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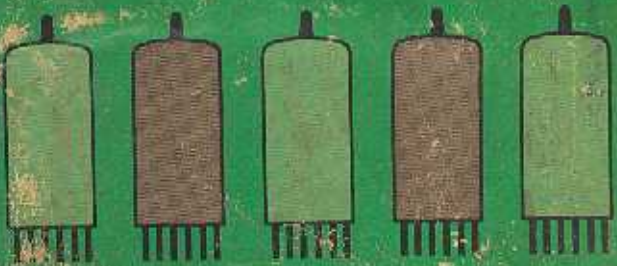
TUBE SUBSTITUTION HANDBOOK



No. 10
Pocket Edition

TUBE SUBSTITUTION handbook

by

The Howard W. Sams Engineering Staff

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INTRODUCTION

Although tube substitution should not be performed indiscriminately, there are numerous occasions when it is necessary and feasible. For example, when you don't have the exact tube type with you on a service call, you'll either have to take the chassis to the shop (without knowing if a new tube would fix the trouble), or else make a special trip just to get the tube. The same applies if you're working in the shop and need a replacement you don't have—you have to make a special trip to the distributor. Such needless trips waste time and reduce profits.

Also, when a tube is out of production or the distributor does not have it in stock, a substitute is needed. On occasion, too, it is desirable to use an improved version of the tube being replaced. For example, replacing a 6BQ6 with the improved 6CU6 will usually result in better performance.

For your convenience, this handbook is divided into seven sections. The first section lists receiving tubes and their substitutes. The second section lists picture tubes and their substitutes. There are numerous occasions when a picture-tube substitute is necessary: The exact type may be out of production, or it may not be immediately available from the distributor; in either case it is necessary to use a substitute. Also, in custom installations a shorter-necked picture tube may have to be chosen. At the end of the picture-tube section is a listing of those tubes requiring odd filament voltages (other than 6.3 volts), or low E_{g2} potentials. This information can be very useful when setting up your picture tube testing and rejuvenating equipment.

The third section is a cross reference of subminiature tubes. Section 4 lists receiving tubes which can be replaced with industrial types. (Industrial tubes are more rugged than receiving types in that their peak ratings and power-handling characteristics are much higher; therefore, it may be desirable to substitute an industrial tube to get more satisfactory results.) Section 5 lists communications and special-purpose tubes.

Sections 6 and 7 list American and foreign equivalents. If you have an American tube and want to know what foreign type will serve as a substitute, refer to Section 6. If you have a foreign tube and need to know what American type can be used as a substitute, refer to Section 7. This is a very useful section because of the large amount of foreign-made equipment being sold in this country. (Additional substitutes may be obtained by cross-referencing the American substitutes given in Section 7 with listings in Section 1.)

For additional information, refer to the introductions to each section. Also pay particular attention to the various notes pertaining to the substitutions. If you encounter additional substitutions that can be made, they can be added on th pages allotted for that purpose at the end of each

Section 1

CROSS REFERENCE OF AMERICAN RECEIVING TUBES

This section lists all American receiving tubes which have been or are being manufactured. Also included are the latest tube types registered with EIA but not yet in production.

To use this listing, locate the tube type to be replaced in the left-hand column. Then refer to the right-hand column for the substitute. The substitutes are only those tubes which have similar, or improved, characteristics and can be inserted directly into the socket. No rewiring or mechanical changes are needed, although the associated service controls may have to be readjusted.

In some instances, the available space around the tube should be considered. For example, although electrically identical to a 6L6GB, a 6L6G is more than one inch taller and a half inch larger in diameter. Thus, the substitution may be physically impossible in some compact equipment.

Do not replace a tube in the right-hand column with one in the left-hand column because this may result in a tube with lesser qualifications being used. For example, where a high heater-to-cathode potential exists, a 6AX4 will hold up, whereas a 6W4 will not. Thus, you'll find the 6AX4 listed as a substitute for the 6W4, but not vice versa.

When no substitutes are shown, none are recommended. Refer to Section 4 to see if an industrial replacement is recommended.

The meaning of each footnote symbol appears at the bottom of each page.

To Replace	Use
0OA	
01A	12A, 112A
0A2	
0A3	0A3A, VR75
0A3A	0A3, VR75
0A4G	
0A5	
0B2	
0B3	0B3A, VR90
0B3A	0B3, VR90
0C2	
0C3	0C3A, VR105
0C3A	0C3, VR105
0D3	0D3A, VR150
0D3A	0D3, VR150
0Y4	0Y4G
0Y4G	0Y4
0Z4	0Z4A, 0Z4G (may require shield)
0Z4A	0Z4, 0Z4G (may require shield)
0Z4G	0Z4, 0Z4A
1A3	
1A4	1A4P, 1A4T, 1B4, 1B4G, 1B4P, 1B4T, 951, 32, 34, 1C4*, 1K4*
1A4P	1A4, 1A4T, 1B4, 1B4G, 1B4P, 1B4T, 951, 32, 34, 1C4*, 1K4*
1A4T	1A4, 1A4P, 1B4, 1B4G, 1B4P, 1B4T, 951, 32, 34, 1C4*, 1K4*
1A5G	1A5GT, 1A5GT/G, 1T5GT
1A5GT	1A5G, 1A5GT/G, 1T5GT
1A5GT/G	1A5G, 1A5GT, 1T5GT
1A6	1C6*
1A7G	1A7GT, 1B7G*, GT*, 1A7GT/G, 1B7GT/G*
1A7GT	1A7G, 1B7G*, GT*, 1A7GT/G, 1B7GT/G*
1A7GT/G	1A7G, GT, 1B7G*, 1B7GT*, 1B7GT/G‡
1AB5	
1AB6	1AC6*
1AC6	1AB6*
1AD2	
1AE4	

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
1AJ2	
1AF4	1AJ4, 1AM4, 1T4SF, 1AE4*, 1T4*, 1U4*
1AF5	1AH5, 1AR5, 1S5*
1AH5	1AF5, 1AR5, 1S5*
1AJ4	1AF4, 1AM4, 1T4SF, 1AE4*, 1T4*
1AM4	1AF4, 1AJ4, 1T4SF, 1AE4*, 1T4*
1AN5	
1AQ5	1R5SF, 1R5*
1AR5	1AF5, 1AH5, 1S5*
1AS5	1U5SF, 1DN5*, 1U5*
1AU2	
1AU3	1N2, 1N2A
1AX2	1S2A
1AY2	
1B3GT	1AU3, 1G3GT, 1G3GT/1B3GT, 1J3, 1J3A, 1K3, 1N2, 1N2A
1B4	1B4G, 1B4P, 1B4T, 951, 1A4, 1A4P, 1A4T, 32, 34, 1C4*, 1K4*
1B4G	1B4, 1B4P, 1B4T, 951, 1A4, 1A4P, 1A4T, 32, 34, 1C4*, 1K4*
1B4P	1B4, 1B4G, 1B4T, 32, 951, 1A4, 1A4P, 1A4T, 34, 1C4*, 1K4*
1B4T	1B4, 1B4G, 1B4T, 32, 951, 1A4, 1A4P, 1A4T, 34, 1C4*, 1K4*
1B5	1B5/25S, 25, 25S
1B5/25S	1B5, 25, 25S
1B6	
1B7G	1B7GT, 1A7G*, GT*, GT/G*, 1B7GT/G
1B7GT	1B7G, 1A7G*, GT* GT/G*, 1B7G/G
1B7GT/G	1B7G, GT, 1A7G*, GT*, GT/G*
1B8GT	1D8GT§
1BC2	
1BH2	
1C3	
1C4	1K4, 1A4*, 1A4P*, 1A4T*, 1B4*, 1B4G*, 1B4P*, 1B4T*, 32*, 34*, 951*
1C5G	1C5GT, 1C5GT/G, 1Q5G, 1Q5GT, 1Q5GT/G, 1T5GT*
1C5GT	1C5G, 1C5GT/G, 1Q5G, 1Q5GT, 1Q5GT/G, 1T5GT*

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
1C5GT/G	1C5G, 1C5GT, 1Q5G, 1Q5GT, 1Q5GT/G, 1T5GT*
1C6	1A6*
1C7G	1D7G*
1D4G	1D4GT
1D4GT	1D4G
1D5G	1D5GP, 1D5GT, 1E5G, 1E5GP, 1E5GT, 1K5G*, 1M5G*
1D5GP	1D5G, 1D5GT, 1E5G, 1E5GP, 1E5GT, 1K5G*, 1M5G*
1D5GT	1D5G, 1D5GT, 1E5G, 1E5GP, 1E5GT, 1K5G*, 1M5G*
1D7G	1C7G*
1D8GT	1B8GT§
1DN5	1U5, 1AS5*, 1U5SF*
1DY4	1DY4A
1DY4A	1DY4
1E3	
1E4G	1E4GT, 1G4G, 1G4GT, 1G4GT/G
1E4GT	1E4G, 1G5G, 1G5GT, 1G5GT/G
1E5G	1E5GP, 1E5GT, 1D5G, 1D5GP, 1D5GT, 1K5G*, 1M5G*
1E5GP	1E5G, 1E5GT, 1D5G, 1D5GP, 1D5GT, 1K5G*, 1M5G*
1E5GT	1E5G, 1E5GP, 1D5G, 1D5GP, 1D5GT, 1K5G*, 1M5G*
1E7G	1E7GT
1E7GT	1E7G
1F4	
1F5G	1L5G*
1F6	
1F7G	1F7GH, 1F7GT, 1F7GV, 1F7GY
1F7GH	1F7G, 1F7GT, 1F7GV, 1F7GY
1F7GT	1F7G, 1F7GH, 1F7GV, 1F7GY
1F7GV	1F7G, 1F7GH, 1F7GT, 1F7GY
1F7GY	1F7G, 1F7GH, 1F7GT, 1F7GV
1G3GT	1AU3, 1B3GT, 1G3GT/1B3GT, 1J3, 1J3A, 1K3, 1N2, 1N2A
1G3GT/1B3GT	1B3GT, 1G3GT, 1AU3, 1J3, 1J3A, 1K3, 1N2, 1N2A
1G4G	1G4GT, 1G4GT/G, 1E4G, 1E4GT
1G4GT	1G4G, 1G4GT/G, 1E4G, 1E4GT

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
1G4GT/G	1G4G, 1G4GT, 1E4G, 1E4GT
1G5G	1G5GT, 1G5GT/G, 1J5G, 1J5GT
1G5GT	1G5G, 1G5GT/G, 1J5G, 1J5GT
1G5GT/G	1G5G, 1G5GT, 1J5G, 1J5GT
1G6G	1G6GT, 1G6GT/G
1G6GT	1G6G, 1G6GT/G
1G6GT/G	1G6G, 1G6GT
1H2	
1H4G	1H4GT
1H4GT	1H4G
1H5	1H5G, 1H5GT, GT/G
1H5G	1H5, GT, GT/G
1H5GT	1H5, G, GT/G
1H5GT/G	1H5, G, GT
1H6G	1H6GT
1H6GT	1H6G
1J3	1J3A, 1AU3, 1B3GT, 1G3GT, 1G3GT/1B3GT, 1K3, 1N2, 1N2A
1J3A	1AU3, 1N2, 1N2A
1J5G	1J5GT, 1G5G, 1G5GT, 1G5GT/G
1J5GT	1J5G, 1G5G, 1G5GT, 1G5GT/G
1J6G	1J6GT, 1J6GX
1J6GT	1J6G, 1J6GX
1J6GX	1J6G, 1J6GT
1K3	1AU3, 1B3GT, 1G3GT, 1G3GT/1B3GT, 1J3, 1J3A, 1N2, 1N2A
1K4	1C4, 1A4*, 1A4P*, 1A4T*, 1B4*, 1B4G*, 1B4P*, 1B4T*, 32*, 34*, 951*
1K5G	1M5G, 1D5G*, 1D5GP*, 1D5GT*, 1E5G*, 1E5GP*, 1E5GT*
1K7G	
1L4	1AE4*
1L5G	1F5G*
1L6	1U6*
1LA4	1LA4E
1LA4E	1LA4
1LA6	1LC6
1LB4	
1LB6	
1LC5	1LN5
1LC6	1LA6
1LD5	

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
1LE3	1LF3
1LF3	1LE3
1LG5	
1LH4	
1LN5	1LC5
1M3	1N3
1M5G	1K5G, 1D5G*, 1D5GP*, 1D5GT*, 1E5G*, 1E5GP*, 1E5GT*
1N2	1N2A, 1AU3, 1J3A
1N2A	1N2, 1AU3, 1J3A
1N3	1M3
1N5G	1N5GT, 1N5GT/G, 1P5G, 1P5GT
1N5GT	1N5G, 1N5GT/G, 1P5G, 1P5GT
1N5GT/G	1N5G, 1N5GT, 1P5G, 1P5GT
1N6G	1N6GT
1N6GT	1N6G
1P5G	1P5GT, 1N5G, 1N5GT, 1N5GT/G
1P5GT	1P5G, 1N5G, 1N5GT, 1N5GT/G
1Q5G	1Q5GT, 1Q5GT/G, 1C5G, 1C5GT, 1C5GT/G, 1T5GT*
1Q5GT	1Q5G, 1Q5GT/G, 1C5G, 1C5GT, 1C5GT/G, 1T5GT*
1Q5GT/G	1Q5G, 1Q5GT, 1C5G, 1C5GT, 1C5GT, 1T5GT*
1R4	
1R5	1R5SF*, 1AQ5*
1R5SF	1AQ5, 1R5*
1S2	1S2A
1S2A	1S2
1S4	
1S5	1AF5*, 1AH5*, 1AR5*
1SA6GT	
1SB6GT	
1T4	1AE4*, 1AF4*, 1AJ4*, 1AM4*, 1T4SF
1T4SF	1AE4*, 1AF4, 1AJ4, 1AM4, 1T4*
1T5GT	1A5G, 1A5GT, 1A5GT/G, 1C5*, 1C5GT*, 1C5GT/G*, 1Q5G*, 1Q5GT/G*
1U4	1AF4*
1U5	1DN5, 1AS5*, 1U5SF*
1U5SF	1AS5, 1DN5*, 1U5*
1U6	1L6*
1V	6Z3

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
1V2	
1W4	
1X2	1X2A, 1X2B
1X2A	1X2B
1X2B	
1Y2	
1Z2	
2A3	2A3H
2A3H	2A3
2A5	
2A6	
2A7	2A7S
2A7S	2A7
2AF4	2AF4A, 2AF4B, 2DZ4§, 2T4§
2AF4A	2AF4B, 2DZ4§, 2T4§
2AF4B	2DZ4§
2AH2	
2AS2	
2AV2	2BA2
2AZ2	2BJ2
2B3	
2B6	
2B7	2B7S
2B7S	2B7
2BA2	2AV2
2BJ2	
2BN4	2BN4A
2BN4A	2BN4
2CW4	2DS4
2CY5	2EA5, 2EV5
2DF4	
2DS4	2CW4
2DV4	
2DX4	
2DY4	2DY4A
2DY4A	2DY4
2DZ4	2AF4B§
2E5	
2EA5	2EV5
2EN5	
2ER5	2FQ5, 2FQ5A, 2FY5
2ES5	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
2EV5	2EA5
2FH5	2ES5, 2FQ5, 2FQ5A, 2GK5
2FQ5	2FQ5A, 2ES5, 2GK5
2FQ5A	2FQ5, 2ES5, 2GK5
2FS5	2GU5
2FV6	
2FY5	2ER5, 2FQ5, 2FQ5A, 2GK5
2G5	
2GK5	2FQ5, 2FQ5A
2GU5	2FS5
2GW5	
2HA5	2HK5, 2HM5, 2HQ5
2HK5	2HM5, 2HQ5, 2HA5†
2HM5	2HA5, 2HK5, 2HQ5
2HQ5	2HA5, 2HK5, 2HM5
2HR8	
2J2	
2S/4S	4S
2T4	2AF4§, 2AF4A§, 2AF4B§, 2DZ4§
2V2	3C2
2V3G	
2W3	2W3GT
2W3GT	2W3
2X2	2X2A, 2Y2
2X2A	2X2, 2Y2
2X3G	
2Y2	2X2, 2X2A
2Z2	2Z2/G84, G84
2Z2/G84	2Z2, G84
3A2	
3A3	3A3A, 3AW3, 3CA3
3A3A	3A3, 3CA3
3A4	
3A5	
3A8G	3A8GT
3A8GT	3A8G
3AF4A	3AF4B, 3DZ4§
3AF4B	3DZ4§
3AJ8	
3AL5	
3AT2	3BN2
3AU6	3BA6, 3BC5§, 3CB6§, 3CE5§, 3CF6§

† May not work in all circuits. § Parallel-filament circuits.

To Replace	Use
3AV6	
3AW2	
3AW3	3A3, 3A3A, 3CA3
3B2	3A3, 3A3A, 3AW3
3B4	
3B5	3B5GT, 3C5GT, 3Q5, 3Q5G, 3Q5GT, 3Q5GT/G
3B5GT	3B5, 3C5GT, 3Q5, 3Q5G, 3Q5GT, 3Q5GT/G
3B7	
3BA6	3AU6, 3BZ6§
3BC5	3CE5, 3AU6§, 3CB6§, 3CF6§, 3DK6§
3BE6	3BY6, 3CS6
3BF2	
3BN2	3AT2
3BN4	3BN4A
3BN4A	3BN4
3BN6	
3BU8	3BU8A, 3GS8, 3HS8, 3KF8
3BU8A	3BU8, 3GS8, 3HS8, 3KF8
3BX6	3BY7
3BY6	3BE6, 3CS6
3BY7	3BX6
3BZ6	3BA6§, 3CB6§, 3CE6§, 3CF6§, 3DK6§
3C2	
3C4	3E5, 3V4*
3C5GT	3B5, GT, 3Q5, G, GT, GT/G
3C6	XXB
3CA3	3A3, 3A3A, 3AW3
3CB6	3CF6, 3DK6, 3AU6§, 3BC5§, 3BZ6§, 3EC5§
3CE5	3BC5, 3AU6§, 3BZ6§, 3CB6§, 3CF6§, 3DK6§
3CF6	3CB6, 3DK6, 3AU6§, 3BC5§, 3BZ6§, 3CE5§
3CS6	3BE6, 3BY6
3CY5	3EA5, 3EV5
3D6	3LE4*, 3LF4*
3DG4	
3DK6	3CB6, 3CF6, 3BC5§, 3BZ6§, 3CE5§
3DT6	3DT6A
3DT6A	3DT6

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
3DX4	
3DY4	3DY4A
3DY4A	3DY4
3DZ4	3AF4B§
3E5	3C4, 3V4*
3E6	
3EA5	3EV5
3EH7	3EJ7, 3HM6§, 3HT6§, 3JC6§, 3JC6A§, 3JD6§
3EJ7	3EH7, 3HM6§, 3HT6§, 3JC6§, 3JC6A§, 3JD6§
3ER5	3FQ5, 3FQ5A, 3FY5
3ES5	
3EV5	3EA5
3FH5	3ES5, 3FQ5, 3FQ5A, 3GK5
3FQ5	3FQ5A, 3ES5, 3GK5
3FQ5A	3FQ5, 3GK5
3FS5	3GU5
3FY5	3ER5
3GK5	3FQ5, 3FQ5A
3GS8	3BU8, 3BU8A, 3HS8, 3KF8
3GU5	3FS5
3GW5	
3HA5	3HK5, 3HM5, 3HQ5
3HK5	3HA5, 3HM5, 3HQ5
3HM5	3HA5, 3HK5, 3HQ5
3HM6	3HT6, 3JC6, A, 3JD6, 3KT6
3HQ5	3HA5, 3HK5, 3HM5
3HS8	3BU8, 3BU8A, 3GS8, 3KF8
3HT6	3HM6, 3JC6, A, 3JD6, 3KT6
3JC6	3HM6, 3HT6, 3JC6A, 3JD6, 3KT6
3JC6A	3HM6, 3HT6, 3JC6, 3JD6, 3KT6
3JD6	3HM6, 3HT6, 3JC6, A, 3KT6
3KF8	3BU8, 3BU8A, 3GS8, 3HS8
3KT6	3HM6, 3HT6, 3JC6, A, 3JD6
3LE4	3LF4§, 3D6*
3LF4	3LE4§, 3D6*
3Q4	3S4§, 3S4SF*§, 3W4*§, 3Z4*§
3Q5	3Q5G, 3Q5GT, 3Q5GT/G, 3B5, 3B5GT, 3C5GT
3Q5G	3Q5, 3Q5GT, 3Q5GT/G, 3B5, 3B5GT, 3C5GT

§ May not work in all circuits. * Parallel-filament circuits
† Series circuit not requiring controlled warm-up time.

To Replace	Use
3Q5GT	3Q5, 3Q5G, 3Q5GT/G, 3B5, 3B5GT, 3C5GT
3Q5GT/G	3Q5, 3Q5G, 3Q5GT, 3B5, 3B5GT, 3C5GT
3S4	3S4SF*, 3Q4§, 3W4*, 3Z4*
3S4SF	3W4, 3Z4, 3S4*, 3Q4*§
3V4	3C4*, 3E5*
3W4	3S4SF, 3Z4, 3S4*, 3Q4*§
3Z4	3S4SF, 3W4, 3S4*, 3Q4*§
4A6	4A6G
4A6G	4A6
4AU6	4BA6, 4BC5§, 4BZ6§, 4CB6§, 4CE5§, 4DE6§, 4CF6§
4AV6	
4BA6	4AU6, 4BZ6§
4BC5	4CE5, 4AU6§, 4CB6§, 4DE6§, 4DK6§, 4CF6§
4BC8	4BQ7A, 4BS8, 4BX8, 4BZ7, 4BZ8, 5BK7A
4BE6	4CS6
4BL8	5EA8, 5U8, 5CQ8§
4BN4	
4BN6	
4BQ7A	4BC8, 4BS8, 4BX8, 4BZ7, 4BZ8, 5BK7A
4BS8	4BC8, 4BQ7A, 4BX8, 4BZ7, 4BZ8, 5BK7A
4BU8	4GS8, 4HS8, 4KF8
4BX8	4BC8, 4BQ7A, 4BS8, 4BZ7, 4BZ8, 5BK7A
4BZ6	4JH6, 4AU6§, 4BA6§, 4CB6§, 4DE6§, 4DK6§, 4CF6§
4BZ7	4BC8, 4BQ7A, 4BS8, 4BX8, 4BZ8, 5BK7A
4BZ8	4BC8, 4BQ7A, 4BS8, 4BX8, 4BZ7, 5BK7A
4CB6	4CF6, 4DE6, 4DK6, 4AU6§, 4BC5§, 4BZ6§, 4CE5§
4CE5	4BC5, 4AU6§, 4BZ6§, 4CB6§, 4DE6§, 4DK6§, 4CF6§
4CF6	4CB6, 4DK6, 4AU6§, 4BC5§, 4BZ6§, 4CE5§
4CM4	

§ May not work in all circuits. * Parallel-filament circuits.

To Replace	Use
4CS6	4BE6
4CX7	
4CY5	
4DE6	4CB6, 4DK6, 4AU6§, 4BC5§, 4BZ6§, 4CE5§
4DK6	4CB6, 4CF6, 4DE6, 4BC5§, 4BZ6§, 4CE5§
4DT6	4DT6A
4DT6A	4DT6
4EH7	4EJ7, 4HM6§, 4HT6§, 4JC6§, 4JC6A§, 4JD6§
4EJ7	4EH7, 4HM6§, 4HT6§, 4JC6§, 4JC6A§, 4JD6§
4ES8	4KN8
4EW6	4GM6
4FS7	4HG8
4GJ7	4GX7
4GK5	
4GM6	4EW6
4GS7	4LJ8
4GS8	4BU8, 4HS8, 4KF8
4GW5	
4GX7	4GJ7
4GZ5	
4HA5	4HK5†, 4HM5, 4HQ5
4HA7	
4HC7	
4HG8	
4HK5	4HA5, 4HM5, 4HQ5
4HM5	4HA5, 4HQ5, 4HK5†
4HM6	4HT6, 4JC6, A, 4JD6, 4KT6
4HQ5	4HA5, 4HM5, 4HK5†
4HR8	
4HS8	4BU8, 4GS8, 4KF8
4HT6	4HM6, 4JC6, A, 4JD6, 4KT6
4JC6	4HM6, 4HT6, 4JC6A, 4JD6, 4KT6
4JC6A	4HM6, 4HT6, 4JC6, 4JD6, 4KT6
4JD6	4HM6, 4HT6, 4JC6, A, 4KT6
4JH6	4BZ6
4JK6	4EW6, 4JL6
4JL6	4EW6, 4JK6
4KE8	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
4KF8	4BU8, 4GS8, 4HS8
4KN8	
4KT6	4HM6, 4HT6, 4JC6, A, 4JD6
4LJ8	4GS7*
4S	2S/4S
5A6	
5AF4A	
5AM8	
5AN8	
5AQ5	
5AR4	
5AS4	5AS4A, 5DB4, 5U4GB, 5V3, 5V3A
5AS4A	5AS4, 5DB4, 5U4GB, 5V3, 5V3A
5AS8	
5AT4	
5AT8	5BE8§, 5BR8§, 5CG8§, 5CL8§, 5CL8A§, 5DH8§, 5FG7§, 5FV8§
5AU4	5V3, 5V3A
5AV8	5B8§
5AW4	5AS4, 5AS4A, 5AU4, 5DB4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5U4GA, 5U4GB, 5V3, 5V3A
5AX4GT	5AR4, 5AS4, 5AS4A, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5U4G, 5U4GA, 5U4GB, 5V4G, 5V4GA, 5V4GY
5AZ3	
5AZ4	
5B8	5AV8§
5BC3	5BC3A
5BC3A	5BC3
5BE8	5BR8§, 5CL8§, 5CL8A§, 5FG7§, 5FV8§
5BK7A	4BC8, 4BQ7A, 4BS8, 4BX8, 4BZ7, 4BZ8
5BQ7A	5BS8, 5BZ7
5BR8	5FV8, 5BE8§, 5CL8§, 5CL8A§
5BS8	5BQ7A, 5BZ7
5BT8	
5BW8	
5BZ7	5BQ7A, 5BS8
5CG4	5AR4, 5V4G, 5V4GA, 5V4GY, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
5CG8	5FG7, 5AT8§, 5BE8§, 5BR8§, 5CL8§, 5CL8A§, 5FV8§
5CL8	5CL8A, 5BE8§, 5BR8§, 5FV8§
5CL8A	5CL8, 5BE8§, 5BR8§, 5FV8§
5CM6	
5CM8	5CR8§
5CQ8	5EA8§, 5U8§
5CR8	5CM8§, 5KZ8§
5CU4	
5CZ5	
5DB4	5AS4, 5AS4A, 5U4GB
5DH8	5BR8§, 5CL8§, 5CL8A§, 5FG7§, 5FV8§
5DJ4	5DN4
5DN4	
5EA8	5U8, 5CQ8§
5EH8	5X8§
5ES8	
5EU8	
5EW6	5GM6
5FG7	5BE8§, 5BR8§
5FV8	5BR8, 5BE8§, 5CL8§, 5CL8A§, 5DH8§
5GH8	5EA8, 5U8, 5CQ8§
5GJ7	5GX7
5GM6	5EW6
5GS7	5LJ8§
5GX6	5HZ6
5GX7	5GJ7
5HA7	
5HB7	
5HC7	
5HG8	
5HZ6	5GX6
5J6	
5JK6	5EW6, 5JL6
5JL6	5EW6, 5JK6
5KD8	
5KE8	
5KZ8	5CR8§
5LJ8	5GS7†§
5MB8	
5R4G	5R4GTY, 5R4GY, 5R4GYA, 5R4GYB
5R4GTY	5R4G, 5R4GY, 5R4GYA, 5R4GYB

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
5R4GY	5R4G, 5R4GTY, 5R4GYA, 5R4GYB
5R4GYA	5R4G, 5R4GTY, 5R4GY, 5R4GYB
5R4GYB	5R4G, GTY, GY, GYA
5T4	5AR4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB
5T8	
5U4G	5U4GA, 5U4GB, 5AR4, 5AS4, 5AS4A, 5AU4, 5DB4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V3, 5V3A
5U4GA	5U4GB, 5AS4, 5AS4A, 5AU4, 5DB4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5V3, 5V3A
5U4GB	5AS4, A, 5AU4, 5DB4, 5V3, A
5U8	5EA8, 5CQ8§
5U9	
5V3	5V3A, 5AU4
5V3A	
5V4G	5V4GA, 5V4GY, 5AR4
5V4GA	5V4G, 5V4GY, 5AR4
5V4GY	5V4G, 5V4GA, 5AR4
5V6GT	
5V9	
5W4	5W4G, 5W4GT, 5W4GT/G, 5AR4, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5V4GY, 5Y3G, 5Y3GA, 5Y3GT, 5Y3GT/G, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG
5W4G	5W4, 5W4GT, 5W4GT/G, 5AR4, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5V4GY, 5Y3G, 5Y3GA, 5Y3GT, 5Y3GT/G, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG
5W4GT	5W4, 5W4G, 5W4GT/G, 5AR4, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5V4GY, 5Y3G, 5Y3GA, 5Y3GT, 5Y3GT/G, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
5W4GT/G	5W4, 5W4G, 5W4GT, 5AR4, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5V4GY, 5Y3G, 5Y3GA, 5Y3GT, 5Y3GT/G, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG
5X8	13, 80, 83V, 88
5X4G	5X4GA
5X4GA	5X4G
5X8	5EH8§
5X9	
5Y3G	5Y3GA, 5Y3GT, 5Y3GT/G, 5AR4, 5AX4GT, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4, 5V4GA, 5V4GY, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG
5Y3GA	5Y3G, 5Y3GT, 5Y3GT/G, 5AR4, 5AX4GT, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4, 5V4GA, 5V4GY, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG
5Y3GT	5Y3G, 5Y3GA, 5Y3GT/G, 5AR4, 5AX4GT, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4, 5V4GA, 5V4GY, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG
5Y3GT/G	5Y3G, 5Y3GA, 5Y3GT, 5AR4, 5AX4GT, 5CG4, 5R4G, 5R4GTY, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5V4GY, 5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG
5Y4G	5Y4GA, 5Y4GT
5Y4GA	5Y4G, 5Y4GT
5Y4GT	5Y4G, 5Y4GA
5Z3	83
5Z4	5Z4G, 5Z4GT, 5Z4GT/G, 5Z4MG, 5AR4, 5CG4, 5V4G, 5V4GA, 5V4GY
5Z4G	5Z4, 5Z4GT, 5Z4GT/G, 5Z4MG, 5AR4, 5CG4, 5V4G, 5V4GA, 5V4GY
5Z4GT	5Z4, 5Z4G, 5Z4GT/G, 5Z4MG, 5AR4, 5CG4, 5V4G, 5V4GA, 5V4GY

