        |        | E F..... |   |        |   |   |        |
| 6C5GT.....                                                                                                      | 7A4.....              |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | 8      |
|                                                                                                                 | 6J5GT.....            | A.....                                                                                                                                                                             |          |        |        |          |   |        |   |   |        |
|                                                                                                                 | 6AF5G.....            |                                                                                                                                                                                    |          |        |        |          |   |        |   |   | K..... |
|                                                                                                                 | 76.....               |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | K..... |
|                                                                                                                 | 6P5GT.....            |                                                                                                                                                                                    |          |        |        |          |   |        |   |   | K..... |
|                                                                                                                 | 37.....               |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | K..... |
|                                                                                                                 | 6AE5G.....            |                                                                                                                                                                                    |          |        |        |          |   |        |   |   | K..... |
|                                                                                                                 | 6V7G.....             |                                                                                                                                                                                    |          | D..... |        |          |   |        |   |   | K..... |
|                                                                                                                 | 85.....               |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | K..... |
|                                                                                                                 | 6R7G.....             |                                                                                                                                                                                    |          | D..... |        | G.....   |   |        |   |   |        |
|                                                                                                                 | 6SR7G.....            |                                                                                                                                                                                    |          | D..... |        |          |   |        |   |   |        |
| Any type listed under 6L5G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.)  |                       |                                                                                                                                                                                    |          |        |        |          |   |        |   |   |        |
| 6C6.....                                                                                                        | 77.....               |                                                                                                                                                                                    |          |        |        | F.....   |   |        |   |   |        |
|                                                                                                                 | 6J7GT.....            |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
|                                                                                                                 | 6SH7GT.....           |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   | 6      |
|                                                                                                                 | 6SJ7GT.....           |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   |        |
|                                                                                                                 | 7L7.....              |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   | 6      |
|                                                                                                                 | 7H7.....              |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   | 6      |
|                                                                                                                 | 7G7.....              |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   | 6      |
|                                                                                                                 | 36.....               |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
|                                                                                                                 | 6D7.....              |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
| Also types under 6D6, but see Note 1.                                                                           |                       |                                                                                                                                                                                    |          |        |        |          |   |        |   |   |        |
| Any types listed under 6W7G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) |                       |                                                                                                                                                                                    |          |        |        |          |   |        |   |   |        |
| 6D6.....                                                                                                        | 78.....               |                                                                                                                                                                                    |          |        |        | F.....   |   |        |   |   |        |
|                                                                                                                 | 39/44.....            |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
|                                                                                                                 | 6K7GT.....            |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
|                                                                                                                 | 6SK7GT.....           |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   |        |
|                                                                                                                 | 6U7G.....             |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
|                                                                                                                 | 6SD7GT.....           |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   | 6      |
|                                                                                                                 | 6SG7.....             |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   | 6      |
|                                                                                                                 | 7A7.....              |                                                                                                                                                                                    |          |        |        | E F..... |   | H..... |   |   |        |
|                                                                                                                 | 6E7.....              |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
| Also types under 6C6, but see note 1.                                                                           |                       |                                                                                                                                                                                    |          |        |        |          |   |        |   |   |        |
| Any types listed under 6S7G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) |                       |                                                                                                                                                                                    |          |        |        |          |   |        |   |   |        |
| 6F5GT.....                                                                                                      | 6K5GT.....            |                                                                                                                                                                                    |          |        | D..... |          |   |        |   |   |        |
|                                                                                                                 | 6SF5GT.....           |                                                                                                                                                                                    |          |        | E..... |          |   | H..... |   |   |        |
|                                                                                                                 | 6SL7GT.....           |                                                                                                                                                                                    |          |        | D..... |          |   |        |   |   | 9      |
|                                                                                                                 | 6Q7GT.....            |                                                                                                                                                                                    |          |        | D..... |          |   |        |   |   | 9      |
|                                                                                                                 | 6SQ7GT.....           |                                                                                                                                                                                    |          |        | D..... |          |   | H..... |   |   | 9      |
|                                                                                                                 | 75.....               |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | 9      |
|                                                                                                                 | 6B6G.....             |                                                                                                                                                                                    |          |        | D..... |          |   |        |   |   | 9      |
|                                                                                                                 | 6B8G.....             |                                                                                                                                                                                    |          |        | D..... |          |   |        |   |   | 3      |
|                                                                                                                 | 6SF7.....             |                                                                                                                                                                                    |          |        | D..... |          |   | H..... |   |   | 3      |
|                                                                                                                 | 6F7.....              |                                                                                                                                                                                    |          |        | E..... |          |   |        |   |   | 3-9    |
|                                                                                                                 | 6P7G.....             |                                                                                                                                                                                    |          |        | D..... |          |   |        |   |   | 3-9    |
|                                                                                                                 | 6B7.....              |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | 3      |
|                                                                                                                 | 7B4.....              |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | 8      |
|                                                                                                                 | 7B6.....              |                                                                                                                                                                                    |          |        |        | E.....   |   |        |   |   | 8-9    |
| Any type listed under 12F5G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) |                       |                                                                                                                                                                                    |          |        |        |          |   |        |   |   |        |
| 6F7.....                                                                                                        | 6F78.....             |                                                                                                                                                                                    |          |        |        | F.....   |   |        |   |   |        |
|                                                                                                                 | 6P7G.....             |                                                                                                                                                                                    |          |        |        | E F..... |   |        |   |   |        |
|                                                                                                                 | 12B8GT.....           |                                                                                                                                                                                    | B.....   |        |        | E F..... |   |        |   |   | K..... |
|                                                                                                                 | 25B8GT.....           |                                                                                                                                                                                    | B C..... |        |        | E F..... |   |        |   |   | K..... |
| 6H6GT.....                                                                                                      | 6C8G.....             |                                                                                                                                                                                    |          |        | D..... |          |   | G..... |   |   | 4      |
|                                                                                                                 | 12A7.....             |                                                                                                                                                                                    | B.....   |        | D..... |          |   | G..... |   |   | 4      |

These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 18                                                           |                                            | <div>NO CHANGES<br/>FIL. VOLTS<br/>FIL. CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>CATHODE CONNECTION<br/>OR FOCUS CONNECTION<br/>CHANGE BIAS<br/>OR PLATE VOLTS<br/>NOTE NO.</div> |        |        |        |        |        |        |        |        |  |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| REQUIRED TYPE                                                                                                  | POSSIBLE REPLACEMENTS                      | A                                                                                                                                                                                                    | B      | C      | D      | E      | F      | G      | H      | K      |  |
| 6H6GT.....                                                                                                     | 7F7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... |        |        |        | 4      |  |
| (Continued)                                                                                                    | 14N7.....                                  |                                                                                                                                                                                                      | B..... |        |        | E..... |        |        |        | 4      |  |
|                                                                                                                | 14Y4.....                                  |                                                                                                                                                                                                      | B..... |        |        | E..... |        |        |        |        |  |
| Any type listed under 7A6 in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.)  |                                            |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6J5GT.....                                                                                                     | 6C5GT.....                                 | A.....                                                                                                                                                                                               |        |        |        |        |        |        |        |        |  |
| See also 6C5GT in this table.                                                                                  |                                            |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6J7GT.....                                                                                                     | 7L7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... | H..... |        | 6-8    |  |
|                                                                                                                | 6SJ7GT.....                                |                                                                                                                                                                                                      |        |        | D..... |        | F..... | H..... |        |        |  |
|                                                                                                                | 77.....                                    |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 6C6.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 6SH7GT.....                                |                                                                                                                                                                                                      |        |        | D..... |        | F..... | H..... |        | 6      |  |
|                                                                                                                | 7H7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... | H..... |        | 6      |  |
| Any type listed under 6W7G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) |                                            |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6J8G.....                                                                                                      | 6A8GT.....                                 |                                                                                                                                                                                                      |        |        |        |        | F..... |        |        |        |  |
|                                                                                                                | 6K8GT.....                                 |                                                                                                                                                                                                      |        |        |        |        | F..... |        |        |        |  |
|                                                                                                                | 6A7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 7B8.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... | H..... |        | 8      |  |
|                                                                                                                | 7J7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... | H..... |        | 8      |  |
|                                                                                                                | 7S7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... | H..... |        | 8      |  |
|                                                                                                                | 6F7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 6P7G.....                                  |                                                                                                                                                                                                      |        |        | D..... |        | F..... |        |        |        |  |
| Any type listed under 6D8G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) |                                            |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6K5GT.....                                                                                                     | See 6F5GT.....                             |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6K7GT.....                                                                                                     | 7H7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... | H..... |        | 6-8    |  |
|                                                                                                                | 6U7G.....                                  |                                                                                                                                                                                                      |        |        |        |        | F..... |        |        |        |  |
|                                                                                                                | 6SK7GT.....                                |                                                                                                                                                                                                      |        |        | D..... |        | F..... | H..... |        |        |  |
|                                                                                                                | 39/44.....                                 |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 78.....                                    |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 6D6.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 36.....                                    |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 6SG7.....                                  |                                                                                                                                                                                                      |        |        | D..... |        | F..... | H..... |        | 6      |  |
|                                                                                                                | 7A7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... | H..... |        | 8      |  |
| Types under 6J7GT, but see note 1.                                                                             |                                            |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| Any type listed under 6S7G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) |                                            |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6K8GT.....                                                                                                     | 6J8G.....                                  |                                                                                                                                                                                                      |        |        |        |        | F..... |        |        |        |  |
|                                                                                                                | 6A8GT.....                                 |                                                                                                                                                                                                      |        |        |        |        | F..... |        |        |        |  |
|                                                                                                                | 6A7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 7B8.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 7J7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 7S7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
| Any type listed under 6D8G in 150 ma. chart may be used with simple resistor changes. (See article on Page 8.) |                                            |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6P5GT.....                                                                                                     | See 6C5GT—Bias change may not be required. |                                                                                                                                                                                                      |        |        |        |        |        |        |        |        |  |
| 6P7G.....                                                                                                      | 6F7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... | F..... |        |        |        |  |
|                                                                                                                | 12B8GT.....                                |                                                                                                                                                                                                      | B..... |        | D..... |        | F..... |        |        | K..... |  |
|                                                                                                                | 25B8GT.....                                |                                                                                                                                                                                                      | B..... | C..... | D..... |        | F..... |        |        | K..... |  |
| 6Q7GT.....                                                                                                     | 6B6G.....                                  | A.....                                                                                                                                                                                               |        |        |        |        |        |        |        |        |  |
|                                                                                                                | 6SQ7GT.....                                |                                                                                                                                                                                                      |        |        | D..... |        |        |        | H..... |        |  |
|                                                                                                                | 75.....                                    |                                                                                                                                                                                                      |        |        |        | E..... |        |        |        | 8      |  |
|                                                                                                                | 7B6.....                                   |                                                                                                                                                                                                      |        |        |        | E..... |        |        | H..... | 8      |  |
|                                                                                                                | 7K7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... |        |        | H..... |        |  |
|                                                                                                                | XXFM.....                                  |                                                                                                                                                                                                      |        |        |        | E..... |        |        | H..... |        |  |
|                                                                                                                | 6B7.....                                   |                                                                                                                                                                                                      |        |        |        | E..... |        |        |        | 3      |  |
|                                                                                                                | 6B8G.....                                  |                                                                                                                                                                                                      |        |        | D..... |        |        |        |        | 3      |  |
|                                                                                                                | 6SF7.....                                  |                                                                                                                                                                                                      |        |        | D..... |        |        |        | H..... | 3      |  |

| For details of changes indicated<br>Refer to page 18                                                                    |                       | <div>NO CHANGES<br/>FIL. VOLTS<br/>FIL. CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>CATH. CONNECTION<br/>OR FOCUS CONNECTION<br/>CHANGE BIAS<br/>OR PLATE VOLTS<br/>NOTE NO.</div> |   |   |        |        |   |        |      |    |  |
|-------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--------|--------|---|--------|------|----|--|
| REQUIRED TYPE                                                                                                           | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                                  | B | C | D      | E      | F | G      | H    | K  |  |
| 6Q7GT.....                                                                                                              | 7E7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   |        | H... | 3  |  |
| (Continued)                                                                                                             | 7R7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   |        | H... | 3  |  |
| Any type listed under 6T7G in 150 ma. chart<br>may be used with simple resistor changes.<br>(See article on Page 8.)    |                       |                                                                                                                                                                                                    |   |   |        |        |   |        |      |    |  |
| 6R7GT.....                                                                                                              | 6V7G.....             |                                                                                                                                                                                                    |   |   |        |        |   |        |      | K  |  |
|                                                                                                                         | 85.....               |                                                                                                                                                                                                    |   |   |        | E..... |   |        | K    |    |  |
|                                                                                                                         | 6SR7GT.....           |                                                                                                                                                                                                    |   |   | D..... |        |   | H..... |      |    |  |
|                                                                                                                         | 6B7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   |        | K    | 4  |  |
|                                                                                                                         | 6B8G.....             |                                                                                                                                                                                                    |   |   | D..... |        |   |        | K    | 4  |  |
|                                                                                                                         | 6SF7.....             |                                                                                                                                                                                                    |   |   | D..... |        |   | H      | K    | 4  |  |
|                                                                                                                         | 7E7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   | H      | K    | 4  |  |
|                                                                                                                         | 7R7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   | H      | K    | 4  |  |
|                                                                                                                         | 7E6.....              |                                                                                                                                                                                                    |   |   |        | E..... |   | H      | K    | 4  |  |
| 6SA7GT.....                                                                                                             | 6A8GT.....            |                                                                                                                                                                                                    |   |   | D..... |        |   | G..... |      | 11 |  |
|                                                                                                                         | 6J8G.....             |                                                                                                                                                                                                    |   |   | D..... |        |   | G..... |      | 11 |  |
|                                                                                                                         | 6K8GT.....            |                                                                                                                                                                                                    |   |   | D..... |        |   | G..... |      | 11 |  |
|                                                                                                                         | 7B8.....              |                                                                                                                                                                                                    |   |   |        | E..... |   |        |      | 11 |  |
|                                                                                                                         | 7Q7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   |        |      | 8  |  |
|                                                                                                                         | 7J7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   |        |      | 11 |  |
|                                                                                                                         | 7S7.....              |                                                                                                                                                                                                    |   |   |        | E..... |   |        |      | 11 |  |
| Any type listed under 12SA7GT in 150 ma. chart<br>may be used with simple resistor changes.<br>(See article on Page 8.) |                       |                                                                                                                                                                                                    |   |   |        |        |   |        |      |    |  |
| 6SJ7GT.....                                                                                                             | 7L7.....              |                                                                                                                                                                                                    |   |   |        | E      | F |        |      | 6  |  |
|                                                                                                                         | 6J7GT.....            |                                                                                                                                                                                                    |   |   | D..... |        | F | G      |      |    |  |
|                                                                                                                         | 77.....               |                                                                                                                                                                                                    |   |   |        | E      | F | G      |      |    |  |
|                                                                                                                         | 6C6.....              |                                                                                                                                                                                                    |   |   |        | E      | F | G      |      |    |  |
|                                                                                                                         | 6SH7GT.....           |                                                                                                                                                                                                    |   |   | D..... |        | F |        |      | 6  |  |
|                                                                                                                         | 7H7.....              |                                                                                                                                                                                                    |   |   |        | E      | F |        |      | 6  |  |
|                                                                                                                         | 7C7.....              |                                                                                                                                                                                                    |   |   | C..... |        | E | F      |      |    |  |
|                                                                                                                         | 7A7.....              |                                                                                                                                                                                                    |   |   | C..... |        | E | F      |      |    |  |
|                                                                                                                         | 6AG5.....             |                                                                                                                                                                                                    |   |   |        | E      | F |        |      | 6  |  |
|                                                                                                                         | 6W7G.....             |                                                                                                                                                                                                    |   |   | C      | D..... |   | F      | G    |    |  |
|                                                                                                                         | 7AJ7.....             |                                                                                                                                                                                                    |   |   |        | E      | F |        |      |    |  |
| 6SK7GT.....                                                                                                             | 6BJ6.....             |                                                                                                                                                                                                    |   |   |        | E      | F |        |      |    |  |
|                                                                                                                         | 6K7GT.....            |                                                                                                                                                                                                    |   |   | D..... |        | F | G      |      |    |  |
|                                                                                                                         | 78.....               |                                                                                                                                                                                                    |   |   |        | E      | F | G      |      |    |  |
|                                                                                                                         | 6D6.....              |                                                                                                                                                                                                    |   |   |        | E      | F | G      |      |    |  |
|                                                                                                                         | 7B7.....              |                                                                                                                                                                                                    |   |   | C..... |        | E | F      |      |    |  |
|                                                                                                                         | 6U7G.....             |                                                                                                                                                                                                    |   |   | D..... |        | F | G      |      |    |  |
|                                                                                                                         | 7A7.....              |                                                                                                                                                                                                    |   |   |        | E      | F |        |      |    |  |
|                                                                                                                         | 6SG7GT.....           |                                                                                                                                                                                                    |   |   | D..... |        | F |        |      | 6  |  |
|                                                                                                                         | 6S7G.....             |                                                                                                                                                                                                    |   |   | C      | D..... |   | F      | G    |    |  |
|                                                                                                                         | 6SS7.....             |                                                                                                                                                                                                    |   |   | C..... |        | F |        |      |    |  |
|                                                                                                                         | 6BJ6.....             |                                                                                                                                                                                                    |   |   | C..... |        | E | F      |      |    |  |
| 6SQ7GT.....                                                                                                             | 7B6.....              |                                                                                                                                                                                                    |   |   |        | E      |   |        |      |    |  |
|                                                                                                                         | 7K7.....              |                                                                                                                                                                                                    |   |   |        | E      |   |        |      |    |  |
|                                                                                                                         | 7X7 (XXFM).....       |                                                                                                                                                                                                    |   |   |        | E      |   |        |      |    |  |
|                                                                                                                         | 75.....               |                                                                                                                                                                                                    |   |   |        | E      |   | G      |      |    |  |
|                                                                                                                         | 6AT6.....             |                                                                                                                                                                                                    |   |   |        | E      |   |        |      |    |  |
|                                                                                                                         | 6AV6.....             |                                                                                                                                                                                                    |   |   |        | E      |   |        |      |    |  |
|                                                                                                                         | 6AW7GT.....           |                                                                                                                                                                                                    |   |   | D..... |        |   |        |      |    |  |
|                                                                                                                         | 6B6G.....             |                                                                                                                                                                                                    |   |   |        | E      |   | G      |      |    |  |
|                                                                                                                         | 6BD7.....             |                                                                                                                                                                                                    |   |   | C..... |        | E |        |      |    |  |
|                                                                                                                         | 6BK6.....             |                                                                                                                                                                                                    |   |   |        | E      |   |        |      |    |  |
|                                                                                                                         | 6BT6.....             |                                                                                                                                                                                                    |   |   |        | E      |   |        |      |    |  |
|                                                                                                                         | 6Q7GT.....            |                                                                                                                                                                                                    |   |   | D..... |        |   | G      |      |    |  |
|                                                                                                                         | 6S8GT.....            |                                                                                                                                                                                                    |   |   | D..... |        |   |        |      |    |  |
|                                                                                                                         | 6T7G.....             |                                                                                                                                                                                                    |   |   | C      | D..... |   | G      |      |    |  |
|                                                                                                                         | 6T8.....              |                                                                                                                                                                                                    |   |   | C..... |        | E |        |      |    |  |
|                                                                                                                         | 7C6.....              |                                                                                                                                                                                                    |   |   | C..... |        | E |        |      |    |  |
|                                                                                                                         | 6SZ7.....             |                                                                                                                                                                                                    |   |   | C..... |        |   |        |      |    |  |
| Also any triode like 6F5G plus one or two 1N34<br>crystals in place of the diodes.                                      |                       |                                                                                                                                                                                                    |   |   |        |        |   |        |      |    |  |
| 6U7G.....                                                                                                               | 6K7GT.....            |                                                                                                                                                                                                    |   |   |        | F      |   |        | K    |    |  |
|                                                                                                                         | 6SK7GT.....           |                                                                                                                                                                                                    |   |   | D..... | F      |   | H      | K    |    |  |
|                                                                                                                         | 6SD7.....             |                                                                                                                                                                                                    |   |   | D..... | F      |   | H      |      | 6  |  |

