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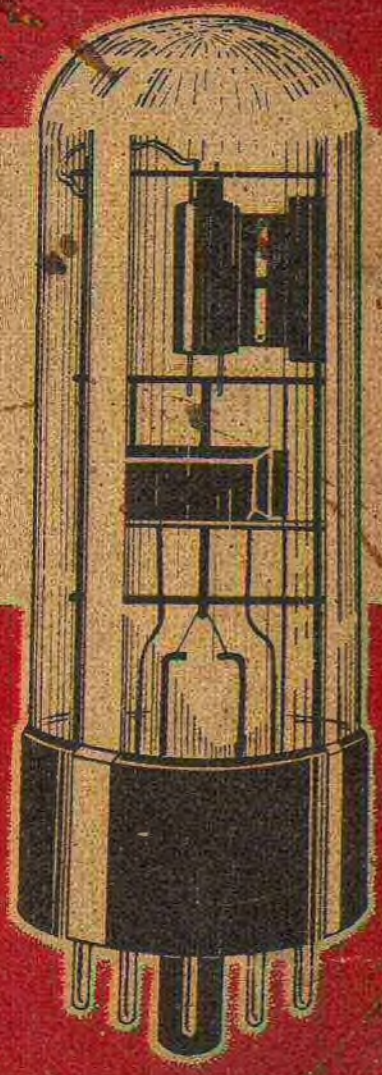
RECEIVING TUBE



SUBSTITUTION GUIDE BOOK

BY H. A. MIDDLETON

FIRST EDITION

SECTION 2

RECEIVING TUBE SUBSTITUTION GUIDE

This section includes the actual information on the tube substitutions. Four columns are included. The first column lists the tube type for which a substitute is desired. This listing is in numerical and alphabetical order. For example 6CB6 precedes 6CD6 and 6ZY5 precedes 7A4. We have not indicated any difference between metal and glass tubes of the octal type. The tube listed can thus be considered either as metal or a glass type. The letters *G, GT, GT/G, GA,* or *GP* indicates that the tube has a glass envelope, the *GT* and *GT/G* are smaller and newer versions of the *G* type. The glass tubes, in practically all cases, have the same characteristics as the metal types.

One of the primary differences between the glass and metal tubes is that the metal type usually have an internal shield. A pin at the base of these tubes is connected to this shield. In most cases this pin is wired to the common ground or B minus of the set. In a few cases substituting a glass type for a metal type causes the circuit to become unbalanced or feedback occurs due to a lack of proper shielding. Most often this can be overcome by shielding the tube or realigning the set.

The second column lists the various possible substitutes. Quite often more than one substitute is listed for a single tube. In such cases the tube in the first column is not repeated for each substitute but is listed only once.

The third column lists the performance of each tube. Three performance ratings are shown in this list. These are *E* for EXCELLENT, *G* for GOOD, and *P* for POOR. They define the suitability of a substitute predicated upon its electrical characteristics as compared to those of the original and upon the relationship between the characteristics of the substitute to the constants of the circuit, which was designed to function best with the original. The comparison between the characteristics of the tubes excludes the filament or heater voltage and current ratings. It is assumed that whatever may be the performance characteristics of the substitute — the filament or heater voltages and current are correct, even if it requires certain minor circuit modifications to accomplish this condition.

Concerning the *E, G,* and *P* ratings, it stands to reason that those tubes which bear *E* (excellent) ratings are either the exact equivalents differing perhaps in basing and maybe in filament or heater voltage and current ratings — or so closely approximate the electrical characteristics of the original as to require no significant major modifications. All applicable tube substitutions which might bear an *E* rating in performance are not shown in the main listing. Some appear on the addendum pages. These represent last-minute additions as the result of information received from television receiver manufacturers and appear at the end of this section.

Concerning the *G* (good) rating, it reflects more than just moderate differences in tube characteristics between the substitute and the original that is being replaced. It still means a triode substitute for a triode original, or a pentode substitute for a pentode original, and sometimes the conversion of a pentode into a triode, but the plate (and screen) voltage demands of the substitute may be higher than that of the original — or the transconductance or amplification constant of the substitute may be less than the original — all of which means that the circuit demands incorporated in the equipment design are not being met by the substitute tube. Possibly the plate impedance of the substitute is higher or lower, reducing the originally intended over-all amplification; perhaps a slight amount of distortion is added to the signal by the substitute. Yet the substitute may be used even if it is not as good in performance as the original, for again it is a matter of continuing the operation of a device.

Those substitutions which bear *P* (poor) ratings are used only as a last resort. They represent the extremes in tube substitution when it is a matter of accomplishing a repair job of sorts, rather than none at all because more appropriate substitutes are not available. Of course, modifications can be made in the circuit design and circuit constants so as to accommodate the tube rated poor, in which case, considerable improvement may be accomplished. It must be remembered, of course, that the *P* rating — or for that matter, the *G* rating — is not a reflection upon the capabilities of the tube or the brand. It simply means that the tube, so designated in the list, was not intended for use in the type of system for which it is suggested as a substitute. With proper circuit changes, it might, as we said before, become a better performing substitute. But whether or not such design changes are warranted is a matter of individual consideration. As

far as circuit modification is concerned, it can be a tedious task. Much depends upon comparative reference data and background knowledge of circuits. Finally such changes are possible only if the cost is acceptable to the owner of the equipment.