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
5Z4GT/G	5Z4, 5Z4G, 5Z4GT, 5Z4MG, 5AR4, 5CG4, 5V4G, 5V4GA, 5V4GY
5Z4MG	5Z4, 5Z4G, 5Z4GT, 5Z4GT/G, 5AR4, 5CG4, 5V4G, 5V4GA, 5V4GY
6A3	
6A4	6A4LA§
6A4LA	6A4§
6A5	6A5G
6A5G	6A5
6A6	6A6X
6A6X	6A6
6A7	6A7S
6A7S	6A7
6A8	6A8G, 6A8GT, 6A8GTX, 6A8MG, 6D8*, 6D8G*
6A8G	6A8, 6A8GT, 6A8GTX, 6A8MG, 6D8*, 6D8G*
6A8GT	6A8, 6A8G, 6A8GTX, 6A8MG, 6D8*, 6D8G*
6A8GTX	6A8, 6A8G, 6A8GT, 6A8MG, 6D8*, 6D8G*
6A8MG	6A8, 6A8G, 6A8GT, 6A8GTX, 6D8*, 6D8G*.
6AB4	
6AB5	6N5, 6N5G, 6AB5/6N5
6AB5/6N5	6AB5, 6N5, 6N5G
6AB6G	6N6*, 6N6G*, 6N6MG*
6AB7	6AB7Y, 6AC7, 6AC7A, 6AC7Y, 6AJ7, 6SG7*§, 6SG7GT*§, 6SG7Y*§, 6SH7*§, 6SH7GT*
6AB7Y	6AB7, 6AC7, 6AC7A, 6AC7Y, 6AJ7, 6SG7*§, 6SG7GT*§, 6SG7Y*§, 6SH7*§, 6SH7GT*
6AB8	
6AB9	
6AC5	6AC5G, 6AC5GT, 6AC5GT/G
6AC5G	6AC5, 6AC5GT, 6AC5GT/G
6AC5GT	6AC5, 6AC5G, 6AC5GT/G
6AC5GT/G	6AC5, 6AC5G, 6AC5GT
6AC6G	6AC6GT
6AC6GT	6AC6G

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6AC7	6AC7A, 6AC7Y, 6AB7, 6AB7Y, 6AJ7, 6SG7*§, 6SG7GT*§, 6SG7Y*§, 6SH7*§, 6SH7GT*§
6AC7A	6AC7, 6AC7Y, 6AB7, 6AB7Y, 6AJ7, 6SG7*§, 6SG7GT*§, 6SG7Y*§, 6SH7*§, 6SH7GT*§
6AC7Y	6AC7, 6AC7A, 6AB7, 6AB7Y, 6AJ7, 6SG7*§, 6SG7GT*§, 6SG7Y*§, 6SH7 6SH7GT*§
6AC9	
6AC10	6U10§
6AD5G	6AD5GT
6AD5GT	6AD5G
6AD6G	6AF6G, 6AF6GT
6AD7G	
6AD8	6DC8, 6N8
6AD10	6T10§
6AE5	6AE5G, 6AE5GT, 6AE5GT/G, 6AF5G
6AE5G	6AE5, 6AE5GT, 6AE5GT/G, 6AF5G
6AE5GT	6AE5, 6AE5G, 6AE5GT/G, 6AF5G
6AE5GT/G	6AE5, 6AE5G, 6AE5GT, 6AF5G
6AE6	6AE6G
6AE6G	6AE6
6AE7G	6AE7GT
6AE7GT	6AE7G
6AE8	
6AF3	6BR3, 6AL3*
6AF4	6AF4A, 6AN4§, 6T4§
6AF4A	6AF4, 6AN4§, 6DZ4§, 6T4§
6AF5G	6AE5, 6AE5G, 6AE5GT, 6AE5GT/G
6AF6G	6AF6GT, 6AD6G
6AF6GT	6AF6G, 6AD6G
6AF7G	6CD7*
6AF10	
6AF11	6AS11, 6BD11
6AG5	6BC5, 6CE5, 6AK5*, 6AU6§, 6AU6A§, 6AW6§, 6CB6§, 6CB6A§, 6CF6§, 6DC6§, 6DE6§, 6CY5*§, 6EA5*§, 6EV5*§
6AG6G	6M6G*
6AG7	6AG7Y, 6AK7

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6AG7Y	6AG7, 6AK7
6AG10	
6AG11	
6AH4GT	
6AH5	6AH5G
6AH5G	6AH5
6AH6	6AH6V
6AH6V	6AH6
6AH7GT	
6AJ4	6AM4§, 6CR4*§
6AJ5	
6AJ7	6AB7, 6AB7Y, 6AC7, 6AC7A, 6AC7Y, 6SG7*§, 6SG7GT*§, 6SG7Y*§, 6SH7*§, 6SH7GT*§
6AJ8	
6AK5	6AG5*, 6BC5*, 6CE5*, 6CY5*§, 6EA5*§, 6EV5*§
6AK6	
6AK7	6AG7, 6AG7Y
6AK8	6T8, 6T8A
6AL3	
6AL5	6EB5
6AL6	6AL6G
6AL6G	6AL6
6AL7	6AL7GT
6AL7GT	6AL7
6AL11	
6AM4	6AJ4§
6AM5	
6AM6	
6AM8	6AM8A, 6HJ8
6AM8A	6AM8*†, 6HJ8
6AN4	6AF4§, 6AF4A§, 6T4§
6AN5	
6AN6	
6AN7	
6AN8	6AN8A
6AN8A	6AN8*†
6AQ4	
6AQ5	6AQ5A, 6BM5, 6HG5
6AQ5A	6HG5, 6AG5*†, 6BM5*†
6AQ6	6AT6*, 6AV6*, 6BK6*, 6BT6*

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	*Use*
6AQ7GT	
6AQ8	6DT8*
6AR5	
6AR6	6AR6G
6AR6G	6AR6
6AR7GT	
6AR8	
6AR11	
6AS4GT	6DM4, 6DM4A, 6DQ4, 6DT4, 6CQ4*, 6DE4*
6AS5	6CA5*
6AS6	6DB6*
6AS7G	6AS7GA, 6AS7GT, 6080
6AS7GA	6AS7G, 6AS7GT, 6080
6AS7GT	6AS7G, 6AS7GA, 6080
6AS8	
6AS11	6AF11, 6BD11
6AT6	6AV6, 6BK6, 6BT6, 6AQ6*
6AT8	6AT8A, 6BE8§, A§, 6BR8§, A§, 6CG8§, A§, 6CL8§, A§, 6FG7§, 6FV8§, A§
6AT8A	6AT8*†, 6BE8A§, 6BR8A§, 6CG8A§, 6CL8§, 6CL8A§, 6FG7§, 6FV8§, 6FV8A§
6AU4GT	6AU4GTA, 6CQ4*, 6DA4A*, 6DE4*, 6DM4*, 6DM4A*, 6DQ4*, 6DT4*
6AU4GTA	6DM4A*, 6DT4*
6AU5GT	6FW5, 6AV5GA*, 6AV5GT*
6AU6	6AU6A, 6BA6, 7543, 6AW6§, 6AG5§, 6BC5§, 6CB6§, 6CB6A§, 6CE5§, 6CF6§, 6DE6§, 6DK6§
6AU6A	6AU6*†, 7543*†, 6BA6*†, 6CB6A§, 6CE5§
6AU7	7AU7, 6AX7§
6AU8	6AU8A, 6AW8, 6AW8A, 6BA8, 6BA8A, 6BH8, 6CX8*, 6EH8*§, 6X8*, 6X8A*
6AU8A	6AU8, 6AW8, 6AW8A, 6BA8, 6BA8A, 6BH8, 6CX8*, 6EH8*§, 6X8*, 6X8A*
6AV4	6BX4*
6AV5GA	6AV5GT, 6FW5, 6AU5GT*
6AV5GT	6AV5GA, 6FW5, 6AU5GT*
6AV6	6AT6, 6BK6, 6BT6, 6AQ6*
6AV11	6K11§, 6Q11§

' §-May not work in all circuits. * Parallel-filament circuit-
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6AW6	6CB6, 6CB6A, 6CF6, 6DC6, 6DE6, 6AG5§, 6AU6§, 6AU6A§, 6BC5§, 6BH6*, 6CE5§
6AW7GT	
6AW8	6AW8A, 6AU8, A, 6BA8, A, 6JV8, 6KS8, 6LF8, 6EB8*, 6EH8*§, 6X8*§, A*§
6AW8A	6AW8, 6AU8, A, 6BA8, A, 6JV8, 6KS8, 6LF8, 6EB8* 6EH8*§, 6X8*§, A*§
6AX3	
6AX4GT	6AX4GTA, 6AX4GTB, 6AS4GT, 6DA4, 6DA4A, 6DM4, 6DM4A, 6DQ4, 6DT4, 6AU4GT*, 6AU4GTA*, 6CQ4*, 6DE4*,
6AX4GTA	6AX4GTB, 6DA4, 6DA4A, 6DM4, 6DM4A, 6DQ4, 6DT4, 6AU4GT*, 6AU4GTA*, 6CQ4*, 6DE4*
6AX4GTB	6DM4A, 6CQ4*, 6DA4A*†, 6DE4*, 6DM4*†, 6DQ4*†, 6DT4*†
6AX5GT	
6AX6G	
6AX7	6AU7§, 6GU7*, 7AU7§
6AX8	6EA8, 6GH8, A, 6LM8, 6U8, A, 6CQ8§, 6GJ8§
6AY3	6AY3A, B, 6BA3, 6BS3, A, 6CK3, 6CL3, 6DW4, A, B, 6BH3*, A*
6AY3A	6AY3, A, 6BA3, 6BS3, A, 6CK3, 6CL3, 6DW4, A, B, 6BH3*, A*
6AY3B	6AY3, A, 6BA3, 6BS3, A, 6CK3, 6CL3, 6DW4, A, B, 6BH3*, A*
6AY11	
6AZ8	
6B3	6V3*, 6V3A*
6B4G	
6B5	
6B6	6BG6, 6Q7, 6Q7G, 6Q7GT, 6Q7MG, 6T7G*
6B6G	6B6, 6Q7, 6Q7G, 6Q7GT, 6Q7MG, 6T7G*
6B7	6B7S
6B7S	6B7
6B8	6B8G, 6B8GT
6B8G	6B8, 6B8GT

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6B8GT	6B8, 6B8G
6B10	
6BA3	6AY3, A, B, 6BS3, A, 6CK3, 6CL3, 6DW4, A, B, 6BH3*, A*
6BA6	6AU6, 6AU6A, 6BD6, 6CG6, 7543, 6BZ6§
6BA7	
6BA8	6BA8A, 6AU8, 6AU8A, 6AW8, 6AW8A, 6BH8
6BA8A	6BA8, 6AU8, 6AU8A, 6AW8, 6AW8A, 6BH8
6BA11	
6BC4	
6BC5	6AG5, 6CE5, 6AK5*, 6AU6§, 6AU6A§, 6AW6§, 6CB6§, 6CB6A§, 6CF6§, 6DC6§, 6DE6§, 6DK6§, 6CY5*§, 6EA5*§, 6EV5*§
6BC7	
6BC8	6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6BZ8, 6HK8, X155, 6BK7*, 6BK7A*, 6BK7B*
6BD4	6BD4A, 6BK4*§, A*§, B*§
6BD4A	6BK4*§, A*§, B*§
6BD5GT	6AU5GT*, 6AV5GA*, 6AV5GT*, 6FW5*
6BD6	6BA6, 6CG6
6BD7	
6BD11	6AF11
6BE3	6BE3A
6BE3A	6BE3
6BE6	6BY6, 6CS6
6BE7	
6BE8	6BE8A, 6BR8§, 6BR8A§, 6CL8§, 6CL8A§, 6FG7§, 6FV8§, 6FV8A§
6BE8A	6BE8*†, 6BR8A§, 6CL8§, 6CL8A§, 6FG7§, 6FV8§, 6FV8A§
6BF5	
6BF6	6BU6
6BF8	
6BF11	
6BG6G	6BG6GA
6BG6GA	6BG6G

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6BH3	6BH3A, 6DW4A*, B*, 6CJ3*, 6CK3*, 6CL3*
6BH3A	6BH3, 6DW4A*, B*, 6CJ3*, 6CK3*, 6CL3*
6BH5	
6BH6	6AW6*, 6CB6*, 6CB6A*, 6CF6*, 6DC6*
6BH8	6AU8, 6AU8A, 6AW8, 6AW8A, 6BA8, 6BA8A
6BH11	
6BJ3	6AX3
6BJ5	
6BJ6	6BJ6A
6BJ6A	6BJ6
6BJ7	
6BJ8	6BN8§
6BK4	6BK4A, 6BD4A*§, 6BK4B
6BK4A	6BK4B
6BK4B	
6BK5	
6BK6	6AT6, 6AV6, 6BT6, 6AQ6*
6BK7	6BK7A, 6BK7B, 6BC8*, 6BQ7*, 6BQ7A*, 6BS8*, 6BX8*, 6BZ7*, 6BZ8*, 6HK8*, X155*
6BK7A	6BK7, 6BK7B, 6BC8*, 6BQ7*, 6BQ7A*, 6BS8*, 6BX8*, 6BZ7*, 6BZ8*, 6HK8*, X155*
6BK7B	6BK7*, 6BK7A*, 6BC8*, 6BQ7*, 6BQ7A*, 6BS8*, 6BX8*, 6BZ7*, 6BZ8*, 6HK8*, X155*
6BK8	
6BK11	6K11§, 6Q11§
6BL4	6AU4GTA*, 6CQ4*, 6DM4A*, 6DT4*
6BL7GT	6BL7GTA, 6BX7GT, 6DN7
6BL7GTA	6BL7GT, 6BX7GT, 6DN7
6BL8	6EA8, 6U8, 6U8A, 6LN8
6BM5	6AQ5, 6AQ5A, 6DL5*, 6DS5*
6BM8	
6BN4	6BN4A
6BN4A	6BN4
6BN5	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6BN6	
6BN7	
6BN8	6BJ8§
6BN11	
6BQ5	7189, 7189A
6BQ6G	6BQ6GA, 6BQ6GT, 6BQ6GTA, 6BQ6GTB, 6BQ6GTB/6CU6, 6CU6 6DQ6, 6DQ6A, 6DQ6B, 6FH6, 6GW6
6BQ6GA	6BQ6G, 6BQ6GT, 6BQ6GTA, 6BQ6GTB, 6BQ6GTB/6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6, 6GW6
6BQ6GT	6BQ6G, 6BQ6GA, 6BQ6GTA, 6BQ6GTB, 6BQ6GTB/6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6, 6GW6
6BQ6GTA	6BQ6G, 6BQ6GA, 6BQ6GT, 6BQ6GTB, 6BQ6GTB/6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6, 6GW6
6BQ6GTB	6BQ6GTB/6CU6, 6CU6, 6DQ6, A, B, 6FH6, 6GW6
6BQ6GTB/6CU6	6BQ6GTB, 6CU6, 6DQ6, A, B, 6FH6, 6GW6
6BQ7	6BQ7A, 6BC8, 6BS8, 6BX8, 6BZ7, 6BZ8, 6HK8, X155, 6BK7*, 6BK7A*, 6BK7B
6BQ7A	6BQ7, 6BC8, 6BS8, 6BX8, 6BZ7, 6BZ8, 6HK8, X155, 6BK7*, 6BK7A*, 6BK7B*
6BR3	6AL3*
6BR5	6DA5
6BR7	
6BR8	6BR8A, 6FV8, 6FV8A, 6JN8, 6BE8§, 6BE8A§, 6CL8§, 6CL8A§
6BR8A	6FV8, 6FV8A, 6JN8, 6BR8*†, 6BE8A§, 6CL8§, 6CL8A§
6BS3	6BS3A, 6CK3, 6CL3, 6DW4, A, B
6BS3A	6BS3, 6CK3, 6CL3, 6DW4, A, B
6BS5	
6BS7	
6BS8	6BC8, 6BQ7, 6BQ7A, 6BX8, 6BZ7, 6BZ8, 6HK8, X155, 6BK7*, 6BK7A*, 6BK7B*
6BT4	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6BT6	6AT6, 6AV6, 6BK6, 6AQ6*
6BT8	
6BU4	
6BU5	
6BU6	6BF6
6BU8	6BU8A, 6GS8, 6HS8, 6KF8
6BU8A	6BU8, 6GS8, 6HS8, 6KF8
6BV7	
6BV8	
6BW4	
6BW6	
6BW7	6BX6, 6EL7, 6HM6§
6BW8	
6BX4	6AV4*
6BX6	6BW7, 6BY7, 6EL7, 6EC7*
6BX7GT	6BL7GT, 6BL7GTA, 6DN7
6BX8	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BZ7, 6BZ8, 6HK8, X155, 6BK7*, 6BK7A*, 6BK7B*
6BY5G	6BY5GA
6BY5GA	6BY5G
6BY6	6BE6, 6CS6
6BY7	6BX6, 6EC7*
6BY8	
6BZ3	6BE3, A, 6CD3*, 6CE3*, 6CG3*
6BZ6	6DC6, 6HQ6, 6JH6, 6BA6§
6BZ7	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ8, 6HK8, X155, 6BK7*, 6BK7A*, 6BK7B*
6BZ8	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6HK8, X155, 6BK7*, 6BK7A*, 6BK7B*
6C4	
6C5	6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6L5G
6C5G	6C5, 6C5GT, 6C5GT/G, 6C5MG, 6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6L5G

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6C5GT	6C5, 6C5G, 6C5GT/G, 6C5MG, 6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6L5G
6C5GT/G	6C5, 6C5G, 6C5GT, 6C5MG, 6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6L5G
6C5MG	6C5, 6C5G, 6C5GT, 6C5GT/G, 6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6L5G
6C6	77, 57A*, 57AS*
6C7	
6C8G	6F8G*§
6C9	
6C10	6K11§, 6Q11†§
6CA4	
6CA5	6EH5, 6AS5*
6CA7	
6CB5	6CB5A, 6CL5
6CB5A	6CL5
6CB6	6CB6A, 6AW6, 6CF6, 6DC6, 6DE6, 6DK6, 6HQ6, 6AG5§, 6AU6§, 6AU6A§, 6BC5§, 6CE5§, 6BH6§, 6HS6*§
6CB6A	6CB6*†, 6CF6*†, 6DC6*†, 6DE6*†, 6DK6*†, 6HQ6*† 6AU6A§, 6CE5§, 6HS6*§
6CD3	
6CD6G	6CD6GA, 6DN6, 6EX6
6CD6GA	6EX6
6CD7	6AF7G*
6CE3	6CD3
6CE5	6AG5*†, 6AK5*, 6AU6A§, 6BC5*†, 6CB6A§, 6CY5*§, 6EA5*§, 6EV5*§, 6HS6*§
6CF6	6AW6, 6CB6, 6CB6A, 6DC6, 6DE6, 6DK6, 6AG5§, 6AU6§, 6AU6A§, 6BC5§, 6BH6*, 6CE5§, 6HS6*§
6CG3	6CD3
6CG6	6BA6, 6BD6
6CG7	6FQ7§

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6CG8	6CG8A, 6FG7, 6AT8§, 6AT8A§, 6BE8§, 6BE8A§, 6BR8§, 6BR8A§, 6FV8§, 6FV8A§
6CG8A	6FG7, 6CG8*†, 6AT8A§, 6BE8A§, 6BR8A§, 6FV8§, 6FV8A§
6CH3	
6CH6	
6CH7	6CX7
6CH8	6CU8§
6CJ3	6CH3
6CJ5	
6CJ6	6DR6
6CK3	6CL3, 6DW4, A, B, 6CH3*, 6CJ3*
6CK4	
6CK5	
6CK6	
6CL3	6CK3, 6DW4A, B, 6CH3*, 6CJ3*
6CL5	
6CL6	
6CL8	6CL8A, 6BE8A§, 6BR8A§, 6FV8§, 6FV8A§
6CL8A	6CL8, 6BE8A§, 6BR8A§, 6FV8§, 6FV8A§
6CM4	
6CM5	
6CM6	
6CM7	
6CM8	6CR8§, 6CS8§
6CN6	
6CN7	
6CQ4	6DT4*, 6DE4
6CQ6	
6CQ8	6EA8§, 6U8A§
6CR4	6AJ4*§
6CR5	
6CR6	
6CR8	6CM8§, 6CS8§
6CS5	6DW5, 6CM6*
6CS6	6BE6, 6BY6
6CS7	6DA7*
6CS8	6CM8§, 6CR8§
6CT7	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6CU5	6AS5*
6CU6	6BQ6GTB/6CU6, 6BQ6GTB, 6DQ6, A, B 6FH6, 6GW6
6CU7	
6CU8	
6CV7	
6CW4	6DS4
6CW5	
6CW7	6FC7
6CX7	6CH7
6CX8	6EB8, 6GN8, 6HF8, 6JA8, 6JE8, 6AU8*, 6AU8A*, 6AW8*, 6AW8A*, 6JV8*
6CY5	6EA5, 6EV5, 6AG5*§, 6AK5*§, 6BC5*§, 6CE5*§, 6HS6*§
6CY7	
6CZ5	6DW5*
6D5	6D5G, 6D5MG
6D5G	6D5, 6D5MG
6D5MG	6D5, 6D5G
6D6	78, 58AS*
6D7	
6D8	6D8G, 6A8*, 6A8G*, 6A8GT*, 6A8GTX* 6A8MG*
6D8G	6D8, 6A8*, 6A8G*, 6A8GT*, 6A8GTX*, 6A8MG*
6D10	6AV11*§, 6C10§, 6K11*§, 6Q11*§
6DA4	6DA4A, 6AX4GTA, 6AX4GTB, 6DM4, 6DM4A, 6DQ4, 6DT4, 6AU4GT*, 6AU4GTA*, 6CQ4*, 6DE4*
6DA4A	6DM4A, 6DQ4, 6DT4, 6CQ4*, 6DE4*
6DA5	6BR5
6DA6	
6DA7	
6DB5	
6DB6	6AS6*
6DC6	6AW6, 6BZ6, 6CB6, 6CB6A, 6CF6, 6DE6, 6DK6, 6AG5§, 6AU6§, 6AU6A§ 6BC5§, 6BH6*, 6CE5§
6DC8	6AD8, 6N8
6DE4	6CQ4, 6DA4A*, 6DM4*, 6DM4A*, 6DQ4*, 6DT4*

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6DE6	6AW6, 6CB6, 6CB6A, 6CF6, 6DC6, 6DK6, 6HQ6, 6AG5§, 6AU6§, 6AU6A§, 6BC5§, 6BH6*, 6CE5§
6DE7	6EW7
6DG6GT	6W6, 6W6GT, 6EF6*, 6EY6*, 6EZ5*
6DG7	
6DJ8	6ES8, 6FW8*, 6KN8*
6DK6	6CB6, 6CB6A, 6CF6, 6DC6, 6DE6, 6HQ6, 6BC5§, 6CE5§, 6HS6*§
6DL4	
6DL5	6BM5*
6DL7	
6DM4	6DM4A, 6DA4A, 6DQ4, 6DT4, 6CQ4*, 6DE4*
6DM4A	6DT4, 6CQ4*
6DN6	6CD6G, 6CD6GA, 6EX6
6DN7	
6DQ4	6DT4, 6CQ4*, 6DE4*
6DQ5	
6DQ6	6DQ6A, 6DQ6B, 6FH6, 6GW6
6DQ6A	6DQ6B, 6FH6, 6GW6
6DQ6B	6GW6*†
6DR4	
6DR6	6CJ6
6DR7	6FD7, 6FR7
6DR8	
6DS4	6CW4
6DS5	6AQ5*, 6AQ5A*, 6BM5*
6DS8	
6DT4	
6DT5	6EM5*
6DT6	6DT6A
6DT6A	6DT6
6DT8	
6DV4	
6DW4	6DW4A, B, 6CK3, 6CL3
6DW4A	6DW4, B, 6CK3, 6CL3
6DW4B	6DW4, A, 6CK3, 6CL3
6DW5	
6DX4	6DY4*§, 6DY4A*§
6DX8	
6DY4	6DY4A, 6DX4*§

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6DY4A	6DY4, 6DX4*§
6DY5	6CW5*
6DY7	6DZ7§
6DZ4	6AF4§, 6AF4A§, 6T4§
6DZ7	6DY7§
6DZ8	6FY8*
6E5	6G5§
6E6	
6E7	
6E8	6E8G
6E8G	6E8
6EA4	
6EA5	6EV5, 6AG5*§, 6AK5*§, 6BC5*§, 6CE5*§
6EA7	6GL7, 6EM7
6EA8	6U8A, 6CQ8§, 6KD8*, 6U8†*, 6LN8
6EB5	6AL5
6EB8	6CX8, 6GN8, 6HF8, 6JA8, 6JE8, 6AU8*, 6AU8A*, 6HZ8*, 6JV8*
6EC4	
6EC7	6BX6*, 6BY7*
6EF6	6EY6*, 6EZ5*
6EH5	6CA5
6EH7	6EJ7, 6HM6§, 6HT6§, 6JC6§, 6JC6A§, 6JD6§
6EH8	6AU8*§, 6AU8A*§, 6AW8*§, 6AW8A*§, 6X8A§
6EJ7	6EH7, 6HM6§, 6HT6§, 6JC6§, 6JC6A§, 6JD6§
6EL7	6BW7, 6BX6, 6HM6§
6EM5	
6EM7	6EA7, 6GL7
6EQ7	6KL8§
6ER5	6FY5*
6ES5	
6ES6	6ET6, 6FD6
6ES8	6DJ8, 6FW8*, 6KN8*
6ET6	6ES6, 6FD6
6ET7	
6EU7	
6EU8	
6EV5	6EA5, 6AG5*§, 6AK5*§, 6BC5*§, 6CE5*§

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6EV7	
6EW6	6GM6, 6HS6*§
6EW7	
6EX6	6CD6GA
6EY6	6EZ5*
6EZ5	
6EZ8	
6F4	6L4
6F5	6F5G, 6F5GT, 6F5MG
6F5G	6F5, 6F5GT, 6F5MG
6F5GT	6F5, 6F5G, 6F5MG
6F5MG	6F5, 6F5G, 6F5GT
6F6	6F6G, 6F6GT, 6F6GT/G, 6F6MG
6F6G	6F6, 6F6GT, 6F6GT/G, 6F6MG
6F6GT	6F6, 6F6G, 6F6GT/G, 6F6MG
6F6GT/G	6F6, 6F6G, 6F6GT, 6F6MG
6F6MG	6F6, 6F6G, 6F6GT, 6F6GT/G
6F7	6F7S
6F7S	6F7
6F8G	6C8G*§
6FA7	
6FC7	6CW7
6FD6	6ES6, 6ET6
6FD7	6FR7
6FE5	
6FE8	
6FG5	6HS6*§
6FG6	
6FG7	6BE8A§, 6BR8A§
6FH5	6ES5, 6FQ5*, 6FQ5A*, 6GK5*
6FH6	6DQ6B, 6GW6
6FH8	
6FJ7	
6FM7	
6FM8	
6FN5	
6FQ5	6FQ5A, 6GK5, 6ES5*
6FQ5A	6FQ5, 6GK5, 6ES5*
6FQ7	
6FR7	6FD7
6FS5	6FG5, 6GU5*
6FV6	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6FV8	6FV8A, 6BR8A, 6BE8A§, 6BR8*†, 6CL8§, 6CL8A§
6FV8A	6FV8, 6BR8A, 6BE8A, 6BR8*†, 6CL8§, 6CL8A§
6FW5	
6FW8	6KN8, 6DJ8*, 6ES8*
6FY5	6ER5*
6FY7	
6FY8	
6G5	6G5/6H5, 6H5, 6T5, 6U5/6G5, 6U5
6G5 6H5	6G5, 6H5, 6U5, 6U5/6G5
6G6G	6G6GT
6G6GT	6G6G
6G11	
6GA7	
6GA8	6CG7*
6GB5	
6GC5	
6GC6	
6GD7	6LJ8§
6GE5	
6GE8	
6GF5	6GE5
6GF7	6GF7A
6GF7A	6GF7
6GH8	6GH8A, 6EA8, 6U8A, 6AX8*†, 6CQ8§, 6GJ8*, 6LM8*†, 6U8*†, 6HL8*†
6GH8A	6GH8, 6EA8, 6AX8*†, 6CQ8§, 6GJ8*, 6LM8*†, 6U8*†, A, 6HL8*†
6GJ5	6GJ5A
6GJ5A	6GJ5
6GJ7	6GX7
6GJ8	6AX8*, 6CQ8*§, 6EA8*, 6GH8*, 6GH8A*, 6U8*, 6U8A*
6GK5	6FQ5, 6FQ5A
6GK6	
6GK7	
6GL7	6EA7, 6EM7
6GM5	
6GM6	6EW6, 6HQ6*, 6JH6*
6GM8	
6GN6	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6GN8	6CX8, 6EB8, 6HF8, 6JE8, 6AU8*, A*, 6AW8*, A*, 6HZ8*, 6JA8, 6JV8*, 6LF8*
6GQ7	6BC7§
6GS8	6BU8, 6BU8A, 6HS8, 6KF8
6GT5	6GT5A
6GT5A	6GT5
6GU5	6FS5*
6GU7	
6GV5	
6GV7	
6GV8	
6GW5	
6GW6	6DQ6B
6GW8	
6GX6	6GY6, 6HZ6
6GX7	6GJ7
6GY5	
6GY6	6GX6, 6HZ6
6GY8	
6GZ5	
6H4	6H4GT
6H4GT	6H4
6H5	6G5, 6G5/6H5, 6T5, 6U5, 6U5/6G5
6H6	6H6G, 6H6GT, 6H6GT/G, 6H6MG
6H6G	6H6, 6H6GT, 6H6GT/G, 6H6MG
6H6GT	6H6, 6H6G, 6H6GT/G, 6H6MG
6H6GT/G	6H6, 6H6G, 6H6GT, 6H6MG
6H6MG	6H6, 6H6G, 6H6GT, 6H6GT/G
6H8G	
6HA5	6HK5, 6HM5, 6HQ5
6HB5	
6HB6	
6HB7	
6HC8	6BM8*
6HD5	
6HD7	
6HE5	6BM8*
6HE7	
6HF5	
6HF8	6CX8, 6EB8, 6GN8, 6JA8, 6JE8, 6HZ8*, 6JV8*, 6LF8*