These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

# 300 MA. SERIES HEATER TYPES

| For details of changes indicated<br>Refer to page 18                                                                |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>CAP. TOP C/P<br>OR PLATE TOP C/P<br>CHANGE BITS<br>NOTE NO. |   |   |   |   |   |   |   |   |  |
|---------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|--|
| REQUIRED TYPE                                                                                                       | POSSIBLE REPLACEMENTS | A                                                                                                                                                    | B | C | D | E | F | G | H | K |  |
| 6U7G . . . . .                                                                                                      | 39/44 . . . . .       |                                                                                                                                                      |   |   |   | E | F |   |   |   |  |
| (Continued)                                                                                                         | 78 . . . . .          |                                                                                                                                                      |   |   |   | E | F |   |   | K |  |
|                                                                                                                     | 6D6 . . . . .         |                                                                                                                                                      |   |   |   | E | F |   |   |   |  |
|                                                                                                                     | 7A7 . . . . .         |                                                                                                                                                      |   |   |   | E | F |   | H |   |  |
|                                                                                                                     | 6B7 . . . . .         |                                                                                                                                                      |   |   |   | E | F |   |   | 9 |  |
|                                                                                                                     | 6B8G . . . . .        |                                                                                                                                                      |   |   | D |   | F |   |   | 9 |  |
|                                                                                                                     | 6SF7 . . . . .        |                                                                                                                                                      |   |   | D |   | F |   | H | K |  |
|                                                                                                                     | 6F7 . . . . .         |                                                                                                                                                      |   |   |   | E | F |   |   | 9 |  |
|                                                                                                                     | 6P7G . . . . .        |                                                                                                                                                      |   |   | D |   | F |   |   | 9 |  |
|                                                                                                                     | 12B8GT . . . . .      |                                                                                                                                                      | B |   | D |   | F |   |   | 9 |  |
|                                                                                                                     | 36 . . . . .          |                                                                                                                                                      |   |   |   | E | F |   |   |   |  |
| Any type listed under 6S7G in 150 ma. chart may be used with simple resistor changes.<br>(See article on Page 8.)   |                       |                                                                                                                                                      |   |   |   |   |   |   |   |   |  |
| 6V7G . . . . .                                                                                                      | 85 . . . . .          |                                                                                                                                                      |   |   |   | E |   |   |   |   |  |
| See type 6R7G, Bias change may not be required                                                                      |                       |                                                                                                                                                      |   |   |   |   |   |   |   |   |  |
| 12A5 . . . . .                                                                                                      | 25B6G . . . . .       |                                                                                                                                                      | B |   |   | E |   |   |   | 2 |  |
|                                                                                                                     | 38 . . . . .          |                                                                                                                                                      | B |   |   | E |   | G |   | K |  |
|                                                                                                                     | 25A6 . . . . .        |                                                                                                                                                      | B |   |   | E |   |   |   |   |  |
|                                                                                                                     | 43 . . . . .          |                                                                                                                                                      | B |   |   | E |   |   |   |   |  |
|                                                                                                                     | 14C5 . . . . .        |                                                                                                                                                      |   | C |   | E |   |   |   | K |  |
|                                                                                                                     | 25A7G . . . . .       |                                                                                                                                                      | B |   |   | E |   |   |   |   |  |
|                                                                                                                     | 25L6GT . . . . .      |                                                                                                                                                      | B |   |   | E |   |   |   | K |  |
|                                                                                                                     | 25C6G . . . . .       |                                                                                                                                                      | B |   |   | E |   |   |   | K |  |
|                                                                                                                     | 25N6G . . . . .       |                                                                                                                                                      | B |   |   | E |   |   |   | K |  |
|                                                                                                                     | 32L7GT . . . . .      |                                                                                                                                                      | B |   |   | E |   |   |   | K |  |
|                                                                                                                     | 12A7 . . . . .        |                                                                                                                                                      |   |   | D |   |   | G |   | K |  |
| Any type listed under 6G6G in 150 ma. chart may be used with simple resistor changes.<br>(See article on Page 8.)   |                       |                                                                                                                                                      |   |   |   |   |   |   |   |   |  |
| 12A7 . . . . .                                                                                                      | 32L7GT . . . . .      |                                                                                                                                                      | B |   |   | E |   |   | H | K |  |
|                                                                                                                     | 25A7GT . . . . .      |                                                                                                                                                      | B |   |   | E |   |   | H | K |  |
| Any type listed under 70L7GT in 150 ma. chart may be used with simple resistor changes.<br>(See article on page 8.) |                       |                                                                                                                                                      |   |   |   |   |   |   |   |   |  |
| 12B8GT . . . . .                                                                                                    | 12AT6 and 12BA6 {     | Make adaptor with 2 min. sockets                                                                                                                     |   |   |   |   | F |   | H | 9 |  |
|                                                                                                                     | 12AV6 and 12BD6 {     | Make adaptor with 2 min. sockets                                                                                                                     |   |   |   |   | F |   | H | 9 |  |
|                                                                                                                     | 12BK6 and 12BA6 {     | Make adaptor with 2 min. sockets                                                                                                                     |   |   |   |   | F |   | H | 9 |  |
|                                                                                                                     | 12BT6 and 12BD6 {     | Make adaptor with 2 min. sockets                                                                                                                     |   |   |   |   | F |   | H | 9 |  |
|                                                                                                                     | 6F7 . . . . .         |                                                                                                                                                      | B |   |   |   |   |   |   | K |  |
|                                                                                                                     | 6P7G . . . . .        |                                                                                                                                                      | B |   |   |   |   |   |   | K |  |
|                                                                                                                     | 25B8GT . . . . .      |                                                                                                                                                      | B | C |   |   |   |   |   |   |  |
| 12Z3 . . . . .                                                                                                      | 1V . . . . .          |                                                                                                                                                      | B |   |   |   |   |   |   |   |  |
|                                                                                                                     | 12A7 . . . . .        |                                                                                                                                                      |   |   |   | E |   | G |   | 4 |  |
|                                                                                                                     | 76 . . . . .          |                                                                                                                                                      | B |   |   | E |   |   |   | 4 |  |
|                                                                                                                     | 37 . . . . .          |                                                                                                                                                      | B |   |   | E |   |   |   | 4 |  |
|                                                                                                                     | 6J5G . . . . .        |                                                                                                                                                      | B |   |   | E |   |   |   | 4 |  |
|                                                                                                                     | 14Y4 . . . . .        |                                                                                                                                                      |   |   |   | E |   |   |   |   |  |
|                                                                                                                     | 28Z5 . . . . .        |                                                                                                                                                      | B | C |   | E |   |   |   |   |  |
| Any type listed under 35Z3 in 150 ma. chart may be used with simple resistor changes.<br>(See article on page 8.)   |                       |                                                                                                                                                      |   |   |   |   |   |   |   |   |  |
| 25A6GT . . . . .                                                                                                    | 14C5 . . . . .        |                                                                                                                                                      | B | C |   | E |   |   |   | 8 |  |
|                                                                                                                     | 25B6G . . . . .       |                                                                                                                                                      |   |   |   |   |   |   |   | 2 |  |
|                                                                                                                     | 25N6G . . . . .       |                                                                                                                                                      |   |   |   |   |   |   |   | K |  |
|                                                                                                                     | 25L6GT . . . . .      |                                                                                                                                                      |   |   |   |   |   |   |   | K |  |
|                                                                                                                     | 43 . . . . .          |                                                                                                                                                      |   |   |   | E |   |   |   |   |  |
|                                                                                                                     | 12A5 . . . . .        |                                                                                                                                                      | B |   |   | E |   |   |   |   |  |
|                                                                                                                     | 38 . . . . .          |                                                                                                                                                      | B |   |   | E |   | G |   | K |  |
|                                                                                                                     | 25C6G . . . . .       |                                                                                                                                                      |   |   |   |   |   |   |   | K |  |
|                                                                                                                     | 32L7GT . . . . .      |                                                                                                                                                      | B |   | D |   |   |   |   | K |  |
|                                                                                                                     | 25A7GT . . . . .      |                                                                                                                                                      |   |   | D |   |   |   |   | 9 |  |
|                                                                                                                     | 12A7 . . . . .        |                                                                                                                                                      | B |   |   | E |   | G |   | K |  |

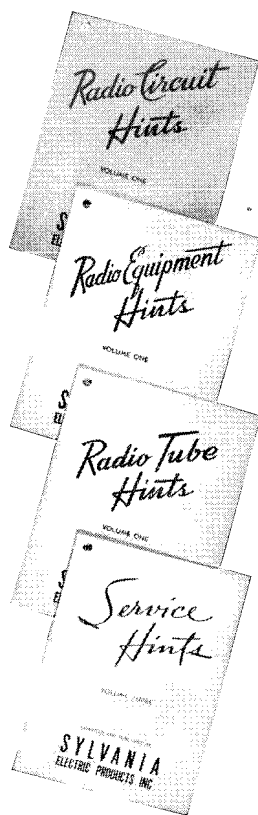
| For details of changes indicated<br>Refer to page 18 |                                                                                                                                                                                                                                                                                                                                                                                                                                             | <div>NO CHANGES<br/>FIL. VOLTS<br/>FIL. CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>CAP. CONNECTION<br/>OR PLATE TOP C/P<br/>CHANGE BITS<br/>NOTE NO.</div> |   |   |   |   |   |   |   |   |  |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                                                                                                                                                                                                                                                                                                                                                                                                                       | A                                                                                                                                                                           | B | C | D | E | F | G | H | K |  |
| 25A6GT.....                                          | Any type listed under 35A5 in 150 ma. chart (Continued) may be used with simple resistor changed. (See article on page 8.)                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25A7GT.....                                          | 12A7..... B..... E... G... K 2<br>32L7GT..... B..... K 2<br>Any type listed under 70L7GT on 150 ma. chart may be used with simple resistor changes. (See article on page 8.)                                                                                                                                                                                                                                                                |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25AC5GT....                                          | Same types as 25A6GT. (Driver no longer required.)                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25B6G.....                                           | 25N6G..... K.....<br>25L6GT..... K.....<br>25C6G..... K.....<br>12A5..... B..... E..... 2<br>38..... B..... E... G... K 2<br>25A6GT..... 2<br>25A7GT..... D..... 2-9<br>12A7..... B..... E... G... K 2-9<br>25B5..... E..... K.....<br>43..... E..... 2<br>32L7GT..... B... D..... K 2-9<br>Any type listed under 35A5 in 150 ma. chart may be used with simple resistor changes. (See article on page 8.)                                  |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25C6G.....                                           | 25N6G..... K 2<br>25L6GT..... K 2<br>25A6GT..... K 2<br>43..... E..... K 2<br>12A5..... B..... E..... K 2<br>38..... B..... E... G... 2<br>25B6G..... K 2<br>32L7GT..... B... D..... K 2-9<br>25A7GT..... D..... K 2-9<br>12A7..... B..... E... G... 2-9<br>25B5..... E..... K 2<br>Any type listed under 35L6GT in 150 ma. chart may be used with simple resistor changes. (See article on page 8.)                                        |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25L6GT.....                                          | 14C5..... B C... E..... 8<br>25N6G..... K.....<br>25A6GT..... K 2<br>25B6G..... K.....<br>25C6G..... K 2<br>43..... E..... K 2-8<br>12A5..... B..... E..... K 2<br>38..... B..... E... G... K 2<br>32L7GT..... B... D..... 9<br>25A7GT..... D..... K 2-9<br>12A7..... B..... E... G... K 2-9<br>25B5..... E..... K.....<br>Any type listed under 35L6GT in 150 ma. chart may be used with simple resistor changes. (See article on page 8.) |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25Y5.....                                            | 25Z5..... A.....<br>25Z6GT..... E.....<br>50Y6GT..... B C... E.....<br>50Z7G..... B C... E.....<br>When used as a half-wave rectifier, add types under 12Z3.                                                                                                                                                                                                                                                                                |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25Z5.....                                            | Same as 25Y5 above.                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |
| 25Z6GT.....                                          | 25Z5..... E..... 8<br>25Y5..... E.....<br>50Y6GT..... B C.....<br>50Z7G..... B C D.....<br>When used as a half-wave rectifier add types under 12Z3.                                                                                                                                                                                                                                                                                         |                                                                                                                                                                             |   |   |   |   |   |   |   |   |  |

These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

For details of changes indicated  
Refer to page 18

For details of changes indicated  
Refer to page 18

## SYLVANIA REFERENCE BOOKS



## 227

### Radio Circuit Hints

Handy reference on radio circuits, characteristics, — problems and quick solutions. **FREE**

## 228 Radio Equipment Hints

The most complete, handy booklet ever published on radio testing equipment, — how to build and use it. **FREE**

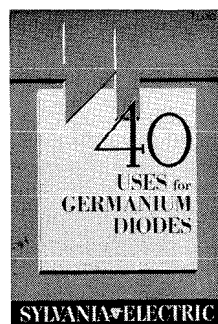
## 226

### Radio Tube Hints

A condensed reference book of generally helpful information and data on radio tubes. **FREE**

**208**  
**Service Hints**

Up-to-date service tips on many makes of receivers. Advise on unusual service problems. **FREE**

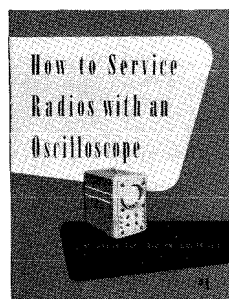


## 240

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## 218

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These substitutions are for AC-DC series sets. For transformer operated sets the above substitutions are possible if tubes requiring no voltage change are used. Substitutes from either the 150 or 300 ma. chart may be used.

# TRANSFORMER AND AUTO TYPES

| For details of changes indicated<br>Refer to page 18 |                                   | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>CAP. CONNECTION<br>OR PLATE TOP VOLT.<br>REMOVING CAP.<br>ADD TOP VOLT.<br>CHANGE BITS |   |   |   |   |   |   |   |   |   | NOTE NO. |
|------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|----------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS             | A                                                                                                                                                                               | B | C | D | E | F | G | H | K |   |          |
| OZ4 (G).....                                         | 84.....                           |                                                                                                                                                                                 | B |   |   | E |   |   |   |   |   |          |
|                                                      | 6X5.....                          |                                                                                                                                                                                 | B |   | D |   |   |   |   |   |   |          |
|                                                      |                                   | (Sometimes already wired)                                                                                                                                                       |   |   |   |   |   |   |   |   |   |          |
|                                                      | 7Y4.....                          |                                                                                                                                                                                 | B |   |   | E |   |   |   |   |   |          |
| 2A3.....                                             | 2A5.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   | K |   |          |
|                                                      | 59.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   | K |   |          |
|                                                      | 47.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   | K |   |          |
|                                                      | 46.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   | K |   |          |
| 2A5.....                                             | 47.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   | K |   |          |
|                                                      | 59.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   | K |   |          |
| 2A6.....                                             | 2B7.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   | 3 |          |
| 5U4G.....                                            | 5X4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 83.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 83V.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 5V4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
| 5V4G.....                                            | 83V (See also type 83)            |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
| 5W4G.....                                            | 5Y3G.....                         | A                                                                                                                                                                               |   |   |   |   |   |   |   |   |   |          |
|                                                      | 80.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 5Y4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 5Z4.....                          |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
| 5X4G.....                                            | 5U4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 83.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 83V.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 5Z3.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
| 5Y3G.....                                            | 5AZ4.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 5V4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 5W4G.....                         | A                                                                                                                                                                               |   |   |   |   |   |   |   |   |   |          |
|                                                      | 5Z4.....                          |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 80.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 83V.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 5Y4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
| 5Y4G.....                                            | Same as 5Y3G above. (Add note D.) |                                                                                                                                                                                 |   |   |   |   |   |   |   |   |   |          |
| 5Z3.....                                             | 5U4G.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 5X4G.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 83.....                           | A                                                                                                                                                                               |   |   |   |   |   |   |   |   |   |          |
|                                                      | 83V.....                          | A                                                                                                                                                                               |   |   |   |   |   |   |   |   |   |          |
| 5Z4.....                                             | 5V4G.....                         | A                                                                                                                                                                               |   |   |   |   |   |   |   |   |   |          |
|                                                      | 5W4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 5Y3G.....                         | A                                                                                                                                                                               |   |   |   |   |   |   |   |   |   |          |
|                                                      | 5Y4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 80.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 83V.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
| 6A3.....                                             | 6A5G.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 6B4G.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
| 6A5G.....                                            | 6B4G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |
|                                                      | 6A3.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
| 6A6.....                                             | 79.....                           |                                                                                                                                                                                 |   |   |   | E |   |   |   | K | 2 |          |
|                                                      | 6N7G.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 6Y7G.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   | K | 2 |          |
|                                                      | 6Z7G.....                         |                                                                                                                                                                                 |   |   |   | E |   |   |   | K | 2 |          |
| 6B4G.....                                            | 6A3.....                          |                                                                                                                                                                                 |   |   |   | E |   |   |   |   |   |          |
|                                                      | 6A5G.....                         |                                                                                                                                                                                 |   |   | D |   |   |   |   |   |   |          |

| For details of changes indicated<br>Refer to page 18 |                       |                                                                                                                                                                  |   |   |   |   |   |   |   |     | NOTE NO. |  |
|------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|-----|----------|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>CAP. CONNECTION<br>OR PLATE TOP VOLT.<br>REMOVING CAP.<br>ADD TOP VOLT. |   |   |   |   |   |   |   |     |          |  |
|                                                      |                       | A                                                                                                                                                                | B | C | D | E | F | G | H | K   |          |  |
| 6B5.....                                             | 6N6G.....             |                                                                                                                                                                  |   |   |   | E |   |   |   |     |          |  |
|                                                      | 42.....               |                                                                                                                                                                  |   |   |   |   |   |   |   | K   |          |  |
|                                                      | 6F6.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
|                                                      | 41.....               |                                                                                                                                                                  |   |   |   |   |   |   |   | K   |          |  |
|                                                      | 7B5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
|                                                      | 7C5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
| 6F6G.....                                            | 42.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | 3   |          |  |
|                                                      | 41.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | K 3 |          |  |
|                                                      | 7C5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K 2 |          |  |
|                                                      | 7B5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
|                                                      | 6B5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
| 6F8G.....                                            | 6C8G.....             |                                                                                                                                                                  |   |   |   |   |   |   |   | K   |          |  |
|                                                      | 6N7G.....             |                                                                                                                                                                  |   |   | D |   |   |   |   | K   |          |  |
|                                                      | 6SN7GT.....           |                                                                                                                                                                  |   |   | D |   |   |   |   |     |          |  |
|                                                      | 7N7.....              |                                                                                                                                                                  |   |   |   | E |   |   |   |     |          |  |
| 6K6GT.....                                           | 6V6GT.....            |                                                                                                                                                                  |   | C |   |   |   |   |   | K   |          |  |
|                                                      | 6F6G.....             |                                                                                                                                                                  |   | C |   |   |   |   |   | K   |          |  |
|                                                      | 6U6GT.....            |                                                                                                                                                                  |   | C |   |   |   |   |   | K   |          |  |
|                                                      | 7A5.....              |                                                                                                                                                                  |   | C |   | E |   |   |   | K   |          |  |
|                                                      | 7B5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   |     |          |  |
|                                                      | 7C5.....              |                                                                                                                                                                  |   | C |   | E |   |   |   | K   |          |  |
|                                                      | 42.....               |                                                                                                                                                                  |   | C |   | E |   |   |   | K 3 |          |  |
|                                                      | 41.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | K 3 |          |  |
|                                                      | 6B5.....              |                                                                                                                                                                  |   | C |   | E |   |   |   | K   |          |  |
| 6L6G.....                                            | 6L6GA.....            | A                                                                                                                                                                |   |   |   |   |   |   |   |     |          |  |
|                                                      | 6AH5G.....            |                                                                                                                                                                  |   |   | D |   |   |   |   |     |          |  |
|                                                      | 6F6G.....             |                                                                                                                                                                  |   | C |   |   |   |   |   | K 2 |          |  |
|                                                      | 42.....               |                                                                                                                                                                  |   | C |   | E |   |   |   | K 2 |          |  |
| 6N6G.....                                            | 6B5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   |     |          |  |
|                                                      | 42.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
|                                                      | 6F6.....              |                                                                                                                                                                  |   |   |   |   |   |   |   | K   |          |  |
|                                                      | 41.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
|                                                      | 7B5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
|                                                      | 7C5.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | K 2 |          |  |
| 6N7G.....                                            | 6Y7G.....             |                                                                                                                                                                  |   |   |   |   |   |   |   | 2   |          |  |
|                                                      | 6Z7G.....             |                                                                                                                                                                  |   |   |   |   |   |   |   | 2   |          |  |
|                                                      | 6A6.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | 2   |          |  |
|                                                      | 79.....               |                                                                                                                                                                  |   |   |   | E |   | G |   |     |          |  |
| 6U5/6G5.....                                         | 6E5.....              | A                                                                                                                                                                |   |   |   |   |   |   |   |     |          |  |
|                                                      | 6AB5/6N5.....         |                                                                                                                                                                  |   | C |   |   |   |   |   |     |          |  |
|                                                      | 2E5.....              |                                                                                                                                                                  |   | B | C |   |   |   |   |     |          |  |
|                                                      | 6T5.....              | A                                                                                                                                                                |   |   |   |   |   |   |   |     |          |  |
|                                                      | 6H5.....              | A                                                                                                                                                                |   |   |   |   |   |   |   |     |          |  |
| 6U6GT.....                                           | See type 6K6GT        |                                                                                                                                                                  |   |   |   |   |   |   |   |     |          |  |
| 6V6GT.....                                           | See type 6K6GT        |                                                                                                                                                                  |   |   |   |   |   |   |   |     |          |  |
| 6X5GT.....                                           | 6ZY5G.....            |                                                                                                                                                                  |   | C |   |   |   |   |   | 2   |          |  |
|                                                      | 84.....               |                                                                                                                                                                  |   |   |   | E |   |   |   | 3   |          |  |
|                                                      | 6Z5.....              |                                                                                                                                                                  |   |   | D |   |   |   |   |     |          |  |
|                                                      | 7Y4.....              |                                                                                                                                                                  |   |   |   | E |   |   |   | 3   |          |  |
|                                                      | 6Y5.....              |                                                                                                                                                                  |   | C |   | E |   |   |   |     |          |  |
| 7B5.....                                             | 6V6GT.....            |                                                                                                                                                                  |   | C |   | E |   |   |   | K 2 |          |  |
|                                                      | 6K6GT.....            |                                                                                                                                                                  |   |   |   | E |   |   |   |     |          |  |
|                                                      | 6F6G.....             |                                                                                                                                                                  |   |   |   | E |   |   |   | K   |          |  |
|                                                      | 6U6GT.....            |                                                                                                                                                                  |   | C |   | E |   |   |   | K 2 |          |  |
|                                                      | 7C5.....              |                                                                                                                                                                  |   | C |   | E |   |   |   | K 2 |          |  |
|                                                      | 6B5.....              |                                                                                                                                                                  |   | C |   | E |   |   |   | K   |          |  |
|                                                      | 41.....               |                                                                                                                                                                  |   |   |   | E |   |   |   |     |          |  |
|                                                      | 42.....               |                                                                                                                                                                  |   |   |   | E |   |   |   |     |          |  |

See also 150 Ma. and 300 Ma. tables. Any type which does not require a voltage change may be used.  
Some types commonly used in television receivers are listed in the table starting on Page 26.

# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 18 |                                                                                    | NO CHANGES | PL. VOLTS | PL. CURRENT | REWIRE SOCKET | CHANGE SOCKET | REALIGN | ADJUST CONNECTION | REPAIR CONNECTION | CHANGE BASE | OR PLATE TOP VOLT | NOTE NO. |
|------------------------------------------------------|------------------------------------------------------------------------------------|------------|-----------|-------------|---------------|---------------|---------|-------------------|-------------------|-------------|-------------------|----------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                                                              | A          | B         | C           | D             | E             | F       | G                 | H                 | K           |                   |          |
| 7C5                                                  | 6V6GT.<br>6K6GT.<br>6F6G.<br>6U6GT.<br>7B5.<br>41.<br>42.                          |            |           |             |               | E             |         |                   |                   | K           | 2                 |          |
| 7N7                                                  | 6N7G.<br>6F8G.<br>6C8G.<br>6SN7GT.                                                 |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 12A                                                  | 01A                                                                                |            |           |             |               |               |         |                   |                   | K           |                   |          |
| 24A                                                  | 57.<br>35.                                                                         |            |           |             |               | E             | F       |                   |                   |             |                   |          |
| 26                                                   | 27.<br>56.                                                                         |            |           |             |               | E             | F       |                   |                   |             |                   |          |
| 35/51                                                | 24.<br>58.<br>57.                                                                  |            |           |             |               | F             |         |                   |                   | 1           |                   |          |
| 41                                                   | 42.<br>6K6G.<br>6F6G.<br>6U6GT.<br>6B5.<br>6N6G.<br>7A5.<br>7B5.<br>7C5.<br>6V6GT. |            |           |             |               | E             |         |                   |                   | K           | 2                 |          |
| 42                                                   | 41.<br>6K6G.<br>6F6G.<br>6U6GT.<br>6B5.<br>6N6G.<br>7A5.<br>7B5.<br>7C5.<br>6V6GT. |            |           |             |               | E             |         |                   |                   | K           | 2                 |          |
| 45                                                   | 2A3.<br>46.<br>47.<br>59.                                                          |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 46                                                   | 47.<br>59.                                                                         |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 56                                                   | 27.                                                                                |            |           |             |               |               |         |                   |                   | K           |                   |          |
| 57                                                   | 58.<br>24A.<br>35/51.                                                              |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 58                                                   | Same as 57. See note (1).                                                          |            |           |             |               |               |         |                   |                   |             |                   |          |
| 59                                                   | 46.<br>47When used as pen.<br>45When used as tri.                                  |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 71A                                                  | 182B.<br>183.<br>12A.                                                              |            |           |             |               |               |         |                   |                   | K           |                   |          |

| For details of changes indicated<br>Refer to page 18                            |                                                                                     | NO CHANGES | PL. VOLTS | PL. CURRENT | REWIRE SOCKET | CHANGE SOCKET | REALIGN | ADJUST CONNECTION | REPAIR CONNECTION | CHANGE BASE | OR PLATE TOP VOLT | NOTE NO. |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------|-----------|-------------|---------------|---------------|---------|-------------------|-------------------|-------------|-------------------|----------|
| REQUIRED TYPE                                                                   | POSSIBLE REPLACEMENTS                                                               | A          | B         | C           | D             | E             | F       | G                 | H                 | K           |                   |          |
| 80                                                                              | 5Y4G.<br>5Y3GT.<br>5W4GT.<br>5Z4.<br>5V4G.<br>83.<br>83V.<br>5Z3.<br>5X4G.<br>5U4G. |            |           |             |               | E             |         |                   |                   |             |                   |          |
| 83                                                                              | 83V.<br>5Z3.<br>5X4G.<br>5U4G.                                                      |            |           |             |               | E             |         |                   |                   |             |                   |          |
| 84                                                                              | 6X5.<br>6Y5.<br>6Z5.<br>6ZY5G.<br>7Y4.                                              |            |           |             |               | E             |         |                   |                   |             |                   |          |
| 89                                                                              | 89Y.<br>41.<br>6K6G.                                                                |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 117L7/M7GT                                                                      | 117N7GT.<br>117P7GT.<br>70L7GT.<br>70A7GT.                                          |            |           |             |               | E             |         |                   |                   | K           | 2                 |          |
| 117N7GT                                                                         | 117L7/M7GT.<br>117P7GT.<br>70L7GT.<br>70A7GT.                                       |            |           |             |               | E             |         |                   |                   | K           | 2                 |          |
| 117P7GT                                                                         | 117L7/M7GT.<br>117N7GT.<br>70L7GT.<br>70A7GT.                                       |            |           |             |               | E             |         |                   |                   | K           | 2                 |          |
| 117Z6GT                                                                         | 117L7/M7GT.<br>117N7GT.<br>70L7GT.<br>117P7GT.<br>70A7GT.<br>50Y6GT.<br>50Z7G.      |            |           |             |               | E             |         |                   |                   | K           | 2                 |          |
| When used as a half-wave rectifier, additional types may be found under 50Y6GT. |                                                                                     |            |           |             |               |               |         |                   |                   |             |                   |          |
| 182B/482B                                                                       | 183/483.<br>71A.<br>45.<br>46.<br>2A3.                                              |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 183/483                                                                         | 182B/482B.<br>12A.<br>45.<br>46.<br>2A3.                                            |            |           |             |               | E             |         |                   |                   | K           |                   |          |
| 485                                                                             | 27.<br>56.                                                                          |            |           |             |               | E             |         |                   |                   | K           |                   |          |

See also 150 Ma. and 300 Ma. tables. Any type which does not require a voltage change may be used.  
Some types commonly used in television receivers are listed in the table starting on page 26.



# TUBE SUBSTITUTIONS IN TELEVISION RECEIVERS

Many television receiver circuits demand tube performances beyond those required by standard broadcast receivers. New functions, higher frequencies and often higher voltages result in a very limited number of tube types suitable for most television receiver sockets. As a result, only the simplest of the substitutions listed are suggested for satisfactory performance. Even so, each receiver model should be considered individually with particular reference to the manufacturer's instruction manuals and servicing data. The following general comments on various functions may also be of aid in selecting a substitute type.

**RF—CONVERTER—IF STAGES:** The use of one higher or lower Gm tube in the RF or IF stages will not be likely to give trouble. If it causes oscillation which cannot be removed by alignment, the screen voltage may be lowered slightly. The effect of one low mutual conductance tube in the IF section probably would be negligible, but more than one would be almost certain to give noticeably poor results. Tubes with the same base, and if possible the same basing, should be selected, as any disturbance to the original wiring might make it difficult, if not impossible, to realign the stage properly. Where the substitute tube has a different value of screen current a change in the series screen resistor may be required.

**DETECTORS:** When diodes are used, very little trouble need be expected with any reasonable substitution. There are, however, receivers using duo-triodes with the other section of the tube possibly in a more critical circuit.

**SYNC STRIPPERS AND SEPARATORS:** These circuits depend on the correct matching of the tube characteristics if the applied signal is to give the exact magnitude and wave-shape required for the output. Changes in load resistors, bleeders, or input signal may be required for satisfactory operation of a substitute. An oscilloscope should be used to check for the proper wave form.

**HORIZONTAL OSCILLATOR:** In general, this is a very difficult circuit to readjust for a substitute tube. Since this tube is used in the AFC circuit any change in current or bias could completely upset the tuning adjustments.

**HORIZONTAL OUTPUT:** Since many of the suggested substitutions require the use of two tubes in parallel, trouble may be encountered due to parasitic oscillations. The addition of a 100-ohm resistor in each grid lead, a 50-ohm resistor in each screen lead, and the use of separate cathode resistors, each twice the value required for the original single tube, is generally effective in eliminating this difficulty. A 50-ohm resistor in each plate lead, close to the socket, may be required in a few cases.

**VERTICAL OUTPUT:** The usual difficulty with substitutions in this stage is obtaining linearity. This is largely due to a mismatch between tube and load. If the adjustment does not give a good picture, little can be done other than try another substitute.

**DAMPER DIODES:** These are critical in two ratings seldom considered seriously in the broadcast receiver. They are the peak inverse voltage rating, and, in some circuits, the maximum permissible heater-cathode voltage. Differences in the heater-cathode voltage rating can be taken care of by using an isolation transformer in the heater circuit, but the peak inverse rating can only be increased by adding tubes in series which is not practical. Damper tubes also require a high current rating making it difficult to find a suitable substitute.

**HIGH VOLTAGE RECTIFIERS:** There are at least three circuits commonly used in high voltage sections: (1) RF Oscillator, (2) Fly-back transformer, (3) Fly-back transformer with voltage-doubler. The peak inverse voltage requirements of the RF and fly-back type circuits are quite different from one another. Although it is possible to change from one system to another, a great deal of careful study of this circuit on the part of the serviceman is urged before such an alteration is attempted.

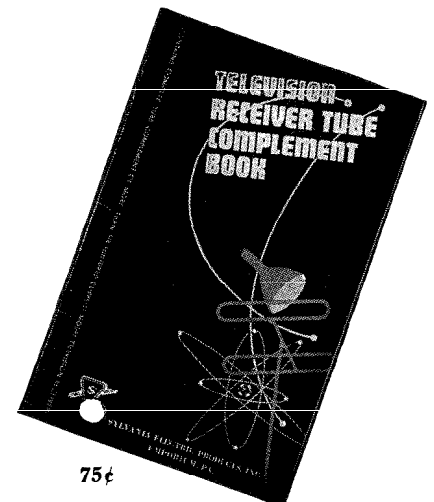


## 205 Television Servicing Book-Vol.II

The biggest "little" book ever printed for the television serviceman. Contains page after page of handy reference for the causes and corrections for faulty reception in TV receiving sets. Profusely illustrated, complete with circuit diagrams, that save guessing and suggestions that save time and make more money, quicker, for you! Handy pocket size, 5" x 7".

## 204 Television Tube Complement Book

The most complete, authentic book of its type ever published. Gives complete tube complement of all current television receiver models. Includes list of manufacturer's names and addresses, replacement charts and usage table. It's an absolute "must" on your shelf for successful servicing of any television receiver, one of the many Sylvania services designed to help you give more dependable service.



# PENNSYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 28 |                                                                                                                                | <div>NO CHANGES<br/>FL VOLTS<br/>FL CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>CARD TOP CONNECTION<br/>CARD TOP CRY<br/>OR PLATE TOP CONNECTION<br/>CHANGE WAX VOLTS<br/>NOTE NO.</div> |   |   |   |   |   |   |   |    |  |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|----|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                                                                                                          | A                                                                                                                                                                                                        | B | C | D | E | F | G | H | K  |  |
| 1B3GT                                                | 1X2 (A)<br>1Y2<br>5642                                                                                                         |                                                                                                                                                                                                          | B | C |   | E |   |   |   | 13 |  |
| 1V2                                                  | 1B3GT<br>1X2 (A)<br>5642<br>1Y2                                                                                                |                                                                                                                                                                                                          | B | C | D | E |   | G |   |    |  |
| 1X2 (A)                                              | 1V2<br>5642<br>1B3GT                                                                                                           |                                                                                                                                                                                                          | B | C | D |   |   |   | H | 13 |  |
| 6AG5                                                 | 6AK5<br>6BC5<br>6BH6<br>6AU6<br>6CB6<br>6AS6<br>12AU6<br>12AW6<br>5591<br>5654                                                 |                                                                                                                                                                                                          |   | C |   | F |   | K |   |    |  |
| 6AK5                                                 | 6AG5<br>6BC5<br>6BH6<br>6AU6<br>6CB6<br>6AS6<br>12AU6<br>12AW6<br>5591<br>5654                                                 |                                                                                                                                                                                                          | C |   |   | F |   | K |   |    |  |
| 6AL5                                                 | 12AL5<br>5726<br>6AQ7GT<br>6AW7GT<br>6BC7<br>6H6GT<br>7A6<br>14A6<br>12AT7<br>12AU7<br>12AV7<br>12AX7<br>12AY7<br>1N34<br>1N60 |                                                                                                                                                                                                          | B | C |   | E |   |   |   | 11 |  |
| 6AQ5                                                 | 6AR5<br>5686<br>6V6GT<br>7C5<br>6BF5<br>6K6GT                                                                                  |                                                                                                                                                                                                          | C | D |   | E |   | K |   |    |  |
| 6AQ5                                                 | 6SN7GT<br>6BF5<br>6W6GT<br>6S4<br>12BH7                                                                                        |                                                                                                                                                                                                          | C |   |   | E |   | K |   | 22 |  |
| 6AT6                                                 | 6AQ6<br>6AQ7GT<br>6AV6<br>6AW7GT<br>6B6G<br>6BD7<br>6BK6<br>6BT6                                                               |                                                                                                                                                                                                          | C |   |   | E |   | G |   |    |  |

| For details of changes Indicated<br>Refer to Page 28 |                       | <div>NO CHANGES<br/>PL. VOLTS<br/>PL. CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>ADD TOP CONNECTION<br/>OR CONNECT TO BOTTOM<br/>CHANGE BIAS VOLT<br/>NOTE NO.</div> |   |   |   |   |   |   |   |   |       |
|------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|-------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                     | B | C | D | E | F | G | H | K |       |
| 6AU5GT.....                                          | 6AV5GT.....           |                                                                                                                                                                                       |   | C |   |   |   |   |   |   |       |
|                                                      | 6BG6G.....            |                                                                                                                                                                                       |   | C | D |   |   | G |   |   |       |
|                                                      | 6BQ6GT.....           |                                                                                                                                                                                       |   | C | D |   |   | G |   |   |       |
|                                                      | 6L6G (A).....         |                                                                                                                                                                                       |   | C | D |   |   |   |   |   | 23    |
|                                                      | 807 (W).....          |                                                                                                                                                                                       |   | C |   | E |   | G |   |   |       |
|                                                      | 6AL6G.....            |                                                                                                                                                                                       |   | C | D |   |   | G |   |   |       |
|                                                      | 6AH5G.....            |                                                                                                                                                                                       |   | C | D |   |   |   |   |   |       |
| 6AU6.....                                            | Same as type 6AK5     |                                                                                                                                                                                       |   |   |   |   |   |   |   |   |       |
| 6AV5GT.....                                          | 6AU5GT.....           |                                                                                                                                                                                       |   | C |   |   |   |   |   |   |       |
|                                                      | 6BG6G.....            |                                                                                                                                                                                       |   | C | D |   |   | G |   |   |       |
|                                                      | 6BQ6GT.....           |                                                                                                                                                                                       |   |   | D |   |   | G |   |   |       |
|                                                      | 6L6G (A).....         |                                                                                                                                                                                       |   | C | D |   |   |   |   |   | 23    |
|                                                      | 6AL6G.....            |                                                                                                                                                                                       |   | C | D |   |   | G |   |   |       |
|                                                      | 807 (W).....          |                                                                                                                                                                                       |   | C |   | E |   | G |   |   |       |
|                                                      | 6AH5G.....            |                                                                                                                                                                                       |   | C | D |   |   |   |   |   |       |
| 6BC5.....                                            | 6AG5.....             |                                                                                                                                                                                       |   |   |   |   |   | F |   |   |       |
|                                                      | 6AK5.....             |                                                                                                                                                                                       |   | C |   |   |   | F |   | K |       |
|                                                      | 6AU6.....             |                                                                                                                                                                                       |   |   | D |   |   | F |   |   |       |
|                                                      | 6BH6.....             |                                                                                                                                                                                       |   | C | D |   |   | F |   |   |       |
|                                                      | 6CB6.....             |                                                                                                                                                                                       |   |   | D |   |   | F |   |   |       |
|                                                      | 6SH7GT.....           |                                                                                                                                                                                       |   |   |   | E | F |   |   |   | 15    |
|                                                      | 7AG7.....             |                                                                                                                                                                                       |   | C |   | E | F |   |   |   | 15    |
|                                                      | 5654.....             |                                                                                                                                                                                       |   | C |   |   | F |   |   | K |       |
|                                                      | 5591.....             |                                                                                                                                                                                       |   | C |   |   | F |   |   | K |       |
| 6BD5GT.....                                          | 6AU5GT.....           |                                                                                                                                                                                       |   | C |   |   |   |   |   | K | 6     |
|                                                      | 6AV5GT.....           |                                                                                                                                                                                       |   | C |   |   |   |   |   | K | 6     |
|                                                      | 6BG6G.....            |                                                                                                                                                                                       |   |   | D |   |   | G |   | K | 6     |
|                                                      | 6BQ6GT.....           |                                                                                                                                                                                       |   | C | D |   |   | G |   | K | 6     |
|                                                      | 6L6G (A).....         |                                                                                                                                                                                       |   |   | D |   |   |   |   |   |       |
|                                                      | 807 (W).....          |                                                                                                                                                                                       |   |   |   | E |   | G |   | K | 6     |
| 6BG6G.....                                           | 6CD6G.....            |                                                                                                                                                                                       |   | C |   |   |   | F |   |   | 10    |
|                                                      | 6BQ6GT.....           |                                                                                                                                                                                       |   | C | D |   |   | F |   |   | 10-14 |
|                                                      | 6AV5GT.....           |                                                                                                                                                                                       |   | C | D |   |   | F |   |   |       |
|                                                      | 6AU5GT.....           |                                                                                                                                                                                       |   | C | D |   |   | F |   |   |       |
|                                                      | 807 (W).....          |                                                                                                                                                                                       |   |   |   | E |   | F |   |   |       |
|                                                      | 19BG6G.....           |                                                                                                                                                                                       | B | C |   |   |   | F |   |   |       |
|                                                      | 25BQ6GT.....          |                                                                                                                                                                                       | B | C | D |   |   | F |   |   | 14    |
| 6BQ6GT.....                                          | 6BG6G.....            |                                                                                                                                                                                       |   | C | D |   |   | F |   |   | 7     |
|                                                      | 6CD6G.....            |                                                                                                                                                                                       |   | C | D |   |   | F |   |   | 7     |
|                                                      | 6AU5GT.....           |                                                                                                                                                                                       |   |   | D |   |   | F | H |   |       |
|                                                      | 6AV5GT.....           |                                                                                                                                                                                       |   |   | D |   |   | F | H |   |       |
|                                                      | 807 (W).....          |                                                                                                                                                                                       |   |   |   | E |   | F |   |   | 7     |
|                                                      | 19BG6G.....           |                                                                                                                                                                                       | B | C | D |   |   | F |   |   | 7     |
|                                                      | 25BQ6GT.....          |                                                                                                                                                                                       | B | C |   |   |   | F |   |   |       |
| 6CB6.....                                            | 6AK5.....             |                                                                                                                                                                                       |   | C | D |   |   | F |   | K |       |
|                                                      | 6AG5.....             |                                                                                                                                                                                       |   |   | D |   |   | F |   |   |       |
|                                                      | 6BC5.....             |                                                                                                                                                                                       |   |   | D |   |   | F |   |   |       |
|                                                      | 6BH6.....             |                                                                                                                                                                                       |   | C |   |   |   | F |   |   |       |
|                                                      | 6AU6.....             |                                                                                                                                                                                       |   |   | D |   |   | F |   |   |       |
|                                                      | 6AS6.....             |                                                                                                                                                                                       |   | C |   |   |   | F |   | K |       |
|                                                      | 12AU6.....            |                                                                                                                                                                                       | B | C | D |   |   | F |   |   |       |
|                                                      | 12AW6.....            |                                                                                                                                                                                       | B | C |   |   |   | F |   |   |       |
|                                                      | 5591.....             |                                                                                                                                                                                       |   | C | D |   |   | F |   | K |       |
|                                                      | 5654.....             |                                                                                                                                                                                       |   | C | D |   |   | F |   | K |       |
| 6CD6.....                                            | 6AU5GT.....           |                                                                                                                                                                                       |   |   |   | E |   | G |   |   | 12    |
|                                                      | 6BQ6GT.....           |                                                                                                                                                                                       |   | C |   | E |   | G |   |   | 12    |
|                                                      | 807 (W).....          |                                                                                                                                                                                       |   | C |   | E |   | G |   |   | 12    |
|                                                      | 19BG6G.....           |                                                                                                                                                                                       | B | C |   | E |   | G |   |   | 12    |
|                                                      | 25BQ6GT.....          |                                                                                                                                                                                       | B | C |   | E |   | G |   |   | 12    |
|                                                      | 6BG6G.....            |                                                                                                                                                                                       |   | C |   | E |   | G |   |   | 12    |
|                                                      | 6AV5GT.....           |                                                                                                                                                                                       |   | C |   | E |   | G |   |   | 12    |

These substitutions apply particularly for television sets but may be used anywhere providing all changes, particularly B and C are considered.



# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 28 |                       | <div>NO CHANGES<br/>FIL. VOLTS<br/>FIL. CURRENT<br/>REWIRE SOCKET<br/>CHANGE SOCKET<br/>REALIGN<br/>ADD CONNECTION<br/>CAP. CONNECTION<br/>OR. CONNECTION<br/>CHANGE W/AS. VOLTS<br/>NOTE NO.</div> |   |   |   |   |   |   |   |    |  |
|------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|----|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                                   | B | C | D | E | F | G | H | K  |  |
| 12SN7GT.....                                         | 12AH7GT.....          | C                                                                                                                                                                                                   | D |   |   | F |   |   |   | K  |  |
|                                                      | 12AU7.....            | C                                                                                                                                                                                                   |   |   |   | E | F |   |   |    |  |
|                                                      | 12AV7.....            |                                                                                                                                                                                                     |   |   |   | E | F |   |   | K  |  |
|                                                      | 12SX7GT.....          |                                                                                                                                                                                                     |   |   |   | F |   |   |   |    |  |
|                                                      | 14N7.....             |                                                                                                                                                                                                     |   |   |   | E | F |   |   |    |  |
|                                                      | 5687.....             |                                                                                                                                                                                                     | C |   |   | E | F |   |   |    |  |
|                                                      | 5694.....             | B                                                                                                                                                                                                   | C | D |   | F |   |   |   | K  |  |
|                                                      | 6SN7GT.....           | B                                                                                                                                                                                                   | C |   |   | F |   |   |   |    |  |
|                                                      | 5692.....             | B                                                                                                                                                                                                   | C |   |   | F |   |   |   |    |  |
|                                                      | 14AF7.....            |                                                                                                                                                                                                     | C |   |   | E | F |   |   |    |  |
|                                                      | 6F8G.....             | B                                                                                                                                                                                                   | C |   |   | E | F |   |   |    |  |
|                                                      | 12BH7.....            |                                                                                                                                                                                                     |   |   |   | E | F |   |   |    |  |
| 19BG6G.....                                          | 25BQ6GT.....          | B                                                                                                                                                                                                   |   | D |   | F |   |   |   | 14 |  |
|                                                      | 807 (W).....          | B                                                                                                                                                                                                   | C |   |   | E | F |   |   |    |  |
|                                                      | 6CD6G.....            | B                                                                                                                                                                                                   | C |   |   | F |   |   |   | 10 |  |

| For details of changes indicated<br>Refer to Page 28 |                       | NO CHANGES<br>FIL. VOLTS<br>FIL. CURRENT<br>REWIRE SOCKET<br>CHANGE SOCKET<br>REALIGN<br>ADD CONNECTION<br>CAP. CONNECTION<br>OR. CONNECTION<br>CHANGE W/AS. VOLTS<br>NOTE NO. |   |   |   |   |   |   |   |   |        |
|------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|--------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS | A                                                                                                                                                                              | B | C | D | E | F | G | H | K |        |
| 19BG6G.....                                          | 6BQ6GT.....           | B                                                                                                                                                                              | C | D |   | F |   |   |   |   | 10-14  |
| Continued)                                           | 6BG6G.....            | B                                                                                                                                                                              | C |   |   | F |   |   |   |   |        |
| 25BQ6GT.....                                         | 19BG6G.....           | B                                                                                                                                                                              |   | D |   | F |   |   |   |   |        |
|                                                      | 807 (W).....          | B                                                                                                                                                                              | C |   |   | E | F |   |   |   |        |
|                                                      | 6CD6G.....            | B                                                                                                                                                                              | C | D |   | F |   |   |   |   |        |
|                                                      | 6BQ6GT.....           | B                                                                                                                                                                              | C |   |   | F |   |   |   |   |        |
|                                                      | 6BG6G.....            | B                                                                                                                                                                              | C | D |   | F |   |   |   |   |        |
| 25W4GT.....                                          | 25Z6.....             |                                                                                                                                                                                |   |   |   | E |   |   |   |   | 19     |
|                                                      | 25Z5.....             |                                                                                                                                                                                |   |   | D |   |   |   |   |   | 19     |
|                                                      | 35Z3.....             | B                                                                                                                                                                              | C |   | E |   |   |   |   |   | 19, 21 |
|                                                      | 35Y4.....             | B                                                                                                                                                                              | C |   | E |   |   |   |   |   | 19, 21 |
|                                                      | 50AX6G.....           | B                                                                                                                                                                              |   | D |   |   |   |   |   |   | 19     |
|                                                      | 50X6.....             | B                                                                                                                                                                              | C |   | E |   |   |   |   |   | 19     |
|                                                      | 6W4GT.....            | B                                                                                                                                                                              | C |   |   |   |   |   |   |   |        |
|                                                      | 6U4GT.....            | B                                                                                                                                                                              | C |   |   |   |   |   |   |   |        |