The fourth or last column lists the circuit changes that are necessary to make the substitute operate properly. In many cases no change whatsoever is required, the original tube is pulled out and the substitute plugged in. Where the reference "parallel circuits only" or "series circuits only" is found, it refers only to the type of filament circuit arrangement in which the substitute tube can be used.

Original and Substitute Sockets

The tube substitution lists contain illustrations of the original and the substitute tube sockets when the tube interchange involves a change in sockets. These are offered as a convenience in wiring. The views are the bottoms of the sockets and these correspond to the pin locations on the bottom of the respective tube bases. The bottom socket view of the original tube will always be found to the left of the change writeup and will bear the designation "ORIG." The bottom socket view of the substitute tube will always be found to the right of the change writeup and will bear the designation "SUB."

The instructions given between the two illustrations state the respective socket terminals involved in the rewiring operation. In view of the necessity for removing one socket before mounting the other, it is suggested that as each wire is disconnected from the original socket, it be labeled with a tiny tag showing the appropriate socket connection number. These correspond to the pin numbers on the tube base. Then when being rewired to the new socket, all that is required is to solder the numbered lead to the terminal on the socket as stated in the instructions.

Care must be exercised to see that the socket connections are read in accordance with the location of the key as shown on the pages. In order to attain correspondence between the socket mounted on the chassis and the instructions, one or the other should be changed in physical position so that the keys or identifying terminals are in the same relative position. Another precautionary note relates to the grid caps. In many cases capped tubes are replaced by single ended tubes, and vice-versa. The leads must be properly connected. Finally in some substitutions the pin numbers on the original and the substitute are the same, that is, 1 to 1, 2 to 2, 3 to 3 and so on. This is not standard for all the tubes, nor is it standard for all the pins even if it is true for some of them in any one substitution. In other words, the instructions should be read completely. Nothing should be taken for granted.

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TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
00A	01A	E	No changes.
	40	G	
01A	00A	E	No changes.
	00AA	E	
	01B	E	
0A2	0B2	P	Where application is not too critical.
0A3	VR75	E	No changes.
0A4	1267	E	No changes.
0B2	0C3	E	Where space permits. Change socket to octal and rewire as follows:  No. 1 on miniature to No. 5 on octal 2 to 2 5 to 5 
0B3	VR90	E	No changes.
0C3	VR105	E	No changes.
	0B2	E	Reverse 0B2 to 0C3 procedure.
0D3	VR150	E	No changes.
0Y4	0Y4G	E	No changes.
0Y4G	0Y4	E	Ground pin No. 1
0Z4	0Y4	G	No changes.
	0Z4A/1003	E	
	1005/CK1005	E	
	6X5	E	Solder socket terminal No. 2 to chassis. Connect 6V hot lead to No. 7. Motorolas and some other car radios have filament wired and the 6X5 may be used without making any changes.
	7Y4	E	Change socket to loctal and rewire as follows:  No. 3 on octal to No. 3 on loctal 5 to 6 8 to 7  Connect No. 8 on loctal to chassis and No. 1 on loctal to 6V hot lead.
	84	E	Reverse 84 to 6X5 procedure.
0Z4A	0Y4	G	No changes.
	1005/CK1005	G	
1A3	1B4/1294	E	Where space permits. Change socket to loctal and rewire as follows:  No. 1 on miniature to No. 1 on loctal 2 to 4 3 to 7 6 to 4 7 to 8 
1A4	1B4	E	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1A4	1D5	E	Change socket to octal and rewire as follows:
	1E5	E	 No. 1 on four prong to No. 2 on octal; 2 to 3; 3 to 4; 4 to 7; cap to cap 
	32	E	No changes.
	34	E	
1A5	1C5	G	Parallel circuits only. No changes.
	1G4	P	No changes. Emergency but works well in most cases.
	1LA4	E	Change socket to loctal and rewire as follows:
	1LB4	E	 No. 2 on octal to No. 1 on loctal; 3 to 2; 4 to 3; 5 to 6; 7 to 8 
	1N6	P	Remove and tape up any wires anchored on No. 6.
	1Q5	G	Parallel circuits only. No changes.
	1S4	P	Same as 3Q5 to 3S4, except do not connect No. 8 on octal to No. 5 on miniature. Parallel circuits only.
	1T4	P	Emergency substitution. Tone OK at low volume. Change socket to miniature and rewire as follows:
			 No. 2 on octal to No. 1 on miniature; 3 to 2; 4 to 3; 5 to 6; 7 to 7 
	1T5	G	No changes. Filament current 10 mils higher but gives satisfactory results.
	3Q4	P	Electric operation only. Same as 3Q5 to 3S4, except connect nothing to No.
	3S4		5 on miniature.
	3Q5	P	No changes necessary. For electric operation only as the A battery will be too low with 1.4 more filament in the circuit.
1A6	1C6	E	No changes. For parallel operation only as the 1C6 draws 120 mils instead of 60.
	1C7	E	Parallel circuits only. Change socket to octal and rewire as follows:
			 No. 1 on six prong to No. 2 on octal; 2 to 3; 3 to 6; 4 to 5; 5 to 4; 6 to 7 
	1D7	E	Same as 1A6 to 1C7. Either series or parallel circuits.
1A7	1B7	E	Parallel circuits only. No changes.
	1C7	P	Parallel circuits only.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1A7	1D7	P	No changes, unless there is a resistor across 1A7 filament, which must be removed. 1D7 is rated 2V 60 mils and draws slightly less than 50 on 1.4.
	1L6	G	Same as 1A7 to 1U6.
	1LA6	E	Change socket to loctal and rewire as follows:
	1LC6	E	