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6HG5	6AQ5A, 6AQ5*†
6HG8	
6HJ5	
6HJ7	
6HJ8	6AM8A, 6AM8*†
6HK5	6HA5, 6HM5, 6HQ5
6HK8	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6BZ8, X155, 6BK7*, 6BK7A*, 6BK7B*
6HL5	
6HL8	6BL8, 6GH8*†, A*†
6HM5	6HA5, 6HK5, 6HQ5
6HM6	6HT6, 6JC6, A, 6JD6, 6KT6
6HQ5	6HA5, 6HK5, 6HM5
6HQ6	6BZ6, 6CB6, 6CB6A, 6DE6, 6DK6, 6JK6, 6GM6*
6HR5	
6HR6	
6HS5	
6HS6	6CB6*§, 6CB6A*§, 6CE5*§, 6CF6*§, 6CY5*§, 6DK6*§, 6EW6*§, 6FG5*§
6HS8	6BU8, 6BU8A, 6GS8, 6KF8
6HT6	6HM6, 6JC6, 6JC6A, 6JD6, 6KT6
6HU6	
6HU8	
6HW8	
6HZ6	6GX6, 6GY6
6HZ8	6EB8*, 6GN8*, 6HF8*, 6JE8*, 6JV8*, 6LF8*
6J4	
6J5	6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6C5, 6C5G, 6C5GT/G, 6C5MG, 6L5G
6J5G	6J5, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6C5, 6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6L5G
6J5GT	6J5, 6J5G, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG, 6C5, 6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6L5G
6J5GT/G	6J5, 6J5G, 6J5GT, 6J5GTX, 6J5GX, 6J5MG, 6C5, 6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6L5G

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6J5GTX	6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GX, 6J5MG, 6C5, 6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6L5G
6J5GX	6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5MG, 6C5, 6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6L5G
6J5MG	6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6C5, 6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6L5G
6J6	6J6A
6J6A	6J6*†
6J7	6J7G, 6J7GT, 6J7GTX, 6J7MG, 6W7G*
6J7G	6J7, 6J7GT, 6J7GTX, 6J7MG, 6W7G*
6J7GT	6J7, 6J7G, 6J7GTX, 6J7MG, 6W7G*
6J7GTX	6J7, 6J7G, 6J7GT, 6J7MG, 6W7G*
6J7MG	6J7, 6J7G, 6J7GT, 6J7GTX, 6W7G*
6J8G	
6J9	
6J10	
6J11	
6JA8	6CX8, 6EB8, 6GN8, 6HF8, 6JE8, 6JT8, 6HZ8*, 6JV8*, 6LF8*
6JB6	6JB6A
6JB6A	6JB6
6JB8	
6JC6	6HM6, 6HT6, 6JC6A, 6JD6, 6KT6
6JC6A	6HM6, 6HT6, 6JC6, 6JD6, 6KT6
6JC8	
6JD6	6HM6, 6HT6, 6JC6, 6JC6A, 6KT6
6JE6	6JE6A
6JE6A	6JE6
6JE8	6EB8, 6GN8, 6HF8, 6JA8, 6HZ8*, 6JV8*, 6LF8*
6JF6	6KM6
6JF8	
6JG6	6JG6A
6JG6A	6JG6
6JH6	6BZ6, 6HQ6, 6GM6*
6JH8	
6JK6	6EW6, 6JL6
6JK8	
6JL6	6EW6, 6JK6

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6JL8	
6JM6	6JM6A
6JM6A	6JM6
6JN6	6JN6A
6JN6A	6JN6
6JN8	6BR8A, 6FV8, 6FV8A, 6BR8*†
6JS6	6JS6A, 6KD6
6JS6A	6JS6, 6KD6
6JT6	6JT6A, 6JG6*, A*
6JT6A	6JT6, 6JG6*, A*
6JT8	6JA8, 6KR8, A, 6KV8, 6LB8, 6LQ8, 6LY8
6JU6	
6JU8	6JU8A
6JU8A	6JU8
6JV8	6AW8, A, 6KS8, 6LF8, 6CX8*, 6EB8*, 6GN8*, 6HF8*, 6HZ8*, 6JA8*, 6JE8*
6JW6	
6JW8	6LX8
6JX8	
6JZ6	
6JZ8	
6K5	6K5G, 6K5GT
6K5G	6K5, 6K5GT
6K5GT	6K5, 6K5G
6K6	6K6G, 6K6GT, 6K6GT/G, 6K6MG
6K6G	6K6, 6K6GT, 6K6GT/G, 6K6MG
6K6GT	6K6, 6K6G, 6K6GT/G, 6K6MG
6K6GT/G	6K6, 6K6G, 6K6GT, 6K6MG
6K6MG	6K6, 6K6G, 6K6GT, 6K6GT/G
6K7	6K7G, 6K7GT, 6K7GTX, 6K7MG, 6U7G
6K7G	6K7, 6K7GT, 6K7GTX, 6K7MG, 6U7G
6K7GT	6K7, 6K7G, 6K7GTX, 6K7MG, 6U7G
6K7GTX	6K7, 6K7G, 6K7GT, 6K7MG, 6U7G
6K7MG	6K7, 6K7G, 6K7GT, 6K7GTX, 6U7G
6K8	6K8G, 6K8GT, 6K8GTX
6K8G	6K8, 6K8GT, 6K8GTX
6K8GT	6K8, 6K8G, 6K8GTX
6K8GTX	6K8, 6K8G, 6K8GT
6K11	6Q11
6KA8	
6KD6	

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6KD8	6EA8, 6GH8, A, 6U8, A
6KE6	
6KE8	
6KF8	6BU8, 6BU8A, 6GS8, 6HS8
6KG6	
6KL8	6EQ7§
6KM6	6JF6
6KM8	
6KN6	
6KN8	
6KR8	6KR8A, 6JT8, 6KV8, 6LB8, 6LQ8, 6LY8
6KR8A	6KR8, 6JT8, 6KV8, 6LB8, 6LQ8, 6LY8
6KS6	
6KS8	6AU8, A, 6AW8, A, 6JV8, 6LF8, 6CX8*, 6EB8*, 6GN8*, 6HF8*, 6HZ8*, 6JA8*, 6JE8*
6KT6	6HM6, 6HT6, 6JC6, A, 6JD6
6KT8	
6KU8	
6KV8	6JT8, 6KR8, A, 6LB8, 6LQ8, 6LY8
6KY8	6KY8A
6KY8A	6KY8
6KZ8	
6L4	
6L5G	6C5, 6C5G, 6C5GT, 6C5GT/G, 6C5MG, 6J5, 6J5G, 6J5GT, 6J5GT/G, 6J5GTX, 6J5GX, 6J5MG
6L6	6L6A, 6L6G, 6L6GA, 6L6GAY, 6L6GB, 6L6GC, 6L6GT, 6L6GX, 6L6Y, 5881, 7581, 7581A
6L6A	6L6, 6L6G, 6L6GA, 6L6GAY, 6L6GB, 6L6GC, 6L6GT, 6L6GX, 6L6Y, 5881, 7581, 7581A
6L6G	6L6, 6L6A, 6L6GA, 6L6GAY, 6L6GB, 6L6GC, 6L6GT, 6L6GX, 6L6Y, 5881, 7581, 7581A
6L6GA	6L6, 6L6A, 6L6G, 6L6GAY, 6L6GB, 6L6GC, 6L6GT, 6L6GX, 6L6Y, 5881, 7581, 7581A
6L6GAY	6L6, 6L6A, 6L6G, 6L6GA, 6L6GB, 6L6GC, 6L6GT, 6L6GX, 6L6Y, 5881, 7581, 7581A

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6L6GB	6L6, 6L6A, 6L6G, 6L6GA, 6L6GAY, 6L6GC, 6L6GT, 6L6GX, 6L6Y, 5881, 7581, 7581A
6L6GC	7581, 7581A
6L6GT	6L6, 6L6A, 6L6G, 6L6GA, 6L6GAY, 6L6GB, 6L6GC, 6L6GX, 6L6Y, 5881, 7581, 7581A
6L6GX	6L6, 6L6A, 6L6G, 6L6GA, 6L6GAY, 6L6GB, 6L6GC, 6L6GT, 6L6Y, 5881, 7581, 7581A
6L6Y	6L6, 6L6A, 6L6G, 6L6GA, 6L6GAY, 6L6GB, 6L6GC, 6L6GT, 6L6GX, 5881, 7581, 7581A
6L7	6L7G
6L7G	6L7
6LB8	6JT8, 6KR8, A, 6KV8, 6LQ8, 6LY8
6LC8	
6LE8	
6LF8	6AW8, A, 6JV8, 6KS8, 6CX8*, 6GN8*, 6HF8*, 6HZ8*, 6JA8*, 6JE8*
6LJ8	6GD7§, 6MB8§
6LM8	6AX8, 6GH8, A, 6CQ8§
6LN8	6U8A, 6BL8*†, 6EA8, 6U8*†
6LQ8	6JT8, 6KR8, A, 6KV8, 6LB8, 6LY8
6LR8	
6LT8	
6LU8	
6LX8	6JW8*†
6LY8	6JT8, 6KR8, A, 6KV8, 6LB8, 6LQ8
6M3	
6M5	6CK6§
6M6G	6AG6G*
6M7G	6K7§, 6K7G§, 6K7GT§, 6K7GTX§, 6K7MG§
6M8G	6M8GT
6M8GT	6M8G
6M11	
6MB8	6LJ8§
6MD8	
6MG8	6EA8, 6U8, A, 6CQ8§
6N3	6U3
6N4	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6N5	6N5G, 6AB5, 6AB5/6N5
6N5G	6N5, 6AB5, 6AB5/6N5
6N6	6N6G, 6N6MG, 6AB6G*
6N6G	6N6, 6N6MG, 6AB6G*
6N6MG	6N6, 6N6G, 6AB6G*
6N7	6N7G, 6N7GT, 6N7GT/G, 6N7MG
6N7G	6N7, 6N7GT, 6N7GT/G, 6N7MG
6N7GT	6N7, 6N7G, 6N7GT/G, 6N7MG
6N7GT/G	6N7, 6N7G, 6N7GT, 6N7MG
6N7MG	6N7, 6N7G, 6N7GT, 6N7GT/G
6N8	6AD8, 6DC8
6P5G	6P5GT, 6P5GT/G
6P5GT	6P5G, 6P5GT/G
6P5GT/G	6P5G, 6P5GT
6P6	
6P7G	
6Q4	
6Q6	6Q6G
6Q6G	6Q6
6Q7	6Q7G, 6Q7GT, 6Q7MG, 6B6, 6B6G, 6T7G*
6Q7G	6Q7, 6Q7GT, 6Q7MG, 6B6, 6B6G, 6T7G*
6Q7GT	6Q7, 6Q7G, 6Q7MG, 6B6, 6B6G, 6T7G*
6Q7MG	6Q7, 6Q7G, 6Q7GT, 6B6, 6B6G, 6T7G*
6Q11	
6R3	6AF3*, 6AL3*, 6BR3*
6R4	
6R6G	
6R7	6R7G, 6R7GT, 6R7GT/G, 6R7MG
6R7G	6R7, 6R7GT, 6R7GT/G, 6R7MG
6R7GT	6R7, 6R7G, 6R7GT/G, 6R7MG
6R7GT/G	6R7, 6R7G, 6R7GT, 6R7MG
6R7MG	6R7, 6R7G, 6R7GT, 6R7GT/G
6R8	6T8, 6T8A
6S2	6S2A
6S2A	6S2
6S4	6S4A
6S4A	
6S6GT	
6S7	6S7G, 6K7*, 6K7G*, 6K7GT*, 6K7GTX*, 6K7MG*

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6S7G	6S7, 6K7*, 6K7G*, 6K7GT*, 6K7GTX*, 6K7MG*
6S8GT	
6SA7	6SA7G, 6SA7GT, 6SA7GT/G, 6SA7GTX, 6SA7GTY, 6SA7Y, 6SB7, 6SB7Y, 6SB7GTY
6SA7G	6SA7, 6SA7GT, 6SA7GT/G, 6SA7GTX, 6SA7GTY, 6SA7Y, 6SB7, 6SB7Y, 6SB7GTY
6SA7GT	6SA7, 6SA7G, 6SA7GT/G, 6SA7GTX, 6SA7GTY, 6SA7Y, 6SB7, 6SB7Y, 6SB7GTY
6SA7GT/G	6SA7, 6SA7G, 6SA7GT, 6SA7GTX, 6SA7GTY, 6SA7Y, 6SB7, 6SB7Y, 6SB7GTY
6SA7GTX	6SA7, 6SA7G, 6SA7GT, 6SA7GT/G, 6SA7GTY, 6SA7Y, 6SB7, 6SB7Y, 6SB7GTY
6SA7GTY	6SA7, 6SA7G, 6SA7GT, 6SA7GT/G, 6SA7GTX, 6SA7Y, 6SB7, 6SB7Y, 6SB7GTY
6SA7Y	6SA7, 6SA7G, 6SA7GT, 6SA7GT/G, 6SA7GTX, 6SA7GTY, 6SB7, 6SB7Y, 6SB7GTY
6SB7	6SB7GTY, 6SB7Y
6SB7GTY	6SB7, 6SB7Y
6SB7Y	6SB7, 6SB7GTY
6SC7	6SC7GT, 6SC7GTY
6SC7GT	6SC7, 6SC7GTY
6SC7GTY	6SC7, 6SC7GT
6SD7GT	6SE7GT
6SE7GT	6SD7GT
6SF5	6SF5GT
6SF5GT	6SF5
6SF7	6SF7GT
6SF7GT	6SF7
6SG7	6SH7GT, 6SG7Y, 6SH7, 6SH7GT, 6AB7*§, 6AB7Y*§, 6AC7*§, 6AC7A*§, 6AC7Y*§, 6AJ7*§
6SG7GT	6SG7, 6SG7Y, 6SH7, 6SH7GT, 6AB7*§, 6AB7Y*§, 6AC7*§, 6AC7A*§, 6AC7Y*§, 6AJ7*§

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6SG7Y	6SG7, 6SG7GT, 6SH7, 6SH7GT, 6AB7*§, 6AB7Y*§, 6AC7*§, 6AC7A*§, 6AC7Y*§, 6AJ7*§
6SH7	6SH7GT, 6SH7L, 6SG7, 6SG7GT, 6SG7Y, 6AB7*§, 6AB7Y*§, 6AC7*§, 6AC7A*§, 6AC7Y*§, 6AJ7*§
6SH7GT	6SH7, 6SH7L, 6SG7, 6SG7GT, 6SG7Y, 6AB7*§, 6AB7Y*§, 6AC7*§, 6AC7A*§, 6AC7Y*§, 6AJ7*§
6SH7L	6SH7, 6SH7GT, 6SG7, 6SG7GT, 6SG7Y, 6AB7*§, 6AB7Y*§, 6AC7*§, 6AC7A*§, 6AC7Y*§, 6AJ7*§
6SJ7	6SJ7GT, 6SJ7GTX, 6SJ7GTY, 6SJ7Y
6SJ7GT	6SJ7, 6SJ7GTX, 6SJ7GTY, 6SJ7Y
6SJ7GTX	6SJ7, 6SJ7GT, 6SJ7GTY, 6SJ7Y
6SJ7GTY	6SJ7, 6SJ7GT, 6SJ7GTX, 6SJ7Y
6SJ7Y	6SJ7, 6SJ7GT, 6SJ7GTX, 6SJ7GTY
6SK7	6SK7, 6SK7GT, 6SK7GT/G, 6SK7GTX, 6SK7GTY, 6SK7Y, 6SS7*, 6SS7GT*
6SK7G	6SK7, 6SK7GT, 6SK7GT/G, 6SK7GTX, 6SK7GTY, 6SK7Y, 6SS7*, 6SS7GT*
6SK7GT	6SK7, 6SK7G, 6SK7GT/G, 6SK7GTX, 6SK7GTY, 6SK7Y, 6SS7*, 6SS7GT*
6SK7GT/G	6SK7, 6SK7G, 6SK7GT, 6SK7GTX, 6SK7GTY, 6SK7Y, 6SS7*, 6SS7GT*
6SK7GTX	6SK7, 6SK7G, 6SK7GT, 6SK7GT/G, 6SK7GTY, 6SK7Y, 6SS7*, 6SS7GT*
6SK7GTY	6SK7, 6SK7G, 6SK7GT, 6SK7GT/G, 6SK7GTX, 6SK7Y, 6SS7*, 6SS7GT*
6SK7Y	6SK7, 6SK7G, 6SK7GT, 6SK7GT/G, 6SK7GTX, 6SK7GTY, 6SS7*, 6SS7GT*
6SL7A	6SL7GT, 6SL7GTY, 6SL7L
6SL7GT	6SL7A, 6SL7GTY, 6SL7L
6SL7GTY	6SL7A, 6SL7GTY, 6SL7L
6SL7L	6SL7A, 6SL7GT, 6SL7GTY
6SN7A	6SN7GT, 6SN7GTA, 6SN7GTB, 6SN7GTY, 6SN7L
6SN7GT	6SN7A, 6SN7L, 6SN7GTA, 6SN7GTB, 6SN7GTY
6SN7GTA	6SN7GTB

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6SN7GTB	6SN7GTA*†
6SN7GTY	6SN7A, 6SN7L, 6SN7GT, 6SN7GTA, 6SN7GTB
6SN7L	6SN7A, 6SN7GT, 6SN7GTA, 6SN7GTB, 6SN7GTY
6SQ7	6SQ7G, 6SQ7GT, 6SQ7GT/G, 6SZ7*
6SQ7G	6SQ7, 6SQ7GT, 6SQ7GT/G, 6SZ7*
6SQ7GT	6SQ7, 6SQ7G, 6SQ7GT/G, 6SZ7*
6SQ7GT/G	6SQ7, 6SQ7G, 6SQ7GT, 6SZ7*
6SR7	6SR7G, 6SR7GT, 6ST7*
6SR7G	6SR7, 6SR7GT, 6ST7*
6SR7GT	6SR7, 6SR7G, 6ST7*
6SS7	6SS7GT, 6SK7*, 6SK7G*, 6SK7GT*, 6SK7GT/G*, 6SK7GTX*, 6SK7GTY*, 6SK7Y*
6SS7GT	6SS7, 6SK7*, 6SK7G*, 6SK7GT*, 6SK7GT/G*, 6SK7GTX*, 6SK7GTY*, 6SK7Y*
6ST7	6SR7, 6SR7G*, 6SR7GT*
6SU7GT	6SU7GTX, 6SU7GTY
6SU7GTX	6SU7GT, 6SU7GTY
6SU7GTY	6SU7GT, 6SU7GTX
6SV7	6SV7GT
6SV7GT	6SV7
6SZ7	6SQ7*, 6SQ7G, 6SQ7GT*, 6SQ7GT/G*
6T4	6AF4§, 6AF4A§, 6AN4§, 6DZ4§
6T5	6G5, 6G5/6H5, 6H5, 6U5, 6U5/6G5
6T6	6T6GM
6T6GM	6T6
6T7G	6B6*, 6B6G*, 6Q7*, 6Q7G*, 6Q7GT*, 6Q7MG*
6T8	6T8A, 6AK8
6T8A	6T8*†, 6AK8*†
6T9	
6T10	6AD10§
6U3	
6U4GT	6AS4GT, 6AX4GT, 6AX4GTA, 6AX4GTB, 6DA4, 6DA4A, 6DM4, 6DM4A, 6DQ4, 6DT4, 6W4GT, 6W4GTA, 6AU4GT*, 6AU4GTA*, 6CQ4*, 6DE4*
6U5	6G5, 6G5/6H5, 6H5, 6T5, 6U5/6G5

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	*Use*
6U5/6G5	6U5, 6G5, 6G5/6H5, 6H5, 6T5
6U6GT	6Y6G*, 6Y6GA*, 6Y6GT*
6U7G	6K7, 6K7G, 6K7GT, 6K7GTX, 6K7MG, 6S7*, 6S7G*
6U8	6U8A, 6EA8, 6LN8, 6CQ8§, 6KD8*
6U8A	6EA8, 6LN8, 6CQ8§, 6KD8*, 6U8*†
6U9	
6U10	6AC10§
6V3	6V3A
6V3A	6V3
6V4	6CA4*
6V5G	6V5GT
6V5GT	6V5G
6V6	6V6G, 6V6GT, 6V6GTA, 6V6GT/G, 6V6GTX, 6V6GTY, 6V6GX, 6V6Y, 7408
6V6G	6V6, 6V6GT, 6V6GTA, 6V6GT/G, 6V6GTX, 6V6GTY, 6V6GX, 6V6Y, 7408
6V6GT	6V6, 6V6G, 6V6GTA, 6V6GT/G, 6V6GTX, 6V6GTY, 6V6GX, 6V6Y, 7408
6V6GTA	6V6*†, 6V6G*†, 6V6GT*†, 6V6GT/G*†, 6V6GTX*†, 6V6GTY*†, 6V6GX*†, 6V6Y*†, 7408*†
6V6GT/G	6V6, 6V6G, 6V6GT, 6V6GTA, 6V6GTX, 6V6GTY, 6V6GX, 6V6Y, 7408
6V6GTX	6V6, 6V6G, 6V6GT, 6V6GTA, 6V6GT/G, 6V6GTY, 6V6GX, 6V6Y, 7408
6V6GTY	6V6, 6V6G, 6V6GT, 6V6GTA, 6V6GT/G, 6V6GTX, 6V6GX, 6V6GY, 7408
6V6GX	6V6, 6V6G, 6V6GT, 6V6GTA, 6V6GT/G, 6V6GTY, 6V6GTX, 6V6Y, 7408
6V6Y	6V6, 6V6G, 6V6GT, 6V6GTA, 6V6GT/G, 6V6GTX, 6V6GTY, 6V6GX, 7408
6V7G	
6V8	
6V9	
6W4GT	6W4GTA, 6AS4GT, 6AX4GT, 6AX4GTA, 6AX4GTB, 6DA4, 6DA4A, 6DM4, 6DM4A, 6DQ4, 6DT4, 6U4GT, 6AU4GT*, 6AU4GTA*, 6CQ4*, 6DE4*

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6W4GTA	6AX4GTA, 6AX4GTB, 6DA4, 6DA4A, 6DM4, 6DM4A, 6DQ4, 6DT4, 6U4GT, 6AU4GT*, 6AU4GTA*, 6CQ4*, 6DE4*
6W5	6W5G, GT, 6AX5GT*
6W5G	6W5, GT, 6AX5GT*
6W5GT	6W5, G, 6AX5GT*
6W6	6W6GT, 6DG6GT, 6EF6*, 6EY6*, 6EZ5*
6W6GT	6W6, 6DG6GT, 6EF6*, 6EY6*, 6EZ5*
6W7G	6J7*, 6J7G*, 6J7GT*, 6J7GTX*, 6J7MG*
6X4	6BX4, 6AV4*
6X5	6X5G, 6X5GT, 6X5GT/G, 6X5L, 6X5MG, 6AX5GT*, 6W5G*, 6W5GT*
• 6X5G	6X5, 6X5GT, 6X5GT/G, 6X5L, 6X5MG, 6AX5GT*, 6W5G*, 6W5GT*
6X5GT	6X5, 6X5G, 6X5GT/G, 6X5L, 6X5MG, 6AX5GT*, 6W5G*, 6W5GT*
6X5GT/G	6X5, 6X5G, 6X5GT, 6X5L, 6X5MG, 6AX5GT*, 6W5G*, 6W5GT*
6X5L	6X5, 6X5G, 6X5GT, 6X5GT/G, 6X5MG, 6AX5GT*, 6W5G*, 6W5GT*
6X5MG	6X5, 6X5G, 6X5GT, 6X5L, 6X5GT/G, 6AX5GT*, 6W5G*, 6W5GT*
6X8	6X8A, 6AU8*§, 6AU8A*§, 6AW8*§, 6AW8A*§, 6EH8§
6X8A	6X8*†, 6AU8*§, 6AU8A*§, 6AW8*§, 6AW8A*§, 6EH8§
6X9	
6Y3	6Y3G
• 6Y3G	6Y3
6Y5	6Y5G, 6Y5GT, 6Y5V
6Y5G	6Y5, 6Y5GT, 6Y5V
6Y5GT	6Y5, 6Y5G, 6Y5V
6Y5V	6Y5, 6Y5G, 6Y5GT
6Y6G	6Y6GA, 6Y6GT, 6U6GT*
6Y6GA	6Y6G, 6Y6GT, 6U6GT*
6Y6GT	6Y6G, 6Y6GA, 6U6GT*
6Y7G	
6Y9	
6Y10	
6Z3	1V
6Z4	84/6Z4, 98
6Z5	12Z5, 6Z5/12Z5

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
6Z5/12Z5	6Z5, 12Z5
6Z6G	6Z6GT, 6Z6MG
6Z6GT	6Z6G, 6Z6MG
6Z6MG	6Z6G, 6Z6GT
6Z7G	
6Z10	
6ZY5G	6X5*, 6X5G*, 6X5GT*, 6X5GT/G*, 6X5L*, 6X5MG*
7A4	XXL
7A5	
7A6	
7A7	7A7LM, 7H7, 7B7*
7A7LM	7A7, 7H7, 7B7*
7A8	7B8*, 7B8LM*
7AB7	
7AD7	
7AF7	
7AG7	7AH7, 7G7*, 7T7*
7AH7	7AG7, 7B7, 7H7*
7AJ7	7C7*
7AK7	
7AN7	7EK7
7AU7	6AU7, 6AX7§
7B4	7A4§, XXL§
7B5	7B5LT, 7C5*, 7C5LT*
7B5LT	7B5, 7C5*, 7C5LT*
7B6	7B6LM, 7C6*
7B6LM	7B6, 7C6*
7B7	7AH7, 7A7*, 7A7LM*, 7H7*
7B8	7B8LM, 7A8*
7B8LM	7B8, 7A8*
7C4	
7C5	7C5LT, 7B5*, 7B5LT*
7C5LT	7C5, 7B5*, 7B5LT*
7C6	7B6*, 7B6LM*
7C7	7AJ7*, 7G7*. 7L7*
7D7	
7DJ8	7ES8
7E5	
7E6	
7E7	7R7
7ED7	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
7EK7	7AN7
7ES8	7DJ8
7EY6	
7F7	
7F8	
7FC7	7EK7
7G7	7V7, 7AG7*, 7C7*, 7L7*
7G8	
7GS7	
7GV7	
7H7	7A7, 7A7LM, 7AH7*, 7B7*
7HG8	8HG8
7J7	7S7
7K7	
7L7	7C7*, 7G7*, 7V7*
7N7	7AF7*
7Q7	
7R7	7E7
7S7	7J7
7T7	7AG7*, 7V7*
7V7	7G7, 7L7*, 7T7*
7W7	
7X6	
7X7	XXFM
7Y4	7Z4*
7Z4	
8A8	9A8, 9EA8, 9U8, 9U8A
8AC9	
8AR11	8BQ11§
8AU8	8AU8A, 8AW8A, 8BA8A, 8BH8
8AU8A	8AU8, 8AW8A, 8BA8A, 8BH8
8AW8A	8AU8, 8AU8A, 8BA8A, 8BH8, 8KS8, 8JV8
8B8	
8B10	
8BA8A	8AU8, 8AU8A, 8AW8A, 8BH8
8BA11	
8BH8	8AU8, 8AU8A, 8AW8A, 8BA8A
8BM11	
8BN8	
8BQ5	
8BQ7A	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
8BQ11	8AR11§
8BU11	
8CG7	8FQ7§
8CM7	
8CN7	
8CS7	
8CW5	8CW5A
8CW5A	8CW5†
8CX8	8EB8, 8GN8, 8JE8
8CY7	
8EB8	8CX8, 8GN8, 8JE8
8EM5	
8ET7	
8FQ7	
8GJ7	8GX7
8GK6	
8GN8	8CX8, 8EB8, 8JE8
8GU7	
8GX7	8GJ7
8HG8	7HG8
8JE8	8CX8, 8EB8, 8GN8
8JK8	
8JL8	
8JT8	
8JU8A	
8JV8	8AW8A, 8KS8
8KA8	
8KS8	8AU8, 8AU8A, 8AW8A, 8JV8
8LC8	
8LE8	
8LT8	
8SN7GTB	
8U9	
8X9	
9A8	8A8, 9EA8, 9U8, 9U8A
9AK8	
9AQ8	
9AU7	
9BJ11	
9BM5	
9BR7	
9BR8	9CL8§

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
9BW6	
9CG8A	9BR8†§
9CL8	9BR8§†
9DZ8	
9EA8	8A8, 9U8A, 9A8†, 9U8†
9EF6	
9EN7	
9GB8	
9GH8A	9EA8
9GV8	
9KC6	
9KZ8	
9U8	8A8, 9U8A, 9A8, 9EA8
9U8A	8A8, 9U8†, 9A8†, 9EA8
9X8	
9V9	
10	10X, 10Y
10AL11	
10BQ5	
10C8	
10CW5	
10DA7	
10DE7	10EW7
10DR7	10FD7, 10FR7
10DX8	
10EB8	10GN8, 10HF8, 10JA8, 11JE8
10EG7	10EM7
10EM7	10EG7
10EW7	
10FD7	10FR7
10FR7	10FD7
10GF7	10GF7A
10GF7A	10GF7
10GK6	
10GN8	10EB8, 10HF8, 11JE8, 10LZ8, 10JY8, 10JA8
10HF8	10EB8, 10GN8, 11JE8, 10LZ8, 10JY8, 10JA8
10J10	
10JA8	11JE8, 10EB8, 10GN8, 10HF8, 10JY8
10JT8	10LW8, 10KR8, 10LB8, 11KV8, 11LQ8

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
10JY8	10EB8, 10GN8, 10HF8, 10LZ8, 11JE8, 10JA8
10KR8	10LW8, 10JT8, 10LB8, 11KV8, 11LQ8
10KU8	
10LB8	10LW8, 10KR8, 10JT8, 11KV8, 11LQ8
10LE8	
10LW8	10JT8, 10KR8, 10LB8, 11KV8, 11LQ8
10LZ8	10EB8, 10GN8, 10HF8, 11JE8, 10JY8
10X	10, 10Y
10Y	10, 10X
11	
11AR11	11BQ11§
11BM8	
11BQ11	11AR11§
11BT11	
11C5	12DM5
11CY7	
11FY7	
11HM7	
11JE8	10EB8, 10GN8, 10HF8, 10JA8, 10LZ8, 10JY8
11KV8	10JT8, 10KR8, 10LW8, 10LB8, 11LQ8
11LQ8	11KV8, 10LB8, 10LW8, 10KR8, 10JT8
11Y9	
12	
12A	12A/112A, 112A
12A/112A	12A, 112A
12A4	
12A5	
12A6	12A6G, 12A6GT, 12A6GTY, 12A6Y, 12V6GT*§
12A6G	12A6, 12A6GT, 12A6GTY, 12A6Y, 12V6GT*§
12A6GT	12A6, 12A6G, 12A6GTY, 12A6Y 12V6GT*§
12A6GTY	12A6, 12A6G, 12A6GT, 12A6Y, 12V6GT*§
12A6Y	12A6, 12A6G, 12A6GT, 12A6GTY, 12V6GT*§
12A7	
12A8	12A8G, 12A8GT
12A8G	12A8, 12A8GT