## NOTES FOR USE WITH TELEVISION TUBE TABLE

- This is shown only when the tubes are directly interchangeable for all published ratings. Unusual operating conditions may require analysis.
- This means that the heater voltage of the substitute type is different from the required type. A slight decrease can be taken care of by adding a series resistor but other changes may require a complete change in the power circuits or the addition of an extra transformer to provide the required voltage.
- Indicates that the heater current of the substitute tube is different from the required type. On transformer operated sets this is not too important unless the total current, particularly when more than one substitution is made, causes the transformer rating to be exceeded.
- In these cases the tube socket is the same but some rearrangement of the connections may be necessary. It may only be necessary to be sure that contacts connected to elements of the substitute tube which are not required in that circuit are not used as tie points.
- Requires a different type of socket. Watch out for tie points as in "D".
- Realignment is recommended as good practice in all cases of RF and IF tube changes.
- Provision must be made for connection to the top cap of the substitute tube which was not originally required.
- The former top-cap connection will have to be changed to connect to a base pin.
- Indicates that the substitute tube operates at a different bias for the applied plate voltage than the original tubes. Self bias circuits give some automatic correction but this should be measured and changed if necessary to prevent early failures.
  - The use of a sharp cut-off pentode in place of a remote cut-off tube may cause great distortion in locations when strong signals are available. If no other substitute can be found all tubes on the A.V.C. system should be changed.
  - The optimum load resistance for these types is more than 20% off. If tone or volume is noticeably poor transformer tap adjustment or a new transformer may be required.
  - Requires addition of screen voltage, resistor and bypass condenser. Select resistor to give screen volts approximately equal to actual plate volts.
  - This type can be used as a triode by tying screen and suppressor to the plate. As a rectifier tie all grids to plate.
- If separate cathode connections to the diodes are required one or two type 1N34 crystals may be used.
- Screen voltage should be decreased to prevent oscillation with this higher gm tube or to keep within tube ratings.
- Screen voltage may be increased for this type.
- Circuit for this substitution is given on last few pages of this booklet.
- Unused elements should be connected to chassis or cathode terminal.
- Pilot lamp may be omitted or provided for by other means.
- Connect triode elements together to form two diodes having separate cathodes.
- Usable only when space is available for two tubes of this type connected in parallel.
- Usable only in fly-back type power supplies and when peak inverse voltage does not exceed tube rating.
- In many of the older sets a high efficiency transformer and/or yoke may also be required.
- The substitution of these types in RF or mixer oscillator stage is not recommended. Changes in lead length or capacity may make it impossible to align.
- Not usable in circuits requiring separate cathode leads.
- If circuit requires voltage between cathode and heater do not use this type.
- Connect grid and screen to plate to obtain diode characteristics.
- Not recommended for damper service as peak inverse rating is too low.
- These types do not have as high a heater-cathode peak voltage rating as the original tube but may be used in most cases. An isolation transformer insulated for 2500 volts may be used.
- Check load current to be sure it is within ratings of substitute tube.
- Connect triode sections in parallel.
- If arcing occurs peak voltage rating is being exceeded. A type having a higher peak rating will be required.

These substitutions apply particularly for television sets but may be used anywhere providing all changes particularly B and C are considered.

# SUBSTITUTION CHART

## FOR TELEVISION PICTURE TUBES

**T**HE following tables show some of the possible substitutions which may be made when the required type is temporarily unobtainable. Individual listings of all tube types bearing an A or B suffix have not been included in this table. These letters generally indicate a difference only in face, plate or screen treatment not materially affecting the tube's application. A copy of Sylvania's Television Picture Tube Characteristics Chart lists these types bearing suffixes and indicates their face plate characteristics. The tables have been extended slightly to show a few larger type tubes that may be used when it is desired to increase the size of the picture.

Before undertaking any of the more radical changes, the ease of adjustment provided by the receiver under consideration should be examined. If the focus coil and yoke supporting assembly are not adjustable in the direction of the long axis of the tube, it may be too difficult to use any tube having a longer cone. The wide variety of cabinets will also require that each case be examined carefully to be sure that there is room in the cabinet for the tube. Some designs of deflection and focus coils are longer than others so that short neck tubes cannot be directly interchanged. This fact is indicated in the notes when a short-neck tube would usually be a

good replacement.

The tables indicate the important physical and electrical changes required but it was necessary to make the following assumptions: (a) Since the usual tolerance in the overall length of a picture tube is  $\pm \frac{3}{8}$ " the dimension shown under B is given only to the nearest  $\frac{1}{4}$ ". (b) Since the new wide-angle picture tubes require more scanning power than the older tubes, and since there is usually some adjustment in the receiver circuit, we have assumed that a major coil change will not be required unless the replacement tube's deflection angle is greater than the original tube's by more than 4 degrees. (c) Besides the major changes in bulb dimensions considered under columns A and B there are also small changes in the radius of curvature of the bulb face and the shape of the picture area. This affects the mask dimensions and might give trouble in some sets if the adjustments are not flexible. Small changes in curvature radius of the cone may also be encountered, particularly between glass and metal types.

In a few cases we have listed replacement types smaller than the originals, because there are few or no tubes of the same or larger sizes which would, in our opinion, make practical substitutes.

| For details of changes indicated<br>Refer to page 34 |             | <div><div>NOTE NO</div><div>ADD FLUOR CAPACITANCE</div><div>CHANGE TUBE SOCKET</div><div>CHANGE DEFLECTION</div><div>CHANGE ORBITAL MAG.</div><div>REMOVE OR TRAP MAG.</div><div>ADJ. ON TRAP MAG.</div><div>CONNECTOR</div><div>BULB LENGTH</div><div>BULB DIAMETER</div></div> |       |   |   |   |   |   |   |    |      | RE-<br>QUIRED<br>TYPE | POSSIBLE<br>REPLACEMENTS |
|------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---|---|---|---|---|---|----|------|-----------------------|--------------------------|
|                                                      |             | A                                                                                                                                                                                                                                                                                | B     | C | D | E | F | G | H | K  |      |                       |                          |
| 3KP4.....                                            | 3GP1A.....  |                                                                                                                                                                                                                                                                                  |       |   |   |   |   |   |   | H  | 2    |                       |                          |
|                                                      | 3JP1.....   | -1 ¼                                                                                                                                                                                                                                                                             |       |   |   |   |   |   |   | II |      |                       |                          |
| 3NP4.....                                            | None.....   |                                                                                                                                                                                                                                                                                  |       |   |   |   |   |   |   |    |      |                       |                          |
| 5BP4.....                                            | 5NP4.....   | No changes                                                                                                                                                                                                                                                                       |       |   |   |   |   |   |   |    |      |                       |                          |
|                                                      | 7EP4.....   | A -1 ¼                                                                                                                                                                                                                                                                           |       |   |   |   |   |   |   |    |      |                       |                          |
| 5HP4.....                                            | 5NP4.....   | No changes                                                                                                                                                                                                                                                                       |       |   |   |   |   |   |   |    |      |                       |                          |
| 5TP4.....                                            | None.....   |                                                                                                                                                                                                                                                                                  |       |   |   |   |   |   |   |    |      |                       |                          |
| 7DP4.....                                            | 10DP4.....  | A +3 ½                                                                                                                                                                                                                                                                           |       |   |   |   |   |   |   | K  |      |                       |                          |
| 7EP4.....                                            | 5BP4-A..... | A +1 ¼                                                                                                                                                                                                                                                                           |       |   |   |   |   |   |   |    |      |                       |                          |
|                                                      | 7JP4.....   | -1                                                                                                                                                                                                                                                                               |       |   |   |   |   |   |   | H  |      |                       |                          |
| 7GP4.....                                            | 7JP4.....   | No changes                                                                                                                                                                                                                                                                       |       |   |   |   |   |   |   |    |      |                       |                          |
|                                                      | 10HP4.....  | A +4 ¾                                                                                                                                                                                                                                                                           |       |   |   |   |   |   |   |    |      |                       |                          |
|                                                      | 8BP4.....   | A +2                                                                                                                                                                                                                                                                             |       |   |   |   |   |   |   |    |      |                       |                          |
| 7JP4.....                                            | 7GP4.....   |                                                                                                                                                                                                                                                                                  |       |   |   |   |   |   | F |    |      |                       |                          |
|                                                      | 10HP4.....  | A +4 ¾                                                                                                                                                                                                                                                                           |       |   |   |   |   |   |   |    |      |                       |                          |
|                                                      | 8BP4.....   | A +2                                                                                                                                                                                                                                                                             |       |   |   |   |   |   |   |    |      |                       |                          |
| 8AP4.....                                            | 10MP4.....  | A +2 ¾                                                                                                                                                                                                                                                                           | C D2. |   |   |   |   |   |   |    | 4, 1 |                       |                          |
|                                                      | 12VP4.....  | A +3 ¾                                                                                                                                                                                                                                                                           | C D2. |   |   |   |   |   |   |    | 4, 1 |                       |                          |
|                                                      | 10BP4.....  | A +3 ¾                                                                                                                                                                                                                                                                           | C D2. |   |   |   |   |   |   |    | 8, 4 |                       |                          |
|                                                      | 10FP4.....  | A +3 ½                                                                                                                                                                                                                                                                           | C     |   | E |   |   |   |   |    | 1, 8 |                       |                          |
|                                                      | 12JP4.....  | A +3                                                                                                                                                                                                                                                                             | C     |   | E |   |   |   |   |    | 8, 1 |                       |                          |
|                                                      | 12UP4.....  | A +4 ½                                                                                                                                                                                                                                                                           | D2.   |   |   |   |   |   |   |    | 8, 1 |                       |                          |
| 9AP4.....                                            | 12AP4.....  | A +4 ¾                                                                                                                                                                                                                                                                           |       |   |   |   |   |   |   |    |      |                       |                          |
| 10BP4.....                                           | 10CP4.....  | -1                                                                                                                                                                                                                                                                               | C     |   | E |   |   |   |   |    |      |                       |                          |
|                                                      | 10FP4.....  |                                                                                                                                                                                                                                                                                  |       |   | E |   |   |   |   |    |      |                       |                          |
|                                                      | 12JP4.....  | A                                                                                                                                                                                                                                                                                | C     |   | E |   |   |   |   | K  |      |                       |                          |
|                                                      | 12KP4.....  | A                                                                                                                                                                                                                                                                                |       |   | E |   |   |   |   |    |      |                       |                          |

| For details of changes indicated<br>Refer to page 34 |                                         | BULB DIAMETER<br>BULB LENGTH<br>CONNECTOR<br>APR ON TRAP MAG.<br>REMOVE ON TRAP MAG.<br>CHANGE ORBITAL MAG.<br>CHANGE DEFLECTION<br>CHANGE TUBE SOCKET<br>ADD PLUG CAPACITANCE<br>NOTE NO |      |     |     |   |   |   |   |   |      | 5 |
|------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|-----|---|---|---|---|---|------|---|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                   | A                                                                                                                                                                                         | B    | C   | D   | E | F | G | H | K |      |   |
| 10BP4.....                                           | 12LP4.....                              | A                                                                                                                                                                                         | + 1  |     |     |   |   |   |   |   |      |   |
| (Continued)                                          | 12UP4.....                              | A                                                                                                                                                                                         | + 1  | C   |     |   |   |   |   | K | 6    |   |
|                                                      | 14BP4 <input type="checkbox"/>          | A                                                                                                                                                                                         |      |     |     |   |   | G |   |   |      |   |
|                                                      | 14CP4 <input type="checkbox"/>          | A                                                                                                                                                                                         | - 1  | D1. |     |   |   | G |   |   |      |   |
| 10CP4.....                                           | 10BP4.....                              |                                                                                                                                                                                           | + 1  | C   | D2. |   |   |   |   |   |      |   |
|                                                      | 10FP4.....                              |                                                                                                                                                                                           | + 1  | C   |     |   |   |   |   |   |      |   |
|                                                      | 12JP4.....                              | A                                                                                                                                                                                         | + 1½ |     |     |   |   |   |   |   |      |   |
|                                                      | 12KP4.....                              | A                                                                                                                                                                                         | + 1  | C   |     |   |   |   |   |   |      |   |
|                                                      | 12LP4.....                              | A                                                                                                                                                                                         | + 1¾ | C   | D2. |   |   |   |   |   |      |   |
|                                                      | 12UP4.....                              | A                                                                                                                                                                                         | + 2  | C   | D2. |   |   |   |   | K | 6    |   |
|                                                      | 14BP4 <input type="checkbox"/>          | A                                                                                                                                                                                         |      | C   | D2. |   |   | G |   |   |      |   |
|                                                      | 14CP4 <input type="checkbox"/>          | A                                                                                                                                                                                         |      | C   |     | E |   | G |   |   |      |   |
| 10DP4.....                                           | 7DP4.....                               | A                                                                                                                                                                                         | - 3½ |     |     |   | F |   |   |   | 4    |   |
| 10FP4.....                                           | 10BP4.....                              |                                                                                                                                                                                           |      |     | D2. |   |   |   |   |   |      |   |
|                                                      | 10CP4.....                              |                                                                                                                                                                                           | - 1  | C   |     |   |   |   |   |   |      |   |
|                                                      | 12JP4.....                              | A                                                                                                                                                                                         |      | C   |     |   |   |   |   | K |      |   |
|                                                      | 12KP4.....                              | A                                                                                                                                                                                         |      |     |     |   |   |   |   |   |      |   |
|                                                      | 12LP4.....                              | A                                                                                                                                                                                         | + 1  |     | D2. |   |   |   |   |   |      |   |
|                                                      | 12UP4.....                              | A                                                                                                                                                                                         | + 1  | C   | D2. |   |   |   |   | K | 6    |   |
|                                                      | 14BP4 <input type="checkbox"/>          | A                                                                                                                                                                                         | - 1  |     | D2. |   |   | G |   |   |      |   |
|                                                      | 14CP4 <input type="checkbox"/>          | A                                                                                                                                                                                         | - 1  |     | D1. |   |   | G |   |   |      |   |
| 10HP4.....                                           | 7GP4.....                               | A                                                                                                                                                                                         | - 4¾ |     |     |   | F |   |   |   |      |   |
|                                                      | 7JP4.....                               | A                                                                                                                                                                                         | - 4¾ |     |     |   | F |   |   |   |      |   |
|                                                      | 10GP4.....                              |                                                                                                                                                                                           | -¾   |     |     |   |   |   |   |   |      |   |
|                                                      | 8BP4.....                               | A                                                                                                                                                                                         | - 2¾ |     |     |   |   |   |   |   |      |   |
| 10MP4.....                                           | 8AP4.....                               | A                                                                                                                                                                                         | - 2¾ | C   | D1. |   | F |   |   |   | 6    |   |
|                                                      | 12VP4.....                              | A                                                                                                                                                                                         | + 1  |     | D1. |   |   |   |   |   | 1, 6 |   |
|                                                      | Also 10" types under 10BP4 but add note |                                                                                                                                                                                           |      |     |     |   |   |   |   |   | 8    |   |
| 12AP4.....                                           | 9AP4.....                               | A                                                                                                                                                                                         | - 4¾ |     |     |   |   |   |   |   |      |   |
| 12JP4.....                                           | 12KP4.....                              | A                                                                                                                                                                                         |      | C   |     |   |   |   |   |   | 4    |   |

☐ Indicates rectangular tubes

**SAFETY FIRST:** Wear goggles and gloves when handling Picture Tubes. Be sure power supply is turned off before working on high-voltage circuits.

# SYLVANIA SUBSTITUTION MANUAL

| For details of changes indicated<br>Refer to page 34 |                                          | BULB DIAMETER<br>BULB LENGTH<br>CONNECTOR<br>ADD ON TRAP MAG.<br>REMOVE ON TRAP MAG.<br>CHANGE VOLTAGE<br>CHANGE OPERATING<br>CHANGE REFLECTION<br>ADD FILTER CAPACITANCE<br>NOTE NO. |        |   |    |   |   |   |   |   |      |
|------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|----|---|---|---|---|---|------|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                    | A                                                                                                                                                                                     | B      | C | D  | E | F | G | H | K |      |
| 12JP4.....                                           | 12LP4.....                               | A                                                                                                                                                                                     | +1 1/4 | C | D2 |   |   |   |   |   | 4    |
| (Cont'd)                                             | 12QP4.....                               | A                                                                                                                                                                                     |        |   | D1 |   |   |   |   |   |      |
|                                                      | 12RP4.....                               |                                                                                                                                                                                       |        |   | D1 |   |   |   |   | K |      |
|                                                      | 12TP4.....                               | A                                                                                                                                                                                     | +1 1/4 | C | D2 |   |   |   |   |   |      |
|                                                      | 12UP4.....                               | A                                                                                                                                                                                     | +1 1/4 | C | D2 |   |   |   |   |   | 6    |
|                                                      | 14BP4 □.....                             | A                                                                                                                                                                                     | -3/4   | C | D2 |   |   | G |   |   | 4    |
|                                                      | 14CP4 □.....                             | A                                                                                                                                                                                     | -3/4   | C | D1 |   |   | G |   |   |      |
| 12KP4.....                                           | 12JP4.....                               | A                                                                                                                                                                                     |        | C |    |   |   |   |   | K |      |
|                                                      | 12LP4.....                               |                                                                                                                                                                                       | +3/4   |   | D2 |   |   |   |   |   |      |
|                                                      | 12QP4.....                               |                                                                                                                                                                                       |        | C | D1 |   |   |   |   | K |      |
|                                                      | 12RP4.....                               | A                                                                                                                                                                                     |        | C | D1 |   |   |   |   | K |      |
|                                                      | 12TP4.....                               |                                                                                                                                                                                       | +3/4   |   | D2 |   |   |   |   | K |      |
|                                                      | 12UP4.....                               | A                                                                                                                                                                                     | +1     | C | D2 |   |   |   |   | K | 6    |
|                                                      | 14BP4 □.....                             | A                                                                                                                                                                                     | -1     |   | D2 |   |   | G |   |   |      |
|                                                      | 14CP4 □.....                             | A                                                                                                                                                                                     | -1     |   | D1 |   |   | G |   |   |      |
|                                                      | 16LP4.....                               | A                                                                                                                                                                                     | +4 1/2 |   | D2 |   |   |   |   |   |      |
|                                                      | 16TP4 □.....                             | A                                                                                                                                                                                     | +1/2   |   | D1 |   |   | G |   |   | 7    |
| 12LP4.....                                           | 12JP4.....                               | A                                                                                                                                                                                     | -1 1/4 | C |    | E |   |   |   | K |      |
|                                                      | 12QP4.....                               |                                                                                                                                                                                       | -1 1/4 | C | D1 |   |   |   |   | K |      |
|                                                      | 12RP4.....                               | A                                                                                                                                                                                     | -1 1/4 | C | D1 |   |   |   |   | K |      |
|                                                      | 12TP4.....                               |                                                                                                                                                                                       |        |   |    |   |   |   |   | K |      |
|                                                      | 12UP4.....                               | A                                                                                                                                                                                     |        | C |    |   |   |   |   | K | 6    |
|                                                      | 14BP4 □.....                             | A                                                                                                                                                                                     | -2     |   |    |   |   | G |   |   |      |
|                                                      | 14CP4 □.....                             | A                                                                                                                                                                                     | -2     |   | D1 |   |   | G |   |   |      |
|                                                      | 16LP4.....                               | A                                                                                                                                                                                     | +3 1/2 |   |    |   |   |   |   |   |      |
|                                                      | 16TP4 □.....                             | A                                                                                                                                                                                     | -1/2   |   | D1 |   |   | G |   |   | 7    |
|                                                      | 12KP4.....                               |                                                                                                                                                                                       | -3/4   |   |    | E |   |   |   |   |      |
| 12QP4.....                                           | 12JP4.....                               | A                                                                                                                                                                                     |        |   |    | E |   |   |   |   |      |
|                                                      | 12LP4.....                               |                                                                                                                                                                                       | +1 1/4 | C | D2 |   |   |   |   |   | 4    |
|                                                      | 12RP4.....                               | A                                                                                                                                                                                     |        |   |    |   |   |   |   |   |      |
|                                                      | 12TP4.....                               |                                                                                                                                                                                       | +1 1/4 | C | D2 |   |   |   |   |   |      |
|                                                      | 12UP4.....                               | A                                                                                                                                                                                     | +1     | C | D2 |   |   |   |   |   | 6    |
|                                                      | 14BP4 □.....                             | A                                                                                                                                                                                     | -3/4   | C | D2 |   |   | G |   |   | 4    |
|                                                      | 14CP4 □.....                             | A                                                                                                                                                                                     | -3/4   | C |    |   |   | G |   |   | 4    |
|                                                      | 16LP4.....                               | A                                                                                                                                                                                     | +4 1/2 | C | D2 |   |   |   |   | K |      |
|                                                      | 16TP4 □.....                             | A                                                                                                                                                                                     | +1/2   | C |    |   |   | G |   |   | 4, 7 |
|                                                      | 12KP4.....                               |                                                                                                                                                                                       |        | C |    | E |   |   |   |   |      |
| 12TP4.....                                           | 12JP4.....                               | A                                                                                                                                                                                     | -3/4   | C |    | E |   |   |   |   | 4    |
|                                                      | 12LP4.....                               |                                                                                                                                                                                       |        |   |    |   |   |   |   | K |      |
|                                                      | 12QP4.....                               |                                                                                                                                                                                       | -3/4   | C | D1 |   |   |   |   |   |      |
|                                                      | 12RP4.....                               | A                                                                                                                                                                                     | -3/4   | C | D1 |   |   |   |   |   |      |
|                                                      | 12UP4.....                               | A                                                                                                                                                                                     |        | C |    |   |   |   |   |   | 6    |
|                                                      | 14BP4 □.....                             | A                                                                                                                                                                                     | -2     |   |    |   |   | G |   |   | 4    |
|                                                      | 14CP4 □.....                             | A                                                                                                                                                                                     | -2     |   | D1 |   |   | G |   |   | 4    |
|                                                      | 16LP4.....                               | A                                                                                                                                                                                     | +3 1/2 |   |    |   |   |   |   |   | 4    |
|                                                      | 16TP4 □.....                             | A                                                                                                                                                                                     | -3/4   |   | D1 |   |   | G |   |   | 7    |
|                                                      | 12KP4.....                               |                                                                                                                                                                                       | -1     |   |    | E |   |   |   |   | 4    |
| 12UP4.....                                           | 12JP4.....                               | A                                                                                                                                                                                     | -1     | C |    | E |   |   |   |   |      |
|                                                      | 12KP4.....                               |                                                                                                                                                                                       | -1     | C |    | E |   |   |   |   | 4    |
|                                                      | 12LP4.....                               |                                                                                                                                                                                       |        | C |    |   |   |   |   |   | 4    |
|                                                      | 12QP4.....                               |                                                                                                                                                                                       | -1     | C | D1 |   |   |   |   |   |      |
|                                                      | 12RP4.....                               | A                                                                                                                                                                                     | -1     | C | D1 |   |   |   |   |   |      |
|                                                      | 12TP4.....                               |                                                                                                                                                                                       |        | C |    |   |   |   |   |   |      |
|                                                      | 14BP4 □.....                             | A                                                                                                                                                                                     | -2 1/4 | C |    |   |   | G |   |   | 4    |
|                                                      | 14CP4 □.....                             | A                                                                                                                                                                                     | -2     | C | D1 |   |   | G |   |   | 4    |
|                                                      | 16LP4.....                               | A                                                                                                                                                                                     | +3 1/2 | C |    |   |   |   |   |   | 4    |
|                                                      | 16TP4 □.....                             | A                                                                                                                                                                                     | -1/2   | C | D1 |   |   | G |   |   | 4, 7 |
|                                                      | 16GP4.....                               | A                                                                                                                                                                                     | -1     |   | D1 |   |   | G |   |   | 7    |
| 12VP4.....                                           | 10MP4.....                               | A                                                                                                                                                                                     | -1     |   |    | F |   |   |   |   |      |
|                                                      | 8AP4.....                                | A                                                                                                                                                                                     |        | C | D1 |   | F |   |   | K | 6    |
|                                                      | 12LP4.....                               |                                                                                                                                                                                       | +3/4   |   |    |   |   |   |   |   | 8    |
|                                                      | Other 12" types under 12LP4 but add note |                                                                                                                                                                                       |        |   |    |   |   |   |   |   | 8    |
| 14BP4 □.....                                         | 14CP4 □.....                             |                                                                                                                                                                                       |        |   | D1 |   |   |   |   |   |      |
|                                                      | 14DP4 □.....                             |                                                                                                                                                                                       |        |   |    |   |   |   |   | K |      |
|                                                      | 14EP4 □.....                             |                                                                                                                                                                                       | -1/2   |   | D1 |   |   |   |   |   | 7    |
|                                                      | 16KP4 □.....                             | A                                                                                                                                                                                     | +2     |   | D1 |   |   |   |   |   |      |
|                                                      | 16TP4 □.....                             | A                                                                                                                                                                                     | +1 1/2 |   | D1 |   |   |   |   |   |      |
|                                                      | 16UP4 □.....                             | A                                                                                                                                                                                     | +1 1/2 |   | D1 |   |   |   |   | K | 7    |