No. 2 on octal	to No.	1 on loctal
3	to	2
6	to	3
5	to	4
4	to	5
7	to	8
cap	to	6

	1R5	G	Make adaptor as follows: Solder rather heavy wires three inches long to all lugs except No. 5 of miniature socket. Break the 1A7, clean out the base and save the cap. Push the wires from miniature socket thru the base pins as follows:

No. 1 on miniature	thru No.	2 of base
2	thru	3
3	thru	6
4	thru	5
7	thru	7

6 bring out and solder grid cap on.

The octal socket could be replaced by a miniature using the above connections but it is usually hard to find a place to mount it.

If 1R5 squeals, reduce value of oscillator grid resistor to 75000 ohms or less if necessary. This resistor is connected between terminal No. 5 on the the 1A7 socket and ground or filament.

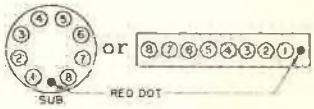
An idea we have been using successfully is to dig a trough from pin No. 5 to pin No. 7 on the adaptor, filling this with the graphite preparation made for volume controls, measuring the resistance, and filling the trough until the desired resistance is acquired.

	1U6	G	Parallel circuits only. Change socket to miniature and rewire as follows:

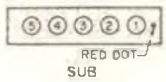
No. 2 on octal	to No.	1 on miniature
3	to	2
4	to	5
5	to	4
6	to	3
7	to	7
cap	to	6

1AB5	1AD5	G	Parallel circuits only. Change socket to subminiature and rewire as follows:

No. 1 on loctal	to No.	4 on subminiature
2	to	7
3	to	8
6	to	2
7	to	5
8	to	5

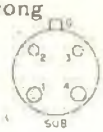
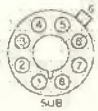


1AC5	1V5	E	No changes.
1AD4	1AD5	G	Parallel circuits only.
	1AE4	G	Reverse 1AE4 to 1AD4 procedure.
1AD5	1AB5	G	Parallel circuits only. Reverse 1AB5 to 1AD5 procedure.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1AD5	1AD4	G	Parallel circuits only.
	1W5	E	No changes.
1AE4	1AD4	G	Change socket to subminiature and rewire as follows: No. 1 on miniature to No. 5 on 1AD4 2 to 1 3 to 2 5 to 5 6 to 4 7 to 3   Pin numbers on 1AD4 number from right to left from red mark on base, as shown.
1AF4	1AF5	P	Rewire as follows: No. 5 to No. 1 2 to 5 3 to 4 Do not use terminal No. 3 for anchor
	1L4	G	No changes. Parallel circuits only.
	1T4	G	
	1U4	G	
1AF5	1LD5	P	Parallel circuits only. Where space permits. Change socket to loctal and rewire as follows: No. 1 on miniature to No. 1 on loctal 3 to 4 4 to 3 5 to 2 6 to 6 7 to 8  
	1S5	G	Parallel circuits only. No changes.
1B3	1X2	E	Reverse 1X2 to 1B3 procedure.
1B4*	1A4	E	No changes.
	1D5	E	Same as 1A4 to 1D5.
	1E5	E	
	32	E	No changes.
	34	E	
1B5	1H6	E	Change socket to octal and rewire as follows: No. 1 on six prong to No. 2 on octal 2 to 3 3 to 4 4 to 5 5 to 6 6 to 7  
	25S	E	No changes.
1B7	1A7	E	Parallel circuits only. No changes.
	1L6	G	Parallel circuits only. Same as 1A7 to 1U6
	1LA6	E	Parallel circuits only. Same as 1A7 to 1LA6.
	1LC6	E	