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
12A8GT	12A8, 12A8G
12AB5	
12AC5	
12AC6	12AF6§
12AD5	
12AD6	12AG6
12AD7	12AX7*, 12AX7A*, 12BZ7*, 12DF7* 12DM7*, 12DT7*, 7025*, 7025A*
12AE6	12AE6A, 12FT6
12AE6A	12AE6, 12FT6
12AE7	
12AE10	13V10
12AF3	12BR3
12AF6	12BL6, 12AC6, 12EK6§
12AG6	12AD6
12AH6	
12AH7GT	
12AH8	
12AJ6	
12AJ7	
12AL5	
12AL8	
12AL11	
12AQ5	12BM5*
12AS5	12CA5*, 12R5*
12AT6	12AT6A, 12AV6, 12AV6A, 12BK6, 12BT6
12AT6A	12AV6A, 12AT6*†, 12AV6*†, 12BK6*†, 12BT6*†
12AT7	12AZ7*, 12AZ7A*
12AU6	12AU6A, 12BA6, 12BA6A, 12AW6§
12AU6A	12BA6A, 12AU6*†, 12BA6*†
12AU7	12AU7A, 12AX7§, 12AX7A§
12AU7A	12AU7, 12AX7§, 12AX7A§
12AU8	
12AV5GA	12AV5GT*†
12AV5GT	12AV5GA
12AV6	12AV6A, 12AT6, 12AT6A, 12BK6, 12BT6
12AV6A	12AT6A, 12AV6*†, 12AT6*†, 12BK6*†, 12BT6*†
12AV7	
12AW6	12AU6§, 12AU6A§

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
12AX3	
12AX4GT	12AX4GTA, 12AX4GTB, 12D4, 12D4A, 12DM4, 12DM4A, 12DQ4
12AX4GTA	12AX4GTB, 12D4, 12D4A, 12DM4, 12DM4A, 12DQ4, 12AX4GT*†
12AX4GTB	12D4A, 12DM4, 12DM4A, 12DQ4
12AX7	12AX7A, 12DF7, 12DT7, 7025, 7025A, 12AD7*, 12AU7§, 12AU7A§, 12BZ7*, 12DM7*
12AX7A	12AX7, 12DF7, 12DT7, 7025, 7025A, 12AD7*, 12AU7§, 12AU7A§, 12BZ7*, 12DM7*
12AY3	12AY3A, 12BS3, A, 12CK3, 12CL3, 12DW4A
12AY3A	12AY3, 12BS3, A, 12CK3, 12CL3, 12DW4A
12AY7	
12AZ7	12AZ7A, 12AT7*
12AZ7A	12AZ7*†, 12AT7*
12B3	
12B4	12B4A
12B4A	12B4*†
12B6M	
12B7	12B7ML, 14A7, 14H7, 14A7/12B7, 14A7ML, 14A7ML/12B7ML
12B7ML	12B7, 14A7, 14H7, 14A7/12B7, 14A7ML, 14A7ML/12B7ML
12B8	12B8GT
12B8GT	12B8
12BA6	12BA6A, 12AU6, 12AU6A, 12BZ6§
12BA6A	12AU6A, 12AU6*†, 12BA6*†
12BA7	
12BD6	12BA6, 12BA6A
12BE3	12BE3A
12BE3A	12BE3
12BE6	12BE6A, 12CS6
12BE6A	12BE6*†, 12CS6*†
12BF6	12BU6
12BF11	
12BQ6GTB	12BQ6GTB/12CU6, 12CU6, 12DQ6, A, B, 12GW6
12BH7	12BH7A

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
12BH7A	12BH7*†
12BK5	
12BK6	12AT6, 12AT6A, 12AV6, 12AV6A, 12BT6
12BL6	12AF6, 12EK6§
12BM5	12AQ5*
12BN6	12BN6A
12BN6A	12BN6*†
12BQ6GA	12BQ6GTA, 12BQ6GTB, 12BQ6GTB/12CU6, 12CU6, 12DQ6, 12DQ6A, 12DQ6B, 12GW6
12BQ6GT	12BQ6GA, 12BQ6GTA, 12BQ6GTB, 12BQ6GTB/12CU6, 12CU6, 12DQ6, 12DQ6A, 12DQ6B, 12GW6
12BQ6GTA	12BQ6GA, 12BQ6GTB, 12BQ6GTB/12CU6, 12CU6, 12DQ6, 12DQ6A, 12DQ6B, 12GW6
12BQ6GTB	12BQ6GTB/12CU6, 12CU6, 12DQ6A, 12DQ6B, 12GW6
12BQ6GTB/12CU6	12BQ6GTB, 12CU6, 12DQ6, A, B, 12GW6
12BR3	
12BR7	12BR7A
12BR7A	12BR7*†
12BS3	12BS3A, 12CK3, 12CL3, 12DW4
12BS3A	12BS3, 12CK3, 12CL3, 12DW4
12BT3	
12BT6	12AT6, 12AT6A, 12AV6, 12AV6A, 12BK6
12BU6	12BF6
12BV7	12BY7, 12BY7A, 12DQ7
12BW4	
12BX6	13EC7*
12BY3	
12BY7	12BY7A, 12BV7, 12DQ7
12BY7A	12DQ7, 12BY7*†, 12BV7*†
12BZ6	12BA6§, 12BA6A§
12BZ7	
12C5	12C5/12CU5, 12CU5, 12R5, 12AS5*, 12DM5*
12C5/12CU5	12C5, 12CU5, 12R5, 12AS5*, 12DM5
12C8	12C8Y

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
2C8Y	12C8
2CA5	12EH5, 12AS5*, 12ED5*, 12FX5*
2CK3	12CL3, 12DW4A
2CL3	12CK3, 12DW4A
2CM6	
2CN5	
2CR5	
2CR6	
2CS5	12DW5, 12CM6*
2CS6	12BE6, 12BE6A
2CT8	
12CU5	12C5, 12C5/12CU5, 12R5, 12AS5*, 12DM5*
12CU6	12BQ6GTB/12CU6, 12BQ6GTB, 12DQ6, A, B, 12GW6
12CX6	12EZ6
12CY6	
12D4	12D4A, 12AX4GTB, 12DM4, 12DM4A, 12DQ4
12D4A	12DM4, 12DM4A, 12DQ4
12DB5	
12DE8	
12DF5	
12DF7	12AX7, 12AX7A, 12DT7, 7025, 7025A, 12AD7*, 12BZ7*, 12DM7*
12DJ8	
12DK5	
12DK6	
12DK7	
12DL8	12DS7§, 12DS7A§
12DM4	12DM4A, 12D4A, 12DQ4
12DM4A	
12DM5	11C5, 12AS5*, 12C5*, 12C5/12CU5*, 12CU5*, 12R5*
12DM7	12AD7*, 12AX7*, 12AX7A*, 12BZ7*, 12DF7*, 12DT7*, 7025*, 7025A*
12DQ4	
12DQ6	12DQ6A, 12DQ6B, 12GW6
12DQ6A	12DQ6B, 12GW6
12DQ6B	12GW6
12DQ7	12BY7A, 12BY7*†, 12BV7*†
12DS7	12DS7A

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
12DS7A	12DS7
12DT5	
12DT6	
12DT7	12AX7, 12AX7A, 12DF7, 7025, 7025A, 12AD7*, 12BZ7*, 12DM7*
12DT8	
12DU7	
12DV7	
12DV8	
12DW4A	12CK3, 12CL3
12DW5	
12DW7	7247
12DW8	
12DY8	
12DZ6	12EA6, 12EK6
12DZ8	12FY8*
12E5GT	12J5, 12J5GT
12EA6	12DZ6, 12EK6
12EC8	
12ED5	12FX5, 12CA5*, 12EH5*
12EF6	
12EG6	
12EH5	12CA5, 12ED5*, 12FX5*
12EK6	12DZ6, 12EA6
12EL6	
12EM6	
12EN6	12L6GT, 12W6GT
12EQ7	12KL8§
12EZ6	12CX6
12F5	12F5GT
12F5GT	12F5
12F8	
12FA6	
12FB5	
12FK6	12FM6
12FM6	12FK6
12FQ7	
12FQ8	
12FR8	
12FT6	12AE6, 12AE6A
12FV7	
12FX5	12ED5, 12EH5*

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
12FX8	12FX8A
12FX8A	12FX8
12FY8	
12G4	12H4
12G8	
12G11	
12GA6	
12GC6	
12GE5	
12GJ5	
12GN6	
12GN7	12GN7A, 12HG7*†
12GN7A	12HG7*†
12GT5	12GT5A
12GT5A	12GT5
12GW6	12DQ6B
12H4	
12H6	
12HE7	
12HG7	12GN7*, A†
12HL5	
12HL7	
12HU8	
12J5	12J5GT
12J5GT	12J5
12J7	12J7G, GT, GT/G
12J7G	12J7, GT, GT/G
12J7GT	12J7, G, GT/G
12J7GT/G	12J7, G, GT
12J8	
12JB6	12JB6A
12JB6A	12JB6
12JN6	12JN6A
12JN6A	12JN6
12JN8	
12JS6	
12JT6	12JT6A
12JT6A	12JT6
12K5	
12K7G	12K7GT, GT/G
12K7GT	12K7G, GT/G
12K7GT/G	12K7G, GT

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
12K8	12K8GT, 12K8Y
12K8GT	12K8, 12K8Y
12K8Y	12K8, 12K8GT
12KL8	
12L6GT	12EN6, 12W6GT
12L8GT	
12MD8	
12Q7	12Q7G, GT, GT/G, 12G7G
12Q7G	12Q7, GT, GT/G, 12G7G
12Q7GT	12Q7, G, GT/G, 12G7G
12Q7GT/G	12Q7, G, GT, 12G7G
12R5	
12S7	
12S8	12S8G, 12S8GT
12S8G	12S8, 12S8GT
12S8GT	12S8, 12S8G
12SA7	12SA7G, 12SA7GT, 12SA7GT/G, 12SA7GTY, 12SA7Y, 12SY7, 12SY7GT
12SA7G	12SA7, 12SA7GT, 12SA7GT/G, 12SA7GTY, 12SA7Y, 12SY7, 12SY7GT
12SA7GT	12SA7, 12SA7G, 12SA7GT/G, 12SA7GTY, 12SA7Y, 12SY7, 12SY7GT
12SA7GT/G	12SA7, 12SA7G, 12SA7GT, 12SA7GTY, 12SA7Y, 12SY7, 12SY7GT
12SA7GTY	12SA7, 12SA7G, 12SA7GT, 12SA7GT/G, 12SA7Y, 12SY7, 12SY7GT
12SA7Y	12SA7, 12SA7G, 12SA7GT, 12SA7GT/G, 12SA7GTY, 12SY7, 12SY7GT
12SC7	
12SF5	12SF5GT
12SF5GT	12SF5
12SF7	12SF7GT, 12SF7Y
12SF7GT	12SF7, 12SF7Y
12SF7Y	12SF7, 12SF7GT
12SG7	12SG7GT, 12SG7Y
12SG7GT	12SG7, 12SG7Y
12SG7Y	12SG7, 12SG7GT
12SH7	12SH7GT
12SH7GT	12SH7

‡ May not work in all circuits. * Parallel-filament circuits
† Series circuit not requiring controlled warm-up time.

To Replace	Use
12SJ7	12SJ7GT
12SJ7GT	12SJ7
12SK7	12SK7G, 12SK7GT, 12SK7GT/G, 12SK7GTY, 12SK7Y
12SK7G	12SK7, 12SK7GT, 12SK7GT/G, 12SK7GTY, 12SK7Y
12SK7GT	12SK7, 12SK7G, 12SK7GT/G, 12SK7GTY, 12SK7Y
12SK7GT/G	12SK7, 12SK7G, 12SK7GT, 12SK7GTY, 12SK7Y
12SK7GTY	12SK7, 12SK7G, 12SK7GT, 12SK7GT/G, 12SK7Y
12SK7Y	12SK7, 12SK7G, 12SK7GT, 12SK7GT/G, 12SK7GTY
12SL7GT	
12SN7GT	12SN7GTA, 12SX7GT
12SN7GTA	
12SQ7	12SQ7G, 12SQ7GT, 12SQ7GT/G
12SQ7G	12SQ7, 12SQ7GT, 12SQ7GT/G
12SQ7GT	12SQ7, 12SQ7G, 12SQ7GT/G
12SQ7GT/G	12SQ7, 12SQ7G, 12SQ7GT
12SR7	12SR7GT, 12SW7, 12SW7GT
12SR7GT	12SR7, 12SW7, 12SW7GT
12SW7	12SW7GT, 12SR7, 12SR7GT
12SW7GT	12SW7, 12SR7, 12SR7GT
12SX7GT	12SN7GT, 12SN7GTA
12SY7	12SY7GT, 12SA7, 12SA7G, 12SA7GT, 12SA7GT/G, 12SA7GTY, 12SA7Y
12SY7GT	12SY7, 12SA7, 12SA7G, 12SA7GT, 12SA7GT/G, 12SA7GTY, 12SA7Y
12T10	
12U7	
12V6GT	12A6*§, 12A6G*§, 12A6GT*§, 12A6GTY*§, 12A6Y*§
12W6GT	12EN6, 12L6GT
12X3	
12X4	
12Z3	14Z3
12Z5	6Z5, 6Z5/12Z5
13	5X3, 80, 83V, 88
13CM5	
13CW4	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
13DE7	15EW7
13DR7	13FD7, 13FR7
13EC7	12BX6*
13EM7	15EA7
13FD7	13FR7
13FM7	
13FR7	13FD7
13GB5	
13GC8	
13GF7	13GF7A
13GF7A	13GF7
13J10	
13V10	12AE10
13Z10	
14	
14A4	
14A5	
14A7	12B7, 12B7ML, 14H7, 14A7/12B7, 14A7ML, 14A7ML/12B7ML
14A7ML	14A7, 14A7/12B7, 14A7ML/12B7ML, 12B7, 12B7ML, 14H7
14A7/12B7	12B7, 12B7ML, 14A7, 14H7, 14A7ML, 14A7ML/12B7ML
14A7ML/12B7ML	14A7, 14A7ML, 14A7/12B7, 12B7, 12B7ML, 14H7
14AF7	XXD, 14N7*
14B6	
14B8	
14BL11	
14BR11	
14C5	
14C7	
14DA7	
14E6	
14E7	14R7
14F7	
14F8	
14G6	
14GT8	14GT8A, 14JG8
14GT8A	14GT8†, 14JG8†
14H7	12B7, 12B7ML, 14A7, 14A7/12B7, 14A7ML, 14A7ML/12B7ML

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
14J7	14S7
14JG8	14GT8, 14GT8A
14K7	
14L7	
14N7	14AF7*
14Q7	
14R7	14E7
14S7	14J7
14V7	
14W7	
14X7	
14Y4	
14Y7	
14Z3	12Z3
15	
15A6	
15A8	
15AB9	17AB9
15AF11	15BD11
15BD11	15AF11
15CW5	
15DQ8	
15EA7	13EM7
15EW6	
15EW7	
15FM7	
15FY7	
15HB6	
15KY8	15KY8A
15KY8A	15KY8
15LE8	
16	16B, 81
16A5	15CW5
16A8	
16AQ3	
16B	16, 81
16GK6	
16GK8	
16GY5	
16KA6	
16Y9	
17	

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
17A8	19EA8, 19EA8A
17AB9	15AB9
17AB10	
17AV5GA	
17AX3	
17AX4GT	17AX4GTA, 17D4, 17D4A, 17DM4, 17DM4A, 17DQ4
17AX4GTA	17D4, 17D4A, 17DM4, 17DM4A, 17DQ4
17AY3	17AY3A, 17BS3, A, 17CK3, 17CL3, 17DW4A
17AY3A	17AY3, 17BS3, A, 17CK3, 17CL3, 17DW4A
17BE3	17BE3A
17BE3A	17BE3
17BF11	17BF11A
17BF11A	17BF11
17BH3	17BH3A
17BH3A	17BH3
17BQ6GTB	17DQ6, A, B, 17GW6
17BR3	
17BS3	17BS3A, 17CK3, 17CL3, 17DW4A
17BS3A	17BS3, 17CK3, 17CL3, 17DW4A
17BZ3	17BE3, A
17C5	17CU5, 17R5
17C8	
17C9	17C9A
17C9A	17C9†
17CA5	
17CK3	17CL3, 17DW4A
17CL3	17CK3, 17DW4A
17CQ4	17DE4
17CU5	17C5, 17R5
17D4	17D4A, 17AX4GTA, 17DM4, 17DM4A, 17DQ4
17D4A	17DM4, 17DM4A, 17DQ4
17DE4	17CQ4
17DM4	17DM4A, 17D4A, 17DQ4
17DM4A	
17DQ4	
17DQ6	17DQ6A, 17DQ6B, 17GW6
17DQ6A	17DQ6B, 17GW6
17DQ6B	17GW6

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
17DW4A	17CK3, 17CL3
17EW8	
17GE5	
17GJ5	17GJ5A
17GJ5A	17GJ5
17GT5	17GT5A
17GT5A	17GT5
17GV5	
17GW6	17DQ6B
17H3	
17HC8	
17JB6	17JB6A
17JB6A	17JB6
17JG6	17JG6A
17JG6A	17JG6
17JK8	
17JM6	17JM6A
17JM6A	17JM6
17JN6	17JN6A
17JN6A	17JN6
17JT6	17JT6A
17JT6A	17JT6
17JZ8	
17L6GT	17W6GT
17LD8	
17R5	
17W6GT	17L6GT
17X10	
17Z3	
18	
18A5	
18DZ8	
18FW6	18FW6A, 18GD6, 18GD6A
18FW6A	18GD6A, 18FW6†, 18GD6†
18FX6	18FX6A
18FX6A	18FX6†
18FY6	18FY6A, 18GE6, 18GE6A
18FY6A	18GE6A, 18FY6†, 18GE6†
18GB5	
18GD6	18GD6A, 18FW6, 18FW6A
18GD6A	18FW6A, 18GD6†, 18FW6†
18GE6	18GE6A, 18FY6, 18FY6A

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
18GE6A	18FY6A, 18GE6†, 18FY6†
18GV8	
18HB8	
19	
19AQ5	
19AU4	19AU4GT, 19AU4GTA, 17CQ4, 17DE4
19AU4GT	19AU4, 19AU4GTA, 17CQ4, 17DE4
19AU4GTA	
19BG6G	19BG6GA
19BG6GA	19BG6G
19C8	19T8, 19T8A
19CL8A	19CL8B, 19JN8
19CL8B	19CL8A†, 19JN8†
19CS4	
19D8	
19DE7	19EW7, 20EW7
19EA8	19EA8A, 17A8
19EA8A	19EA8†, 17A8†
19EW7	20EW7
19EZ8	
19GQ7	
19HR6	
19HS6	
19HV8	
19J6	
19JN8	19CL8A, 19CL8B
19KG8	
19Q9	
19T8	19T8A, 19C8
19T8A	19T8†, 19C8†
19V8	
19X3	
19X8	
19Y3	19X3
20	
20AQ3	
20EQ7	
20EW7	19EW7
20EZ7	
20J8	
21A6	21B6
21A7	

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
21B6	21A6
21EX6	25CD6GB
21GY5	
21HB5	21HB5A
21HB5A	21HB5
21HD5	
21HJ5	
21JV6	
21JZ6	
21KA6	
21KQ6	
21LR8	
21LU8	
22	
22BH3	22BH3A
22BH3A	22BH3
22BW3	25CG3
22DE4	
22JF6	22KM6
22JG6	22JG6A
22JG6A	22JG6
22JU6	
22KM6	
23JS6A	
23Z9	
24A	24S, 35§, 35/51§, 51§, 35S§, 51S§, 35S/51S§
24GA7	
24JE6A	
24S	24A, 35§, 35/51§, 51§, 35S§, 51S§, 35S/51S§
25	25S, 1B5, 1B5/25S
25A6	25A6G, 25A6GT, 25A6GT/G, 25A6MG
25A6G	25A6, 25A6GT, 25A6GT/G, 25A6MG
25A6GT	25A6, 25A6G, 25A6GT/G, 25A6MG
25A6GT/G	25A6, 25A6G, 25A6GT, 25A6MG
25A6MG	25A6, 25A6G, 25A6GT, 25A6GT/G
25A7G	25A7GT, 25A7GT/G
25A7GT	25A7G, 25A7GT/G
25A7GT/G	25A7G, 25A7GT
25AC5G	25AC5GT, 25AC5GT/G
25AC5GT	25AC5G, 25AC5GT/G

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
25AC5GT/G	25AC5G, 25AC5GT
25AV5GA	25AV5GT
25AV5GT	25AV5GA
25AX4GT	25D4
25B5	
25B6	25B6G, 25B6GT
25B6G	25B6, 25B6GT
25B6GT	25B6, 25B6G
25B8	25B8GT
25B8GT	25B8
25BK5	
25BQ6GA	25BQ6GTB, 25BQ6GTB/25CU6, 25CU6, 25DQ6, 25DQ6A
25BQ6GT	25BQ6GA, 25BQ6GTB, 25BQ6GTB/25CU6, 25CU6, 25DQ6, 25DQ6A
25BQ6GTB	25BQ6GTB/25CU6, 25CU6, 25DQ6, A
25BQ6GTB/25CU6	25BQ6GTB, 25CU6, 25DQ6A
25BR3	
25C5	
25C6G	25C6GA
25C6GA	25C6G
25CA5	25C5, 25EH5
25CD6G	25CD6GA, 25CD6GB, 25DN6, 21EX6
25CD6GA	25CD6GB, 25DN6, 21EX6
25CD6GB	21EX6
25CG3	
25CR5	
25CU6	25BQ6GTB/25CU6, 25BQ6GTB, 25DQ6, A
25D4	
25D8GT	
25DK4	
25DN6	25CD6GB, 21EX6
25DQ6	25DQ6A
25DQ6A	
25DT5	
25E5	
25EC6	25CD6GB, 21EX6
25EH5	25CA5
25F5	25F5A
25F5A	25F5†

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time

To Replace	Use
25FY8	
25GF6	
25L6	25L6G, 25L6GT, 25L6GT/G, 25W6GT
25L6G	25L6, 25L6GT, 25L6GT/G, 25W6GT
25L6GT	25L6, 25L6G, 25L6GT/G, 25W6GT
25L6GT/G	25L6, 25L6G, 25L6GT, 25W6GT
25L7G	25L7GT, 25L7GT/G
25L7GT	25L7G, 25L7GT/G
25L7GT/G	25L7G, 25L7GT
25N6	25N6G
25N6G	25N6
25S	25, 1B5, 1B5/25S
25U4GT	25AX4GT, 25D4, 25W4GT
25W4GT	25AX4GT, 25D4, 25U4GT
25W6GT	25L6, 25L6G, 25L6GT, 25L6GT/G
25X6GT	
25Y4	25Y4GT
25Y4GT	25Y4
25Y5	25Z5, 25Z5MG
25Z3	
25Z4	25Z4GT
25Z4GT	25Z4
25Z5	25Z5MG, 25Y5
25Z5MG	25Z5, 25Y5
25Z6	25Z6G, 25Z6GT, 25Z6GT/G, 25Z6MG
25Z6G	25Z6, 25Z6GT, 25Z6GT/G, 25Z6MG
25Z6GT	25Z6, 25Z6G, 25Z6GT/G, 25Z6MG
25Z6GT/G	25Z6, 25Z6G, 25Z6GT, 25Z6MG
25Z6MG	25Z6, 25Z6G, 25Z6GT, 25Z6GT/G
26	
26A6	26CG6
26A7	26A7GT
26A7GT	26A7
26B6	26D6
26BK6	
26C6	
26CG6	26A6
26D6	26B6
26E6G	
26Z5	
27	27S, 56, 56S, 27A*
27A	27*, 27S*

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warmup time.

To Replace	Use
27GB5	28GB5
27KG6	
27S	27, 56, 56S, 27A*
28D7	
28EC4	
28GB5	27GB5
28HD5	30HD5
28Z5	
29	
29GK6	
29KQ6	
30	
30A5	35C5, 35C5A
30AE3	
30AG11	
30CW5	
30HD5	28HD5
30HJ5	
31	
31A3	
31BX7GT	
31JS6A	
32	1A4, 1A4P, 1A4T, 1B4, 1B4G, 1B4P, 1B4T, 34, 951, 1C4*, 1K4*
32A8	
32ET5	32ET5A, 34GD5, 34GD5A
32ET5A	32ET5†, 34GD5A
32GA7	
32L7GT	
33	
33GT7	
33GY7	33GY7A
33GY7A	33GY7
33JV6	
34	1A4, 1A4P, 1A4T, 1B4, 1B4G, 1B4P, 1B4T, 32, 951, 1C4*, 1K4*
34CD3	
34CE3	
34GD5	34GD5A, 32ET5, 32ET5A
34GD5A	32ET5A, 34GD5†, 32ET5†
34R3	
35	35S, 35/51, 35S/51S, 51, 51S, 24A§, 24S§

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
35/51	35, 35S/51S, 51, 35S, 51S, 24A§, 24S§
35A3	35C3
35A5	35A5LT
35A5LT	35A5
35B5	
35C3	35A3
35C5	35C5A, 30A5
35C5A	35C5†, 30A5†
35CD6GA	
35D5	
35DZ8	
35EH5	35EH5A
35EH5A	35EH5†
35FN5	
35GL6	
35HB8	
35L6G	35L6GT, 35L6GT/G
35L6GT	35L6G, 35L6GT/G
35L6GT/G	35L6G, 35L6GT
35S	35S/51S, 51S, 35/51, 35, 51, 24A§, 24S§
35S/51S	35S, 51S, 35/51, 35, 51, 24A§, 24S§
35W4	35W4A
35W4A	35W4†
35Y4	
35Z3	35Z3LT
35Z3LT	35Z3
35Z4	35Z4GT
35Z4GT	35Z4
35Z5	35Z5G, 35Z5GT, 35Z5GT/G
35Z5G	35Z5, 35Z5GT, 35Z5GT/G
35Z5GT	35Z5, 35Z5G, 35Z5GT/G
35Z5GT/G	35Z5, 35Z5G, 35Z5GT
35Z6G	35Z6GT
35Z6GT	35Z5
36	36A, 64*, 64A*
36A	36, 64*, 64A*
36AM3	36AM3A, 36AM3B
36AM3A	36AM3, 36AM3B
36AM3B	36AM3†, 36AM3A†
37	37A, 76, 56A*, 56AS*, 67*, 67A*
37A	37, 76, 56A*, 56AS*, 67*, 67A*
38	38A

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	*Use*
38A	38
38A3	
38HE7	
38HK7	38HE7
39	39/44, 44
39/44	39, 44
40	
40A1	
40B2	
40FR5	
40KD6	
40KG6	
40Z5	40Z5GT, 40Z5/45Z5GT, 45Z5GT
40Z5/45Z5GT	40Z5, 40Z5GT, 45Z5GT
40Z5GT	40Z5, 40Z5/45Z5GT, 45Z5GT
41	42*
42	41*
42EC4	
42KN6	
43	43MG
43MG	43
44	39, 39/44
45	45A
45A	45
45A5	
45B5	
45Z3	
45Z5GT	40Z5, 40Z5/45Z5GT, 40Z5GT
46	
47	
48	
49	
50	
50A1	
50A5	
50AX6G	50AX6GT
50AX6GT	50AX6G
50B5	
50BK5	
50BM8	
50C5	50C5A
50C5A	50C5†

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
50C6G	50C6GA
50C6GA	50C6G
50CA5	50EH5, 50EH5A
50CD6G	
50DC4	
50E5	
50EH5	50EH5A, 50CA5
50EH5A	50EH5†, 50CA5†
50FA5	
50FE5	
50FK5	
50FY8	
50HC6	
50HK6	50HC6
50HN5	
50JY6	
50L6G	50L6GT
50L6GT	50L6G
50X6	
50Y6G	50Y6GT, 50Y6GT/G
50Y6GT	50Y6G, 50Y6GT/G
50Y6GT/G	50Y6G, 50Y6GT
50Y7GT	50Z7G, 50Z7GT
50Z6G	50AX6G, 50AX6GT
50Z7G	50Z7GT, 50Y7GT
50Z7GT	50Z7G, 50Y7GT
51	51S, 35, 35/51, 35S/51S, 35S, 24A§, 24S§
51S	51, 35, 35/51, 35S/51S, 35S, 24A§, 24S§
52	
53	
55	55S
55N3	
55S	55
56	56S, 27, 27S
56A	56AS, 67, 67A, 37*, 37A*, 76*
56AS	56A, 67, 67A, 37*, 37A*, 76*
56R9	
56S	56, 27, 27S
57	57S
57A	57AS, 6C6*, 77*
57AS	57A, 6C6*, 77*
57S	57

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
58	58S
58AS	6D6*, 78*
58HE7	
58S	58
59	
59B	
60E3	
60EH5	
60FX5	
60HL5	
64	64A, 65, 65A, 36*, 36A*
64A	64, 65, 65A, 36*, 36A*
65	65A, 64, 64A
65A	65, 64, 64A
67	67A, 56A, 56AS, 37*, 37A*, 76*
67A	67, 56A, 56AS, 37*, 37A*, 76*
68	68A
68A	68
70A7GT	
70L7GT	
71	71A* 71B*
71A	71*, 71B*
71B	71*, 71A*
75	75S
75S	75
VR75	OA3, OA3A
76	37, 37A, 56A*, 56AS*, 67*, 67A*
77	6C6, 57A*, 57AS*
78	6D6, 58AS
79	
80	5X3, 13, 83V, 88
81	16, 16B
82	82V
82V	82
83	5Z3
83V	
84/6Z4	6Z4, 98
G84	2Z2, 2Z2/G84
85	85S
85AS	
85S	85
88	82, 82V

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

To Replace	Use
89	89Y
89Y	89
VR90	OB3, OB3A
95	2A5
96	
98	84/6Z4, 6Z4
V99	
X99	
VR105	OC3, OC3A
112A	12A, 112A
117L7GT	117L7/M7GT, 117M7GT
117L7/M7GT	117L7GT, 117M7GT
117M7GT	117L7GT, 117L7/M7GT
117N7GT	117P7GT
117P7GT	117N7GT
117Z3	
117Z4GT	
117Z6G	117Z6GT, 117Z6GT/G
117Z6GT	117Z6G, 117Z6GT/G
117Z6GT/G	117Z6G, 117Z6GT
VR150	OD3, OD3A
182B/482B	71*, 71A*, 71B*
183/483	
485	
807	
950	
951	1A4, 1A4P, 1A4T, 1B4P 1B4G, 1B4T, 32, 34, 1C4*, 1K4*
5642	
5879	
5881	6L6GC, 7581, 7581A
6080	6AS7G, 6AS7GA, 6AS7GT
6267	
6550	
6973	
7025	7025A, 12AX7, 12AX7A, 12DF7, 12DT7, 12AD7*, 12BZ7*, 12DM7*
7025A	7025, 12AX7, 12AX7A, 12DF7, 12DT7, 12AD7*, 12BZ7*, 12DM7*
7027	7027A
7189	7189A
7189A	

§ May not work in all circuits. * Parallel-filament circuits.
† Series circuits not requiring controlled warm-up time.