| For details of changes indicated<br>Refer to page 34                                                            |                       | BULB DIAMETER<br>BULB LENGTH<br>CONNECTOR<br>ADD ON TRAP MAG.<br>REMOVE ON TRAP MAG.<br>CHANGE VOLTAGE<br>CHANGE OPERATING<br>CHANGE REFLECTION<br>ADD FILTER CAPACITANCE<br>NOTE NO. |        |   |    |   |   |   |   |   |      |
|-----------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|----|---|---|---|---|---|------|
| REQUIRED TYPE                                                                                                   | POSSIBLE REPLACEMENTS | A                                                                                                                                                                                     | B      | C | D  | E | F | G | H | K |      |
| 14BP4.....                                                                                                      | 17AP4 □.....          | A                                                                                                                                                                                     | +2     |   | D1 |   |   |   |   |   | 7    |
| (Cont'd)                                                                                                        | 17BP4 □.....          | A                                                                                                                                                                                     | +2 1/4 |   | D1 |   |   |   |   |   |      |
| If cabinet space permits, round types listed under type 16SP4 may also be used. Add 1" to dimension change B.   |                       |                                                                                                                                                                                       |        |   |    |   |   |   |   |   |      |
| 14CP4 □.....                                                                                                    | 14BP4 □.....          |                                                                                                                                                                                       |        |   | D2 |   |   |   |   |   |      |
|                                                                                                                 | 14DP4 □.....          |                                                                                                                                                                                       |        |   | D2 |   |   |   |   | K |      |
|                                                                                                                 | 14EP4 □.....          |                                                                                                                                                                                       | -1/2   |   |    |   |   |   |   |   | 7    |
|                                                                                                                 | 16KP4 □.....          | A                                                                                                                                                                                     | +2     |   |    |   |   |   |   |   |      |
|                                                                                                                 | 16TP4 □.....          | A                                                                                                                                                                                     | +1 1/2 |   |    |   |   |   |   |   | 7    |
|                                                                                                                 | 16UP4 □.....          | A                                                                                                                                                                                     | +1 1/2 |   |    |   |   |   |   | K | 7    |
|                                                                                                                 | 17AP4 □.....          | A                                                                                                                                                                                     | +2     |   |    |   |   |   |   |   | 7    |
|                                                                                                                 | 17BP4 □.....          | A                                                                                                                                                                                     | +2 1/4 |   |    |   |   |   |   |   |      |
| If cabinet space permits, round types listed under type 16YP4 may also be used. Add 1/2" to dimension change B. |                       |                                                                                                                                                                                       |        |   |    |   |   |   |   |   |      |
| 14DP4 □.....                                                                                                    | 14BP4 □.....          |                                                                                                                                                                                       |        |   |    |   |   |   |   |   | 4    |
|                                                                                                                 | 14CP4 □.....          |                                                                                                                                                                                       |        |   | D1 |   |   |   |   |   | 4    |
|                                                                                                                 | 14BP4 □.....          |                                                                                                                                                                                       | -1/2   |   | D1 |   |   |   |   |   | 4, 7 |
|                                                                                                                 | 16KP4 □.....          | A                                                                                                                                                                                     | +2     |   | D1 |   |   |   |   | K | 4    |
|                                                                                                                 | 16TP4 □.....          | A                                                                                                                                                                                     | +1 1/2 |   | D1 |   |   |   |   | K | 4, 7 |
|                                                                                                                 | 16UP4 □.....          | A                                                                                                                                                                                     | +1 1/2 |   | D1 |   |   |   |   |   | 4, 7 |
|                                                                                                                 | 17AP4 □.....          | A                                                                                                                                                                                     | +2     |   | D1 |   |   |   |   | K | 4, 7 |
|                                                                                                                 | 17BP4 □.....          | A                                                                                                                                                                                     | +2 1/4 |   | D1 |   |   |   |   | K | 4    |
| If cabinet space permits, round types listed under type 16WP4 may also be used. Add 1" to dimension change B.   |                       |                                                                                                                                                                                       |        |   |    |   |   |   |   |   |      |
| 14EP4 □.....                                                                                                    | 14BP4 □.....          |                                                                                                                                                                                       | +1/2   |   | D2 |   |   |   |   |   |      |
|                                                                                                                 | 14CP4 □.....          |                                                                                                                                                                                       | +1/2   |   |    |   |   |   |   |   |      |
|                                                                                                                 | 14DP4 □.....          |                                                                                                                                                                                       | +1/2   |   | D2 |   |   |   |   | K |      |
|                                                                                                                 | 16KP4 □.....          | A                                                                                                                                                                                     | +2 1/2 |   |    |   |   |   |   |   |      |
|                                                                                                                 | 16TP4 □.....          | A                                                                                                                                                                                     | +2     |   |    |   |   |   |   |   |      |
|                                                                                                                 | 16UP4 □.....          | A                                                                                                                                                                                     | +2     |   |    |   |   |   |   | K |      |
|                                                                                                                 | 17AP4 □.....          | A                                                                                                                                                                                     | +2 1/2 |   |    |   |   |   |   |   | 7    |
|                                                                                                                 | 17BP4 □.....          | A                                                                                                                                                                                     | +3 1/4 |   |    |   |   |   |   |   |      |
| If cabinet space permits, round types listed under type 16YP4 may also be used. Add 1" to dimension change B.   |                       |                                                                                                                                                                                       |        |   |    |   |   |   |   |   |      |
| 15AP4.....                                                                                                      | 15CP4.....            |                                                                                                                                                                                       | +1     | C | D2 |   |   |   |   |   |      |
|                                                                                                                 | 15DP4.....            |                                                                                                                                                                                       |        |   | D2 |   |   |   |   |   |      |
|                                                                                                                 | 16AP4.....            | A                                                                                                                                                                                     | +1 1/4 | C | D2 |   |   |   |   |   | 6    |
|                                                                                                                 | 16CP4.....            | A                                                                                                                                                                                     | +1     | C | D2 |   |   |   |   |   |      |
|                                                                                                                 | 16DP4.....            | A                                                                                                                                                                                     | +3/4   | C | D2 |   |   |   |   |   |      |
|                                                                                                                 | 16EP4.....            | A                                                                                                                                                                                     | -1     | C | D2 |   |   |   |   |   | 6    |
|                                                                                                                 | 16FP4.....            | A                                                                                                                                                                                     | -1/4   |   | D1 |   |   |   |   |   |      |
|                                                                                                                 | 16GP4.....            | A                                                                                                                                                                                     | -3     | C | D1 |   |   | G |   |   | 6, 7 |
|                                                                                                                 | 16HP4.....            | A                                                                                                                                                                                     | +3/4   | C | D2 |   |   |   |   |   | 4    |
|                                                                                                                 | 16JP4.....            | A                                                                                                                                                                                     | +3/4   | C | D2 |   |   | G |   |   | 4    |
|                                                                                                                 | 16KP4 □.....          | A                                                                                                                                                                                     | -1 1/4 | C | D1 |   |   | G |   |   | 4    |
|                                                                                                                 | 16LP4.....            | A                                                                                                                                                                                     | +1 3/4 | C | D2 |   |   |   |   |   | 4    |
|                                                                                                                 | 16QP4 □.....          | A                                                                                                                                                                                     | -1 1/2 | C | D2 |   |   | G |   |   |      |
|                                                                                                                 | 16RP4 □.....          | A                                                                                                                                                                                     | -1 1/4 | C | D1 |   |   | G |   |   | 4    |
|                                                                                                                 | 16SP4.....            | A                                                                                                                                                                                     | -3 1/4 | C | D2 |   |   | G |   |   | 4, 7 |
|                                                                                                                 | 16TP4 □.....          | A                                                                                                                                                                                     | -2 1/4 | C | D1 |   |   | G |   |   | 4, 7 |
|                                                                                                                 | 16UP4 □.....          | A                                                                                                                                                                                     | -2 1/4 | C | D1 |   |   | G |   |   | 7    |
|                                                                                                                 | 16VP4.....            | A                                                                                                                                                                                     | -3 1/4 | C | D1 |   |   | G |   |   | 7    |
|                                                                                                                 | 16WP4.....            | A                                                                                                                                                                                     | -2 1/4 | C | D2 |   |   | G |   |   |      |
|                                                                                                                 | 16WP4A.....           | A                                                                                                                                                                                     | -2 1/4 | C | D2 |   |   | G |   |   | 4    |
|                                                                                                                 | 16XP4 □.....          | A                                                                                                                                                                                     | -1 1/4 | C | D2 |   |   | G |   |   |      |
|                                                                                                                 | 16YP4.....            | A                                                                                                                                                                                     | -3 1/4 | C | D1 |   |   | G |   |   | 4, 7 |
|                                                                                                                 | 16ZP4.....            | A                                                                                                                                                                                     | +1 1/4 | C | D2 |   |   |   |   |   | 4    |
|                                                                                                                 | 17AP4 □.....          | A                                                                                                                                                                                     | -2     |   | G  |   |   |   |   |   | 4, 7 |
|                                                                                                                 | 17BP4 □.....          | A                                                                                                                                                                                     | -1 1/4 | C | D1 |   |   | G |   |   | 4    |
|                                                                                                                 | 20BP4.....            | A                                                                                                                                                                                     | +8 1/4 | C |    |   |   |   |   |   |      |
| 15CP4.....                                                                                                      | 15AP4.....            |                                                                                                                                                                                       | -1     | C |    | E |   |   |   |   |      |
|                                                                                                                 | 15DP4.....            |                                                                                                                                                                                       | -1     | C |    |   |   | G |   |   |      |
|                                                                                                                 | 16AP4.....            | A                                                                                                                                                                                     | +3/4   | C |    |   |   |   |   |   | 6    |
|                                                                                                                 | 16CP4.....            | A                                                                                                                                                                                     |        |   |    |   |   |   |   |   |      |
|                                                                                                                 | 16DP4.....            | A                                                                                                                                                                                     | -3/4   |   |    |   |   | G |   |   |      |
|                                                                                                                 | 16EP4.....            | A                                                                                                                                                                                     | -2     | C |    |   |   | G |   |   | 6    |

□ Indicates rectangular tubes

SAFETY FIRST: Wear goggles and gloves when handling Picture Tubes. Be sure power supply is turned off before working on high-voltage circuits.

| For details of changes indicated<br>Refer to page 34 |                                      | <div><div>BULB DIAMETER</div><div>BULB LENGTH</div><div>CONNECTOR</div><div>ADD ION TRAP MAG.</div><div>REMOVE ION TRAP MAG.</div><div>CHANGE COILS</div><div>CHANGE BRACKETING</div><div>CHANGE TUBE SOCKET</div><div>ADJ. FILTR. CAPACITANCE</div><div>NOTE NO.</div></div> |        |   |    |   |   |   |   |   |      |  |
|------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|----|---|---|---|---|---|------|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                | A                                                                                                                                                                                                                                                                             | B      | C | D  | E | F | G | H | K |      |  |
| 15CP4.....                                           | 16FP4.....                           | A                                                                                                                                                                                                                                                                             | -1 3/4 | C | D1 |   |   | G |   |   |      |  |
| (Cont'd)                                             | 16HP4.....                           | A                                                                                                                                                                                                                                                                             | -1 3/4 |   |    |   |   | G |   |   | 4    |  |
|                                                      | 16JP4.....                           | A                                                                                                                                                                                                                                                                             | -1 3/4 |   |    |   |   | G |   |   | 4    |  |
|                                                      | 16LP4.....                           | A                                                                                                                                                                                                                                                                             | +3/4   |   |    |   |   |   |   |   | 4    |  |
|                                                      | 16ZP4.....                           | A                                                                                                                                                                                                                                                                             | +3/4   |   |    |   |   |   |   |   | 4    |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                             | +7 1/4 | C |    | E |   |   |   |   |      |  |
| 15DP4.....                                           | 15AP4.....                           |                                                                                                                                                                                                                                                                               |        |   |    | E |   |   |   |   |      |  |
|                                                      | 15CP4.....                           |                                                                                                                                                                                                                                                                               | +1     | C |    |   |   |   |   |   |      |  |
|                                                      | 16AP4.....                           | A                                                                                                                                                                                                                                                                             | +1 3/4 | C |    |   |   |   |   |   | 6    |  |
|                                                      | 16CP4.....                           | A                                                                                                                                                                                                                                                                             | +1     | C |    |   |   |   |   |   |      |  |
|                                                      | 16DP4.....                           | A                                                                                                                                                                                                                                                                             | +1 1/4 | C |    |   |   |   |   |   |      |  |
|                                                      | 16EP4.....                           | A                                                                                                                                                                                                                                                                             | -1     | C |    |   |   |   |   |   | 6    |  |
|                                                      | 16FP4.....                           | A                                                                                                                                                                                                                                                                             | -1 3/4 |   | D1 |   |   |   |   |   |      |  |
|                                                      | 16HP4.....                           | A                                                                                                                                                                                                                                                                             | +3/4   | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16JP4.....                           | A                                                                                                                                                                                                                                                                             | +1 3/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16LP4.....                           | A                                                                                                                                                                                                                                                                             | +1 3/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16ZP4.....                           | A                                                                                                                                                                                                                                                                             | +1 3/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                             | +8 3/4 | C |    | E |   |   |   |   |      |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2     | C | D1 |   |   | G |   |   | 4, 7 |  |
|                                                      | 17BP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -1 3/4 | C | D1 |   |   | G |   |   | 4    |  |
| 16AP4.....                                           | 16CP4.....                           |                                                                                                                                                                                                                                                                               | - 3/4  | C |    |   |   |   |   |   |      |  |
|                                                      | 16LP4.....                           |                                                                                                                                                                                                                                                                               |        | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16ZP4.....                           |                                                                                                                                                                                                                                                                               |        | C |    |   |   |   |   |   | 4    |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                             | +6 1/2 | C |    | E |   |   |   |   |      |  |
|                                                      | 16GP4.....                           |                                                                                                                                                                                                                                                                               | +3 3/4 |   | D1 |   |   | G |   |   | 7    |  |
|                                                      | 16TP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -4 1/4 | C | D1 |   |   | G |   |   | 4, 7 |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -4 3/4 | C | D1 |   |   | G |   |   | 4, 7 |  |
|                                                      | 17BP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -3     | C | D1 |   |   | G |   |   | 4    |  |
|                                                      | 19AP4.....                           | A                                                                                                                                                                                                                                                                             | -1 3/4 |   | D1 |   |   | G |   |   |      |  |
|                                                      | 19DP4.....                           | A                                                                                                                                                                                                                                                                             | -3/4   | C |    |   |   | G |   |   | 4    |  |
|                                                      | 19EP4.....                           | A                                                                                                                                                                                                                                                                             | -1     | C | D1 |   |   | G |   |   | 4    |  |
| 16CP4.....                                           | 15AP4.....                           | A                                                                                                                                                                                                                                                                             | -1     | C |    | E |   |   |   |   |      |  |
|                                                      | 16AP4.....                           |                                                                                                                                                                                                                                                                               | +3/4   | C |    |   |   |   |   |   |      |  |
|                                                      | 16LP4.....                           |                                                                                                                                                                                                                                                                               | +3/4   |   |    |   |   |   |   |   | 4    |  |
|                                                      | 16ZP4.....                           |                                                                                                                                                                                                                                                                               | +3/4   |   |    |   |   |   |   |   | 4    |  |
|                                                      | 16GP4.....                           |                                                                                                                                                                                                                                                                               | -4 3/4 | C | D1 |   |   | G |   |   | 6, 7 |  |
|                                                      | 16TP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -3 3/4 |   | D1 |   |   | G |   |   | 4, 7 |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -3     |   | D1 |   |   | G |   |   | 4, 7 |  |
|                                                      | 17BP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2 3/4 |   | D1 |   |   | G |   |   | 4    |  |
|                                                      | 19AP4.....                           | A                                                                                                                                                                                                                                                                             |        | C | D1 |   |   | G |   |   | 6    |  |
|                                                      | 19DP4.....                           | A                                                                                                                                                                                                                                                                             |        |   |    |   |   | G |   |   | 4    |  |
|                                                      | 19EP4.....                           | A                                                                                                                                                                                                                                                                             | -1 3/4 |   | D1 |   |   | G |   |   | 4    |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                             | +7 3/4 | C |    | E |   | G |   |   |      |  |
| 16DP4.....                                           | 16AP4.....                           |                                                                                                                                                                                                                                                                               | +1 1/2 | C |    |   |   |   |   |   | 6    |  |
|                                                      | 16CP4.....                           |                                                                                                                                                                                                                                                                               | +3/4   |   |    |   |   |   |   |   |      |  |
|                                                      | 16EP4.....                           |                                                                                                                                                                                                                                                                               | -1     | C |    |   |   |   |   |   | 6    |  |
|                                                      | 16FP4.....                           |                                                                                                                                                                                                                                                                               | -1 1/2 | C | D1 |   |   |   |   |   |      |  |
|                                                      | 16HP4.....                           |                                                                                                                                                                                                                                                                               | +1 1/2 |   |    |   |   |   |   |   | 4    |  |
|                                                      | 16JP4.....                           |                                                                                                                                                                                                                                                                               | +1 1/2 |   |    |   |   |   |   |   | 4    |  |
|                                                      | 16KP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2     |   | D1 |   |   |   |   |   | 4    |  |
|                                                      | 16LP4.....                           |                                                                                                                                                                                                                                                                               | +1 1/2 |   |    |   |   |   |   |   | 4    |  |
|                                                      | 16QP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -1 1/2 |   |    |   |   |   |   |   |      |  |
|                                                      | 16RP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2     |   | D1 |   |   |   |   |   | 4, 7 |  |
|                                                      | 16TP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2 1/2 |   | D1 |   |   |   |   |   | 4    |  |
|                                                      | 16UP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2 1/2 |   | D1 |   |   |   |   |   | 7    |  |
|                                                      | 16XP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2     |   |    |   |   |   |   |   |      |  |
|                                                      | 16ZP4.....                           |                                                                                                                                                                                                                                                                               | +1 1/2 |   |    |   |   |   |   |   | 4    |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -2     |   | D1 |   |   |   |   |   | 4, 7 |  |
|                                                      | 17BP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -1 1/2 |   | D1 |   |   |   |   |   | 4    |  |
|                                                      | 19EP4.....                           | A                                                                                                                                                                                                                                                                             | +1 3/4 |   | D1 |   |   |   |   |   | 4    |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                             | +8     | C |    | E |   |   |   |   |      |  |
| 16EP4.....                                           | 16AP4.....                           |                                                                                                                                                                                                                                                                               | +2 1/2 |   |    |   |   |   |   |   |      |  |
|                                                      | 16CP4.....                           |                                                                                                                                                                                                                                                                               | +2     | C |    |   |   |   |   |   |      |  |
|                                                      | 16DP4.....                           |                                                                                                                                                                                                                                                                               | +1 3/4 | C |    |   |   |   |   |   |      |  |
|                                                      | 16FP4.....                           |                                                                                                                                                                                                                                                                               | +3/4   | C | D1 |   |   |   |   |   |      |  |
|                                                      | 16HP4.....                           |                                                                                                                                                                                                                                                                               | +1 3/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16JP4.....                           |                                                                                                                                                                                                                                                                               | +1     | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16KP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                             | -1     | C | D1 |   |   |   |   |   | 4    |  |
|                                                      | 16LP4.....                           |                                                                                                                                                                                                                                                                               | +2 3/4 | C |    |   |   |   |   |   |      |  |