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1B7	1R5	G	Parallel circuits only. Same as 1A7 to 1R5.
	1U6	G	Parallel circuits only. Same as 1A7 to 1U6.
1B8	1D8	E	No changes.
1C3	1G4	G	Where space permits. Change socket to octal and rewire as follows: No. 1 on miniature to No. 2 on octal 2 to 3 4 to 5 6 to 3 7 to 7  
	1LE3	G	Where space permits. Change socket to loctal and rewire as follows: No. 1 on miniature to No. 1 on loctal 2 to 2 4 to 6 6 to 2 7 to 8  
1C5	1A5	G	Parallel circuits only. No changes.
	1D8	P	Remove and tape up any wires connected to 6 and 8. No connection to top cap.
	1LA4 1LB4	G G	Same as 1A5 to 1LA4. Parallel circuits only.
	1Q5	G	No changes. Bias different but tone is reasonably good.
	1S4	G	Same as 3Q5 to 3S4, but connect nothing to No. 5 on miniature.
	1T5	G	Parallel circuits no changes. Series circuits shunt 35 ohm resistor across filament.
	3Q4 3S4	P P	Change socket to miniature and rewire as follows: No. 2 on octal to No. 5 on miniature 3 to 2 4 to 4 5 to 3 7 to 1 and 7  
	3Q5	P	Same as 1Q5 to 3Q5.
1C6	1A6	G	Parallel circuits only. No changes.
	1C7	G	Same as 1A6 to 1C7. Either series or parallel circuits.
	1D7	G	Same as 1A6 to 1C7. Parallel circuits only.
1C7	1A6	G	Reverse 1A6 to 1C7 procedure. Parallel circuits only.
	1C6	E	Reverse 1A6 to 1C7 procedure.
	1D7	E	Parallel circuits only. No changes.
1C8	1AE5	G	Parallel circuits only.
	1E8	E	No changes.
1C21			No practical substitute.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1D5	1A4 1B4 32 34 951	E E E E E	Change socket to four prong and rewire as follows:  No. 2 on octal to No. 1 on four prong 3 to 2 4 to 3 7 to 4 cap to cap 
	1E5	G	No changes.
1D7	1A6	G	Reverse 1A6 to 1C7 procedure.
	1C6	E	Reverse 1A6 to 1C7 procedure. Parallel circuits only.
	1C7	E	Parallel circuits only. No changes.
1D8	1B8	E	No changes.
1E4	1G4 1H4	G P	No changes.
	1LE3	G	Change socket to loctal and rewire as follows:  No. 2 on octal to No. 1 on loctal 3 to 2 5 to 6 7 to 8 
	30	P	Change socket to four prong and rewire as follows:  No. 2 on octal to No. 1 on four prong 3 to 2 5 to 3 7 to 4 
1E5 *	1D5	G	No changes.
	1A4 1B4 32 34 951	P P P P P	Change socket to four prong and rewire as follows:  No. 2 on octal to No. 1 on four prong 3 to 2 4 to 3 cap to cap 
1E7			No practical substitute.
1E8	1C8	E	No changes.
1F4	1F5	E	Change socket to octal and rewire as follows:  No. 1 on five prong to No. 2 on octal 2 to 3 4 to 4 3 to 5 5 to 7 
1F5	1F4	E	Reverse 1F4 to 1F5 procedure.
1F6	1F7	E	Change socket to octal and rewire as follows:  No. 1 on six prong to No. 2 on octal 2 to 3 3 to 6 4 to 4 5 to 5 6 to 7 cap to cap 