To Replace	Use
7199	
7247	12DW7
7355	
7408	6V6, 6V6G, 6V6GT, 6V6GTA, 6V6GT/G, 6V6GTY, 6V6GTX, 6V6GX, 6V6Y
7534	
7543	6AU6, 6AU6A
7581	7581A, 6L6GC
7581A	
7591	7591A
7591A	
7687	
7695	
7754	
7867	6EX6*
7868	
8278	
9001	
9002	
9003	
BA	
BH	BA
BR	
XXB	3C6
XXD	14AF7
XXFM	7X7
XXL	7A4
X155	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6BZ8, 6BK7*, 6BK7A*, 6BK7B*

‡ May not work in all circuits. * Parallel-filament circuits.
† Series circuit not requiring controlled warm-up time.

ADDITIONAL RECEIVING-TUBE SUBSTITUTIONS

ADDITIONAL RECEIVING-TUBE SUBSTITUTIONS

Section 2

PICTURE-TUBE SUBSTITUTES

This listing is numerical-alphabetical, with the substitutes shown in the right-hand column. Substitutes are not recommended for some types and, for this reason are not shown in many instances. The listing of a certain tube type as a substitute for another one does not necessarily mean the reverse is true. Always refer to the left-hand column for the original type number. Then find the substitute in the right-hand column.

Minor changes may be necessary when a picture tube is substituted. These changes are indicated by various symbols following the type number. The key to these symbols is given below. Be absolutely certain to refer to this key.

At the end of this section is a listing of those tubes that require odd filament voltages (other than 6.3 volts), or low E_{g2} potentials. This is a handy reference when setting up your picture-tube testing and rejuvenating equipment.

Key to Footnotes:

* Omit ion trap.
** Add ion trap.
# Connect pin 6 to pin 2 or pin 10.
& May require longer or shorter H.V. lead.
! Parallel-filament circuits only.
6 Add high-voltage filter capacitor.
7 Ground the Aquadag coating.
8 Change the anode connector.
9 Change the ion trap.

To Replace	Use
2EP4	
7RP4	7RP4A
7RP4A	7RP4
8AP4	8AP4A
8AP4A	8AP4
9QP4	9QP4A
9QP4A	9QP4
9SP4	
9TP4	
9UP4	
10ABP4	10ABP4A, B, C, 10AEP4[1]
10ABP4A	10ABP4, B, C, 10AEP4[1]
10ABP4B	10ABP4, A, C, 10AEP4[1]
10ABP4C	10ABP4, A, B, 10AEP4[1]
10ADP4	
10AEP4	10ABP4[1], A[1], B[1], C[1]
10AJP4	
10BP4	10BPA, C[9], D[9], 10FP4*, A*
10BP4A	10BP4, C[9], D[9], 10FP4*, A*
10BP4C	10BP4D, 10BP4[9], A[9], 10FP4*, A*
10BP4D	10BP4C, 10BP4[9], A[9], 10FP4*, A*
10CP4	
10DP4	
10EP4	10BP4A[8], 10CP4*, 10FP4*[8], A*[8]
10FP4	10FP4A, 10BP4**, A**, C**, D**
10FP4A	10FP4, 10BP4**, A**, C**, D*
10HP4	
10MP4	10MP4A
10MP4A	10MP4
10RP4	
11AP4	
11BP4	
11CP4	11LP4[1]
11DP4	
11EP4	11FP4[1]
11FP4	11EP4[1]
11GP4	11MP4[1]
11HP4	11HP4A
11HP4A	11HP4
11JP4	
11LP4	11CP4[1]
11MP4	11GP4[1]
11QP4	
11RP4	
11SP22	
12AP4	
12AYP4	12AZP4[1], 12BAP4[1], 12BSP4[a1]
12AZP4	12AYP4[1], 12BAP4[1], 12BSP4[a1]
12BAP4	12AYP4[1], 12AZP4[1], 12BSP4[a]
12BEP4	
12BFP4	
12BGP4	12CAP4[a]
12BJP4	
12BKP4	12BLP4, 12BUP4[a]
12BLP4	12BKP4, 12BQP4
12BMP4	12CDP4
12BNP4	12BNP4A
12BNP4A	12BNP4
12BRP4	

To Replace	Use
12BSP4	12AYP4[a1], 12AZP4[a1], 12BAP4[a]
12BTP4	
12BUP4	12BKP4[a]
12BVP4	
12BZP4	
12CBP4	
12CDP4	12BMP4
12CNP4	
12CP4	
12CQP4	
12JP4	12RP4**, 12QP4**, 12QP4A**
12KP4	12KP4A, 12JP4[6.8], 12ZP4**, 12ZP4A**
12KP4A	12KP4, 12JP4[6.8], 12ZP4**, 12ZP4A**
12LP4	12LP4A, 12LP4C, 12TP4[6], 12KP4*, 12KP4A*, 12ZP4[9], 12ZP4A[9]
12LP4A	12LP4, 12LP4C, 12KP4*, 12KP4A*, 12TP4[6], 12ZP4[9], 12ZP4A[9]
12LP4C	12LP4, 12LP4A, 12KP4*, 12KP4A*, 12TP4[6], 12ZP4[9], 12ZP4A[9]
12QP4	12QP4A, 12RP4, 12JP4*
12QP4A	12QP4, 12RP4, 12JP4*
12RP4	12QP4, 12QP4A, 12JP4*
12TP4	12LP4[7], A[7], C[7], 12KP4*[7], A*[7]
12UP4	12UP4A, 12UP4B[9]
12UP4A	12UP4, 12UP4B[9]
12UP4B	12UP4[9], 12UP4A[9]
12VP4	12VP4A
12VP4A	12VP4
12WP4	
12XP4	12ZP4, 12ZP4A, 12KP4*[1], A*[1]
12YP4	
12ZP4	12ZP4A, 12JP4[6.8], 12KP4*, 12KP4A*
12ZP4A	12ZP4, 12JP4[6.8], 12KP4*, 12KP4A*
13AP4	
14ACP4	14AEP4*
14AEP4	
14AJP4	14ASP4*, 14AVP4*
14ARP4	14AUP4[1], 14AWP4[1]
14ASP4	14AVP4
14ATP4	
14AUP4	14AWP4, 14ARP4[1]
14AVP4	14ASP4
14AWP4	14AUP4, 14ARP4[1]
14BCP22	
14BDP4	
14BP4	14BP4A, 14CP4, A, 14EP4, 14CP4B*
14BP4A	14BP4, 14CP4, A, 14EP4, 14CP4B*
14CP4	14CP4A, 14BP4, A, 14EP4, 14CP4B*
14CP4A	14BP4, A, 14CP4, 14EP4, 14CP4B*
14CP4B	14CP4**, A**, 14BP4**, A**, 14EP4**
14DP4	14UP4*, 14FP4[9]
14EP4	14BP4, A, 14CP4, A, B*

To Replace	Use
14FP4	14UP4*, 14CP4[7], A[7], 14DP4[9], 14EP4[7]
14GP4	
14HP4	
14KP4	14KP4A
14KP4A	14CP4[1.8], A[1.8], 14EP4[1.8]
14NP4	14NP4A, 14SP4, 14WP4*, 14XP4[1], A[1], 14ZP4*
14NP4A	14NP4, 14SP4, 14WP4*, 14XP4[1], A[1], 14ZP4*
14QP4	14QP4A, B*, 14HP4
14QP4A	14QP4, B*, 14HP4
14QP4B	14QP4**, A**, 14HP4**
14RP4	14RP4A, 14NP4, A, 14SP4, 14WP4*, 14XP4[1], A[1], 14ZP4*
14RP4A	14RP4, 14NP4, A, 14SP4, 14WP4*, 14XP4[1], A[1], 14ZP4*
14SP4	14NP4, A, 14WP4*, 14XP4[1], A[1], 14ZP4*
14UP4	14FP4**, 14CP4**[7], 14CP4A**[7], 14DP4**, 14EP4**[7]
14WP4	14ZP4
14XP4	14XP4A, 14NP4[1], A[1], 14SP4[1], 14WP4*[1], 14ZP4*[1]
14XP4A	14XP4, 14NP4[1], A[1], 14SP4[1], 14WP4*[1], 14ZP4*[1]
14ZP4	14WP4
15AP4	15DP4**, A**
15CP4	15AP4*, 15DP4[9], A[9]
15DP4	15DP4A, 15AP4*
15DP4A	15DP4, 15AP4*
15EP4	
15GP22	
15HP22	
15JP4	
16ABP4	16AEP4#
16ACP4	
16AEP4	16ABP4
16AFP4	
16ANP4	16AQP4, 16ASP4[1], 16AXP4[1]
16AP4	16AP4A, 16AP4B
16AP4A	16AP4, B
16AP4B	16AP4, A
16AQP4	16ANP4, 16ASP4[1], 16AXP4[1]
16ASP4	16ANP4[1], 16AQP4[1], 16AXP4
16ATP4	
16AUP4	16BFP4[11], 16BMP4[1]
16AVP4	16BCP4
16AWP4	16AZP4[1]
16AXP4	16ASP4, 16ANP4[1], 16AQP4[1]
16AYP4	16BDP4[1]
16AZP4	16AWP4[1]
16BAP4	16BEP4[1]
16BDP4	16AYP4[1]
16BEP4	16BAP4[1]
16BFP4	16AUP4[11], 16BMP4[11]
16BGP4	16BVP4, 16BWP4, 16BHP4[1], 16BJP4[11]
16BMP4	16AUP4[1], 16BFP4[11]

To Replace	Use
16BNP4	
16BRP4	16BVP4[1], 16CAP4[11], 16CEP4[1], 16CJP4[1], 16CKP4[1], 16CMP4[1]
16BSP4	16BKP4[11], 16BLP4[11], 16BTP4[11]
16BUP4	
16BVP4	
16BWP4	16BGP4, 16BVP4
16BXP4	
16BYP4	
16CAP4	16BVP4, 16BRP4[11], 16CEP4[11], 16CJP4[11], 16CKP4[11], 16CMP4[11]
16CDP22	
16CEP4	16BVP4, 16CJP4, 16CMP4, 16BRP4[1], 16CAP4[11], 16CKP4[1]
16CFP4	
16CHP4	
16CJP4	
16CKP4	16BRP4[1], 16BVP4[1], 16CAP4[11], 16CEP4[1], 16CJP4[1], 16CMP4[1]
16CMP4	16BRP4, 16BVP4, 16CEP4, 16CJP4, 16CAP4[11], 16CKP4[1]
16CNP4	
16CP4	
16CQP4	
16DP4	16DP4A
16DP4A	16DP4
16EP4	16EP4A, 16EP4B
16EP4A	16EP4, 16EP4B
16EP4B	16EP4, 16EP4A
16FP4	
16GP4	16GP4A, 16GP4B, 16GP4C
16GP4A	16GP4, 16GP4B, 16GP4C
16GP4B	16GP4, 16GP4A, 16GP4C
16GP4C	16GP4, 16GP4A, 16GP4B
16HP4	16HP4A
16HP4A	16HP4
16JP4	16JP4A, 16HP4, 16HP4A
16JP4A	16JP4, 16HP4, 16HP4A
16KP4	16KP4A, 16RP4, A, B*
16KP4A	16KP4, 16RP4, A, B*
16LP4	16LP4A, 16ZP4
16LP4A	16LP4, 16ZP4
16MP4	16MP4A, 16JP4, A, 16HP4, A
16MP4A	16MP4, 16JP4, A, 16HP4, A
16QP4	16XP4
16RP4	16RP4A, 16KP4, A, 16RP4B*
16RP4A	16RP4, 16KP4, A, 16RP4B*
16RP4B	16KP4**, A**, 16RP4**, A**
16SP4	16SP4A, 16WP4A, B
16SP4A	16SP4, 16WP4A, B
16TP4	16UP4[5.6]
16UP4	16KP4[7], A[7], 16RP4[7], A[7], 16XP4[9]
16VP4	16WP4[9], 16YP4[7]
16WP4	16WP4A[7], B[7], 16SP4[7], A[7]
16WP4A	16WP4[6], B
16WP4B	16WP4[6], A
16XP4	16QP4, 16UP4[9]

To Replace	Use
16YP4	16WP4A[9], B[9], 16SP4[9], A[9], 16VP4[6]
16ZP4	16CP4[6]
17AP4	
17ASP4	17AP4[1.8], 17BP4A[1.8], B[1.8], C[1.8]
17ATP4	17ATP4A, 17AVP4, A, 17BUP4, 17CBP4, 17CLP4, 17BJP4*, 17BKP4[1], A[1], 17BSP4*[1], 17DCP4*[1], 17DJP4[1]
17ATP4A	17ATP4, 17AVP4, A, 17BUP4, 17CBP4, 17CLP4, 17BJP4*, 17BKP4[1], A[1], 17BSP4*[1], 17DCP4*[1], 17DJP4[1]
17AVP4	17AVP4A, 17ATP4, A, 17BUP4, 17CBP4, 17CLP4, 17BJP4*, 17BKP4[1], A[1], 17BSP4*[1], 17DCP4*[1], 17DJP4[1]
17AVP4A	17AVP4, 17ATP4, A, 17BUP4, 17CBP4, 17CLP4, 17BJP4*, 17BKP4[1], A[1], 17BSP4*[1], 17DCP4*[1], 17DPJ4[1]
17BJP4	17BSP4[1], 17CUP4[1], 17DCP4[1]
17BKP4	17BKP4A, 17ATP4[1], A[1], 17AVP4[1], A[1], 17BJP4*[1], 17BSP4*, 17BUP4[1], 17CBP4[1], 17CLP4[1], 17DCP4*[1], 17DJP4[1]
17BKP4A	17BKP4, 17ATP4[1], A[1], 17AVP4[1], A[1], 17BJP4*[1], 17BSP4*, 17BUP4[1], 17CBP4[1], 17CLP4[1], 17DCP4*[1], 17DJP4[1]
17BMP4	17BNP4*
17BNP4	
17BP4	17BP4A[7], B[7], C[7], D*[7], 17AP4[7], 17JP4[7]
17BP4A	17BP4[6], B, C, D*, 17AP4, 17JP4
17BP4B	17BP4[6], A, C, D*, 17AP4, 17JP4
17BP4C	17BP4[6], A, B, D*, 17AP4, 17JP4
17BP4D	17BP4*[6], A**, B**, C**, 17AP4**, 17JP4**
17BRP4	17CAP4*, 17CKP4*, 17CTP4[1], 17CVP4*[1], 17CWP4*[1], 17DHP4*[1], 17DSP4*, 17DTP4*, 17DZP4*[1], 17EBP4*[1], 17EFP4*[1]
17BSP4	17BJP4[1], 17CUP4[1], 17DCP4[1]
17BTP4	
17BUP4	17CBP4
17BVP4	17BWP4*, 17BYP4*[1], 17CSP4*
17BWP4	17CSP4, 17BYP4[1]
17BYP4	17BWP4[1], 17CSP4[1]
17BZP4	17DSP4, 17DHP4[1], 17EBP4[1], 17EFP4[1]

To Replace	Use
17CAP4	17CKP4, 17CWP4, 17DSP4, 17DTP4, 17BRP4**, 17CTP4[1], 17CVP4[1], 17DHP4[1], 17DZP4[1], 17EBP4[1], 17EFP4[1]
17CBP4	17BUP4
17CDP4	
17CEP4	17CFP4[1], 17CYP4[1]
17CFP4	17CYP4, 17CEP4[1]
17CGP4	
17CKP4	17CAP4, 17CWP4, 17DSP4, 17DTP4, 17BRP4**, 17CTP4[1], 17CVP4[1], 17DHP4[1], 17DZP4[1], 17EBP4[1], 17EFP4[1]
17CLP4	17ATP4, A, 17AVP4, A, 17BUP4, 17CBP4, 17BJP4*, 17BKP4[1], A[1], 17BSP4*[1], 17DCP4*[1], 17DJP4[1]
17CMP4	17CRP4[1], 17CXP4[1]
17CNP4	
17CP4	17CP4A
17CP4A	17CP4
17CRP4	17CXP4, 17CMP4[1]
17CSP4	17BWP4, 17BYP4[1]
17CTP4	17DHP4, 17DZP4, 17EBP4, 17EFP4, 17BRP4**[1], 17CAP4[1], 17CKP4[1], 17CVP4[1], 17CWP4[1], 17DSP4[1], 17DTP4[1]
17CUP4	17DCP4, 17BJP4[1], 17BSP4[1]
17CVP4	17BRP4**[1], 17CAP4[1], 17CKP4[1], 17CTP4[1], 17CWP4[1], 17DHP4[1], 17DSP4[1], 17DTP4[1], 17DZP4[1], 17EBP4[1], 17EFP4[1]
17CWP4	17DSP4, 17DTP4, 17DHP4[1], 17DZP4[1], 17EBP4[1], 17EFP4[1]
17CXP4	17CRP4, 17CMP4[1]
17CYP4	17CFP4, 17CEP4[1]
17CZP4	
17DAP4	17DRP4
17DBP4	17DWP4*[1], 17HP4[1], A[1], B[1], C*[1], 17KP4[1], A[1], 17RP4[1], C[1]
17DCP4	17CUP4, 17BJP4[1], 17BSP4[1]
17DEP4	
17DHP4	17EBP4, 17EFP4, 17DSP4[1]
17DJP4	17ATP4[1], A[1], 17AVP4[1], A[1], 17BJP4*[1], 17BKP4[1], A[1], 17BSP4*[1], 17BUP4[1], 17CBP4[1], 17CLP4[1], 17DCP4*
17DKP4	17DTP4
17DLP4	17DSP4, 17DTP4, 17EBP4[1], 17EFP4[1]
17DQP4	
17DRP4	17DAP4
17DSP4	17EBP4[1], 17EFP4[1]
17DTP4	
17DWP4	
17DXP4	17DZP4, 17DKP4[1], 17DTP4[1]
17DZP4	17DTP4[1]
17EAP4	

To Replace	Use
17EBP4	17EFP4, 17DSP4[1]
17EFP4	17EBP4; 17DSP4[1]
17EHP4	
17EJP22	17ENP22
17ELP4	
17EMP4	
17ENP22	17EJP22
17FP4	17FP4A
17FP4A	17FP4
17GP4	
17HP4	17HP4A, B, C*, 17KP4, A, 17RP4, C, 17DBP4[1], 17DWP4*
17HP4A	17HP4, B, C*, 17KP4, A, 17RP4, C, 17DBP4[1], 17DWP4*
17HP4B	17HP4, A, C*, 17KP4, A, 17RP4, C, 17DBP4[1], 17DWP4*
17HP4C	17HP4**, A**, B**, 17DWP4, 17KP4**, A**, 17RP4**, C**
17JP4	17AP4, 17BP46, A, B, C, D*
17KP4	17KP4A, 17HP4#, A#, B#, C*#, 17RP4#, C#, 17DBP4#[1], 17DWP#*
17KP4A	17KP4, 17HP4#, A#, B#, C*#, 17RP4#, C#, 17DBP4#[1], 17DWP4*# VJ6ñ,21**J
17LP4	17LP4A, B*, 17VP4, 17VP4B
17LP4A	17LP4, B*, 17VP4, 17VP4B
17LP4B	17LP4**, A**, 17VP4**, B**
17QCP4	
17QP4	17QP4A, B*, 17YP4
17QP4A	17QP4, B*, 17YP4
17QP4B	17QP4**, A**, 17YP4**
17RP4	17RP4C, 17HP4, A, B, C*, 17KP4, A, 17DBP4[1], 17DWP4*
17RP4C	17RP4, 17HP4, A, B, C*, 17KP4, A, 17DBP4[1], 17DWP4*
17SP4	17LP4#, A#, 17VP4#, B#
17TP4	
17UP4	17QP4, 17QP4A, 17YP4
17VP4	17VP4B, 17LP4, A, B*
17VP4B	17VP4, 17LP4, A, B*
17YP4	17QP4A, B*
19ABP4	
19ACP4	19CHP4, 19CKP4, 19DLP4
19AEP4	
19AFP4	19AUP4, 19BAP4[1], 19BCP4[1]
19AHP4	19AXP4, 19AVP4[1], 19AYP4[1], 19CJP4[1], 19XP4
19AJP4	19CDP4[1], 19CQP4[1], 19CXP4[1]
19ALP4	19AVP4[1], 19AXP4[1], 19AYP4[1], 19BVP4[1], 19BWP4[1], 19CJP4[1], 19XP4[1]
19ANP4	19BTP4[1], 19YP4[1]

To Replace	Use
19AP4	19AP4A, 19AP4B, 19AP4C, 19AP4D
19AP4A	19AP4, 19AP4B, 19AP4C, 19AP4D
19AP4B	19AP4, 19AP4A, 19AP4C, 19AP4D
19AP4C	19AP4, 19AP4A, 19AP4B, 19AP4D
19AP4D	19AP4, 19AP4A, 19AP4B, 19AP4C
19AQP4	19AVP4[1], 19AXP4[1], 19AYP4[1], 19BHP4[1], 19BLP4[1], 19CJP4[1], 19ELP4[1], 19XP4[1]
19ARP4	19AFP4, 19AUP4, 19ASP4[1], 19BAP4[1], 19BCP4[1], 19BMP4[1], 19CEP4[1]
19ASP4	19BAP4, 19BCP4, 19CEP4, 19AFP4[1], 19ARP4[1], 19AUP4[1], 19BMP4[1]
19ATP4	
19AUP4	19AFP4, 19BAP4[1], 19BCP4[1]
19AVP4	19AYP4[1]
19AXP4	19AYP4, 19AVP4[1], 19CJP4[1], 19XP4[1]
19AYP4	19AVP4[1]
19BAP4	19BCP4, 19AFP4[1], 19AUP4[1]
19BCP4	19BAP4, 19AFP4[1], 19AUP4[1]
19BDP4	19CLP4, 19CRP4
19BEP4	19CTP4, 19DJP4, 19BSP4[1]
19BFP4	
19BHP4	19AVP4, 19BLP4, 19CJP4, 19CYP4, 19XP4, 19AQP4[1], 19AXP4[1], 19AYP4[1]
19BLP4	19AVP4, 19BHP4, 19CJP4, 19CYP4, 19ELP4, 19XP4, 19AQP4[1], 19AXP4[1], 19AYP4[1]
19BMP4	19AFP4, 19AUP4, 19BAP4[1], 19BCP4[1], 19CEP4[1]
19BNP4	19BQP4, 19CVP4[1], 19DYP4[1]
19BQP4	19BNP4, 19CVP4[1], 19DYP4[1]
19BRP4	19DKP4, 19CZP4[1], 19DAP4[1]
19BSP4	19BEP4[1], 19CTP4[1], 19DJP4[1]
19BTP4	19CYP4
19BVP4	19AVP4, 19ALP4[1], 19AYP4[1], 19BWP4[1]
19BWP4	19AYP4, 19ALP4[1], 19AVP4[1], 19BVP4[1]
19CAP4	
19CDP4	19CQP4, 19CXP4, 19AJP4[1]
19CEP4	19AFP4[1], 19AUP4[1], 19BAP4[1], 19BCP4[1], 19BMP4[1]
19CFP4	19CHP4, 19CKP4, 19DLP4, 19FVP4[01]

To Replace	Use
19CGP4	
19CHP4	19CKP4, 19DLP4, 19FVP4[a1]
19CJP4	19AVP4, 19XP4, 19AXP4[1], 19AYP4[1]
19CKP4	19CHP4, 19DLP4, 19FVP4[a1]
19CLP4	19BDP4, 19CRP4
19CMP4	19CMP4A
19CMP4A	
19CQP4	19CDP4, 19CXP4, 19AJP4[1]
19CUP4	19DFP4[1]
19CVP4	19DYP4
19CXP4	19CDP4, 19CQP4, 19AJP4[1]
19CYP4	
19CZP4	19DAP4, 19DKP4[1]
19DAP4	19CZP4, 19DKP4[1]
19DBP4	
19DCP4	19EHP4, A, 19EUP4, 19DWP4[1], 19FJP4[1], 19FTP4[a]
19DEP4	19AVP4, 19BVP4, 19CJP4, 19XP4, 19ALP4[1], 19AXP4[1], 19AYP4[1], 19BWP4[1]
19DFP4	19CUP4[1]
19DHP4	19DSP4, 19EFP4, 19ESP4, 19DUP4[1], 19EAP4[1], 19ENP4[1], A[1], 19FUP4[a1]
19DKP4	19CZP4[1], 19DAP4[1]
19DLP4	19CKP4, 19FVP4[a1]
19DNP4	19DKP4, 19CZP4[1], 19DAP4[1]
19DP4	19DP4A, 19FP46, 19GP46
19DP4A	19DP4, 19FP46, 19GP46
19DQP4	19DWP4, 19DRP4[1], 19EDP4[1], 19ERP4[1], 19FLP4[a], 19FRP4[1]
19DRP4	19EDP4, 19DQP4[1], 19DWP4[1]
19DSP4	19DHP4, 19EFP4, 19ESP4, 19DUP4[1], 19EAP4[1], 19ENP4[1], A[1], 19FUP4[a1]
19DUP4	19ENP4, A, 19EAP4, 19DHP4[1], 19DSP4[1], 19EFP4[1], 19ESP4[1], 19FUP4[a]
19DVP4	19DZP4
19DWP4	19EVP4, 19EDP4[1], 19EUP4[1], 19FTP4[a]
19DYP4	19CVP4
19DZP4	19DVP4
19EAP4	19DUP4, 19ENP4, A, 19DHP4[1], 19DSP4[1], 19EFP4[1], 19ESP4[1]
19EBP4	19GFP4[a1]
19ECP4	
19EDP4	19DCP4, 19DRP4, 19ERP4, 19EUP4, 19DQP4[1], 19DWP4[1], 19EVP4[1], 19FCP4[1], 19FTP4[a1]
19EFP4	19DHP4, 19DSP4, 19ESP4, 19DUP4[1], 19EAP4[1], 19ENP4[1], A[1]
19EGP4	

To Replace	Use
19EHP4	19DCP4, 19DRP4, 19EDP4, 19EHP4A, 19ERP4, 19EUP4, 19DQP4[1], 19DWP4[1], 19EVP4[1], 19FJP4[1], 19FTP4[1a]
19EHP4A	19DCP4, 19DRP4, 19EDP4, 19EHP4, 19ERP4, 19EUP4, 19DQP4[1], 19DWP4[1], 19EVP4[1], 19FJP4[1], 19FTP4[1a]
19EJP4	19FEP4, A
19EKP4	19EZP4
19ELP4	19AVP4, 19BHP4, 19BLP4, 19CJP4, 19CYP4, 19XP4, 19AQP4[1], 19AYP4[1], 19AXP4[1]
19ENP4	19DUP4, 19EAP4, 19ENP4A, 19DHP4[1], 19DSP4[1], 19EFP4[1], 19ESP4[1], 19FUP4[a]
19ENP4A	19DUP4, 19EAP4, 19ENP4, 19DHP4[1], 19DSP4[1], 19EFP4[1], 19ESP4[1]
19EP4	19JP4
19ESP4	19DHP4, 19DSP4, 19EFP4, 19DUP4[1], 19EAP4[1], 19ENP4[1], A[1], 19FUP4[a1]
19ETP4	
19EUP4	19EDP4, 19DWP4[1], 19EVP4[1], 19FTP4[1a]
19EXP22	
19EYP22	
19EZP4	19EKP4
19FBP4	
19FEP4	19EJP4, 19FEP4A
19FEP4A	
19FGP4	
19FHP4	
19FJP4	19FJP4A, 19EHP4[1], 19FTP4[a]
19FNP4	19GKP4[1]
19FP4	19GP4, 19DP4[7], A[7]
19FTP4	19DCP4[1a], 19DWP4[a], 19EDP4[1a], 19EHP4[1a], A[1a], 19EUP4[1a], 19EVP4[a], 19EWP4[a], 19FCP4[a], 19FJP4[a]
19FWP4	
19FXP22	
19GAP4	
19GBP4	19CZP4, 19DAP4, 19DKP4[1]
19GFP4	19EBP4[a1]
19GKP4	19FNP4[1]
19GP4	19DP4[7], A[7], 19FP4[9]
19JP4	19EP4
19QP4	
19TP22	
19VP22	
19XP4	19AVP4, 19CJP4, 19AXP4[1], 19AYP4[1]
19YP4	19BTP4, 19ANP4[1]
19ZP4	19AVP4, 19BHP4, 19BLP4, 19CJP4, 19CYP4, 19ELP4, 19XP4, 19AQP4[1], 19AXP4[1], 19AYP4[1]
20BP4	

To Replace	Use
20CP4	20CP4B, C, 20DP4, B, 20CP4A[7], D[7], 20DP4A[7], C[7], D*[7]
20CP4A	20CP4D, 20DP4A, C, 20CP4[6], B6, C6, 20DP4[6], B6, D*
20CP4B	20CP4, C, 20DP4, B, 20CP4A[7], D[7], 20DP4A[7], C[7], D*[7]
20CP4C	20CP4, B, 20DP4, B, 20CP4A[7], D[7], 20DP4A[7], C[7], D*[7]
20CP4D	20CP4A, 20DP4A, C, 20CP4[6], B6, C6, 20DP4[6], B6, D*
20DP4	20DP4B, 20CP4, B, C, 20DP4A[7], C[7], D*[7], 20CP4A[7], D[7]
20DP4A	20DP4C, 20CP4A, D, 20DP4[6], B6, D*, 20CP4[6], B6, C6
20DP4B	20DP4, 20CP4, B, C, 20DP4A[7], C[7], D*[7], 20CP4A[7], D[7]
20DP4C	20DP4A, 20CP4A, D, 20DP4[6], B6, D*, 20CP4[6], B6, C6
20DP4D	20DP4A**, D**, 20CP4A**, D**
20FP4	20GP4[7]
20GP4	20FP4[6]
20HP4	20HP4B, C, A[7], D[7], E*[7], 20JP4[7], 20LP4[7], 20MP4[7]
20HP4A	20HP4D, 20LP4, 20MP4, 20JP4, 20HP4[6], B6, C6, E*
20HP4B	20HP4, C, A[7], D[7], E*[7], 20JP4[7], 20LP4[7], 20MP4[7]
20HP4C	20HP4, B, A[7], D[7], E*[7], 20JP4[7], 20LP4[7], 20MP4[7]
20HP4D	20HP4A, 20JP4, 20LP4, 20MP4, 20HP4[6], B6, C6, E*
20HP4E	20HP4A**, 20JP4**, 20LP4**, 20MP4**
20JP4	20HP4#[7], A#, B#[7], C#[7], D#, E*#, 20LP4#, 20MP4#
20LP4	20HP4A, D, 20JP4, 20MP4, 20HP4[6], B6, C6, E*
20MP4	20HP4A, D, 20JP4, 20LP4, 20HP4[6], B6, C6, E*
21ACP4	21ACP4A, 21BSP4, 21CUP4
21ACP4A	21ACP4, 21BSP4, 21CUP4
21AFP4	21BCP4*[7], 21YP4[7], A[7], B*[7]
21ALP4	21ALP4A, B, 21ATP4, A, B, 21BTP4, 21CMP4, 21CWP4, 21DNP4, 21CDP4[1], A[1], 21DVP4[1], 21ENP4[1]
21ALP4A	21ALP4, B, 21ATP4, A, B, 21BTP4, 21CMP4, 21CWP4, 21DNP4, 21CDP4[1], A[1], 21DVP4[1], 21ENP4[1]