| For details of changes indicated<br>Refer to page 34 |                                      | <div><div>BULB DIAMETER</div><div>BULB LENGTH</div><div>CONNECTOR</div><div>ADJ. ION TRAP MAG.</div><div>REMOVE ION TRAP MAG.</div><div>CHANGE COILS</div><div>CHANGE BRACKETING</div><div>CHANGE REFLECTION</div><div>CHANGE TUBE SOCKET</div><div>ADJ. FILTER CAPACITANCE</div><div>NOTE NO.</div></div> |        |   |    |   |   |   |   |   |      |  |
|------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|----|---|---|---|---|---|------|--|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                | A                                                                                                                                                                                                                                                                                                          | B      | C | D  | E | F | G | H | K |      |  |
| 16EP4.....                                           | 16QP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C |    |   |   |   |   |   |      |  |
| (Cont'd)                                             | 16RP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1     | C | D1 |   |   |   |   |   | 4    |  |
|                                                      | 16TP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C | D1 |   |   |   |   |   | 4, 7 |  |
|                                                      | 16UP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C | D1 |   |   |   |   |   | 7    |  |
|                                                      | 16XP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1     | C |    |   |   |   |   |   |      |  |
|                                                      | 16ZP4.....                           |                                                                                                                                                                                                                                                                                                            | +2 1/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1     | C | D1 |   |   |   |   |   | 4, 7 |  |
|                                                      | 17BP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C | D1 |   |   |   |   |   | 4    |  |
|                                                      | 19EP4.....                           | A                                                                                                                                                                                                                                                                                                          | +1 1/4 | C | D1 |   |   |   |   |   | 4    |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                                                          | +9     | C |    | E |   |   |   |   |      |  |
| 16FP4.....                                           | 16AP4.....                           |                                                                                                                                                                                                                                                                                                            | +2     | C | D2 |   |   |   |   |   | 6    |  |
|                                                      | 16CP4.....                           |                                                                                                                                                                                                                                                                                                            | +1 1/4 | C | D2 |   |   |   |   |   |      |  |
|                                                      | 16DP4.....                           |                                                                                                                                                                                                                                                                                                            | +1 1/4 | C | D2 |   |   |   |   |   |      |  |
|                                                      | 16EP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 | C | D2 |   |   |   |   |   | 6    |  |
|                                                      | 16HP4.....                           |                                                                                                                                                                                                                                                                                                            | +1 1/4 | C | D2 |   |   |   |   |   | 4    |  |
|                                                      | 16JP4.....                           |                                                                                                                                                                                                                                                                                                            | +1     | C | D2 |   |   |   |   |   | 4    |  |
|                                                      | 16KP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1     | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16LP4.....                           |                                                                                                                                                                                                                                                                                                            | +2 1/4 | C | D2 |   |   |   |   |   | 4    |  |
|                                                      | 16QP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C | D2 |   |   |   |   |   |      |  |
|                                                      | 16RP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1     | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16TP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C |    |   |   |   |   |   | 4, 7 |  |
|                                                      | 16UP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C |    |   |   |   |   |   | 7    |  |
|                                                      | 16XP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1     | C | D2 |   |   |   |   |   |      |  |
|                                                      | 16ZP4.....                           |                                                                                                                                                                                                                                                                                                            | +2 1/4 | C | D2 |   |   |   |   |   | 4    |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1     | C |    |   |   |   |   |   | 4, 7 |  |
|                                                      | 17BP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 19EP4.....                           | A                                                                                                                                                                                                                                                                                                          | +1 1/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                                                          | +8     | C |    | E |   |   |   |   |      |  |
|                                                      | 19GP4.....                           | A                                                                                                                                                                                                                                                                                                          | +1     | C |    |   |   |   |   |   |      |  |
| 16GP4.....                                           | 16EP4.....                           |                                                                                                                                                                                                                                                                                                            | +2     |   | D2 |   |   |   |   |   |      |  |
|                                                      | 16SP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 | C | D2 |   |   |   |   |   | 4    |  |
|                                                      | 16KP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | +1 1/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16QP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | +1 1/4 | C | D2 |   |   |   |   |   |      |  |
|                                                      | 16RP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | +3/4   | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16TP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | +1 1/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 16UP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | +1 1/4 | C |    |   |   |   |   |   |      |  |
|                                                      | 16VP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 | C |    |   |   |   |   |   |      |  |
|                                                      | 16WP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 | C | D2 |   |   |   |   |   |      |  |
|                                                      | 16WP4A.....                          |                                                                                                                                                                                                                                                                                                            | -1 1/4 | C | D2 |   |   |   |   |   | 4    |  |
|                                                      | 16XP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | +1 1/4 | C | D2 |   |   |   |   |   |      |  |
|                                                      | 16YP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | +1     | C |    |   |   |   |   |   | 4    |  |
|                                                      | 19AP4.....                           | A                                                                                                                                                                                                                                                                                                          | +4     |   |    |   |   |   |   |   |      |  |
|                                                      | 19DP4.....                           | A                                                                                                                                                                                                                                                                                                          | +4     | C | D2 |   |   |   |   |   | 4    |  |
|                                                      | 19EP4.....                           | A                                                                                                                                                                                                                                                                                                          | +3 1/4 | C |    |   |   |   |   |   | 4    |  |
|                                                      | 19FP4.....                           | A                                                                                                                                                                                                                                                                                                          | +4 1/4 | C | D2 |   |   |   |   |   |      |  |
|                                                      | 19GP4.....                           | A                                                                                                                                                                                                                                                                                                          | +3 1/4 | C |    |   |   |   |   |   |      |  |
|                                                      | 22AP4.....                           | A                                                                                                                                                                                                                                                                                                          | +5 1/4 |   |    |   |   |   |   |   |      |  |
| 16HP4.....                                           | 16AP4.....                           |                                                                                                                                                                                                                                                                                                            | +1     | C |    |   |   |   |   | K | 6    |  |
|                                                      | 16CP4.....                           |                                                                                                                                                                                                                                                                                                            | +1 1/4 |   |    |   |   |   |   | K |      |  |
|                                                      | 16DP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 |   |    |   |   |   |   | K |      |  |
|                                                      | 16EP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 | C |    |   |   |   |   | K | 6    |  |
|                                                      | 16FP4.....                           |                                                                                                                                                                                                                                                                                                            | -1     | C | D1 |   |   |   |   | K |      |  |
|                                                      | 16JP4.....                           |                                                                                                                                                                                                                                                                                                            | -1 1/4 |   |    |   |   |   |   |   |      |  |
|                                                      | 16KP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -1 1/4 |   | D1 |   |   |   |   |   |      |  |
|                                                      | 16LP4.....                           |                                                                                                                                                                                                                                                                                                            | +1     |   |    |   |   |   |   |   |      |  |
|                                                      | 16QP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -2     |   |    |   |   |   |   | K |      |  |
|                                                      | 16RP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -2 1/4 |   | D1 |   |   |   |   |   |      |  |
|                                                      | 16TP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -3     |   | D1 |   |   |   |   |   | 7    |  |
|                                                      | 16UP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -3     |   | D1 |   |   |   |   | K | 7    |  |
|                                                      | 16XP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -2 1/4 |   |    |   |   |   |   | K |      |  |
|                                                      | 16ZP4.....                           |                                                                                                                                                                                                                                                                                                            | +1     |   |    |   |   |   |   |   |      |  |
|                                                      | 17AP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -2 1/4 |   | D1 |   |   |   |   |   | 7    |  |
|                                                      | 17BP4 <input type="checkbox"/> ..... | A                                                                                                                                                                                                                                                                                                          | -2     |   | D1 |   |   |   |   |   |      |  |
|                                                      | 19EP4.....                           | A                                                                                                                                                                                                                                                                                                          |        |   | D1 |   |   |   |   |   |      |  |
|                                                      | 20BP4.....                           | A                                                                                                                                                                                                                                                                                                          | +11    | C |    | E |   |   |   | K |      |  |
| 16JP4.....                                           | 16AP4.....                           |                                                                                                                                                                                                                                                                                                            | +1 1/4 | C |    |   |   |   |   |   | 6    |  |
|                                                      | 16CP4.....                           |                                                                                                                                                                                                                                                                                                            | +3/4   |   |    |   |   |   |   |   |      |  |
|                                                      | 16DP4.....                           | A                                                                                                                                                                                                                                                                                                          |        |   |    |   |   |   |   | K |      |  |
|                                                      | 16EP4.....                           |                                                                                                                                                                                                                                                                                                            | +1     | C |    |   |   |   |   |   | 6    |  |

□ Indicates rectangular tubes.

SAFETY FIRST: Wear goggles and gloves when handling Picture Tubes. Be sure power supply is turned off before working on high-voltage circuits.

# SYLVANIA SUBSTITUTION MANUAL

For details of changes indicated  
Refer to page 34

|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | For details of changes indicated<br>Refer to page 34                                                                                                                               |                                                                                                                                                                                                                                                 |                                                                                                                                                                                           |                                                                                                                                                                           |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                          |  |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | BULB DIAMETER<br>BULB LENGTH<br>CONNECTOR<br>ADD ION TRAP MAG<br>REMOVE ION TRAP MAG<br>CHANGE OPERATING<br>CHANGE DRIFT<br>CHANGE TUBE SOCKET<br>ADD TUB. CAPACITANCE<br>NOTE NO. |                                                                                                                                                                                                                                                 |                                                                                                                                                                                           |                                                                                                                                                                           |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                          |  |
| REQUIRED TYPE                                                              | POSSIBLE REPLACEMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A                                                                                                                                                                                  | B                                                                                                                                                                                                                                               | C                                                                                                                                                                                         | D                                                                                                                                                                         | E                                                                                                                                                                       | F                                                                                                                                                                       | G                                                                                                                                                                       | H                                                                                                                                                                       | K                                                                                                                                                                        |  |
| 16JP4.....<br>(Cont'd)                                                     | 16FP4.....<br>16HP4.....<br>16KP4 <input type="checkbox"/> .....<br>16LP4.....<br>16MP4.....<br>16QP4 <input type="checkbox"/> .....<br>16RP4 <input type="checkbox"/> .....<br>16TP4 <input type="checkbox"/> .....<br>16UP4 <input type="checkbox"/> .....<br>16XP4 <input type="checkbox"/> .....<br>16ZP4.....<br>17AP4 <input type="checkbox"/> .....<br>17BP4 <input type="checkbox"/> .....<br>19EP4.....<br>20BP4.....                                                         | .....<br>.....<br>A.....<br>.....<br>.....<br>A.....<br>A.....<br>A.....<br>A.....<br>A.....<br>.....<br>A.....<br>A.....<br>A.....<br>A.....<br>A.....                            | -1/2.....<br>+1/2.....<br>-2.....<br>+1 1/2.....<br>+1.....<br>-1 1/2.....<br>-2.....<br>+2 1/2.....<br>+2 1/2.....<br>-2.....<br>+1 1/2.....<br>-2.....<br>-1 1/2.....<br>+1/4.....<br>+8.....                                                 | C.....<br>D1.....<br>.....<br>.....<br>.....<br>.....<br>D1.....<br>D1.....<br>D1.....<br>.....<br>.....<br>D1.....<br>D1.....<br>D1.....<br>.....<br>C.....                              | D1.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                            | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                            | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                            | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                            | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                            | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                             |  |
| 16KP4 <input type="checkbox"/> .....                                       | 16RP4 <input type="checkbox"/> .....<br>16QP4 <input type="checkbox"/> .....<br>16TP4 <input type="checkbox"/> .....<br>16UP4 <input type="checkbox"/> .....<br>16XP4 <input type="checkbox"/> .....<br>17AP4 <input type="checkbox"/> .....<br>17BP4 <input type="checkbox"/> .....                                                                                                                                                                                                   | .....<br>.....<br>.....<br>.....<br>.....<br>A.....<br>A.....                                                                                                                      | .....<br>+1/2.....<br>-1/2.....<br>-1/2.....<br>.....<br>.....<br>+1/2.....                                                                                                                                                                     | .....<br>D2.....<br>.....<br>.....<br>D2.....<br>.....<br>.....                                                                                                                           | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                               | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | .....<br>K.....<br>.....<br>.....<br>K.....<br>.....<br>.....                                                                                                            |  |
| If cabinet space permits, round types listed under 16YP4 may also be used. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                    |                                                                                                                                                                                                                                                 |                                                                                                                                                                                           |                                                                                                                                                                           |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                          |  |
| 16LP4.....                                                                 | 15AP4.....<br>15CP4.....<br>16AP4.....<br>16CP4.....<br>16ZP4.....<br>16GP4.....<br>16TP4 <input type="checkbox"/> .....<br>17AP4 <input type="checkbox"/> .....<br>17BP4 <input type="checkbox"/> .....<br>19AP4.....<br>19DP4.....<br>19EP4.....<br>20BP4.....                                                                                                                                                                                                                       | A.....<br>A.....<br>.....<br>.....<br>.....<br>.....<br>A.....<br>A.....<br>A.....<br>A.....<br>A.....<br>A.....<br>A.....                                                         | -1/4.....<br>-3/4.....<br>.....<br>-1/4.....<br>.....<br>-4 3/4.....<br>-4.....<br>-3 3/4.....<br>-3.....<br>-3/4.....<br>-3/4.....<br>-1.....<br>+6 1/2.....                                                                                   | C.....<br>.....<br>C.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>C.....<br>.....<br>.....<br>C.....                                                                     | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                         | E.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                      | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                       | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                       | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                       | K.....<br>.....<br>K.....<br>K.....<br>.....<br>.....<br>K.....<br>.....<br>.....<br>K.....<br>K.....<br>G.....<br>.....                                                 |  |
| 16MP4.....                                                                 | 16AP4.....<br>16CP4.....<br>16DP4.....<br>16EP4.....<br>16FP4.....<br>16HP4.....<br>16JP4.....<br>16KP4 <input type="checkbox"/> .....<br>16LP4.....<br>16QP4 <input type="checkbox"/> .....<br>16RP4 <input type="checkbox"/> .....<br>16TP4 <input type="checkbox"/> .....<br>16UP4 <input type="checkbox"/> .....<br>16XP4 <input type="checkbox"/> .....<br>16ZP4.....<br>17AP4 <input type="checkbox"/> .....<br>17BP4 <input type="checkbox"/> .....<br>19EP4.....<br>20BP4..... | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>A.....<br>.....<br>A.....<br>A.....<br>A.....<br>A.....<br>A.....<br>.....<br>A.....<br>A.....<br>A.....<br>A.....  | +1/2.....<br>-1/4.....<br>-1.....<br>.....<br>-1 1/2.....<br>-1/2.....<br>-1.....<br>-3.....<br>+1 1/2.....<br>-2 1/2.....<br>-3.....<br>-3 1/2.....<br>-3 1/2.....<br>-3.....<br>+1 1/2.....<br>-3.....<br>-2 1/2.....<br>-3/4.....<br>+7..... | C.....<br>.....<br>.....<br>C.....<br>C.....<br>.....<br>.....<br>D1.....<br>.....<br>.....<br>D1.....<br>D1.....<br>D1.....<br>.....<br>.....<br>D1.....<br>D1.....<br>D1.....<br>C..... | .....<br>.....<br>.....<br>.....<br>D1.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>..... | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>..... | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>..... | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>..... | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>..... | K.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....<br>..... |  |
| 16QP4 <input type="checkbox"/> .....                                       | 16KP4 <input type="checkbox"/> .....<br>16RP4 <input type="checkbox"/> .....<br>16TP4 <input type="checkbox"/> .....<br>16UP4 <input type="checkbox"/> .....<br>16XP4 <input type="checkbox"/> .....<br>17AP4 <input type="checkbox"/> .....<br>17BP4 <input type="checkbox"/> .....                                                                                                                                                                                                   | .....<br>.....<br>.....<br>.....<br>.....<br>A.....<br>A.....                                                                                                                      | -1/2.....<br>-1/2.....<br>-1.....<br>-1.....<br>-1 1/2.....<br>-1/2.....<br>.....                                                                                                                                                               | .....<br>D1.....<br>D1.....<br>D1.....<br>D1.....<br>D1.....<br>D1.....                                                                                                                   | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                               | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | .....<br>.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                                                             | 4.....<br>4.....<br>4, 7.....<br>7.....<br>.....<br>4, 7.....<br>4.....                                                                                                  |  |
| If cabinet space permits, round types listed under 16WP4 may also be used. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                    |                                                                                                                                                                                                                                                 |                                                                                                                                                                                           |                                                                                                                                                                           |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                         |                                                                                                                                                                          |  |
| 16RP4 <input type="checkbox"/> .....                                       | 16KP4 <input type="checkbox"/> .....<br>16QP4 <input type="checkbox"/> .....<br>16TP4 <input type="checkbox"/> .....<br>16UP4 <input type="checkbox"/> .....                                                                                                                                                                                                                                                                                                                           | .....<br>.....<br>.....<br>.....                                                                                                                                                   | .....<br>+1/2.....<br>-3/4.....<br>-3/4.....                                                                                                                                                                                                    | .....<br>D2.....<br>.....<br>.....                                                                                                                                                        | .....<br>.....<br>.....<br>.....                                                                                                                                          | .....<br>.....<br>.....<br>.....                                                                                                                                        | .....<br>.....<br>.....<br>.....                                                                                                                                        | .....<br>.....<br>.....<br>.....                                                                                                                                        | .....<br>.....<br>.....<br>.....                                                                                                                                        | K.....<br>.....<br>.....<br>K.....                                                                                                                                       |  |

For details of changes indicated  
Refer to page 34

| For details of changes indicated<br>Refer to page 34                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BULB DIAMETER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BULB LENGTH | CONNECTOR | ADD ION TRAP MAG | REMOVE ION TRAP MAG | CHANGE OPERATING VOLTAGE | CHANGE BRIDGE CONNECTION | CHANGE TUBE SOCKET | ADD FILTER CAPACITANCE | NOTE NO |
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| REQUIRED TYPE                                                              | POSSIBLE REPLACEMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | B           | C         | D                | E                   | F                        | G                        | H                  | K                      |         |
| 16RP4.....<br>(Cont'd)                                                     | 16XP4 <input type="checkbox"/> .....<br>17AP4 <input type="checkbox"/> .....<br>17BP4 <input type="checkbox"/> .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <br>A<br>A + ½                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |           | D2               |                     |                          |                          |                    | K                      | <br>7   |
| If cabinet space permits, round types listed under 16YP4 may also be used. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |           |                  |                     |                          |                          |                    |                        |         |
| 16SP4.....                                                                 | 16AP4.....<br>16CP4.....<br>16DP4.....<br>16EP4.....<br>16FP4.....<br>16GP4.....<br>16HP4.....<br>16JP4.....<br>16KP4 <input type="checkbox"/> .....<br>16LP4.....<br>16MP4.....<br>16QP4 <input type="checkbox"/> .....<br>16RP4 <input type="checkbox"/> .....<br>16TP4 <input type="checkbox"/> .....<br>16UP4 <input type="checkbox"/> .....<br>16VP4.....<br>16WP4.....<br>16WP4A.....<br>16XP4 <input type="checkbox"/> .....<br>16YP4.....<br>16ZP4.....<br>17AP4 <input type="checkbox"/> .....<br>17BP4 <input type="checkbox"/> .....<br>19AP4.....<br>19DP4.....<br>19EP4.....<br>19FP4.....<br>19GP4.....<br>20BP4.....<br>22AP4..... | <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>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|             |           |                  |                     |                          |                          |                    |                        |         |

□ Indicates rectangular tubes.

SAFETY FIRST: Wear goggles and gloves when handling Picture Tubes. Be sure power supply is turned off before working on high-voltage circuits.