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1F7	1F6	E	Reverse 1F6 to 1F7 procedure.
1G4	1C3	G	Reverse 1C3 to 1G4 procedure.
	1E4	G	No changes.
	1H4	P	
	1LE3	G	Same as 1E4 to 1LE3.
	30	P	Same as 1E4 to 30.
1G5	1J5	G	No changes.
1G6	1J6	P	Parallel circuits only. No changes.
1H4	1E4	P	No changes.
	1LE3	P	Same as 1E4 to 1LE3.
	30	P	Same as 1E4 to 30.
1H5	1H6	P	Connect grid cap to socket terminal No. 6. Connect Nos. 4 and 5 together.
	1LD5	G	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 2 and 3 5 to 4 7 to 8 cap to 6
	1LH4	E	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 2 5 to 4 7 to 8 cap to 6
	1S5	G	Change socket to miniature or make adaptor wiring as follows: No. 2 on octal to No. 1 on miniature 3 to 4 and 5 5 to 3 7 to 7 cap to 6
1H6	1B5	E	Change socket to six prong and rewire as follows: No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to 4 6 to 5 7 to 6
1J5	1G5	G	No changes.
1J6	19	E	Reverse 19 to 1J6 procedure.
1L4	1AF4	G	Parallel circuits only. No changes.
	1SA6	G	Same as 1T4 to 1SA6.
	1T4	G	No changes.
	1U4	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1L6	1U6	E	Parallel circuits only. No changes.
1LA4	1A5	G	Same as 1LB4 to 1A5.
	1C5	G	Same as 1LB4 to 1A5. Parallel circuits only.
	1LB4	G	No changes.
	1Q5	G	Same as 1LB4 to 1A5. Parallel circuits only.
	1S4	G	Same as 1LA4 to 3Q4. Parallel circuits only.
	1T5	G	Same as 1LB4 to 1A5.
	1W4	G	Same as 1LB4 to 1W4.
	3Q4	P	Electric operation only. Change socket to miniature and rewire as follows:
	3S4	P	 No. 1 on loctal to No. 1 on miniature. 2 to 2 3 to 4 6 to 3 8 to 7 
	3Q5	P	Same as 1LB4 to 1A5. Series circuits only.
1LA6	1A7	E	Change socket to octal and rewire as follows:  No. 1 on loctal to No. 2 on octal 2 to 3 3 to 6 4 to 5 5 to 4 6 to cap 8 to 7 
	1B7	E	Same as 1LA6 to 1A7. Parallel circuits only.
	1L6	E	Same as 1LA6 to 1U6.
	1LB6	P	Rewire as follows: No. 5 to No. 7 Connect pins No. 5 and No. 8 together.
	1LC6	E	No changes.
	1R5	G	Make adaptor as follows: Break the glass envelope on a burned out loctal tube leaving the extension of the pins intact. Bend the extension of the pins so that they connect to a miniature socket according to the following:  No. 1 on miniature to No. 1 on loctal 2 to 2 3 to 3 4 to 4 6 to 6 7 to 8  In case this substitution squeals on the high frequency end of the dial, change the oscillator grid resistor to 100M ohms or less if necessary.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1LA6	1U6	G	Parallel circuits only. Change socket to miniature and rewire as follows: No. 1 on loctal to No. 1 on miniature 2 to 2 3 to 3 4 to 4 5 to 5 6 to 6 8 to 7  
1LB4	1A5	G	Change socket to octal and rewire as follows: No. 1 on loctal to No. 2 on octal 2 to 3 3 to 4 6 to 5 8 to 7  
	1T5	G	
	1C5	G	Same as 1LB4 to 1A5. Parallel circuits only.
	1LA4	G	No changes.
	1Q5	G	Same as 1LB4 to 1A5. Parallel circuits only.
	1S4	G	Same as 1LA4 to 3Q4. Parallel circuits only.
	1W4	G	Change socket to miniature and rewire as follows: No. 1 on loctal to No. 1 on miniature 2 to 2 3 to 3 6 to 6 8 to 7  
	3Q4	P	Same as 1LA4 to 3Q4.
	3Q5	P	Same as 1LB4 to 1A5. Series circuits only.
	3S4	P	Same as 1LA4 to 3Q4.
1LB6	1LA6	P	Rewire as follows: No. 5 to No. 8 7 to 5
	1LC6	P	
1LC5	1L4	G	Same as 1LG5 to 1L4.
	1LG5	G	No changes.
	1LN5	G	No changes.
	1N5	G	Same as 1LN5 to 1N5.
	1P5	G	
	1S4	G	Parallel circuits only. Change socket to miniature and rewire as follows: No. 1 on loctal to No. 1 on miniature 2 to 2 3 to 4 4 to 1 6 to 3 8 to 7  

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1LC5	1SA6	G	Change socket to octal and rewire as follows:

No. 1 on loctal	to No.	2 on octal
2	to	8
3	to	6
4	to	3
6	to	4
8	to	7

	1T4	G	Same as 1LG5 to 1L4.
	1U4	G	Same as 1LG5 to 1L4.
1LC6	1A7	G	Change socket to octal and rewire as follows:

No. 1 on loctal	to No.	2 on octal
2	to	3
3	to	6
4	to	5
5	to	4
8	to	7
6	to	cap

	1B7	G	Reverse 1A7 to 1LA6 procedure. Parallel circuits only.
	1L6	G	Same as 1LA6 to 1U6.
	1LA6	E	No changes.
	1LB6	P	Same as 1LA6 to 1LB6.
	1R5	G	Same as 1LA6 to 1R5.
	1U6	G	Same as 1LA6 to 1U6. Parallel circuits only.
1LD5	1AF5	P	Parallel circuits only. Reverse 1AF5 to 1LD5 procedure.
	1N6	G	Change socket to octal and rewire as follows:

No. 1 on loctal	to No.	2 on octal
2	to	3
3	to	4
4	to	6
6	to	5
8	to	7

	1S5	G	Change socket to miniature and rewire as follows:

No. 1 on loctal	to No.	1 on miniature
2	to	5
3	to	4
4	to	3
6	to	6
8	to	7

	1SB6	G	Change socket to octal and rewire as follows:

No. 1 on loctal	to No.	2 on octal
2	to	3
3	to	4
4	to	5
6	to	8
8	to	7

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1LD5	1U5	G	Change socket to miniature and rewire as follows:  No. 1 on loctal to No. 1 on miniature 2 to 2 3 to 3 4 to 4 6 to 6 8 to 7 
1LE3	1C3	G	Reverse 1C3 to 1LE3 procedure.
	1E4	G	Reverse 1E4 to 1LE3 procedure. Not a good oscillator.
	1G4	G	Change socket to octal and rewire as follows:  No. 1 on loctal to No. 2 on octal 2 to 3 6 to 5 8 to 7 
	1H4	P	Reverse 1E4 to 1LE3 procedure. Not a good oscillator.
	1293	G	Parallel circuits only. No changes.
1LG5	1L4	G	Change socket to miniature and rewire as follows:
	1T4	G	
	1U4	G	 No. 1 on loctal to No. 1 on miniature 2 to 2 3 to 3 4 to 5 6 to 6 8 to 7 
	1LC5	G	No changes.
1LH4	1H5	E	Change socket to octal and rewire as follows:  No. 1 on loctal to No. 2 on octal 2 to 3 4 to 5 8 to 7 6 to cap 
	1S5	G	Make adaptor as follows: No. 1 on base to No. 1 on top 2 to 5 and 4 4 to 3 6 to 6 8 to 7
1LN5	1LC5	E	No changes.
	1N5	E	Change socket to octal and rewire as follows:
	1P5	G	 No. 1 on loctal to No. 2 on octal 2 to 3 3 to 4 8 to 7 6 to cap 
	1S4	G	Same as 1LC5 to 1S4. Parallel circuits only.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1LN5	1S5	P	Change socket to miniature and rewire as follows: Nos. 1 and 4 on loctal to No. 1 on miniature 2 to 5 3 to 4 4 to 1 6 to 6 8 and 5 to 7  
	1SA6	G	Same as 1LC5 to 1SA6.
	3A8	P	Electric operation only. Same as 1LN5 to 1N5. Connect nothing to pins not used.
1N5	1D5	P	No changes. 1D5 rated 60 mils on 2 volts and pulls less than 50 on 1.4 volt.
	1LC5	G	Same as 1N5 to 1LN5.
	1LN5	E	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 2 4 to 3 7 to 8 cap to 6 Short loctal terminals 4 and 5  
	1P5	G	No changes.
	1S4	P	Parallel circuits only. Change socket to miniature and rewire as follows: No. 2 on octal to No. 1 on miniature 3 to 2 4 to 4 7 to 7 cap to 3  
	1S5	G	Change socket to miniature and rewire as follows: No. 2 on octal to No. 1 on miniature 3 to 5 4 to 4 7 to 7 cap to 6  
	1SA6	G	Make adaptor as follows: No. 2 on base to No. 2 on top 3 to 8 4 to 6 7 to 7 and 3 cap to 4
	1T4	G	Change socket to miniature or make adaptor as follows: No. 2 on octal to No. 7 on miniature. 3 to 2 4 to 3 7 to 1 cap to 6 This substitution squeals in some cases, works best as r-f tube.  
	3A8	P	Electric operation only. Remove and tape up wire if any anchored on Nos. 5, 6 and 8.
1N6	1LD5	G	Reverse 1LD5 to 1N6 procedure.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1N6	1SB6	G	Rewire as follows: No. 5 to No. 8 6 to 5
1P5	1N5	G	No changes.
	1S4	P	Parallel circuits only. Same as 1N5 to 1S4.
	1SA6	G	Same as 1N5 to 1SA6.
	1T4	G	Same as 1N5 to 1T4.
1Q5	1A5	G	Parallel circuits only. No changes.
	1C5	P	No changes. Bias different but tone reasonably good.
	3B5	P	Move No. 7 to No. 8 and short No. 2 and 7 together.
	3C5	P	
	3Q4	P	Same as 1C5 to 3Q4.
	3Q5	P	Move No. 7 to No. 8 and short No. 2 and 7 together.
	3S4	P	Same as 1C5 to 3Q4.
1Q6	1S6	E	Rewire as follows:
	1T6	E	No. 1 to No. 4 7 to 1 2 to 3
1R4/1294	1A3	P	Reverse 1A3 to 1R4/1294 procedure.
1R5	1A7	G	Where extra space permits. Reverse 1A7 to 1R5 procedure.
	1LA6	G	Where space permits. Reverse 1LA6 to 1R5 procedure.
	1LC6	G	
1S4	1LC5	G	Where space permits. Parallel circuits only. Reverse 1LC5
	1LN5	G	to 1S4 procedure.
	1N5	G	Where space permits. Parallel circuits only. Reverse 1N5
	1P5	G	to 1S4 procedure.
	1S5	P	Parallel circuits only. Rewire as follows: Nos. 2 and 6 to No. 5 3 to 6 5 to 1
	1L4	P	Parallel circuits only. Rewire as follows:
	1T4	P	
	1U4	P	No. 6 to No. 2 3 to 6 4 to 3

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1S4	3E5	G	Parallel circuits only. Rewire as follows: No. 6 to No. 2 3 to 6 4 to 3 5 to 1 7 to 5 Connect 1 and 7 together.
1S5	1AF5	E	Parallel circuits only. No changes.
	1LD5	G	Where space permits. Reverse 1LD5 to 1S5 procedure.
	1SB6	G	Where space permits. Reverse 1SB6 to 1S5 procedure.
	1U5	E	Rewire as follows: No. 5 to No. 2 Reverse 3 and 4
1S6	1Q6	E	Rewire as follows: No. 3 to No. 2 1 to 7
	1T6	E	No changes.
1SA6	1L4	G	Reverse 1T4 to 1SA6 procedure
	1LC5 1LN5	G G	Reverse 1LC5 to 1SA6 procedure.
	1N5	G	Reverse 1N5 to 1SA6 procedure.
	1T4 1U4	G	Reverse 1T4 to 1SA6 procedure.
1SB6	1H5	G	Extend wire from No. 8 to cap.
	1LD5	G	Reverse 1LD5 to 1SB6 procedure.
	1S5	G	Change socket to miniature and rewire as follows:  No. 2 on octal to No. 1 on miniature 3 to 5 4 to 4 5 to 3 7 to 7 8 to 6 
1T4	1AF4	G	Parallel circuits only. No changes.
	1L4	G	No changes.
	1SA6	E	Where space permits. Change socket to octal and rewire as follows:  No. 1 on miniature to No. 2 on octal 2 to 8 3 to 6 6 to 4 7 to 7 Connect Nos. 2 and 3 together. 