To Replace	Use
21ALP4B	21ALP4, A, 21ATP4, A, B, 21BTP4, 21CMP4, 21CWP4, 21DNP4, 21CDP4[1], A[1], 21DVP4[1], 21ENP4[1]
21AMP4	21AMP4A, 21ACP4, A, 21BSP4, 21CUP4, 21AMP4B*
21AMP4A	21AMP4, 21ACP4, A, 21BSP4, 21CUP4, 21AMP4B*
21AMP4B	21AMP4**, A**, 21ACP4**, A**, 21BSP4**, 21CUP4**
21ANP4	21ANP4A
21ANP4A	21ANP4
21AP4	
21AQP4	21AQP4A
21AQP4A	21AQP4, 21ACP4[7], A[7], 21AMP4[7], A[7], B*[7], 21BSP4[7], 21CUP4[7]
21ARP4	21ARP4A
21ARP4A	21ARP4
21ASP4	21AYP4[7], 21XP4[7], A[7], B*[7]
21ATP4	21ATP4A, B, 21ALP4, A, B, 21BTP4, 21CMP4, 21CWP4, 21DNP4, 21CDP4[1], A[1], 21CVP4*, 21DVP4[1], 21ENP4[1]
21ATP4A	21ATP4B, 21ALP4B, 21BTP4, 21CMP4, 21CWP4, 21DNP4, 21CDP4[1], A[1], 21DVP4[1], 21ENP4[1]
21ATP4B	21ATP4A, 21ALP4A, B, 21BTP4, 21CMP4, 21CWP4, 21DNP4, 21CDP4[1], A[1], 21DVP4[1], 21ENP4[1]
21AUP4	21AUP4A, B, C*, 21AVP4, A, B, C*, 21BDP4*
21AUP4A	21AUP4, B, C*, 21AVP4, A, B, C*, 21BDP4*
21AUP4B	21AUP4, A, C*, 21AVP4, A, B, C*, 21BDP4*
21AUP4C	21AUP4**, A**, C**, 21AVP4**, A**, B**, 21BDP4
21AVP4	21AVP4A, B, C*, 21AUP4, A, B, C*, 21BDP4*
21AVP4A	21AVP4, B, C*, 21AUP4, A, B, C*, 21BDP4*
21AVP4B	21AVP4, A, C*, 21AUP4, A, B, C*, 21BDP4*
21AVP4C	21AUP4C, 21BDP4, 21AUP4B**, 21AVP4B**
21AWP4	21AWP4A*, 21ZP4[6], A, B, C*
21AWP4A	21AWP4**, 21ZP4**[6], 21ZP4A**[6], 21ZP4B**, 21ZP4C
21AXP22	
21AXP22A	
21AYP4	21XP4, A, B*, 21ASP4[6]

To Replace	Use
21BAP4	21BNP4, 21CBP4A, B, 21CVP4, 21DLP4, 21DQP4, 21DRP4, 21FLP4, 21CKP4[1], 21DJP4[1], 21ELP4[1]
21BCP4	
21BDP4	21AUP4A**, B**, C, 21AVP4**, B**, C
21BNP4	21BAP4, 21CBP4A, B, 21CVP4, 21DLP4, 21DQP4, 21DRP4, 21FLP4, 21CKP4[1], 21DJP4[1], 21ELP4[1]
21BRP4	
21BSP4	21ACP4, 21ACP4A, 21CUP4
21BTP4	21ALP4B, 21ATP4A, 21CMP4, 21DNP4, 21CDP4[1], A[1], 21DVP4[1], 21ENP4[1]
21CBP4	21CBP4A, B, 21DQP4, 21DLP4, 21DRP4, 21FLP4, 21CKP4[1], 21DJP4[1]
21CBP4A	21CBP4B, 21DLP4, 21DQP4, 21DRP4, 21FLP4, 21CKP4[1], 21DJP4[1]
21CBP4B	21CBP4A, 21DLP4, 21DQP4, 21DRP4, 21FLP4, 21CKP4[1], 21DJP4[1]
21CDP4	21CDP4A, 21ALP4B[1], 21ATP4A[1], B[1], 21BTP4[1], 21CMP4[1], 21CWP4[1], 21DNP4[1], 21DVP4[1], 21ENP4[1]
21CDP4A	21CDP4, 21ALP4B[1], 21ATP4A[1], B[1], 21BTP4[1], 21CMP4[1], 21CWP4[1], 21DNP4[1], 21DVP4[1], 21ENP4[1]
21CEP4	21CEP4A, 21DFP4[1], 21EMP4, 21DWP4[1]
21CEP4A	
21CGP4	21CHP4*
21CHP4	21CGP4**
21CKP4	21CBP4A[1], B[1], 21DJP4[1], 21DLP4[1], 21DQP4[1], 21DRP4[1], 21FLP4[1]
21CLP4	
21CMP4	21DNP4, 21ENP4[1]
21CQP4	21CSP4[1]
21CSP4	21CQP4[1]
21CUP4	21ACP4, 21BSP4
21CVP4	21BAP4, 21BNP4, 21CBP4A, B, 21DLP4, 21DQP4, 21DRP4, 21FLP4, 21CKP4[1], 21DJP4[1], 21ELP4[1]
21CWP4	21ALP4, A, B, 21ATP4, A, B, 21BTP4, 21CMP4, 21DNP4, 21CDP4[1], A[1], 21DVP4[1], 21ENP4[1]
21CXP4	21DSP4
21CYP22	
21CYP22A	

To Replace	Use
21CZP4	21DAP4*, 21DEP4*, A*, 21DHP4[1]*, 21DKP4[1]*, A[1]*, 21DMP4*
21DAP4	21DEP4, A, 21DMP4, 21CZP4**, 21DHP4[1], 21DKP4[1], A[1]
21DEP4	21DEP4A, 21DAP4, 21DMP4, 21CZP4**, 21DHP4[1], 21DKP4[1], A[1]
21DEP4A	21DMP4
21DFP4	21CEP4, A, 21EMP4, 21DWP4[1]
21DHP4	21CZP4**[1], 21DAP4[1], 21DEP4[1], A[1], 21DKP4[1], A[1], 21DMP4[1]
21DJP4	21CBP4A[1], B[1], 21CKP4[1], 21DLP4[1], 21DQP4[1], 21DRP4[1], 21FLP4[1]
21DKP4	21DKP4A, 21CZP4**[1], 21DAP4[1], 21DEP4[1], A[1], 21DHP4[1], 21DMP4[1]
21DKP4A	21DKP4[1], 21CZP4**[1], 21DAP4[1], 21DEP4[1], 21DEP4A[1], 21DHP4[1], 21DMP4[1]
21DLP4	21DQP4
21DMP4	
21DNP4	21CMP4, 21ENP4[1]
21DP4	
21DQP4	21CBP4, A, B, 21DLP4, 21FLP4, 21CKP4[1], 21DJP4[1]
21DRP4	21CBP4A, B, 21DLP4, 21DQP4, 21FLP4, 21CKP4[1], 21DJP4[1]
21DSP4	21CXP4
21DVP4	21ENP4, 21ALP4B[1], 21ATP4A[1], 21BTP4[1], 21CDP4[1], A[1], 21CMP4[1], 21CVP4**[1], 21CWP4[1], 21DNP4[1]
21DWP4	21CEP4[1], 21DFP4[1], 21FMP4[1]
21EAP4	
21ELP4	21DJP4, 21CBP4A[1], B[1], 21CKP4[1], 21DLP4[1], 21DQP4[1], 21DRP4[1], 21FLP4[1]
21EMP4	
21ENP4	21CMP4[1], 21DNP4[1]
21EP4	21EP4A[7], B[7], C*[7]
21EP4A	21EP4[6], B, C*
21EP4B	21EP4[6], A, C*
21EP4C	21EP4A**, B**
21EQP4	21EXP4[1]
21ERP4	
21ESP4	21DMP4
21EVP4	
21EXP4	21EQP4[1]
21EZP4	
21FAP4	
21FBP22	
21FBP22A	
21FCP4	
21FDP4	
21FJP22	21FKJP22
21FJP22A	

To Replace	Use
21FKP22	21FJP22
21FLP4	21CBP4A, B, 21DLP4, 21DQP4, 21DRP4, 21CKP4[1], 21DJP4[1]
21FMP4	
21FP4	21FP4A[7], 21FP4C[7], D*[7], 21KP4, A[7]
21FP4A	21FP4[6], 21FP4C, D*, 21KP4[6], A
21FP4C	21FP4[6], 21FP4A, D*, 21KP4[6], A
21FP4D	21FP4A**, C**
21FUP4	
21FVP4	21FWP4
21FXP4	
21FYP4	
21FZP4	
21GBP4	
21JP4	21JP4A
21JP4A	21JP4
21KP4	21KP4A[7], 21FP4#, A#[7],
21KP4A	21KP4[6], 21FP4#[6], A#, C#
21MP4	
21WP4	21WP4A, B*
21WP4A	21WP4, B*
21WP4B	21WP4**, A**
21XP4	21XP4A, 21AYP4, 21XP4B*, 21ASP4[6]
21XP4A	21XP4, 21AYP4, 21XP4B*, 21ASP4[6]
21XP4B	21XP4**, A**, 21AYP4**
21YP4	21YP4A, B*, 21AFP4[6]
21YP4A	21YP4, B*, 21AFP4[6]
21YP4B	21YP4**, A**
21ZP4	21ZP4A[7], B[7], C*[7], 21AWP4[7], A*[7]
21ZP4A	21ZP4B, 21AWP4, A*, 21ZP4[6], C*
21ZP4B	21ZP4A, 21AWP4, A*, 21ZP4[6], C*
21ZP4C	21AWP4A, 21ZP4A**, B**, 21AWP4**
22AP4	22AP4A
22AP4A	22AP4
23ACP4	23TP4
23AFP4	23BTP4, 23BVP4
23AHP4	23ASP4, 23AUP4, 23CZP4, 23AZP4[1]
23AKP4	23CVP4[1]
23ALP4	23AMP4[1], 23FP4[1], A[1], 23MP4[1], A[1], 23VP4[1]
23AMP4	23ALP4[1], 23FP4[1], A[1], 23MP4[1], A[1], 23VP4[1]
23ANP4	23ATP4, 23BKP4, 23BLP4
23AQP4	23AMP4, 23DRP4, 23VP4, 23ALP4[1], 23FP4[1], A[1], 23MP4[1], A[1]
23ARP4	23BCP4[1], 23CEP4[1], 23CMP4[1]
23ASP4	
23ATP4	23ANP4, 23BKP4, 23BLP4
23AUP4	23AHP4, 23ASP4, 23CZP4, 23AZP4[1]

To Replace	Use
23AVP4	23ADP4, 23BNP4, 23CP4, A, 23DXP4, 23GP4, 23AYP4[1], 23BEP4[1], A[1], 23BQP4[1], 23BSP4[1], 23CBP4[1], 23SP4[1], 23UP4[1]
23AWP4	23BJP4
23AXP4	23DFP4, 23EJP4
23AYP4	23BEP4, A, 23BSP4, 23SP4, 23ADP4[1], 23AVP4[1], 23BNP4[1], 23BQP4[1], 23CBP4[1], 23CP4[1], A[1], 23DXP4[1], 23GP4[1], 23UP4[1]
23AZP4	23AHP4[1], 23ASP4[1], 23AUP4[1], 23CZP4[1]
23BAP4	23BNP4, 23BP4
23BCP4	23CMP4, 23EBP4, 23EJP4, 23ARP4[1], 23CEP4[1]
23BDP4	23BTP4, 23YP4, 23CTP4[1], 23EAP4[1]
23BEP4	23BEP4A, 23ADP4[1], 23BQP4[1], 23CBP4[1], 23DXP4[1], 23UP4[1]
23BEP4A	23BEP4, 23ADP4[1], 23BQP4[1], 23CBP4[1], A[1], 23DXP4[1], 23UP4[1]
23BGP4	23BHP4
23BHP4	23BGP4
23BJP4	
23BKP4	23ANP4, 23ATP4, 23BLP4
23BLP4	23ANP4, 23ATP4, 23BKP4
23BMP4	23AFP4, 23BDP4, 23BTP4, 23BVP4, 23YP4, 23CDP4[1], 23CTP4[1], 23EAP4[1]
23BNP4	23ADP4, 23AVP4, 23CP4, A, 23DXP4, 23GP4, 23AYP4[1], 23BEP4[1], A[1], 23BQP4[1], 23BSP4[1], 23CBP4[1], 23SP4[1], 23UP4[1]
23BP4	23BAP4, 23BNP4
23BQP4	23CBP4, 23UP4, 23ADP4[1], 23BEP4[1], A[1], 23DXP4[1]
23BRP4	23BYP4, 23CSP4, 23RP4, 23CUP4[1], 23DP4[1]
23BSP4	23AYP4, 23BEP4, A, 23SP4, 23ADP4[1], 23AVP4[1], 23BNP4[1], 23BQP4[1], 23CBP4[1], 23CP4[1], A[1], 23DXP4[1], 23GP4[1], 32UP4[1]
23BTP4	23BDP4, 23YP4, 23CTP4[1], 23EAP4[1]
23BVP4	23AFP4, 23BTP4
23BXP4	23EDP4, 23GZP4
23BYP4	23BRP4, 23CSP4, 23RP4, 23CUP4[1], 23DP4[1]
23BZP4	
23CAP4	
23CBP4	23BQP4, 23UP4, 23ADP4[1], 23BEP4[1], A[1], 23DXP4[1]
23CDP4	23AFP4[1], 23BDP4[1], 23BMP4[1], 23BTP4[1], 23BVP4[1], 23CTP4[1], 23EAP4[1], 23YP4[1]

To Replace	Use
23CEP4	23ARP4[1], 23BCP4[1], 23CMP4[1]
23CGP4	23ASP4[1], 23CZP4[1]
23CMP4	23BCP4, 23ARP4[1], 23CEP4[1]
23CP4	23ADP4, 23AVP4, 23BNP4, 23CP4, A, 23DXP4, 23AYP4[1], 23BEP4[1], A[1], 23BGP4[1], 23BSP4[1], 23CBP4[1], 23GP4[1], 23SP4[1], 23UP4[1]
23CP4A	23ADP4, 23AVP4, 23BNP4, 23CP4, 23DXP4, 23GP4, 23AYP4[1], 23BEP4[1], A[1], 23BQP4[1], 23BSP4[1], 23CBP4[1], 23SP4[1], 23UP4[1]
23CQP4	23FP4[1], A[1], 23VP4[1]
23CSP4	23BRP4, 23BYP4, 23RP4, 23CUP4[1], 23DP4[1]
23CTP4	23EAP4, 23BDP4[1], 23BTP4[1], 23YP4[1]
23CUP4	23DP4, 23BRP4[1], 23BYP4[1], 23CSP4[1], 23RP4[1]
23CVP4	23AKP4[1]
23CWP4	23CXP4[1]
23CXP4	23CWP4[1]
23CZP4	23ASP4
23DAP4	23DCP4[1]
23DBP4	
23DCP4	23DAP4[1]
23DEP4	
23DFP4	23AXP4, 23EJP4
23DHP4	23DJP4
23DJP4	23DHP4
23DKP4	23DTP4, 23ELP4, 23EMP4, 23FLP4[1]
23DLP4	23DLP4A, 23ENP4, 23FBP4, 23FWP4[1], A[1]
23DLP4A	23DLP4, 23ENP4, 23FBP4, 23FWP4[1], A[1]
23DNP4	23BKP4, 23BLP4
23DP4	23CUP4, 23BRP4[1], 23BYP4[1], 23CSP4[1], 23RP4[1]
23DSP4	23DSP4A
23DSP4A	23DSP4
23DTP4	23DKP4, 23ELP4, 23EMP4, 23FLP4[1]
23DVP4	23DVP4A, 23DRP4[1], 23DZP4[1], 23EWP4A[1]
23DVP4A	23DVP4, 23DRP4[1], 23DZP4[1], 23EWP4A[1]
23DWP4	23GAP4[1]
23DYP4	23ETP4, 23FJP4, 23GTP4, 23ESP4[1], 23FMP4[1], 23FVP4[1], A[1], 23HFP4A[1], 23HMP4[1]
23DZP4	23EWP4A, 23DRP4[1], 23DVP4[1], A[1]
23EAP4	23CTP4, 23BDP4[1], 23BTP4[1], 23YP4[1]
23ECP4	
23EDP4	23GZP4
23EFP4	23FCP4[1], 23FDP4[1], 23FHP4[1], 23GJP4[1], A[1], 23GWP4[1]

To Replace	Use
23EGP22	
23EKP4	23FLP4, 23DKP4[1], 23DTP4[1]
23ENP4	23FBP4
23EP4	
23EQP4	23DZP4, 23DVP4[1], A[1]
23ESP4	23FMP4, 23FVP4, A, 23HFP4A, 23DYP4[1], 23ETP4[1], 23FJP4[1], 23GTP4[1], 23HMP4[1]
23ETP4	23DYP4, 23FJP4, 23GTP4, 23ESP4[1], 23FMP4[1], 23FVP4[1], A[1], 23HFP4A[1], 23HMP4[1]
23EWP4	23DZP4, 23DRP4[1], 23DVP4[1], A[1]
23EWP4A	23DZP4, 23EWP4, 23DRP4[1], 23DVP4[1], A[1], 23GDP4[1]
23EYP4	
23EZP4	23GCP4
23FAP4	
23FBP4	23ENP4, 23FEP4
23FCP4	23FDP4, 23FHP4, 23GJP4, A, 23GWP4, 23EFP4[1]
23FDP4	23FCP4, 23FHP4, 23GJP4, A, 23GWP4, 23EFP4[1]
23FHP4	23FCP4, 23FDP4, 23JP4, A, 23GWP4, 23EFP4[1]
23FKP4	
23FLP4	23DTP4[1]
23FMP4	23ESP4, 23FVP4, A, 23HFP4A, 23DYP4[1], 23ETP4[1], 23FJP4[1], 23GTP4[1], 23HMP4[1]
23FNP4	
23FP4	23FP4A, 23VP4[1]
23FP4A	23FP4, 23VP4[1]
23FRP4	
23FSP4	
23FVP4	23ESP4, 23FMP4, 23HFP4A, 23DYP4[1], 23ETP4[1], 23GTP4[1]
23FVP4	23ESP4, 23FMP4, 23FVP4A, 23HFP4A, 23DYP4[1], 23ETP4[1], 23FJP4[1], 23GTP4[1], 23HMP4[1]
23FWP4	23FWP4A, 23DLP4[1], A[1], 23ENP4[1], 23FBP4[1]
23FWP4A	23FWP4, 23DLP4[1], A[1], 23ENP4[1], 23FBP4[1]
23GBP4	23HFP4
23GDP4	23DVP4, A, 23DRP4[1], 23DZP4[1], 23EWP4[1], A[1]
23GJP4	23GJP4A, 23FCP4, 23FDP4, 23FHP4, 23GWP4, 23EFP4[1]
23GJP4A	23GJP4, 23FCP4, 23FDP4, 23FHP4, 23GWP4, 23EFP4[1]
23GKP4	23GMP4, 23GNP4[1], 23GRP4[1]
23GP4	23ADP4, 23AVP4, 23BNP4, 23CP4, A, 23DXP4, 23AYP4[1], 23BEP4[1], A[1], 23BQP4[1], 23BSP4[1], 23CBP4[1], 23SP4[1], 23UP4[1]

To Replace	Use
23GRP4	23GNP4, 23GKP4[1], 23GMP4[1]
23GSP4	23HGP4[1], 23HZP4[1]
23GTP4	23DYP4, 23ETP4, 23FJP4, 23FSP4[1], 23FMP4[1], 23FVP4[1], A[1], 23HFP4A[1], 23HMP4[1]
23GVP4	
23GWP4	23FCP4, 23FDP4, 23FHP4, 23GJP4, A, 23EFP4[1]
23GXP4	23HQP4[1]
23HBP4	
23HFP4	23GBP4
23HFP4A	23ESP4, 23FMP4, 23FVP4, A, 23DYP4[1], 23ETP4[1], 23FJP4[1], 23GTP4[1], 23HMP4[1]
23HGP4	23GSP4[1], 23HZP4[1]
23HKP4	
23HP4	23AVP4, 23BNP4, 23CP4, A, 23DXP4, 23GP4, 23ADP4[1], 23AYP4[1], 23BEP4[1], A[1], 23BQP4[1], 23BSP4[1], 23CBP4[1], 23SP4[1], 23UP4[1]
23HQP4	23GXP4[1]
23HZP4	23GSP4[1], 23HGP4[1]
23JAP4	
23JBP4	
23JP4	
23KP4	23KP4A
23KP4A	23KP4
23MP4	23MP4A, 23FP4, A, 23ALP4[1], 23AMP4[1], 23VP4[1]
23MP4A	23MP4, 23FP4, A, 23ALP4[1], 23AMP4[1], 23VP4[1]
23NP4	
23RP4	23BRP4, 23BYP4, 23CSP4, 23CUP4[1], 23DP4[1]
23SP4	23AYP4, 23BEP4, A, 23BSP4, 23ADP4[1], 23AVP4[1], 23BNP4[1], 23BQP4[1], 23CBP4[1], 23CP4[1], A[1], 23DXP4[1], 23GP4[1], 23UP4[1]
23TP4	
23UP4	23BQP4, 23CBP4, 23ADP4[1], 23BEP4[1], A[1], 23DXP4[1]
23VP4	23FP4[1], A[1]
23WP4	23FP4, A, 23MP4, A, 23ALP4[1], 23AMP4[1], 23AQP4[1], 23VP4[1]
23XP4	23BDP4, 23BTP4, 23YP4, 23CTP4[1], 23EAP4[1]
23YP4	23BDP4, 23BTP4, 23CTP4[1], 23EAP4[1]
23ZP4	
24ADP4	24CP4, A, 24TP4, 24VP4, A, 24CP4B*
24AEP4	24AUP4, 24ASP4[1]
24AHP4	24ALP4, 24AQP4[1], 21AWP4[1], 24AXP4[1]
24AJP4	24ATP4
24ALP4	24AHP4, 24AQP4[1], 21AWP4[1], 24AXP4[1]

To Replace	Use
24AMP4	
24ANP4	24AEP4*, 24ASP4*[1], 24AUP4*
24AP4	24AP4A, 24AP4B
24AP4A	24AP4, 24AP4B
24AP4B	24AP4, 24AP4A
24AQP4	24AHP4[1], 24ALP4[1], 21AWP4[1], 24AXP4[1]
24ASP4	24AEP4[1], 24AUP4[1]
24ATP4	24AJP4
24AUP4	
24AVP4	
24AWP4	
24AXP4	24AHP4[1], 24ALP4[1], 24AQP4[1], 21AWP4[1]
24BAP4	
24BCP4	
24BEP4	
24BP4	
24CP4	24CP4A, 24ADP4, 24TP4, 24VP4, 24CP4B*
24CP4A	24CP4, 24ADP4, 24TP4, 24VP4, A, 24CP4B*
24CP4B	24CP4**, A**, 24ADP4**, 24TP4**, 24VP4**, A**
24DP4	24DP4A, 24ANP4, 24YP4, 24AEP4*, 24ASP4*[1], 24AUP4*, 24ZP4*
24DP4A	24DP4, 24ANP4, 24YP4, 24AEP4*, 24ASP4*[1], 24AUP4*, 24ZP4*
24QP4	24ADP4, 24CP4, A, 24TP4, 24VP4, A, 24CP4B*
24TP4	24ADP4, 24CP4, A, 24VP4, 24CP4B*
24VP4	24VP4A, 24ADP4, 24CP4, A, 24TP4, 24CP4B*
24VP4A	24VP4, 24ADP4, 24CP4, A, 24TP4, 24CP4B*
24XP4	
24YP4	24ANP4, 24DP4, A, 24AEP4*, 24ASP4*[1], 24AUP4*, 24ZP4*
24ZP4	24AEP4, 24AUP4, 24ASP4[1]
25AP22	
25AP22A	
25BP22	
25BP22A	
25DP4	
25HP4	
25JP4	
25KP4	25LP4[1]
25LP4	25KP4[1]
27ABP4	27ADP4, 27AGP4, 27AFP4[1]
27ACP4	27YP4
27ADP4	27AFP4[1]
27AEP4	27ZP4[1]
27AFP4	27ADP4[1]
27AGP4	27ABP4, 27ADP4, 27AFP4[1]
27AP4	
27EP4	27GP4
27GP4	27EP4
27LP4	
27MP4	
27NP4	27RP4
27RP4	27RP4A*
27RP4A	27RP4**

To Replace	Use
27SP4	27UP4
27UP4	27SP4
27VP4	27XP4
27WP4	

To Replace	Use
27XP4	
27YP4	27ACP4
27ZP4	27AEP4[1]
30BP4	

ODD FILAMENT VOLTAGES

Type	Voltage
9QP4,A	4.7V
9UP4	12.6V
9VP4	12.6V
10ADP4	8.4V
11NP4	11.0V
11QP4	12.6V
12AP4	2.5V
12BFP4	4.2V
12BJP4	4.2V
12BRP4	12.6V
12BTP4	12.6V
12BVP4	12.6V
12BZP4	12.0V
12CNP4	4.2V
12CP4	2.5V
14ATP4	8.4V
16CNP4	12.0V
17CDP4	8.4V
17DAP4	2.68V
17DEP4	2.35V
17DRP4	2.68V
19ABP4	2.68V
19AEP4	12.6V
19BUP4	2.2V
19FWP4	4.2V
21EAP4	2.35V
21EVP4	2.68V
23BZP4	8.4V
23CAP4	8.4V
23EMP4	8.4V
24AVP4	2.35V

LOW E_{g2}

Type	Voltage
8DP4	150V
9TP4	50V
9UP4	100V
11AP4	150V
11BP4	150V
11DP4	50V
11GP4	135V
11HP4	150V
11JP4	50V
11MP4	135V
11QP4	100V
11RP4	140V
12BEP4	30V
12BFP4	200V
12BGP4	50V
12BKP4	50V
12BLP4	30V
12BMP4	140V
12BNP4	250V
12BRP4	30V
12BTP4	50V
12BUP4	50V
12BVP4	50V
12BZP4	100V
12CBP4	30V
12CDP4	140V
12CNP4	200V
12CQP4	40V
13AP4	50V
14ACP4	125V
14AEP4	110V
14ARP4	50V
14AUP4	50V
14AWP4	50V
15JP4	50V
16ATP4	50V
16AVP4	35V
16AWP4	150V
16AZP4	150V
16BAP4	50V
16BEP4	50V
16BNP4	50V
16BSP4	50V
16BUP4	100V
16BXP4	35V
16BYP4	100V
16CFP4	140V
16CHP4	30V
16CNP4	100V
16CQP4	140V
17BMP4	110V
17BNP4	110V
17CMP4	50V
17CNP4	50V
17CRP4	50V
17CXP4	50V
17DQP4	50V
17EHP4	50V
17ELP4	50V
17EMP4	50V
19ACP4	50V
19AEP4	100V
19AJP4	50V
19BDP4	50V
19BNP4	50V
18BQP4	50V
19CDP4	50V
19CFP4	50V
19CHP4	50V
19CKP4	50V
19CLP4	35V
19CMP4	30V
19CQP4	50V
19CUP4	65V
19CVP4	50V
19CXP4	45V
19DBP4	40V
19DFP4	65V
19DHP4	50V
19DLP4	50V
19DSP4	50V
19DUP4	50V
19DVP4	150V
19DYP4	50V
19DZP4	150V
19EAP4	50V
19ECP4	150V
19EFP4	50V
19EGP4	50V
19EJP4	30V
19EKP4	45V
19ENP4	50V
19ESP4	50V
19ETP4	50V
19EZP4	45V
19FBP4	50V
19FEP4	30V
21CGP4	110V
21CHP4	110V
21CXP4	50V
21DSP4	50V
21FMP4	50V
21FUP4	50V
21FYP4	50V
21GBP4	50V
23ANP4	50V
23ATP4	50V
23AWP4	50V
23BGP4	50V
23BHP4	50V
23BJP4	50V
23BKP4	50V
23BLP4	50V
23DAP4	50V
23DBP4	50V
23DCP4	50V
23DLP4	50V
23DNP4	35V
23DSP4	65V
23ECP4	35V
23EFP4	50V
23ENP4	50V
23EP4	50V
23EYP4	35V
23EZP4	50V
23FBP4	50V
23FCP4	50V
23FDP4	50V
23FHP4	50V
23FRP4	50V
23FWP4	50V
23GJP4	50V
23GVP4	45V
23GWP4	50V
23HKP4	150V
23JP4	50V
23NP4	50V
23ZP4	50V
24AJP4	50V
24ATP4	50V
24BAP4	50V
25HP4	50V

Section 3

CROSS REFERENCE OF SUBMINIATURE TUBES

This section lists subminiature tubes and recommended substitutes. Tubes are listed in numerical-alphabetical order, with the substitutes shown in the right-hand column.

To use this section, locate the tube type to be replaced in the left-hand column. Then refer to the right-hand column for the substitute. The substitutes listed include only those tubes which have similar, or improved, characteristics and can be inserted directly into the socket. No rewiring or mechanical changes are needed, although the associated service controls may have to be readjusted. When no substitutes are shown, none are recommended.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tube is wired in a parallel circuit. Those tubes marked with a section symbol (§) may not work in all circuits.