# PICTURE TUBES

For details of changes indicated  
Refer to page 34

| For details of changes indicated<br>Refer to page 34 |                                                                                     | <div><div>BULB DIAMETER</div><div>BULB LENGTH</div><div>CONNECTOR</div><div>ADD ION TRAP MAG.</div><div>REMOVE ORBITAL MAG.</div><div>CHANGE ORBITAL MAG.</div><div>CHANGE ORBITAL DEFLECTION</div><div>CHANGE TUBE SOCKET</div><div>ADD IFTB CAPACITANCE</div><div>NOTE NO.</div></div> |         |        |    |   |   |   |   |      |   |
|------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------|----|---|---|---|---|------|---|
| REQUIRED TYPE                                        | POSSIBLE REPLACEMENTS                                                               | A                                                                                                                                                                                                                                                                                        | B       | C      | D  | E | F | G | H | K    |   |
| 16VP4....<br>(Cont'd)                                | 17BP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | +2      |        |    |   |   |   |   | 4    |   |
|                                                      | 19AP4....                                                                           | A                                                                                                                                                                                                                                                                                        | +4 1/4  | C      |    |   |   |   |   | 6    |   |
|                                                      | 19DP4....                                                                           | A                                                                                                                                                                                                                                                                                        | +4 1/4  | D2     |    |   |   |   |   | 4    |   |
|                                                      | 19EP4....                                                                           | A                                                                                                                                                                                                                                                                                        | +3 3/4  |        |    |   |   |   |   | 4    |   |
|                                                      | 19FP4....                                                                           | A                                                                                                                                                                                                                                                                                        | +4 3/4  | D2     |    |   |   |   |   |      |   |
|                                                      | 19GP4....                                                                           | A                                                                                                                                                                                                                                                                                        | +4      |        |    |   |   |   |   |      |   |
|                                                      | 20BP4....                                                                           | A                                                                                                                                                                                                                                                                                        | +11 1/2 | C      |    | E |   |   |   |      |   |
|                                                      | 22AP4....                                                                           | A                                                                                                                                                                                                                                                                                        | +5 1/2  | C      |    |   |   |   |   | 6    |   |
|                                                      | 16WP4....                                                                           | 16AP4....                                                                                                                                                                                                                                                                                |         | +4 1/2 | C  |   |   |   |   |      | 6 |
| 16CP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +4      |        |    |   |   |   |   |      |   |
| 16DP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +3      |        |    |   |   |   |   |      |   |
| 16EP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +1 3/4  | C      |    |   |   |   |   | 6    |   |
| 16FP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +2 1/2  | C D1   |    |   |   |   |   |      |   |
| 16GP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | -1/4    | C D1   |    |   |   |   |   | 7    |   |
| 16HP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +3 1/2  |        |    |   |   |   |   | 4    |   |
| 16JP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +3      |        |    |   |   |   |   | 4    |   |
| 16LP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +4 1/2  |        |    |   |   |   |   | 4    |   |
| 16MP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +4      |        |    |   |   |   |   | 4    |   |
| 16QP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +1 1/4  |        |    |   |   |   |   |      |   |
| 16KP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +1      | D1     |    |   |   |   |   | 4    |   |
| 16RP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +1      | D1     |    |   |   |   |   | 4    |   |
| 16SP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | -1/2    |        |    |   |   |   |   | 4, 7 |   |
| 16TP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +1/4    | D1     |    |   |   |   |   | 4, 7 |   |
| 16UP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +3/4    | D1     |    |   |   |   |   | 7    |   |
| 16VP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | -1/2    | D1     |    |   |   |   |   | 7    |   |
| 16WP4A....                                           |                                                                                     |                                                                                                                                                                                                                                                                                          |         |        |    |   |   |   |   | 4    |   |
| 16XP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +1      |        |    |   |   |   |   |      |   |
| 16YP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | -1/2    | D1     |    |   |   |   |   | 4, 7 |   |
| 16ZP4....                                            |                                                                                     |                                                                                                                                                                                                                                                                                          | +5 1/2  |        |    |   |   |   |   | 4    |   |
| 17AP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +3/4    | D1     |    |   |   |   |   | 4, 7 |   |
| 17BP4 □                                              |                                                                                     | A                                                                                                                                                                                                                                                                                        | +1 1/2  | D1     |    |   |   |   |   | 4    |   |
| 19AP4....                                            |                                                                                     | A                                                                                                                                                                                                                                                                                        | +3 3/4  | C D1   |    |   |   |   |   | 6    |   |
| 19DP4....                                            |                                                                                     | A                                                                                                                                                                                                                                                                                        | +3 3/4  |        |    |   |   |   |   | 4    |   |
| 19EP4....                                            |                                                                                     | A                                                                                                                                                                                                                                                                                        | +3 3/4  | D1     |    |   |   |   |   | 4    |   |
| 19FP4....                                            |                                                                                     | A                                                                                                                                                                                                                                                                                        | +4 1/4  |        |    |   |   |   |   |      |   |
| 19GP4....                                            |                                                                                     | A                                                                                                                                                                                                                                                                                        | +3 1/2  | D1     |    |   |   |   |   |      |   |
| 20BP4....                                            |                                                                                     | A                                                                                                                                                                                                                                                                                        | +11     | C      |    | E |   |   |   |      |   |
| 22AP4....                                            |                                                                                     | A                                                                                                                                                                                                                                                                                        | +5      | C D1   |    |   |   |   |   | 6    |   |
| 16WP4A....                                           |                                                                                     | Same as listed above for type 16WP4 with addition of note K for types not having note 4.                                                                                                                                                                                                 |         |        |    |   |   |   |   |      |   |
| 16XP4 □                                              |                                                                                     | 16KP4 □                                                                                                                                                                                                                                                                                  |         |        | D1 |   |   |   |   |      | 4 |
|                                                      |                                                                                     | 16QP4 □                                                                                                                                                                                                                                                                                  |         | +1/2   |    |   |   |   |   |      |   |
|                                                      | 16RP4 □                                                                             |                                                                                                                                                                                                                                                                                          |         | D1     |    |   |   |   |   | 4    |   |
|                                                      | 16TP4 □                                                                             |                                                                                                                                                                                                                                                                                          | -1/2    | D1     |    |   |   |   |   | 4, 7 |   |
|                                                      | 16UP4 □                                                                             |                                                                                                                                                                                                                                                                                          | -1/2    | D1     |    |   |   |   |   | 7    |   |
|                                                      | 17AP4 □                                                                             | A                                                                                                                                                                                                                                                                                        |         | D1     |    |   |   |   |   | 4, 7 |   |
|                                                      | 17BP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | +1/2    | D1     |    |   |   |   |   | 4    |   |
|                                                      | If cabinet space permits, round types listed under 16WP4 may also be used.          |                                                                                                                                                                                                                                                                                          |         |        |    |   |   |   |   |      |   |
| 16YP4....                                            | Same types as listed for 16VP4 with addition of note K for types not having note 4. |                                                                                                                                                                                                                                                                                          |         |        |    |   |   |   |   |      |   |
| 16ZP4....                                            | 16LP4....                                                                           |                                                                                                                                                                                                                                                                                          |         |        |    |   |   |   |   |      |   |
|                                                      | Also any type listed under 16LP4 with same changes.                                 |                                                                                                                                                                                                                                                                                          |         |        |    |   |   |   |   |      |   |
| 17AP4 □                                              | 16QP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | +1/2    | D2     |    |   |   |   |   | K    |   |
|                                                      | 16KP4 □                                                                             | A                                                                                                                                                                                                                                                                                        |         |        |    |   |   |   |   |      |   |
|                                                      | 16RP4 □                                                                             | A                                                                                                                                                                                                                                                                                        |         |        |    |   |   |   |   |      |   |
|                                                      | 16TP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | -1/2    |        |    |   |   |   |   |      |   |
|                                                      | 16UP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | -1/2    |        |    |   |   |   |   | K    |   |
|                                                      | 16XP4 □                                                                             | A                                                                                                                                                                                                                                                                                        |         | D2     |    |   |   |   |   | K    |   |
|                                                      | 17BP4 □                                                                             |                                                                                                                                                                                                                                                                                          | +1/4    |        |    |   |   |   |   |      |   |
|                                                      | If cabinet space permits, round types listed under 16KP4 may also be used.          |                                                                                                                                                                                                                                                                                          |         |        |    |   |   |   |   |      |   |
| 17BP4 □                                              | 17AP4 □                                                                             |                                                                                                                                                                                                                                                                                          | -1/4    |        |    |   |   |   |   | 7    |   |
|                                                      | 16QP4 □                                                                             | A                                                                                                                                                                                                                                                                                        |         | D2     |    |   |   |   |   | K    |   |
|                                                      | 16KP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | -1/2    |        |    |   |   |   |   |      |   |
|                                                      | 16RP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | -1/2    |        |    |   |   |   |   |      |   |
|                                                      | 16TP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | -1      |        |    |   |   |   |   | 7    |   |
|                                                      | 16UP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | -1      |        |    |   |   |   |   | K    |   |
|                                                      | 16XP4 □                                                                             | A                                                                                                                                                                                                                                                                                        | -1/2    | D2     |    |   |   |   |   | K    |   |

For details of changes indicated  
Refer to page 34

| For details of changes indicated<br>Refer to page 34                                                     |                                                                                     | <div><div>BULB DIAMETER</div><div>BULB LENGTH</div><div>CONNECTOR</div><div>ADD ION TRAP MAG.</div><div>REMOVE ION TRAP MAG.</div><div>CHANGE ORBITAL MAG.</div><div>CHANGE ORBITAL DEFLECTION</div><div>CHANGE TUBE SOCKET</div><div>ADD FILTER CAPACITANCE</div><div>NOTE NO.</div></div> |       |      |    |   |   |   |   |   |         |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|----|---|---|---|---|---|---------|
| REQUIRED TYPE                                                                                            | POSSIBLE REPLACEMENTS                                                               | A                                                                                                                                                                                                                                                                                           | B     | C    | D  | E | F | G | H | K |         |
| 17BP4.....                                                                                               | If cabinet space permits, round types listed under (Cont'd) 16YP4 may also be used. |                                                                                                                                                                                                                                                                                             |       |      |    |   |   |   |   |   |         |
| 19AP4.....                                                                                               | 17AP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -3    | C    |    |   |   |   |   |   | 4, 6, 7 |
|                                                                                                          | 17BP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -2 ¼  | C    |    |   |   |   |   |   | 4, 6    |
|                                                                                                          | 19DP4.....                                                                          |                                                                                                                                                                                                                                                                                             |       | C D2 |    |   |   |   |   |   | 4, 6    |
|                                                                                                          | 19EP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -½    | C    |    |   |   |   |   |   | 4, 6    |
|                                                                                                          | 19FP4.....                                                                          |                                                                                                                                                                                                                                                                                             | +½    | C D2 |    |   |   |   |   |   | 6       |
|                                                                                                          | 19GP4.....                                                                          |                                                                                                                                                                                                                                                                                             | -¼    | C    |    |   |   |   |   |   | 6       |
|                                                                                                          | 20BP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +7 ¾  | C    |    | E |   |   |   |   | 6       |
|                                                                                                          | 22AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +1 ½  |      |    |   |   |   |   |   |         |
| Also other types listed under 16GP4 with addition of change A and 4" decrease in length differential.    |                                                                                     |                                                                                                                                                                                                                                                                                             |       |      |    |   |   |   |   |   |         |
| 19DP4.....                                                                                               | 17AP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -3    |      | D1 |   |   |   |   |   | 7       |
|                                                                                                          | 17BP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -2 ¼  |      | D1 |   |   |   |   |   |         |
|                                                                                                          | 19AP4.....                                                                          |                                                                                                                                                                                                                                                                                             |       | C D1 |    |   |   |   | K |   | 6       |
|                                                                                                          | 19EP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -½    |      | D1 |   |   |   |   |   |         |
|                                                                                                          | 19FP4.....                                                                          |                                                                                                                                                                                                                                                                                             | +½    |      |    |   |   |   |   | K |         |
|                                                                                                          | 19GP4.....                                                                          |                                                                                                                                                                                                                                                                                             | -¼    |      | D1 |   |   |   |   | K |         |
|                                                                                                          | 20BP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +7 ¾  | C    |    | E |   |   |   | K |         |
|                                                                                                          | 22AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +1 ½  | C D1 |    |   |   |   |   | K | 6       |
| Also any 16" types listed under 16SP4 with addition of change A and 4 ¼" decrease in length differential |                                                                                     |                                                                                                                                                                                                                                                                                             |       |      |    |   |   |   |   |   |         |
| 19EP4.....                                                                                               | 17AP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -2 ½  |      |    |   |   |   |   |   | 7       |
|                                                                                                          | 17BP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -2    |      |    |   |   |   |   |   |         |
|                                                                                                          | 20BP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +7 ½  | C    |    | E |   |   |   | K |         |
|                                                                                                          | 22AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +1 ¼  | C    |    |   |   |   |   | K | 6       |
| Also 16" types listed under 16YP4 with 3 ¾" decrease in length differential.                             |                                                                                     |                                                                                                                                                                                                                                                                                             |       |      |    |   |   |   |   |   |         |
| 19FP4.....                                                                                               | 17AP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -3 ½  |      | D1 |   |   |   |   |   | 7, 4    |
|                                                                                                          | 17BP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -2 ¾  |      | D1 |   |   |   |   |   | 4       |
|                                                                                                          | 19AP4.....                                                                          |                                                                                                                                                                                                                                                                                             | -½    | C D1 |    |   |   |   |   |   | 6       |
|                                                                                                          | 19DP4.....                                                                          |                                                                                                                                                                                                                                                                                             | -½    |      |    |   |   |   |   |   | 4       |
|                                                                                                          | 19EP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -1    |      | D1 |   |   |   |   |   | 4       |
|                                                                                                          | 19GP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -¾    |      | D1 |   |   |   |   |   |         |
|                                                                                                          | 20BP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +6 ¾  | C    |    | E |   |   |   |   |         |
|                                                                                                          | 22AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +1    | C D1 |    |   |   |   |   |   | 6       |
| Also 16" types listed under 16WP4 with 4 ¼" decrease in length differential.                             |                                                                                     |                                                                                                                                                                                                                                                                                             |       |      |    |   |   |   |   |   |         |
| 19GP4.....                                                                                               | 17AP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -2 ¾  |      |    |   |   |   |   |   | 7, 4    |
|                                                                                                          | 17BP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -2    |      |    |   |   |   |   |   | 4       |
|                                                                                                          | 19AP4.....                                                                          |                                                                                                                                                                                                                                                                                             | +¾    | C    |    |   |   |   |   |   | 6       |
|                                                                                                          | 19DP4.....                                                                          |                                                                                                                                                                                                                                                                                             | +¾    |      | D2 |   |   |   |   |   | 4       |
|                                                                                                          | 19EP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -¼    |      |    |   |   |   |   |   | 4       |
|                                                                                                          | 19FP4.....                                                                          |                                                                                                                                                                                                                                                                                             | +¾    |      | D2 |   |   |   |   |   |         |
|                                                                                                          | 20BP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +7 ½  | C    |    | E |   |   |   |   |         |
|                                                                                                          | 22AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +1 ½  | C    |    |   |   |   |   |   | 6       |
| Also 16" types listed under 16VP4 with 4" decrease in length differential.                               |                                                                                     |                                                                                                                                                                                                                                                                                             |       |      |    |   |   |   |   |   |         |
| 20BP4.....                                                                                               | 16AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -6 ½  | C D2 |    |   |   |   |   |   |         |
|                                                                                                          | 16CP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -7 ¾  | C D2 |    |   |   |   |   |   |         |
|                                                                                                          | 16LP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -6 ½  | C D2 |    |   |   |   |   |   | 4       |
|                                                                                                          | 16ZP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -6 ½  | C D2 |    |   |   |   |   |   | 4       |
|                                                                                                          | 16KP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -10   | C D1 |    |   | G |   |   |   | 4       |
|                                                                                                          | 16QP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -9 ½  | C D2 |    |   | G |   |   |   |         |
|                                                                                                          | 16RP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -10   | C D1 |    |   | G |   |   |   | 4       |
|                                                                                                          | 16TP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -10 ½ | C D1 |    |   | G |   |   |   | 4, 7    |
|                                                                                                          | 16UP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -10 ½ | C D1 |    |   | G |   |   |   | 7       |
|                                                                                                          | 16XP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -10   | C D2 |    |   | G |   |   |   |         |
|                                                                                                          | 17AP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -10   | C D1 |    |   | G |   |   |   | 4, 7    |
|                                                                                                          | 17BP4 □.....                                                                        | A                                                                                                                                                                                                                                                                                           | -9 ½  | C D1 |    |   | G |   |   |   | 4       |
|                                                                                                          | 22AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -6    | C D1 |    |   | G |   |   |   | 6       |
| 22AP4.....                                                                                               | 19AP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -1 ½  |      |    |   |   |   |   |   |         |
|                                                                                                          | 19DP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -1 ½  | C D2 |    |   |   |   |   |   | 4       |
|                                                                                                          | 19EP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -1 ¾  | C    |    |   |   |   |   |   | 4       |
|                                                                                                          | 19FP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -1    | C D2 |    |   |   |   |   |   |         |
|                                                                                                          | 19GP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | -1 ½  | C    |    |   |   |   |   |   |         |
|                                                                                                          | 20BP4.....                                                                          | A                                                                                                                                                                                                                                                                                           | +6    | C    |    | E |   |   |   |   |         |
| Also 16" types listed under 16GP4 with 5" decrease in length differential.                               |                                                                                     |                                                                                                                                                                                                                                                                                             |       |      |    |   |   |   |   |   |         |

□ Indicates rectangular tubes.

SAFETY FIRST: Wear goggles and gloves when handling Picture Tubes. Be sure power supply is turned off before working on high-voltage circuits.

## NOTES FOR PICTURE TUBE SUBSTITUTION CHART

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A. Make adjustment for different bulb diameter or shape.</p> <p>B. Number of inches the replacement tube is longer (+) or shorter (-) than the original tube.</p> <p>C. Change anode connector to type required for the substitute tube.</p> <p>D. Add or change permanent magnet type ion trap magnet. D1 indicates single field and D2 double field type required. When no change is indicated by notes D or E the type of ion trap magnet used on the original tube should be used.</p> <p>E. Remove the ion trap magnet. If the ion trap magnet is the permanent magnet type, just remove it with the tube; if it is the coil type magnet leave it in the circuit and put it somewhere in the cabinet, out of the way, so that no circuit changes will be necessary.</p> <p>F. Suggested only if the operating conditions of the receiver do not exceed the maximum ratings of the substitute tube.</p> <p>G. Requires change of deflection yoke to 70° type and possibly a new horizontal output transformer and/or tube.</p> <p>H. Change in picture tube socket is required.</p> <p>K. Original tube had an external coating which provided a high voltage filter capacitor. Additional external capacitance may be required to replace that normally supplied by the original picture tube.</p> | <p>(1) Increase in power supply voltage may be necessary for optimum performance.</p> <p>(2) May be used only when no potential is required between heater and cathode.</p> <p>(4) Replacement type has coating on bulb which provides filter capacitance. Be sure this coating is grounded. The underwriter's safety code requires that the total high voltage filter capacity be limited to 2000 <math>\mu\text{f}</math> at the usual operating voltage. The original filter capacitance should be disconnected in most cases.</p> <p>(6) Substitution of a metal cone tube for a coated glass tube may also require rearrangement of any parts near the metal cone to prevent corona discharge and removal of any contacts formerly grounding the bulb coating. Additional insulation is usually necessary at the cone lip since a wood cabinet alone is not sufficient to protect the user.</p> <p>(7) Substitution of a short-neck, wide-angle picture tube for a long-neck tube may require a change in focus coil and/or deflection coil.</p> <p>(8) Substitution of tetrode types for this triode type requires the addition of a 250-300 volt source of accelerator voltage. A voltage divider drawing 25 <math>\mu\text{a}</math> is a possible solution.</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
- ☐ Indicates rectangular tubes.

**SAFETY FIRST:** Wear goggles and gloves when handling Picture Tubes. Be sure power supply is turned off before working on high-voltage circuits.

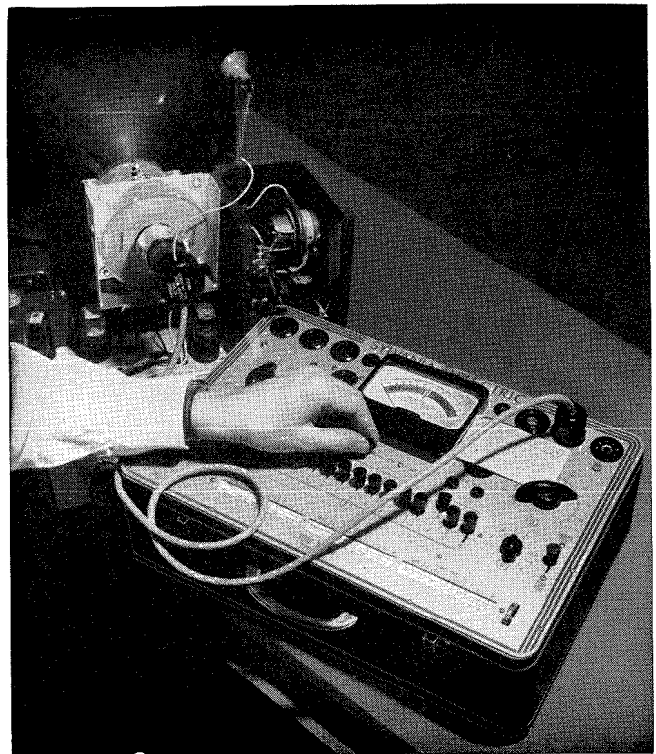
## SYLVANIA CATHODE RAY TUBE TEST ADAPTOR

Standard procedure for testing television picture tubes today consists of the old-fashioned substitution method. That can all be changed if you own a Sylvania Tube Tester Model 139, 140, 219 or 220 and a Sylvania 228 CR Tube Test Adaptor. With this combination, all of the commonly used 10 to 19 inch magnetic types\* can be checked.

By placing your Sylvania tube tester close to the chassis, the picture tube need not be removed from the cradle—a real time saver in many sets. After making sure the set is turned off, the adaptor is plugged in according to the instructions with the unit and settings determined from the accompanying card. Since only a few hundred volts are available, as compared to 10,000 or more in the receiver, comparative readings are taken from the small numerical scale rather than on the "GOOD-BAD" scale.

There are a few picture tube defects, such as gas, that show up only with high voltage, but this tester will determine 85% of cases where the picture tube should be replaced. Shorts, leakage, open circuits, and relative emission are easily determined. Most other defects, such as a damaged screen coating, can be determined by observing the picture.

The socket provided is the almost universal duodecal. Test settings are provided for such popular tubes as 10BP4, 10FP4, 12KP4, 12LP4, 14BP4, 14CP4, 16AP4, 16GP4, 16JP4, 16LP4, 16RP4, 16TP4, 16WP4, 16ZP4, 17AP4, 17BP4, 17CP4, 19AP4, 20CP4, 20DP4 and any A or B versions of these.

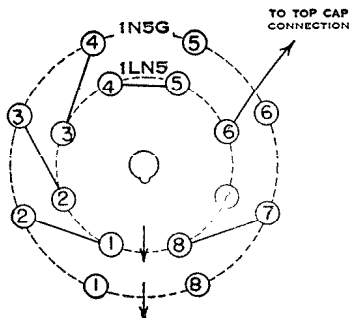


\*Will not test electrostatic deflection type tubes or tubes with no accelerating electrode, such as the 10MP4 and 12VP4.

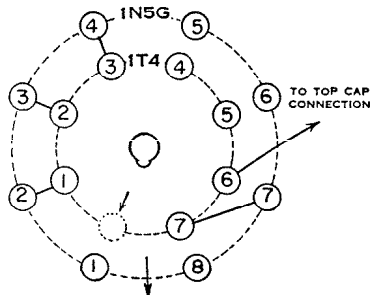
# ADAPTOR CIRCUITS COMMONLY REQUIRED

## AMPLIFIERS

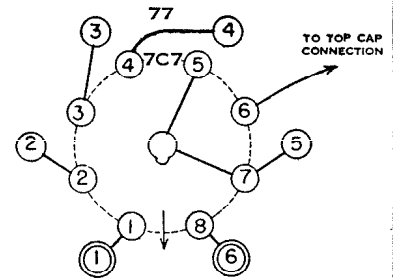
TYPE 1LN5 REPLACING TYPE 1N5G



TYPE 1T4 REPLACING TYPE 1N5G

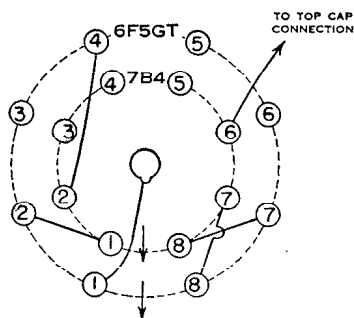


TYPE 7C7\* REPLACING TYPE 77  
TYPE 7A7 REPLACING TYPE 7B7\*

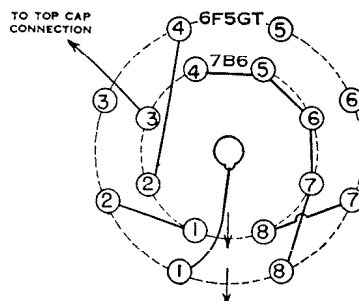


\* REQUIRES 42 TO 50 OHMS ACROSS HEATERS IN AC-DC SETS.