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1T4	1U4	G	No changes.
1T5	1A5	G	No changes. 1T5 pulls 10 mils more but it works OK.
	1C5	G	Parallel circuits only. No changes.
	1D8	P	Remove and tape up wires if any anchored on No. 6 and 8. Parallel circuits only.
	1G4	P	No changes. Emergency works good in most cases.
	1LA4 1LB4	P P	Same as 1A5 to 1LA4
	1Q5	G	Parallel circuits only. No changes.
	1S4	G	Same as 3Q4 to 3S4 parallel circuits only except omit connection No. 8 on octal to No. 5 on miniature.
	3Q4 3S4	P P	Electric operation only. Same as 3Q5 to 3S4 but connect nothing to No. 5 on miniature.
1T6	1Q6	E	Rewire as follows: No. 3 to No. 2 1 to 7
	1S6	E	No changes.
1U4	1AF4	G	Parallel circuits only. No changes.
	1L4	G	No changes.
	1S5	G	Rewire as follows: No. 5 to No. 1 2 to 5 3 to 4
	1SA6	G	Where space permits. Same as 1T4 to 1SA6.
	1T4	G	No changes.
1U5	1S5	E	Rewire as follows: No. 2 to No. 5 Reverse 3 and 4
1U6	1L6	E	Parallel circuits only. No changes.
1V	6Z3	E	No changes.
	12Z3	G	No changes necessary. Series circuits only. Six volts added to the filament string makes no difference.
1V2			No practical substitute.
1V5	1AC5	E	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1W4	1LA4	G	Where space permits. Reverse 1LB4 to 1W4 procedure.
	1LB4	G	
	3E5	G	Rewire as follows: No. 7 to No. 5 Connect 1 and 7 together
1W5	1V5	P	No changes.
1X2	1B3	G	Where space permits. Change socket to octal and rewire as follows:  Nos. 1,3,4,6 on miniature to No. 2 on octal 2,5,7 to 7 cap to cap 
1Z2	1B3	G	Where space permits. Change socket to octal and rewire as follows:  Nos. 1,3,4,6 on miniature to No. 2 on octal 2,7,5 to 7 cap to cap 
2A3	45	G	No changes.
2A4G			No practical substitute.
2A5	47	G	Reverse 47 to 2A5 procedure.
	59	G	Change socket to seven prong and rewire as follows:  No. 1 on six prong to No. 1 on seven prong 2 to 2 3 to 3 4 to 4 5 to 6 6 to 7  Short Nos. 5 and 6 together.
	1619	G	Parallel circuits only. Make adaptor as follows: No. 1 on base to No. 2 on top 2 to 3 3 to 4 4 to 5 5 to 8 6 to 7 There are or will be many used 1619 tubes available.
2A6	2B7	P	Change socket to seven prong and rewire as follows:  No. 1 on six prong to No. 1 on seven prong 2 to 2 and 3 3 to 4 4 to 5 5 to 6 6 to 7 cap to cap 
	55	E	Parallel circuits only. No changes.
2A7	2A7S	E	No changes.
2B7	6B7	E	Heater voltage — current ratings differ.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
2B7S			No practical substitute.
2B25			No practical substitute.
2C4			No practical substitute.
2C21	6SN7	G	Change socket to octal and rewire as follows:

No. 1 on seven prong		to No. 8 on octal
2	to	3
3	to	2
4	to	4
5	to	5
6	to	6
7	to	7
cap	to	1

2C22	6AD5	P	Rewire as follows:
	6AF5	P	Connect grid cap to No. 5
	6C5	P	Connect plate cap to No. 3
	6J5	P	
	6P5	P	
2C51	7F8	G	Where space permits. Change socket to loctal and rewire as follows:

No. 1 on noval		to No. 2 on loctal
2	to	4
3	to	1
4	to	3
6	to	6
7	to	8
8	to	5
9	to	7

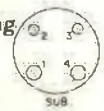
	5670	G	Parallel circuits only. No changes.
2C52	12SN7	P	No changes.
	12SX7	P	
2D21			No practical substitute.
2E5	6E5	E	Heater voltage-current ratings differ.
	6T5	E	Same as above.
	6U5	E	Same as above.
2E26			No practical substitute.
2E30	5812	G	No changes.
2E31	2E32	E	No changes.
2E32	2E31	E	No changes.
2E35	2E36	E	No changes.
2E36	2E35	E	No changes.
2E41	2E42	E	No changes.
2E42	2E41	E	No changes.
2G5	6U5/6G5	E	Heater voltage-current ratings differ.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
2G21	2G22	E	No changes.
2G22	2G21	E	No changes.
2S/4S			No practical substitute.
2V3	2X2/879	P	Parallel circuits only. Change socket to four prong and rewire as follows