To Replace	Use
1AC5	1V5
1AD4	
1AD5	1W5
1AE5	
1AG4	
1AG5	2E41, 2E42, CK551AXA, 1AJ5*, 1AK5*
1AH4	1AK4*
1AJ5	1AG5*, 1AK5*
1AK4	1AH4*
1AK5	1AG5*, 1AJ5*
1C8	1E8
1D3	
1E8	1C8
1Q6	
1S6	1T6
1T2	
1T6	1S6
1V5	1AC5
1V6	
1W5	1AD5
2B5	
2B24	2B24A
2B24A	
2C27	
2C28	
2E27	
2E29	
2E31	2E32, CK553AXA
2E32	2E31, CK553AXA
2E35	2E36, CK502AX
2E36	2E35, CK502AX
2E41	1AG5, 2E42
2E42	1AG5, 2E41
2G21	2G22, CK555AX
2G22	2G21, CK555AX
2L2	
3FW7	
3FX7	
6AD4	5637, 5719, 5719A, 5898
6AK4	
6AZ5	
6AZ6	
6BA5	
6BF7	6BF7A, 6BF7W, 6BG7, 6021, 6021A, 6021WA
6BF7A	6BF7, 6BF7W, 6BG7, 6021, 6021A, 6021WA
6BF7W	6021, 6021A, 6021WA
6BG7	6BF7, 6BF7A, 6BF7W, 6021, 6021A, 6021WA
6FW7	
6FX7	
6K4	6K4A, 6778
6K4A	6778
6W2	
6X2	6W2*
RK61	CK1054
CK501	

To Replace	Use
CK501AX	
CK502AX	2E35, 2E36
CK503AX	CK518AX, 5854
CK505AX	
CK506AX	
CK507AX	
CK509AX	CK515BX
CK510AX	
CK511X	
CK512AX	CK574AX, 6281
CK515BX	CK509AX
CK516AX	
CK518AX	CK503AX
CK520AX	
CK521AX	
CK522AX	CK528AX, 6088
CK523AX	
CK524AX	
CK525AX	
CK526AX	CK537AX
CK527AX	
CK528AX	CK522AX, 6088
CK529AX	CK535AX
CK531DX	
CK532DX	
CK533AX	CK536AX
CK534AX	
CK535AX	CK529AX
CK536AX	CK533AX
CK537AX	CK526AX
CK538DX	
CK539DX	
CK541DX	
CK542DX	CK542DXS
CK542DXS	CK542DX
CK543DX	
CK544DX	
CK545DX	
CK546DX	6519
CK547DX	
CK548DX	6418
CK549DX	6419
CK551AXA	1AG5
CK553AXA	2E31, 2E32
CK555AX	2G21, 2G22
CK556AX	5676, 6050
CK568AX	5677
CK569AX	5678
CK570AX	5697
CK571AX	5886
CK573AX	6029
CK574AX	CK512AX, 6281
CK600AX	
CK605CX	CK623CX, 5702, 5702WA, 5702WB, 6148, 6540
CK606BX	5704, 5704WA
CK608CX	5703, 5703WA, 5703WB, 6149
CK619CX	5744, 5744WA, 5744WB, 6151

* Parallel-filament circuits. ‡ May not work in all circuits.

To Replace	Use
CK623CX	CK605CX, 5702, 5702WA, 5702WB, 6148, 6540
CK628	6247, 6247WA
CK1036	6436
CK1037	6437, 5950§
CK1038	5841§
CK1039	6438
CK1042	6659
CK1045	6542
CK1050	CK1050A, 7323, 7979
CK1050A	CK1050, 7323, 7979
CK1054	
CK1061	
CK1068	
CK1069	
CK1089	
CK1301	CK1301A
CK1301A	CK1301
CK1362	
CK1363	
5633	5634
5634	5633
5635	
5636	5636A
5636A	
5637	5719, 5719A, 5898
5638	
5639	5639A, 5639WA
5639A	5639WA
5639WA	
5640	5902, 5902A, 5902WA
5641	5641A, 7436*
5641A	7436*
5642	
5643	
5644	5644A
5644A	
5645	
5646	
5647	5647A
5647A	
5672	
5676	CK556AX, 6050
5677	CK568AX
5678	CK569AX
5697	CK570AX
5702	5702WA, 5702WB, 6148, CK605CX, CK623CX, 6540
5702WA	5702WB, 6148, 6540
5702WB	
5703	5703WA, 5703WB, 6149, CK608CX
5703WA	5703WB, 6149
5703WB	
5704	5704WA, CK606BX
5704WA	
5718	5718A
5718A	5718
5719	5719A

To Replace	Use
5719A	5719
5744	5744WA, 5744WB, 6151, CK619CX
5744WA	5744WB, 6151
5744WB	
5783	5783WA, 5783WB
5783WA	5783WB
5783WB	
5784	5784WA, 5784WB, 6150
5784WA	5784WB, 6150
5784WB	
5785	
5787	5787WA, 5787WB
5787WA	5787WB
5787WB	
5797	
5798	
5799	
5800	
5801	
5802	
5828	
5829	5829WA
5829WA	
5840	5840A
5840A	
5841	CK1038§
5851	6397*
5854	CK503AX
5873	
5875	
5884	
5885	
5886	CK571AX
5889	
5896	5896A, 6052
5896A	6052
5897	5718, 5718A
5898	5637, 5719, 5719A
5899	5899A
5899A	5899
5900	5899, 5899A
5901	5840, 5840A
5902	5902A, 5902WA
5902A	5902WA
5902WA	
5903	6053
5904	6055
5905	
5906	
5907	6056
5908	
5911	6008
5913	6007
5916	
5935	
5947	
5950	CK1037§, 6437§
5967	
5968	

* Parallel-filament circuits. § Mfrs. not vouch for mech. & elec. characteristics

To Replace	Use
5969	
5970	
5971	
5972	
5975	
5977	5977A
5977A	
5987	
5995	
6007	5913
6008	5911
6021	6021A, 6021WA
6021A	6021WA
6021WA	
6026	
6029	CK573AX
6049	
6050	5676, CK556AX
6051	
6052	5896, 5896A
6053	5903
6055	5904
6056	5907
6088	CK522AX, CK528AX
6092	
6110	
6111	6111A, 6111WA
6111A	6111WA
6111WA	
6112	6112A, 6112WA
6112A	6112WA
6112WA	
6119	
6121	
6143	
6147	6397
6148	5702WA, 5702WB, 6540
6149	5703WA, 5703WB
6150	5784WA, 5784WB
6151	5744WA, 5744WB
6152	
6169	
6193	
6195	
6205	6205A
6205A	
6206	6206A
6206A	
6213	
6221	
6222	
6223	6225, 7432
6224	
6225	6223, 7432
6245	
6247	6247WA
6247WA	
6281	CK574AX
6286	
6308	

To Replace	Use
6320	6321
6321	6320
6352	
6373	
6375	
6391	7434
6397	6147, 5851*
6418	
6419	
6436	CK1036
6437	CK1037, 5950§
6438	CK1039
6487	
6488	7433
6489	
6519	
6526	
6533	6533WA
6533WA	
6540	5702WA, 5702WB, 6148
6542	
6611	
6612	
6659	CK1042
6690	
6778	
6788	
6814	
6832	
6872	
6943	
6944	
6945	
6946	
6947	
6948	
6977	
6999	
7079	
7083	
7099	
7231	
7232	
7246	
7323	
7327	
7401	
7432	
7433	
7434	
7435	
7436	
7437	
7438	
7550	
7626	
7759	
7760	
7761	
7762	

* Parallel filament, [illegible]

To Replace	Use
7813	
7887	
7888	
7889	
7962	
7963	
7979	
7994	
7995	
8064	
8070	
8071	
8096	
8103	
8185	
8186	
8210	

To Replace	Use
8211	
8213	
8216	
8254	
8319	
8414	
8417	
8444	
8517	
8522	
8524	
8525	
8526	
8527	
8528	
8529	
8530	

ADDITIONAL SUBMINIATURE-TUBE SUBSTITUTIONS

Section 4

INDUSTRIAL SUBSTITUTES FOR RECEIVING TUBES

In this section are those American receiving tubes that can be replaced by industrial types. The receiving tubes are listed in the left-hand column and their industrial substitutes in the right-hand column. Each tube listed has one or more substitutes. If a tube type does not appear in the listing, an industrial substitute is not recommended.

This substitution list should be used in one direction only—that is, an industrial type to replace a standard type. If the equipment is already designed for an industrial tube, a standard receiving tube will not usually work as efficiently or as long as the original.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tube is wired in a parallel circuit.

To Replace	Use
0A2	0A2WA, 6073, 6626
0A4G	1267,WTT132
0B2	0B2WA, 6074, 6627
0C3	0C3W, VR105W, WT269
0D3	0D3W, VR150W, WT294
0Z4	1003, WTT114
0Z4A	1003
1F4	2101
1R4	1294
1R5	1R5WA
1T4	1T4WA
1U4	1U4WA, 5910
1U5	1U5WA
2A3	2A3W, 5930
2A6	1659
2X2	2B21, 879
2X2A	2B21
3B4	3B4WA
3B7	1291
3D6	1299
3Q5GT	WT389
3V4	3V4WA
5R4GY	5R4WGA, WGB, WGY, WGYA, 274B
5U4G	5U4WG, WGB, 5931, WTT135
5V4G	274
5Y3GT	5Y3WGT, WGTA, WGTB, 6087, 6106, 6853, WTT202
5Z3	1275, WT270X
5Z4	6087
6AB4	6664
6AB7	1853
6AC7	6AC7W, 6AC7WA, 6AC7Y, 1852, 6134
6AG5	6AG5WA, 6186
6AG7	6AG7W
6AH6	6AH6WA, 6485
6AJ5	7755
6AK5	6AK5W, WA, WB, 403A, 1220, 5654, 5591*, 6096, 6968
6AL5	6AL5W, 5726, 6058, 6097, 6663, 7631, D27
6AM5	6516
6AM6	6064, 7498
6AN5	6AN5WA
6AQ5	6AQ5W, 6005, 6095, 6669
6AR6	6AR6WA, 6098, 6384, 7756
6AS6	6AS6W, 409A, 5725, 6187*, 7752
6AS7G	6AS7GYB, 6080WA, 6080WB, 6520
6AT6	6066
6AU6	6AU6WA, 6AU6WB, 6136
6AV6	6066
6BA5	5638

To Replace	Use
6BA6	6BA6W, 6BA6WA, 5749, 6660, 7496
6BE6	6BE6W, 5750, 7502*
6BH6	6265*, 6661, 7693
6BJ6	6662, 7694
6BL8	7643*
6BQ5	7320
6BR7	6059
6BW6	6061
6C4	6C4W, 6C4WA, 6100, 6135*
6C5	WT390
6C6	1221, 1223, 7700, WTT131
6CB6	6676, 7732
6CH6	6132, 7499
6CL6	2014, 6197, 6297, 6677
6CQ6	6065
6CW4	7895
6CY5	7717, 8113
6DB6	6954
6DJ8	6922*
6DK6	8136
6DS4	7895
6F6	1611, 1621
6G6G	WTT130
6GE8	7734
6H6	6H6WGT, WTT103, WT261
6J4	6J4W, WA, 8532
6J5	6J5WGT, WTT129
6J6	6J6W, 6J6WA, 5964, 6030, 6045*, 6099, 6101, 6927*
6J7	1223, 1620, 7000
6K5	6K5WGT
6K7	5732
6K8	WTT128
6L6	6L6W, WA, WGA, WGB, WGT, 1622, 5932, WT6
6L7	1612, 1620
6N7	5694
6N7GT	WTT125
6Q5G	884, WT245
6Q7	6118
6SA7	6SA7WGT, 5961
6SC7	1655
6SG7	6006
6SJ7	6SJ7W, WGT, WGTY, 5693, WTT122
6SK7	6SK7W, 6SK7WA, 6SK7WGT, 6137
6SL7	6SL7W, 6SL7WGT, 5691*, 6113
6SN7	6SN7W, 6SN7WGT, 6SN7WGTA, 5692
6SQ7	6SQ7W
6SU7	6SU7WGT, 6188
6U6	6U6WGT
6U8	1252, 6678, 7731
6V6	5871, 7184, WTT123

* Parallel-filament circuits.

To Replace	Use
6X4	6X4W, WA, 6063, 6202, WTT100
6X5	6X5W, WGT, 5852*, WT308
6Y7G	1635
6Z4	WT263
7A6	5679
7AB7	1204
7AJ7	1273
7C4	1203, 1203A
7E5	1201
7F8	7F8W
7G7	1232
7G8	1206
7K7	WTT124
7Y4	1274*
12A6	12A6GTY, 5659
12AT7	12AT7WA, 12AT7WB, 6060, 6201, 6671, 6679, 7492, 7728, A2900
12AU7	12AU7W, 12AU7WA, 5814*, 5814A*, 5814WA*, 5963, 6067, 6189, 6680, 7316, 7489, 7730
12AX7	12AX7WA, 5721, 5751*, 5751WA*, 6057, 6681, 7494, 7729

To Replace	Use
12AY7	6072*
12BH7	6913
12BR7	8447
12BY7	7733, 8448
12C8	1664, 5660
12J5	12J5WGT
12L6GT	1632*
12L8GT	1644
12SC7	1634
12SK7	5661
12SL7GT	2C52*
12Z3	H250
14C7	1280
14GT8	7724
25B6G	5824
25L6GT	6046
25W6GT	6046
25Z6	25Z6WGT
26E6G	26E6WG, 26E6WGB
26Z5	26Z5W
28D7	28D7W, 1238
50B5	WTT126
80	213B, RE1, WT270
81	RE2
83	WT301
117N7GT	WTT115
117Z6GT	WT377
807	807W, 5933, WA, 8018

* Parallel-filament circuits.

ADDITIONAL INDUSTRIAL-TUBE SUBSTITUTIONS

Section 5

COMMUNICATIONS AND SPECIAL-PURPOSE TUBES

This section lists communications and special-purpose tubes. The listing is numerical instead of numerical-alphabetical. The tubes to be replaced are listed in the left-hand column and the recommended substitutes in the right-hand column.

The listing of a certain tube type as a substitute for another one does not necessarily mean the reverse is true. Always refer to the left-hand column for the original tube number. Then find the substitute in the right-hand column.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tube is wired in a parallel circuit.

To Replace	Use
RE1	80
2-15A/15R	4B30, 15R, 8022
2A3W	5930
2B21	2X2A
2C21	1642
2C22	7193
2C51	2C51W*, 396A, 1219, 5670*, 5670WA*, 6185, 6385*
2C51W	1219, 5670, 5670WA, 6185
2D21	2D21W, 5727
2D21W	5727
2RA3	213, 213A
2RA5	205
2RA6	206, 619
2RA15	203, 215
RE2	81
EL3B	6013
EL3C	4B24, 6484
4-125A	4D21, 4D21A, 6155
4-250A	4-250/5D22, 5D22, 6156
SN4	1D21, 631P1
5R4WGA	5R4WGB, 5R4WGY, 5R4WGYA
5R4WGB	5R4WGYA
5R4WGY	5R4WGA, 5R4WGB, 5R4WGYA
5R4WGYA	5R4WGB
5U4WG	5U4WGB, 5931
5U4WGB	5931
5Y3WGT	5Y3WGTA, 5Y3WGTB, 6087, 6106, 6853
5Y3WGTA	5Y3WGTA, 6087, 6106, 6853
5Y3WGTB	5Y4WGTA, 6087, 6106, 6853
ELC5F14	6278
6AC7W	6AC7WA, 6134
6AC7WA	6AC7W, 6134
6AG5WA	6186
6AK5W	6AK5WB, 5654
6AL5W	5726, 6097
6AQ5W	6005, 6095
6AR6WA	6098
6AS6W	5725, 6187
6AS7GYB	6080, 6080WA, 6080WB
6AU6WA	6AU6WB, 6136
6AU6WB	6136
6BA6W	5749
6BE6W	5750
6C4W	6C4WA, 6100, 6135*
6C4WA	6100, 6135*
6J6W	6J6WA, 6099, 6101
6J6WA	6099, 6101
6L6W	6L6WA, 6L6WGA, 6L6WGB, 5932
6L6WA	6L6WGA, 6L6WGB, 5932
6L6WGA	6L6WGB, 5932
6L6WGB	5881

To Replace	Use
6L6WGT	5932
6Q5G	884, 884W
6SJ7W	6SJ7WGT, 6SJ7WGTY
6SJ7WGT	6SJ7W, 6SJ7WGTY
6SJ7WGTY	6SJ7W, 6SJ7WGT
6SK7W	6SK7WA, 6SK7WGT
6SK7WA	6SK7W, 6SK7WGT
6SK7WGT	6SK7W, 6SK7WA
6SL7W	6SL7WGT, 6113
6SL7WGT	6SL7W, 6113
6SN7W	6SN7WGT, 6SN7WGTA
6SN7WGT	6SN7W, 6SN7WGTA
6SN7WGTA	6SN7W, 6SN7WGT
6SU7WGT	6188
6X4W	6X4WA
6X5W	6X5WGT
6X5WGT	6X5W
EL6B	6I8, 6I8P, 5892
WT6	6L6
12AT7WA	6201
12AT7WB	6201
12AU7WA	6189
12AX7WA	5721, 6057, 7494, 7729
D27	6AL5
RK28	803
31Z	1231Z
RK31	830B
TE36	6754
RK39	807
TE40	6888
HZ50	12Z3
RK57	805
RK58	838
T60	8005
HY61	807
WTT100	6X4
WTT102	5Y3GT
WTT103	6H6
CK108	77
HY113	HY123
WTT114	OZ4
HY115	HY145
WTT115	117N7GT
WTT117	5557
WTT118	105
WTT119	172
WTT122	6SJ7
HY123	HY113
WTT123	6V6
WTT124	7K7
HF125	203H
HY125	HY155
WTT125	6N7GT
WTT126	5085
WTT127	833A
WTT128	6K8
WTT129	6J5GT
WTT130	6G6G
WTT131	6C6
WTT132	OA4G

* Parallel-filament circuits.

To Replace	Use
WTT135	5U4G
HY145	HY115
WTT149	172
VR150W	OD3W
HY155	HY125
WT210-0001	2D21
WT210-0003	884
WT210-0004	2050
WT210-0006	6H6
WT210-0009	6Z4
WT210-0011	OC3
WT210-0012	80
WT210-0013	5Z3
WT210-0018	OD3
WT210-0019	83
WT210-0021	6X5
WT210-0025	117Z6GT
WT210-0028	3Q5GT
WT210-0029	6C5
WT210-0037	117L7/M7GT
WT210-0040	6X4
WT210-0042	5Y3GT
WT210-0048	5U4G
WT210-0060	OZ4
WTT210-0062	5557
WTT210-0069	5557
WT210-0081	6SJ7
WT210-0082	6V6
WT210-0083	7K7
WT210-0084	6N7
WT210-0085	5085
WT210-0087	6K8
WT210-0088	6J5
WT210-0089	6G6G
WT210-0090	6C6
WT210-0091	OA4G
213B	80
UV216	81
UX216B	81
WT245	884
WT246	2050
H250	6C6
259A	259B
259B	259A
WT261	6H6
WT263	6Z4
264	864
WT269	OC3
WT270	80
WT270X	5Z3
274	5V4G
274B	5R4GY
WT294	OD3
WT301	83
WT308	6X5GT
310A	310B
310B	310A
S340	5960
WT377	117Z6GT
WT389	3Q5GT

To Replace	Use
WT390	6C5
396A	2C51, 2C51W*, 1219*, 5670*, 5670WA*, 6185, 6385*
398A	5603
401A	5590
403A	6AK5
403B	5591
404A	5847
408A	6028
409A	6AS6
412A	6754
417A	417B, 5842
420A	5755
421A	5998
423A	6140
WT606	2D21
WL630	2050
WL630A	2050
731A	6AK5
807	807W, 807WA, RK39, HY61, 5933, 5933WA, 8018
807W	807WA, 5933, 5933WA
807WA	807W, 5933, 5933WA
879	2X2
884	884W, 6Q5G
885	2B4
932	1229
CK1003	OZ4A
CK1009	CK1009A, BA
C1106	6AZ6
NU1106	6AZ6
1201	7E5, 1201A
1201A	7E5, 1201A
1203	7C4, 1203A
1203A	7C4, 1203
1204	7AB7
1206	7G8
1216	5844
1217	6BE6, 5915, 5915A, 7036
1219	2C51W, 5670, 5670WA, 6185, 6385*
1221	6C6
1223	6J7, 1620, 7000
1225	6L7
1229	932
1231	7V7
1231Z	31Z
1232	7G7
1273	7AJ7
1274	7Y4*
1275	5Z3
1280	14C7
1282	7W7
1288	3B7, 1291, 1292
1291	3B7, 1288, 1292
1292	3B7, 1288, 1291
1294	1R4
1299	3D6

To Replace	Use
1381HQ	6AK5
1603	6C6, 7700
1611	6F6
1612	6L7
1613	6F6
1614	6L6
1620	6J7, 1223, 7000
1621	6F6
1622	6L6
1632	12L6
1634	12SC7
1642	2C21
1644	12L8GT
1649	6AC7
1650	955
1655	6SC7
1657	2050, 2050A, 2050W
1659	2A6
1662	3A4
1664	12C8
1665	2050, 2050A, 2050W
1852	6AC7
1853	6AB7
2013	6211
2014	6CL6, 6197
2050	1657, 1665, 2050A, 2050W
2050A	1657, 1665, 2050, 2050W
2935A	81
3841	80
3871	50
3872	30
3873	32
3921	45
3924	24A
4465	35
4610	36
4611	37
4612	38
5517	1B48, CK1013
5556	PJ8
5588	6161
5590	401A
5591	403B
5603	398A
5654	6AK5W, 6AK5WB, 1220, 6096
5659	12A6
5660	12C8
5661	12SK7
5667	889RA
5670	2C51W, 1219, 5670WA, 6185, 6385*
5687	5687WA
5721	12AX7WA, 6057, 7494, 7729
5725	6AS6W, 6187
5726	6AL5W, 6097
5727	2D21W
5731	955
5742	PJ7

To Replace	Use
5743	PJ21
5749	6BA6W
5750	6BE6W
5751	5751WA
5755	420A
5759	501R
5762	7C24, 5762A
5763	6062
5767	6481
5771	356
5794	5794A, 6562
5794A	6562
5814	5814A, 5814WA
5814A	5814WA
5824	25B6G
5842	417A, 417B
5844	1216
5847	404A
5871	6V6GT
5881	6L6WGB, 7581, 7581A
5894	9903
5910	1U4, 1U4WA
5915	6BE6, 1217, 5915A, 7036
5915A	6BE6, 1217, 5915, 7036
5923	9904
5930	2A3W
5931	5U4WGB
5932	6L6WGA, 6L6WGB
5933	807, 807W, 807WA, 5933WA
5933WA	807, 807W, 807WA, 5933
5992	6V6GT*
6005	6AQ5W, 6095
6028	408A
6058	6AL5W, 5726, 6097
6063	6X4, 6X4W, 6X4WA
6073	OA2WA, 6626
6074	OB2WA, 6627
6075	9907
6076	9907R
6077	9906
6078	9906R
6079	9908
6080	6080WA, 6080WB
6080WA	6080WB
6080WB	6080WA
6083	9909
6087	5Y3WGTB, 6106, 6853
6095	6AQ5W, 6005
6096	6AK5W, 5654
6097	6AL5W, 5726
6098	6AR6WA
6099	6J6WA, 6101
6100	6C4WA, 6135*
6101	6J6WA, 6099
6106	5Y3WGT, 5Y3WGTA, 5Y3WGTB, 6853
6113	6SL7W, 6SL7WGT
6134	6AC7W, 6AC7WA
6135	6C4WA*, 6100*

* Parallel filament circuit

To Replace	Use
6136	6AU6WA, 6AU6WB
6146	8042
6146B	8298A
6155	4-125A, 4D21
6161	5588
6166A	7007
6185	2C51W, 1219, 5670, WA
6186	6AG5WA
6187	6AS6W, 5725*
6188	6SU7WGT
6189	12AU7WA
6197	2014
6201	12AT7WA, 12AT7WB
6211	2013
6252	9910
6485	6AH6WA
6582	TE35
6626	OA2WA, 6073
6627	OB2WA, 6074
6660	6BA6, 6BA6W, 5749
6661	6BH6
6662	6BJ6
6663	6AL5, 6AL5W, 5726, 6058, 6097
6664	6AB4
6669	6AQ5A, 6AQ5W, 6005, 6095
6676	6CB6
6677	6CL6
6678	6U8A
6679	12AT7, 12AT7WA, 12AT7WB, 6201
6680	12AU7A, 12AU7WA, 6189, 7730
6681	12AX7, 12AX7WA, 5721, 6057, 7494, 7729
6754	TE36, 412A
6853	5Y3WGT, 5Y3WGTA, 5Y3WGTB, 6087, 6106
6888	TE40
6939	7645
6968	6AK5
6979	4X250B
7000	6J7, 1223, 1620
7007	6166A
7025	12AX7, 7025A
7025A	12AX7, 7025
7027	7027A
7034	4X150A
7035	4X150D, 7609
7036	6BE6, 1217, 5915, 5915A
7054	8077
7184	6V6
7189	7189A
7247	12DW7
7408	6V6GT
7494	12AX7WA, 5721, 6057, 7729
7543	6AU6, 6AU6WA, 6AU6WB, 6136
7581	7581A
7645	6939
7700	6C6, 1603
7729	12AX7WA, 5721, 6057, 7494
7730	12AU7WA, 6189
7752	6AS6
7755	6AJ5
7756	6AR6
7867	6EX6*
8016	1B3GT
8018	807
8077	7054

Section 6

FOREIGN SUBSTITUTES FOR AMERICAN TYPES

This section lists foreign substitutes for American tubes. Refer to this section only after checking for an American substitute in Sections 1, 3, 4, and 5.

American tubes are shown in the left-hand column; foreign equivalents are in the right-hand column. Only those American types which can be replaced with foreign brands have been included. For a list of foreign types with American equivalents, refer to Section 7.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tube is wired in a parallel circuit. Those tubes marked with a section symbol (§) may not work in all circuits.

To Replace	Use
OA2	15OC2, 15OC4, M8223, STV105/30
OA3	KD21
OA4G	PL1267, Z300T
OB2	108C1, M8224, STV108/30
OC3	KD24
OD3	15OC3, KD25
OE3	85A1
OG3	85A2
1A3	1D13, DA90
1A5G	DL31
1A7GT	DK32, X14
1AB6	1C3, 1H35, DK96, X25
1AC6	1C2, DK92, X18, X20
1AD4	DF62
1AF4	1F1, DF96, W25
1AF5	1FD1, DAF96, ZD25
1AH5	1FD1, DAF96, ZD25
1AJ4	1F1, DF96, W25
1AM4	1F1, DF96, W25
1AN5	DF97
1AQ5	1H33
1AR5	1FD1, DAF96, ZD25
1AS5	DAF92*
1B3GT	DY30, U41
1C5GT	DL35, DL36, N14
1DN5	DAF92
1E3	DC80
1F5G	KL35*
1G3GT	DY30, U41
1H5GT	DAC32, HD14
1J3	DY30, U41
1K3	DY30, U41
1L4	1F2, DF92
1M3	DM70, DM71, Y25
1N3	DM71, DM70, Y25
1N5GT	DF33, Z14
1Q5GT	DL35, DL36, N14
1R5	1C1, DK91, X17, 1H33*
1R5SF	1H33
1S2	1RK23, DY86, DY87
1S2A	DY87
1S4	DL91
1S5	1FD9, DAF91, ZD17
1T2	R16, U37
1T4	1F3, DF91, W17
1T4SF	1F1, DF96, W25
1T5GT	DL31
1U4	DF904
1U5	DAF92
1V	AD
1V6	DCF60
1X2	DY80, R19
1X2A	DY80, R19
2B35	6D1, EA50, T6D
2D21	20A3, E91N, EN91, M8204, PL21
2ER5	XC95, XC97
2FY5	XC95, XC97

To Replace	Use
2HA5	XC900
2J2	R20, U26, U49
3A4	DL93
3A5	DCC90
3AJ8	XCH81
3AL5	XAA91
3AU6	XF94
3B4	DL98, HD30
3B5GT	DL33, N15, N16
3BX6	XF80, XF85
3BY7	XF80, XF85
3BZ6	3M-V7
3C4	1P1, DL96, N25
3C5GT	DL33, N15, N16
3D6	DL29
3DK6	3M-R24
3E5	1P1, DL96, N25
3EH7	XF183, XF184
3EJ7	XF183, XF184
3ER5	YC95
3FY5	YC97
3HA5	LC900
3Q4	DL95, N18
3Q5GT	DL33, N15, N16
3S4	1P10, DL92, N17
3V4	1P11, DL94, N19
4BC8	4R-HH2
4BL8	5R-HP1, XCF80
4BS8	4R-HH2
4CM4	PC86
4EH7	LF183, YF183
4EJ7	LF184, YF184
4ES8	4R-HH8, XCC189
4GJ7	XCF801
4GK5	PC95
4HA5	PC900
4KN8	4R-HH8
5AR4	52KU, 53KU, 54KU, GZ30, GZ32, GZ33, GZ34, GZ37, R52, U54, U77
5AW4	U54
5AX4GT	U54
5BK7A	4R-HH2
5CG4	OSW3107
5EA8	XCF80
5GJ7	LCF801
5HG8	LCF86
5J6	5M-HH3
5T4	GZ31, U52
5U4G	5Z10, GZ32, U52
5U8	XCF80
5U9	LCF201
5V4G	52KU, 53KU, 54KU, GZ30, GZ32, GZ33, GZ34, OSW3107, R52, U54
5V9	LCH200
5W4	U50, U51
5X9	LCF200
5Y3GT	U50, U52

* Parallel-filament circuits. ‡ May not work in all circuits.