TYPE 7B4 REPLACING TYPE 6F5GT

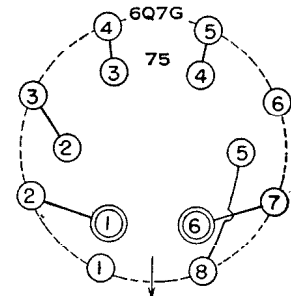


TYPE 7B6 REPLACING TYPE 6F5GT  
TYPE 7C6\*

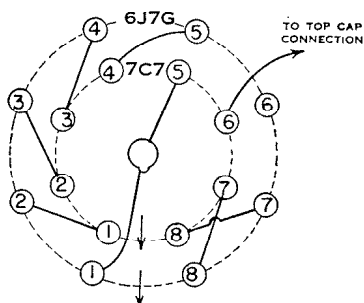


\* REQUIRES 42 TO 50 OHMS ACROSS HEATERS IN AC-DC SETS.

TYPE 75 REPLACING TYPE 6Q7G  
TYPE 43 REPLACING TYPE 25L6  
TYPE 41 REPLACING TYPE 6F6  
TYPE 42 REPLACING TYPE 6K6  
6U6  
6V6

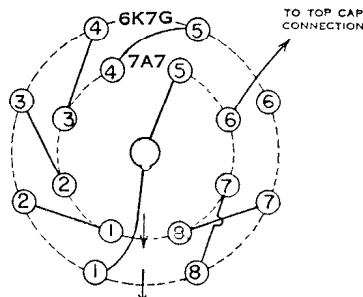


TYPE 7C7\* REPLACING TYPE 6J7GT  
TYPE 7L7  
TYPE 14C7 REPLACING TYPE 12J7GT  
TYPE 7C7 REPLACING TYPE 12J7GT

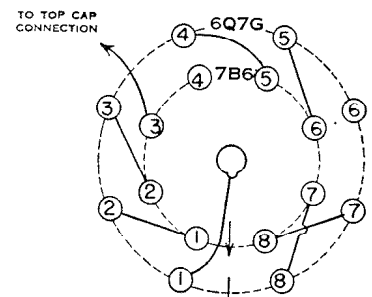


\* REQUIRES 42 TO 50 OHMS ACROSS HEATERS IN AC-DC SETS.

TYPE 7H7 REPLACING TYPE 6K7GT  
TYPE 7A7  
TYPE 14H7 REPLACING TYPE 12K7GT  
TYPE 14A7



TYPE 7B6 REPLACING TYPE 6Q7GT  
TYPE 7C6\* REPLACING TYPE 12Q7GT  
TYPE 14B6



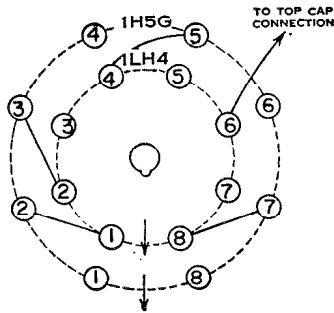
\* REQUIRES 42 TO 50 OHMS ACROSS HEATERS IN AC-DC SETS.

INNER CIRCLES REPRESENT THE PINS OF THE TYPE OF TUBE AVAILABLE FOR USE IN THE SOCKET WIRED FOR THE TYPE SHOWN AS THE OUTER CIRCLE. THE SOLID LINES SHOW THE WIRING FOR EITHER AN ADAPTOR OR FOR RECONNECTING TO THE SAME OR TO DIFFERENT SOCKETS.

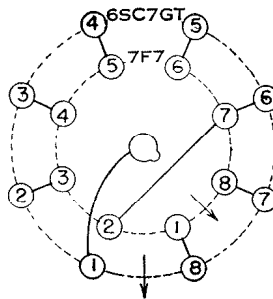
# ADAPTOR CIRCUITS COMMONLY REQUIRED

## AMPLIFIERS CONT'D

TYPE 1LH4 REPLACING TYPE 1H5GT



TYPE 7F7 REPLACING TYPE 6SC7GT

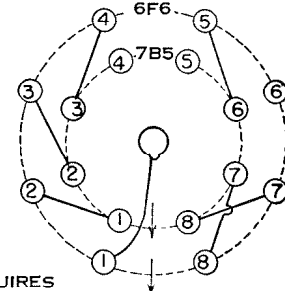


TYPE 1LA4 REPLACING TYPE 1A5G  
TYPE 35A5 REPLACING TYPE 35L6  
TYPE 50A5 REPLACING TYPE 50L6GT

TYPE 14C5\* REPLACING TYPE { 25L6G  
25A6G

TYPE { 7A4 REPLACING TYPE 6C5GT  
XXL

TYPE 7B5 REPLACING TYPE { 6F6  
6K6  
6U6  
6V6

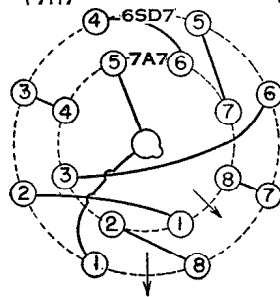


\* REQUIRES  
175 OHMS ACROSS HEATERS IN AC-DC  
SETS AND 42 OHMS IN SERIES STRING.

TYPE { 7C7 REPLACING TYPE { 12SJ7GT  
14C7 6SJ7GT\*

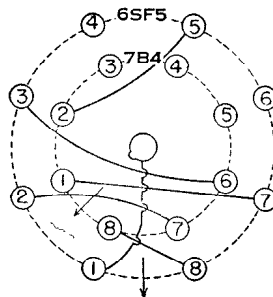
TYPE { 14H7 REPLACING TYPE 12SK7GT  
14A7

TYPE { 7A7 REPLACING TYPE { 6SD7GT  
7H7 6SK7GT

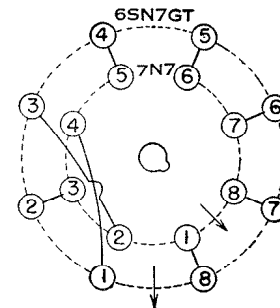


\* REQUIRES 42 TO 50 OHMS ACROSS  
HEATERS IN AC-DC SETS.

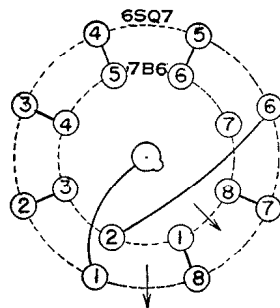
TYPE 7B4 REPLACING TYPE 6SF5



TYPE 7N7 REPLACING TYPE 6SN7GT



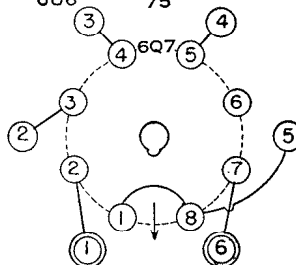
TYPE 7B6 REPLACING TYPE 6SQ7  
TYPE 14B6 REPLACING TYPE 12SQ7



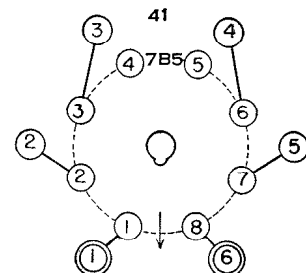
TYPE 6Q7GT REPLACING TYPE 75

TYPE 25L6 REPLACING TYPE 43

TYPE { 6K6 REPLACING TYPE { 41  
6V6 42  
6F6 75  
6U6



TYPE 7B5 REPLACING TYPE { 41  
42



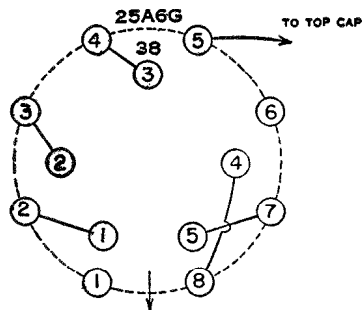
INNER CIRCLES REPRESENT THE PINS OF THE TYPE OF TUBE AVAILABLE FOR USE IN THE  
SOCKET WIRED FOR THE TYPE SHOWN AS THE OUTER CIRCLE. THE SOLID LINES SHOW THE  
WIRING FOR EITHER AN ADAPTOR OR FOR RECONNECTING TO THE SAME OR TO DIFFERENT SOCKETS.

SYLVANIA

# ADAPTOR CIRCUITS COMMONLY REQUIRED

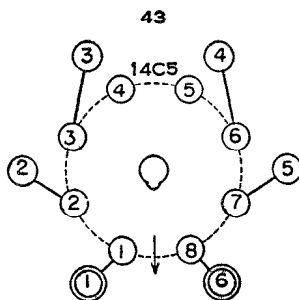
## AMPLIFIERS CONT'D

TYPE 38 REPLACING TYPE 25A6G



ADD 70 OHMS IN SERIES WITH HEATER IN AC-DC SETS.

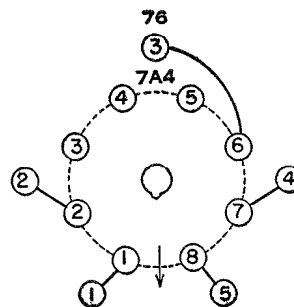
TYPE 14C5 REPLACING TYPE 43



REQUIRES

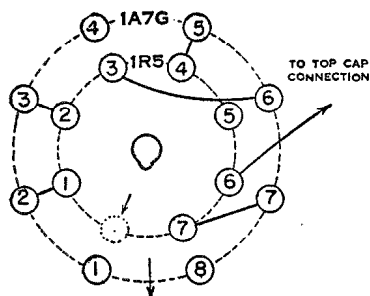
175 OHMS ACROSS HEATERS IN AC-DC SETS AND 42 OHMS IN SERIES STRING.

TYPE 7A4 REPLACING TYPE 76



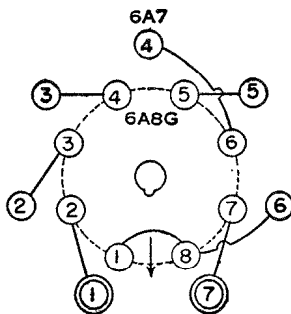
## CONVERTERS

TYPE 1R5 REPLACING TYPE 1A7G

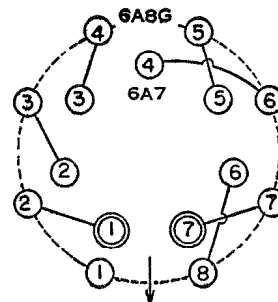


IN SOME LOCATIONS SENSITIVITY MAY BE TOO LOW FOR AVAILABLE SIGNAL STRENGTH.

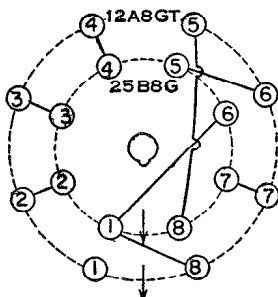
TYPE 6K8G  
6J8G REPLACING TYPE 6A7  
6A8G



TYPE 6A7 REPLACING TYPE 6A8G

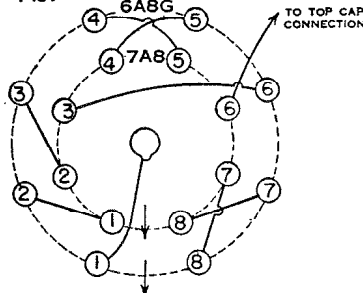


TYPE 25B8GT REPLACING TYPE 12A8GT  
TYPE 12B8GT REPLACING TYPE 6A8G



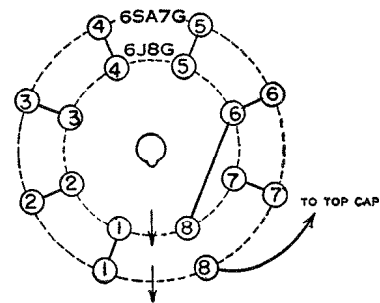
TYPE 7B8  
7A8\* REPLACING TYPE 6A8G  
7J7 6J8G 6K8G

TYPE 7A8  
14B8 REPLACING TYPE 12A8GT  
14J7 12K8G



\* REQUIRES 42 TO 50 OHMS ACROSS HEATERS IN AC-DC SETS.

TYPE 6J8G REPLACING TYPE 6SA7GT  
6A8G TYPE 12K8G REPLACING TYPE 12SA7GT

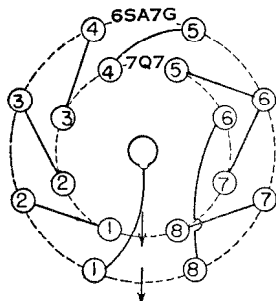


INNER CIRCLES REPRESENT THE PINS OF THE TYPE OF TUBE AVAILABLE FOR USE IN THE SOCKET WIRED FOR THE TYPE SHOWN AS THE OUTER CIRCLE. THE SOLID LINES SHOW THE WIRING FOR EITHER AN ADAPTOR OR FOR RECONNECTING TO THE SAME OR TO DIFFERENT SOCKETS.

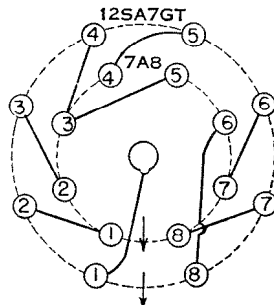
# ADAPTOR CIRCUITS COMMONLY REQUIRED

## CONVERTERS CONT'D

TYPE 7Q7 REPLACING TYPE 6SA7GT  
TYPE 14Q7 REPLACING TYPE 12SA7

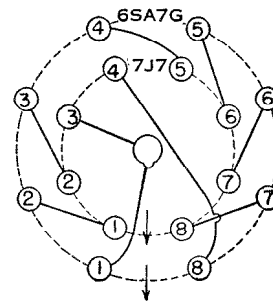


TYPE { 7A8  
14B8 } REPLACING TYPE 12SA7GT  
TYPE { 7B8  
7A8 \* } REPLACING TYPE 6SA7GT



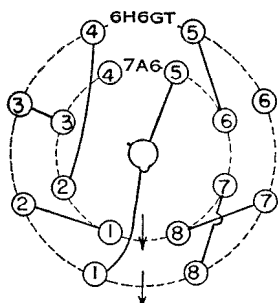
\* REQUIRES 42 TO 50 OHMS ACROSS  
HEATERS IN AC-DC SETS.

TYPE { 14S7  
14J7 } REPLACING TYPE 12SA7GT  
TYPE { 7S7  
7J7 } REPLACING TYPE 6SA7GT



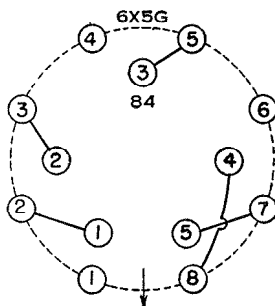
## RECTIFIERS

TYPE 7A6 REPLACING TYPE 6H6GT

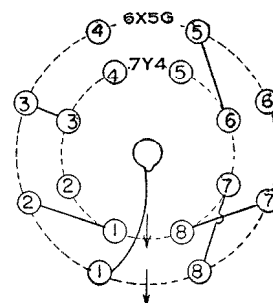


REQUIRES 42 TO 50 OHMS ACROSS  
HEATERS IN AC-DC SETS.

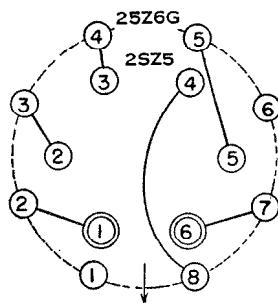
TYPE 84 REPLACING TYPE 6X5G



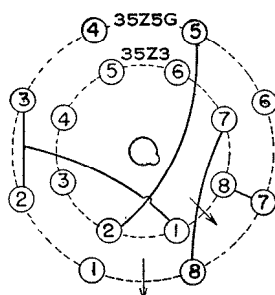
TYPE 7Y4 REPLACING TYPE 6X5G



TYPE 25Z5 REPLACING TYPE 25Z6G

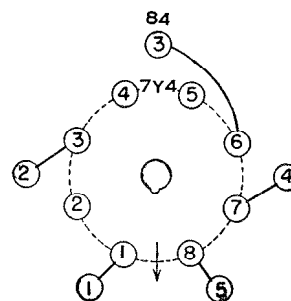


TYPE 35Z3 REPLACING TYPE 35Z5GT/G



OTHER PROVISION NECESSARY FOR  
PILOT LAMP.

TYPE 7Y4 REPLACING TYPE 84

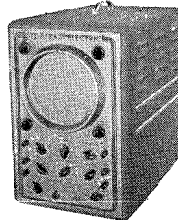


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SOCKET WIRED FOR THE TYPE SHOWN AS THE OUTER CIRCLE. THE SOLID LINES SHOW THE  
WIRING FOR EITHER AN ADAPTOR OR FOR RECONNECTING TO THE SAME OR TO DIFFERENT SOCKETS.

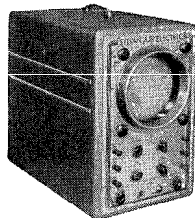
# Look to SYLVANIA for the latest in ELECTRONIC TEST EQUIPMENT



**Television Oscilloscope.** An Exceptionally High-Gain, Wide-Band Oscilloscope Designed for Television. Accurately displays any TV pulse or wave-shape on a large, eye-saving 7" screen. Sensitivity: 0.01 v./in. Vert. response useful to 4.0 mc. Hard-tube sweeps to 50 kc.; phasing control; pos. or neg. sync. control; many other outstanding features. Recommended for servicemen; laboratories; advanced schools and industry.



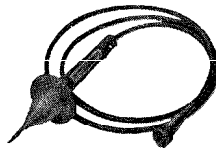
Type 400



Type 132Z

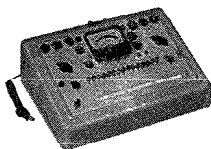
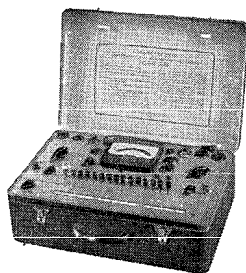
**General Purpose Oscilloscope.** A Versatile 7" Scope with Many Features Found in Type 400 above, priced as low as oscilloscopes with smaller screens. Sensitivity: 0.10 v./in.; freq. response: exceeds 7 cps. to 70 kc. Widely used by servicemen, schools and industry for AM-FM-TV testing.

**TV High-Voltage Probes.** New, Quality Probes that Permit Measuring High TV Anode Voltages by increasing the dc range of Polymeters to 30,000 or 10,000 volts. Special conversion cartridge permits using 30 kv probes with ANY 1,000 volt scale 20,000 ohm/volt meter. Select correct probe from list below:



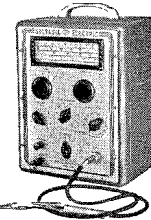
| Type | Range | Use with                                                                                                                               |
|------|-------|----------------------------------------------------------------------------------------------------------------------------------------|
| 225  | 30 kv | Polymer, Type 221 or 221Z.                                                                                                             |
| 224  | 30 kv | Earlier Polymeters, Types 134 and 134Z.                                                                                                |
| 226  | 30 kv | Conversion cartridge for use with above Type 225 or 224 to convert ANY 20,000 ohm/volt meter with a 1000-volt scale to a kilovoltmeter |
| 223  | 10 kv | Polymer, Type 221 or 221Z.                                                                                                             |
| 222  | 10 kv | Earlier Polymeters, Types 134 and 134Z.                                                                                                |

**Tube Tester Type 220.** Made By A Tube Manufacturer For Tube Users, these instruments test for ALL usual faults—not just one particular characteristic. New and exclusive ohmmeter-type shorts/leakage test indicates "GOOD" or "REPLACE" directly on the illuminated meter. Gas and a special heater-cathode leakage tests made in single operations. Single composite dynamic test for emission, transconductance and relative tube-life. Panel-mounted roller-chart; convenient switches; provisions for future tubes. Portable Type 220 has durable metal case and handle; removable cover. Size: 6" x 11 1/4" x 17".



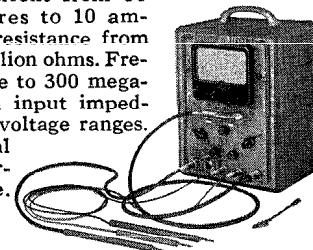
**Tube Tester Type 219.** The counter Type 219 is electrically equivalent to the portable type. Attractively housed in a streamlined wood and metal cabinet. Adaptable to any surroundings. Occupies small counter space. Size: 5 7/8" x 13" x 18 7/8".

Type 500



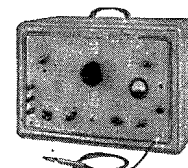
**TV Signal Generator.** An ALL ELECTRONIC Sweep Generator for TV and FM. Fundamental center frequencies: 2-25, 20-64, 60-120, and 140-230 mc. Two adjustable sweep widths: 0-600 kc./15 mc.; excellent sweep linearity; output 0.1 v. Edge-lighted dial; simplified controls; small size: 11 1/2" x 8 1/2" x 7". May be used with any 'scope and marker including those shown at left and below.

**Polymer-TV Vacuum-Tube Voltmeter.** A Sensitive DC, AC and RF Vacuum-Tube Voltmeter, Ohmmeter and DC Current Meter. The basic instrument for every TV, FM and AM shop. Ranges: rf to 300 volts (only 3  $\mu$ f shunt capacity); ac and dc to 1000 volts (10 or 30 kv dc using h.v. probes described at left); dc current from 50 microamperes to 10 amperes; and resistance from 0.5 to one billion ohms. Frequency range to 300 megacycles. High input impedance on all voltage ranges. Size identical to TV generator above.



Type 221Z

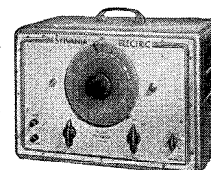
**FM-AM Signal Generator.** Useful as a TV Marker. A versatile AM-FM generator, doubly useful for peaking alignment of TV and as a TV marker. Calibrated to 0.05%.



Type 216

Fundamentals 80 kc to 120 mc; harmonics to 240 mc. Modulation: 0-100% AM; 0-30/150/700 kc FM. 1.0 volt max. output. Low leakage. Built-in crystal circuit. Size same as audio oscillator below.

**Audio Oscillator.** An Accurate Sine-Wave Generator for Better Equipped Shops and Sound Specialists. Maximum output: 22.5 volts, 20-20,000 cps, flat within 2 db. size 11 3/8" x 17 1/16" x 9 9/16"



Type 145

# SYLVANIA ELECTRIC