To Replace	Use
5Z4	52KU, 53KU, 54KU, GZ30, GZ32, GZ33, GZ34, OSW3107, R52, U54, U77
5Z4G	52KU, GZ30, R52, U77
6A6	B63
6A8	PH4, X63
6AB4	EC92
6AB7	6F10, OSW2190, OSW2600
6AB8	63TP, ECL80, LN152
6AC7	6F10, OSW2190, OSW2600
6AD8	6FD12, EBF80, EBF81, EBF89, WD709, ZD152
6AF3	EY88*
6AF4	EC94
6AF7G	64ME*, EM34*
6AG5	EF96
6AG7	6L10, OSW2192, OSW2601
6AH6	6F36
6AJ4	EC84
6AJ5	6F35
6AJ7	6F10, OSW2190, OSW2600
6AJ8	6C12, 20D4, ECH81, X719
6AK5	6F32, DP61, E95F, EF95§, EF905, M8100§, PM05§
6AK7	6L10, OSW2192, OSW2601
6AK8	6LD12, DH719, EA8C80
6AL3	EY88
6AL5	6B32, 6D2, D2M9, D77, D152, D717, DD6, EAA91, EB91, EAA901, EAA901S
6AM5	6P17, 7D9, 16A, DD7, DDR7, EL91, M8082*
6AM6	6F12, 8D3, EF91, HP6, M8083, PM07, QA2403, QZ77, R144, S6F12, SP6, Z77
6AN7	ECH80
6AQ4	6L34, EC91, M8099
6AQ5	6L31, BPM04, EL90, M8245, N727
6AQ8	6L12, B719, ECC85
6AS6	6F33, M8196
6AS7G	A1834, ECC230
6AT6	6BC32, DH77, EBC90, EBC91
6AU4GT	6G-K17
6AU6	EF94
6AV4	6FX4*, EZ91
6AV6	6BC32, DH77, EBC90, EBC91
6AW6	EF190
6B8	EBF32*
6BA6	6F31, EF93, M8101, PM04, W727
6BC5	EF96
6BD7	EBC80, EBC81, 6LD13*
6BE6	6H31, EK90, HM04, X77, X727

To Replace	Use
6BE7	EQ80
6BH5	EF81
6BH6	E90F
6BJ5	N78
6BJ6	E99F
6BK6	6BC32, DH77, EBC90, EBC91
6BK8	EF83
6BL8	6C16, ECF80, EB0CF*
6BM5	6L31, 6P9, EL90, N727
6BM8	6PL12, ECL82
6BN5	EL85, N155
6BQ5	6P15, EL84, E84L, N709
6BQ6GT	6G-B6
6BQ7A	ECC180
6BR3	EY88*
6BR5	55ME, EM80, EM81
6BR7	BD5
6BS7	BD7
6BS8	6R-HH2
6BT4	66KU, EZ40, U150, U718*, UU9*, V61
6BT6	6BC32, DH77, EBC90, EBC91
6BW7	6F23, 8D6, EF80
6BX4	EZ91*
6BX6	8D6, 64SPT, EF80, Z152, Z719
6BX8	6R-HH2, ECC180
6BY6	6H31, EH90, EK90
6BY7	6F19, 6F26, EF85, W719
6C4	EC90, L77, M8080, QA2401, QL77
6C5	L63, OSW3112
6CA4	EZ81, U709, UU12
6CA7	7D11, 12E13, EL34, KT77, KT88
6CB6	EF190
6CD7	64ME, EM34
6CE5	EF96
6CF6	EF190
6CH6	7D10, EF82, EL821, EL822
6CJ5	6C15, 6F16, 7F16, 62VP, EF41, HF61, W150
6CJ6	EL81, EL820
6CK5	67PT, BF61, EL41, N150
6CK6	EL83, EL820, EL803§
6CL6	6L43
6CM4	EC86, E86C*, ECB06S*
6CM5	6G-B7, EL36, EL360
6CN6	5P29, EL38
6CQ6	6F21, 9D6, EF92, M8161, QA2400, QW77, V177, V884, VP6, W77
6CS6	6H31, EH90, EK90
6CT7	D61§, EAF42, WD150
6CU6	6G-B9
6CU7	62TH, ECH42, ECH43, ECH113, 6C9*, 6C10*, X150*

* Parallel-filament circuits. § May not work in all circuits.

To Replace	Use
6CV7	6LD3, 62DDT, DH150, DH718, EBC41
6CW5	EL86
6CW7	6L16, ECC84
6D4	EN93
6D8	X73*, X73M*
6DA5	65ME, EM80, EM81
6DA6	EF89
6DC6	EF190
6DC8	6FD12, EBF85, EBF89
6DG7	EF89F
6DJ8	ECC88, ECC189, E88CC*
6DL4	EC88
6DL5	EL95
6DQ6A	6G-B9
6DR6	EL81, EL820
6DR8	EBF83
6DS8	ECH83
6DT8	6AT7N
6DX8	ECL84
6DY5	EL82
6E5	6S5G, OSW3110
6E8G	X61M, X147, ECH35*, TH62*
6EB5	6B32, 6D2, D2M9, D77, D152, D717, DD6, EAA91, EB91, EAA901, EAA901S
6EC4	EY500
6EC7	6F18, W739
6EH7	6F25, 6F29, EF183, EF811
6EJ7	6F24, 6F30, EF184, EF814
6EL7	6F23, EF812, Z749
6ER5	EC95, EC97*
6ES6	EF97, EF98
6ES8	ECC88, ECC189
6ET6	EF97, EF98
6F5GT	H63
6F6G	KT63
6FC7	ECC89
6FD6	EF97, EF98
6FG6	EM84, EM840
6FW8	6R-HH8, ECC88*, ECC189*
6FY5	EC95*, EC97
6GA8	6/30L2, B729, ECC804
6GB5	EL500
6GJ7	ECF801
6GM8	ECC86
6GV7	6C18, ECF805
6GV8	ECL85
6GW8	ECL86
6H5G	6M1
6H6	D63, EB34*, OSW3109
6HA5	EC900
6HC8	ECL82*
6HG5	6L31, 6P9, EL90, N727
6HG8	ECF86
6HL8	6C16, ECF80
6HM5	EC900
6HQ5	EC900
6HQ6	EF190

To Replace	Use
6HU6	EM87
6HU8	ELL80
6J4	6M-H1, M8232, TM12
6J5	L63, L63B, OSW3112
6J6	6CC31, 6M-HH3, ECC91, M8081, T2M05
6J7	A863, EF37*, Z63
6J7GT	A863, KTW63, KTZ63, KTZ63M, Z63, EF37*
6JW8	ECF802
6JX8	ECH84
6K7	PF9, W61, W63, EF39*, OM6*, W147*
6KN8	6R-HH8, ECC88*, ECC189*
6L6	EL37
6L6GC	KT66
6L7	X64
6LN8	LCF80
6LX8	LCF802
6M5	EL80
6M6G	EL33*, KT61*, N147*, PP6BG§
6N3	EY80, EY82
6N8	EBF80, EBF81, WD709, ZD152
6Q4	EC80
6Q7	DH63
6R3	63VP*, EY81, EY83*, EY88*
6R4	EC81
6R8	6LD12, DH719, EABC80
6S2	EY86, EY87
6S2A	EY87
6S7	OF1, OM5*
6SA7	OSW3104
6SK7	OSW3111
6SL7	ECC35*
6SN7GT	13D2, B65, ECC32*, QA2408, QB65
6SQ7	OSW3105
6T8	6LD12, DH719, EABC80
6U3	EY80
6U8	ECF80, ECF82
6U9	ECF201
6V3	EYB1F
6V4	EZ80
6V6GT	OSW3106*
6V9	ECH200
6W7G	BD4*
6X2	EY51, R12, SU61, U43, U45, U151
6X4	6Z31, E90Z, EZ90, EZ900, U707, V2M70, QA2407*, U78*
6X5G	EZ35, U147, U70*
6X9	ECF200
6Y9	EFL200
6Z3	AD
7A7	W81, W148, EF22*, W143*
7AN7	30L1, 30L15, B319, PCC84

To Replace	Use
7AU7	PCC186, XCC82
7B5	EL22, KT81, N148
7B6	DH81, DL82
7B7	W149
7C5	EL22, KT81, N148
7C6	DH149
7DJ8	PCC88, PCC189
7ED7	30F5, Z329
7EK7	30L15, B349, PCC805
7ES8	PCC88, PCC189
7FC7	PCC84, PCC89
7GV7	30C18, PCF805
7H7	EF22*, W143*, W148
7S7	X81, X148
7Y4	U82*, U149
8A8	30C1, LZ319, LZ329, PCF80 PCF82
8B8	8R-HP1, XCL82
8BQ5	XL84
8CW5	XL86
8GJ7	PCF801, PCF806
8HG8	PCF86
8U9	PCF201
8X9	PCF200
9A8	30C1, LZ319, LZ329, PCF80
9AK8	PABC80
9AQ8	PCC85
9BM5	9P9
9EA8	30C1, LZ319, LZ329, PCF80, PCF82
9EN7	30C15, LZ339, PCF800
9GB8	30FL1, PCE800
9GV8	XCL85
9U8	30C1, LZ319, LZ329, PCF80, PCF82
9V9	PCH200
10CW5	LL86
10DE7	9R-AL1
10DX8	LCL84
11Y9	LFL200
12A8	OH4
12AC5	10F9, 121VP, HF121, UF41, W118, W142, W145
12AD7	6L13*
12AF3	12R-K19
12AH8	20D3
12AJ7	HCH81
12AL5	10D2, HAA91, UB91
12AT6	12BC32, HBC90, HBC91
12AT7	B152, B309, B739, ECC81, ECC801, ECC801S, E81CC, M8162, QA2406, QB309
12AU6	12F31, HF93, HF94
12AU7	B329, B749, E82CC, ECC82, ECC186, ECC802, ECC802S, M8136
12AV6	12BC32, HBC90, HBC91
12AV7	12R-LL3§

To Replace	Use
12AX7	6L13, B339, B759, E83CC, ECC83, ECC803, M8137
12BA6	12F31, HF93, HF94
12BE6	12H31, HK90
12BK6	12BC32, HBC90, HBC91
12BQ6GT	12G-B6
12BR3	12R-K19
12BT6	12BC32, HBC90, HBC91
12BX6	10F18*, W119*
12BY7	EL180
12C8	VP12D
12CS6	12H31, HK90
12DF7	6L13, B339, B759, ECC83, ECC803
12DT7	6L13, B339, B759, ECC83, ECC803
12F8S	30P12
12HU8	PLL80
12K7	W76
12K7GT	OF5, W76
12K8	X71M, X76M
12Q7GT	DH74, DH76, DL74M
12S7	UAF42§, WD142§
12SN7GT	13D2, B36
12SQ7	OBC3
12SX7GT	B36
12X4	HZ90
12Z3	HZ90
13CM5	12G-B7, XL36
13EC7	10F18, W110, W119
13GB5	XL500
13GC8	30PL1, 30PL10, LN319
14G6	10LD13, DH119, UBC81
14K7	14ITH, UCH42, UCH43, X142
14L7	10LD3, 141DDT, DH118, DH142, UBC41
14Z3	HZ90
15A6	N153, N309, PL83
15CW5	30P18, N379, PL84
15DQ8	PCL84
16A5	30P16, 30P18, 163PEN, N154, N329, N379, PL82, PL84
16A8	30PL12, N369, PCL82
16AQ3	XY88
16GK8	30PL13, 30PL14, PCL88, PCL800
16Y9	PFL200
17C8	17N8, 171DDP, UBF80
17EW8	HCC85
17N8	UBF80
17Z3	A61, PY81, PY83, PY800, PY801, U153, U193, U251, U349
18FW6	19M-R9
18FX6	X107§
18GD6	19M-R9
18GV8	PCL85
19AQ5	HL90

* Parallel-filament circuits. § May not work in all circuits.

To Replace	Use
19C8	HABC80
19CS4	U191, U339
19D8	10C14, 19AJ8, UCH81, X119
19T8	HABC80
19X3	19BD, 19U3, 19W3, PY80, U152, U309
19Y3	19SU, PY82, U154, U192, U319
20AQ3	LY88
21A6	213PEN, N152, N339, N359, PL81, PL820
25BQ6GT	25G-B6
25E5	30P4, 30P19, N308, PL36
20GF6	30P4, 30P19, N389, PL302
25L6	KT32
25W6GT	KT32
25Z4GT	U31
27GB5	PL500
27KG6	LL505
28EC4	LY500
28GB5	PL500
30A5	HL94
30AE3	PY88
31A3	311SU, U118, U142, U145, U404, UY41, UY42, V311, V312
35C5	HL94
35W4	HY90
35Z4GT	U74, U76
38A3	U119, U381, UY85
40KG6	PL505
42EC4	PY500
45A5	10P14, 451PT, BF451, N142, UL41, UL46
45B5	10P18, N119, UL84
50BM8	10PL12, LN119, UCL82
50C5	HL92
50L6GT	KT71
55N3	UY82
807	4Y25, 5S1, P17A, QE06/50, QV05-25
954	E1F, ZA2*
955	UN955
956	E2F
957	D1C
958A	D2C
959	D3F
5636	EF730
5642	DY70

To Replace	Use
5654	E95F
5678	DF60
5726	EAA901
5763	QE03/10, QV03-12
5840	EF732, M8121
5847	6R-R8C
5852	EZ35, U70, U147
5861	EC55
5899	EF731
5902	EL71
5911	DF67
5920	E90C, E90CC
6008	DF67
6057	ECC803
6060	ECC801
6063	EZ900
6080	A1834, ECC230
6084	E80F
6085	E80CC
6146	QE05/40, QV06-20
6158	13D3
6159	QE05/40H
6189	E82CC, ECC802
6205	EF734
6218	E80T
6227	E80L
6252	QQE03/20, QQV03-20
6267	8D8, 6F22, EF86, EF87, EF806S, M8195, Z729
6360	QQE03/12, QQV03-10
6374	EY84
6443	EY84
6550	7D11, 12E13, KT88
6686	E81L
6687	E91H
6688	E180F
6922	E88CC
6939	QQE02/5, QQV02-6
7025	B339, B759, ECC83, M8137
7027	KT66
7027A	KT88
7308	E188CC
7408	OSW3106
7543	EF94
7581	KT66, KT77
8223	E288CC
8233	E55L
9905	QQC04/15
9910	QQE03/20, QQV03-20

* Parallel-filament circuits. § May not work in all circuits.

ADDITIONAL FOREIGN SUBSTITUTES FOR AMERICAN TUBES

ADDITIONAL FOREIGN SUBSTITUTES FOR AMERICAN TUBES

Section 7

AMERICAN SUBSTITUTES FOR FOREIGN TYPES

This section lists American substitutes for foreign tubes. Foreign tubes are shown in the left-hand column; American equivalents are in the right-hand column. Only those foreign types which can be replaced with American brands have been listed. For a list of foreign equivalents for American types, refer to Section 6.

In most cases, there is only one American replacement shown as a direct equivalent to the foreign type. Other equivalents for the American replacement are listed in Sections 1, 3, 4, and 5. For example, the American replacement for the 6F10 is the 6AC7. If a 6AC7 is not available, Section 1 shows that a 6AJ7 can be used as a substitute. Therefore, the 6AJ7 can be used as a substitute for the 6F10.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tube is wired in a parallel circuit. Those tubes marked with a section symbol (§) may not work in all circuits.

To Replace	Use
1C1	1R5
1C2	1AC6
1C3	1AB6
1D13	1A3
1F1	1AJ4
1F2	1L4
1F3	1T4
1FD1	1AH5
1FD9	1S5
1H33	1AQ5, 1R5SF, 1R5*
1H35	1AB6
1P1	3C4
1P10	3S4
1P11	3V4
1RK23	1S2
3M-R24	3DK6
3M-V7	3BZ6
4R-HH2	4BS8
4R-HH8	4KN8
4Y25	807
5M-HH3	5J6
5P29	6CN6
5R-HP1	4BL8
5S1	807
5Z10	5U4G
6/30L2	6GA8
6AT7N	6DT8
6B32	6AL5
6BC32	6AV6
6C9	6CU7*
6C10	6CU7*
6C12	6AJ8
6C15	6CJ5
6C16	6BL8
6C18	6GV7
6CC10	5692
6CC31	6J6
6CC42	5670
6CF8	6267
6D1	2B35
6D2	6AL5
6F10	6AC7
6F12	6AM6
6F16	6CJ5
6F18	6EC7
6F19	6BY7
6F21	6CQ6
6F22	6267
6F23	6EL7
6F24	6EJ7
6F25	6EH7
6F26	6BY7
6F29	6EH7
6F30	6EJ7
6F31	6BA6
6F32	6AK5
6F33	6AS6
6F35	6AJ5

To Replace	Use
6F36	6AH6
6FD12	6DC8
6FX4	6AV4*
6G-B3A	6BQ6GT
6G-B9	6GW6
6G-B6	6DQ6A
6G-K17	6AU4GT
6H31	6BE6
6L10	6AG7
6L12	6AQ8
6L13	12AX7
6L16	6CW7
6L31	6AQ5
6L34	6AQ4
6L43	6CL6
6LD3	6CV7
6LD12	6AK8
6LD13	6BD7
6M1	6U5G
6M-M1	6J4
6M-HH3	6J6
6P9	6BM5
6P15	6BQ5
6P17	6AM5
6PL12	6BM8
6R-HH2	6BS8
6R-HH8	6KN8
6R-R8C	5847
6S5G	6E5
6V3P	6R3*
6Z4	6BX4
6Z31	6X4
7D9	6AM5
7D10	6CH6
7D11	6550
7F16	6CJ5
8D3	6AM6
8D4	6W7G*
8D5	6BR7
8D6	6BW7
8D7	6BS7
8D8	6267
8R-HP1	8B8
9D6	6CQ6
9P9	9BM5
9R-AL1	10DE7
10C14	19D8
10F9	12AC5
10F18	13EC7
10LD3	14L7
10LD13	14G6
10P18	45B5
10PL12	508M8
12BC32	12AV6
12E13	6550
12F31	12BA6
12G-B3	12GW6
12G-B6	12BQ6GT
12G-B7	13CM5
12G-K17	12D4A

To Replace	Use
12H31	12BE6
12R-K19	12BR3
13D2	65N7GT
13D3	6158
16A	6AM5
17N8	17C8
18AK5	6028
19AJ8	19D8
19BD	19X3
19M-R9	18GD6
19SU	19Y3
19U3	19X3
19W3	19X3
20A3	2D21
20D3	12AH8
20D4	6AJ8
25G-B6	25BQ6GT
30C1	9A8
30C15	9EN7
30C18	7GV7
30F5	7ED7
30FL1	9GB8
30L1	7AN7
30L15	7EK7
30P4	25GF6
30P12	12FB5
30P16	16A5
30P18	15CW5
30P19	25GF6
30PL1	13GC8
30PL10	13GC8
30PL12	16A8
30PL13	16GK8
30PL14	16GK8
52KU	5Z4G
62DDT	6CV7
62TH	6CU7
62VP	6CJ5
63TP	6AB8
64ME	6CD7
64SPT	6BX6
65ME	6BR5
66KU	6BT4
67PT	6CK5
85A1	OE3
85A2	OG3
108C1	OB2
121VP	12AC5
141DDT	14L7
141TH	14K7
150C2	OA2
150C3	OD3
150C4	OA2
163PEN	16A5
171DDP	17C8
213PEN	21A6
311SU	31A3
451PT	45A5
A61	17Z3
A863	6J7GT

* Parallel-filament circuits. ‡ May not work in all circuits.

To Replace	Use
A1834	6AS7G
AD	6Z3
B36	12SN7GT
B63	6A6
B65	6SN7GT
B152	12AT7
B309	12AT7
B319	7AN7
B329	12AU7
B339	12AX7
B349	7EK7
B719	6AQ8
B729	6GA8
B739	12AT7
B749	12AU7
B759	12AX7
BF61	6CK5
BF451	45A5
BPM04	6AQ5
D1C	957
D2C	958A
D2M9	6AL5
D3F	959
D61	6CT7§
D63	6H6
D77	6AL5
D152	6AL5
D717	6AL5
DA90	1A3
DAC32	1H5GT
DAF91	1S5
DAF92	1U5
DAF96	1AH5
DC80	1E3
DCC90	3A5
DCF60	1V6
DD6	6AL5
DD7	6AM5
DDR7	6AM5
DF33	1N5GT
DF60	5678
DF62	1AD4
DF67	5911, 6008
DF91	1T4
DF92	1L4
DF96	1AJ4
DF97	1AN5
DF904	1U4
DH63	6Q7
DH74	12Q7GT
DH76	12Q7GT
DH77	6AT6
DH81	7B6
DH118	14L7
DH119	14G6
DH142	14L7
DH149	7C6
DH150	6CV7
DH718	6CV7
DH719	6AK8
DK32	1A7GT
DK91	1R5
DK92	1AC6
DK96	1AB6
DL29	3D6
DL31	1A5G
DL33	3Q5GT
DL35	1C5GT
DL36	1Q5GT
DL82	7B6
DL91	1S4
DL92	3S4
DL93	3A4
DL94	3V4
DL95	3Q4
DL96	3C4
DL98	3B4
DM70	1M3
DM71	1N3
DP61	6AK5
DY30	1B3GT
DY70	5642
DY80	1X2A
DY86	1S2
DY87	1S2A
E1F	954
E2F	956
E55L	8233
E80CC	6085
E80F	60B4
E80L	6227
E80T	6218
E81CC	12AT7, 6201
E81L	6686
E82CC	12AU7
E88C	6DL4, 8255
E88CC	6922
E90C	5920
E90CC	5920
E90F	6BH6
E90Z	6X4
E91H	6687
E95F	6AK5
E99F	6BJ6
E180F	6688
E188CC	7308
E288CC	8223
EA50	2B35
EAA91	6AL5
EAA901	5726
EABC80	6AK8
EAF41	6CT7§
EAF42	6CT7
EB34	6H6*
EB91	6AL5
EBC41	6CV7
EBC80	6BD7
EBC81	6BD7
EBC90	6AT6
EBC91	6AV6
EBF32	6B8*
EBF80	6N8
EBF81	6AD8
EBF83	6DR8
EBF85	6DC8
EBF89	6DC8
EC55	5861
EC80	6Q4
EC81	6R4
EC84	6AJ4
EC86	6CM4
EC88	6DL4, 8255
EC90	6C4
EC91	6AQ4
EC92	6AB4
EC94	6AF4
EC95	6ER5
EC97	6FY5
EC806S	6CM4
EC900	6HA5
ECC32	6SN7GT
ECC35	6SL7*
ECC70	6021
ECC81	12AT7
ECC82	12AU7
ECC83	12AX7
ECC84	6CW7
ECC85	6AQ8
ECC86	6GM8
ECC88	6DJ8
ECC89	6FC7
ECC91	6J6
ECC180	6BQ7A
ECC186	12AU7
ECC189	6ES8
ECC230	6080
ECC801	6060
ECC802	6189
ECC803	6057
ECC804	6GA8
ECF80	6BL8
ECF82	6U8
ECF86	6HG8
ECF200	6X9
ECF201	6U9
ECF801	6GJ7
ECF802	6JW8
ECF805	6GV7
ECH35	6E8G*
ECH42	6CU7
ECH80	6AN7
ECH81	6AJ8
ECH83	6DS8
ECH84	6JX8
ECH200	6V9
ECL80	6AB8
ECL82	6BM8
ECL84	6DX8
ECL85	6GV8
ECL86	6GW8

* Parallel-filament circuits. § May not work in all circuits.

To Replace	Use
EF22	7A7*
EF37	6J7GT*
EF39	6K7*
EF41	6CJ5
EF71	5899
EF72	5840
EF80	6BX6
EF81	6BH5
EF82	6CH6
EF83	6BK8
EF85	6BY7
EF86	6267
EF87	6267
EF89	6DA6
EF89F	6DG7
EF91	6AM6
EF92	6CQ6
EF93	6BA6
EF94	6AU6
EF95	6AK5
EF96	6AG5
EF97	6ES6
EF98	6ET6
EF183	6EH7
EF184	6EJ7
EF190	6CB6
EF730	5636
EF731	5899
EF732	5840
EF734	6205
EF811	6EH7
EF812	6EL7
EF814	6EJ7
EF905	6AK5
EFL200	6Y9
EH90	6CS6
EK90	6BE6
EL33	6M6G*
EL34	6CA7
EL36	6CM5
EL37	6L6
EL38	6CN6
EL41	6CK5
EL71	5902
EL80	6M5
EL81	6CJ6
EL82	6DY5
EL83	6CK6
EL84	6BQ5
EL85	6BN5
EL86	6CW5
EL90	6AQ5
EL91	6AM5
EL95	6DL5
EL180	12BY7
EL500	6GB5
EL803	6CK6§
EL820	6CK6
EL821	6CH6
EL822	6CH6

To Replace	Use
ELL80	6HU8
EM34	6CD7
EM80	6BR5
EM81	6DA5
EM84	6FG6
EM87	6HU6
EM840	6FG6
EN91	2D21
EQ80	6BE7
EY51	6X2
EY80	6U3
EY81	6R3
EY81F	6V3
EY82	6N3
EY83	6AL3*
EY84	6374
EY86	6S2
EY87	6S2A
EY88	6AL3
EY500	6EC4
EZ35	6X5G
EZ40	6BT4
EZ80	6V4
EZ81	6CA4
EZ90	6X4
EZ91	6AV4
EZ900	6063
GZ30	5Z4G
GZ31	5U4G
GZ34	5AR4
H63	6F5GT
HAA91	12AL5
HABC80	19T8
HBC90	12AT6
HBC91	12AV6
HCC85	17EW8
HCH81	12AJ7
HD14	1H5GT
HD30	3B4
HF61	6CJ5
HF93	12BA6
HF94	12AU6
HF121	12AC5
HK90	12BE6
HL90	19AQ5
HL92	50C5
HL94	30A5
HM04	6BE6
HP6	6AM6
HY90	35W4
HZ90	12X4
KD21	OA3
KD24	OC3
KD25	OD3
KL35	1F5G*
KT32	25W6GT
KT61	6M6G*
KT63	6F6G
KT66	6L6GC
KT71	50L6GT

To Replace	Use
KT77	6CA7
KT88	6550
KTW63	6J7GT
KTZ63	6K7GT
KTZ63M	6J7GT
L63	6J5
L63B	6J5
L77	6C4
LC900	3HA5
LCF80	6LN8
LCF86	5HG8
LCF200	5X9
LCF201	5U9
LCF801	5GJ7
LCF802	6LX8
LCH200	5V9
LCL84	10DX8
LF183	4EH7
LF184	4EJ7
LFL200	11Y9
LL86	10CW5
LL505	27KG66
LN119	503M8
LN152	6AB8
LN319	13GC8
LY88	20AQ3
LY500	28EC4
LZ319	9A8
LZ329	9A8
LZ339	9EN7
M8081	6J6
M8121	5840
N14	1C5GT
N15	3Q5GT
N16	3Q5GT
N17	3S4
N18	3Q4
N19	3V4
N25	3C4
N77	6AM5
N78	6BJ5
N119	45B5
N142	45A5
N144	6AM5
N147	6M6G*
N148	7C5
N150	6CK5
N152	21A6
N153	15A6
N154	16A5
N155	6BN5
N308	25E5
N309	15A6
N329	16A5
N359	21A6
N369	16A8
N379	15CW5
N389	25GF6
N709	6BQ5
N727	6AQ5

* Parallel-filament circuits. § May not work in all circuits.

To Replace	Use
OBC3	12SQ7
OF1	6S7
OH4	12A8
OM6	6K7
OSW2190	6AC7
OSW2192	6AG7
OSW2600	6AC7
OSW2601	6AG7
OSW3104	6SA7
OSW3105	6SQ7
OSW3106	6V6GT
OSW3109	6H6
OSW3110	6E5
OSW3111	6SK7
OSW3112	6J5
P17A	807
PABC80	9AK8
PC86	4CM4
PC95	4GK5
PC900	4HA5
PCC84	7AN7
PCC85	9AQ8
PCC88	7DJ8
PCC89	7FC7
PCC186	7AU7
PCC189	7ES8
PCC805	7EK7
PCE800	9GB8
PCF80	9A8
PCF82	9U8
PCF86	8HG8
PCF200	8X9
PCF201	8U9
PCF800	9EN7
PCF801	8GJ7
PCF805	7GV7
PCF806	8GJ7
PCH200	9V9
PCL82	16A8
PCL84	15DQ8
PCL85	18GV8
PCL88	16GK8
PCL800	16GK8
PF9	6K7
PFL200	16Y9
PH4	6A8
PL21	2D21
PL36	25E5
PL81	21A6
PL82	16A5
PL83	15A6
PL84	15CW5
PL302	25GF6
PL500	27GB5
PL505	40KG6
PL820	21A6
PL1267	OA4G
PL180	12HU8
PM04	6BA6
PM07	6AM6

To Replace	Use
PY80	19X3
PY81	17Z3
PY82	19Y3
PY83	17Z3
PY88	30AE3
PY500	42EC4
PY800	17Z3
PY801	17Z3
Q865	6SN7GT
QB309	12AT7
QE03/10	5763
QE05/40	6146
QE05/40H	6159
QE06/50	807
QL77	6C4
QN77	6AM5*
QQE02/5	6939
QQE03/12	6360
QQE03/20	6252
QQV02-6	6939
QQV03-20	6252
QQV03-10	6360
QV03-12	5763
QV05-25	807
QV06-20	6146
QW77	6CQ6
QZ77	6AM6
R12	6X2
R16	1T2
R19	1X2A
R20	2J2
R52	5Z4G
R144	6AM6
RL21	2D21
S6F12	6AM6
SP6	6AM6
STV108/30	OB2
STV150/30	OA2
SU61	6X2
T6D	2B35
T2M05	6J6
TM12	6J4
U26	2J2
U31	25Z4GT
U37	1T2
U41	1B3GT
U43	6X2
U45	6X2*
U49	2J2
U50	5Y3GT
U51	5W4GT
U52	5U4G
U70	6X5G*
U76	35Z4GT
U78	6X4*
U82	7Y4*
U119	38A3
U142	31A3
U147	6X5G

To Replace	Use
U149	7Y4
U150	6BT4
U151	6X2
U152	19X3
U153	17Z3
U154	19Y3
U191	19CS4
U192	19Y3
U193	17Z3
U251	17Z3
U309	19X3
U319	19Y3
U339	19CS4
U349	17Z3
U381	38A3
U707	6X4
U709	6CA4
U718	6BT4*
UAF42	12S7
UBC41	14L7
UBC81	14G6
UBF80	17C8
UCH42	14K7
UCH81	19D8
UCL82	50BM8
UF41	12AC5
UL41	45A5
UL84	45B5
UN955	955
UU9	6BT4*
UU12	6CA4
UY41	31A3
UY42	31A3
UY82	55N3
UY85	38A3
UY89	38A3
V2M70	6X4
V61	6BT4
V177	6CQ6
V311	31A3
V312	31A3
V884	6CQ6
VP6	6CQ6
VP12D	12C8
W17	1T4
W25	1AJ4
W61	6K7
W63	6K7
W76	12K7
W77	6CQ6
W110	13EC7
W118	12AC5
W119	13EC7
W142	12AC5
W143	7A7*
W145	12AC5
W148	7A7
W149	7B7
W150	6CJ5

To Replace	Use
W719	6BY7
W727	6BA6
W739	6EC7
WD142	12S7
WD150	6CT7
WD709	6N8
X14	1A7GT
X17	1R5
X18	1AC6
X20	1AC6
X25	1AB6
X63	6A8
X64	6L7
X73	6D8*
X76M	12K8GT
X77	6BE6
X81	7S7
X107	18FX6§
X119	19D8
X142	14K7
X147	6E8G
X148	7S7
X150	6CU7*
X719	6AJ8
X727	6BE6
XAA91	3AL5
XC95	2ER5
XC97	2FY5
XC900	2HA5
XCC82	7AU7
XCC189	4ES8
XCF80	4BL8
XCF801	4GJ7
XCH81	3AJ8
XCL82	8B8
XCL85	9GV8
XF80	3BX6
XF85	3BY7
XF94	3AU6
XF183	3EH7
XF184	3EJ7
XL36	13CM5
XL84	8BQ5
XL86	8CW5
XL500	13GB5
XY88	16AQ3
Y25	1M3
YC95	3ER5
YC97	3FY5
YF183	4EH7
YF184	4EJ7
Z14	1N5GT
Z63	6J7
Z77	6AM6
Z152	6BX6
Z300T	OA4G
Z329	7ED7
Z719	6BX6
Z729	6267
Z749	6EL7
ZA2	954*
ZD17	1S5
ZD25	1AH5
ZD152	6N8

* Parallel-filament circuits. § May not work in all circuits.

ADDITIONAL AMERICAN SUBSTITUTES FOR FOREIGN TUBES