No.	2 on octal	to No.	1 on four prong
	cap	to	cap
	7	to	4

2W3	2Z2/G84	E	Reverse 2Z2/G84 to 2W3 procedure.
	82	P	For half wave operation only. Change socket to four prong and rewire as follows:

No.	2 on octal	to No.	1 on four prong
	4	to	2 and 3
	8	to	4



2X2/879	2V3	P	Reverse 2V3 to 2X2/879 procedure. Examine power transformer and determine whether it will handle additional filament current.
2Y2			No practical substitute.
2Z2/G84	2W3	E	Change socket to octal and rewire as follows:

No.	1 on four prong	to No.	2 on octal
	2	to	4
	4	to	8

3A4	3Q4	P	Parallel circuits only. Rewire as follows:
	3S4	P	Reverse connections on terminals 3 and 4.
	3V4	P	Parallel circuits only. Rewire as follows:

No.	6	to No.	2
	4	to	6

3A5	3C6	P	Parallel circuits only. Change socket to loctal and rewire as follows:

No.	1 on miniature	to No.	1 on loctal
	2	to	3
	3	to	4
	4	to	7
	5	to	5
	6	to	6
	7	to	8

3A8GT			No practical substitute.
3B4			No practical substitute.
3B5	3C5	E	No changes.
	3LE4	E	Same as 3Q5 to 3LF4.
	3LF4	E	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
3B5	3Q5	E	No changes.
	3S4	G	Same as 3Q5 to 3S4 except omit connection of No. 8 on octal to No. 5 on miniature.
3B7	1291	E	No changes.
3B7/1291	3A5	P	Change socket to miniature and rewire as follows:

No. 1 on loctal	to No. 1 on miniature
2	to 2
3	to 3
4	to 4
6	to 5
7	to 6
8	to 7

	3C6	P	Parallel circuits only. Rewire as follows:

No. 6	to No. 5
7	to 6
4	to 7
3	to 4
2	to 3

3C5	3B5	E	No changes.
	3Q5	E	
	3LE4	E	Same as 3Q5 to 3LF4
	3LF4	E	
3C6	3A5	P	Parallel circuits only. Reverse 3A5 to 3C6 procedure.
	3B7/1291	G	Parallel circuits only. Reverse 3B7/1291 to 3C6 procedure.
3D6/1299	3LF4	G	Parallel circuits only. No changes.
	3S4	G	Parallel circuits only. Change socket to miniature and rewire as follows:

No. 1 on loctal	to No. 1 on miniature
2	to 2
3	to 4
6	to 3
7	to 5
8	to 7

	3Q5	E	Parallel circuits only. Reverse 3C5 to 3LE4 procedure.
	3V4	G	Parallel circuits only. Change socket to miniature and rewire as follows:

No. 1 on loctal	to No. 1 on miniature
2	to 2
3	to 3
6	to 6
7	to 5
8	to 7

3E5	3S4	G	Parallel circuits only. Rewire as follows:

No. 3	to No. 4
6	to 3

	3V4	G	Parallel circuits only. No changes.
3E6			No practical substitute.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
3LE4	3LF4	E	No changes.
	3V4	G	Same as 3D6/1299 to 3V4.
3LF4	3D6/1299	G	Parallel circuits only. No changes.
	3V4	G	Same as 3D6/1299 to 3V4.
3Q4	3A4	P	Parallel circuits only. Rewire as follows: Reverse No. 3 and No. 4
	3D6/1299	G	Parallel circuits only. Reverse 3D6/1299 to 3Q4 procedure.
	3E5	G	Parallel circuits only. Rewire as follows: No. 6 to No. 2 3 to 6 4 to 3
	3LE4 3LF4	G G	Reverse 3D6/1299 to 3Q4 procedure.
	3S4	G	No changes.
	3V4	G	Rewire as follows: No. 6 to No. 2 3 to 6 4 to 3
3Q5	1A5 1G4	P P	No changes. For electric operation only. Battery operation requires resistor 25 to 30 ohms in one of the A leads.
	1LA4 1LB4	P P	Electric operation only. Same as 1A5 to 1LB4.
	1T4	P	Same as 1A5 to 1T4. Electric operation only. Emergency substitution.
	1T5	P	No changes. Electric operation only.
	3B5	E	No changes.
	3C5	E	No changes.
	3LF4 3LE4	E E	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 2 4 to 3 5 to 6 7 to 8 8 to 7
	3Q4 3S4	G G	Change socket to miniature and rewire as follows: No. 2 on octal to No. 1 on miniature 3 to 2 4 to 4 5 to 3 7 to 7 8 to 5

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
3Q5	3V4	G	Change socket to miniature and rewire as follows:

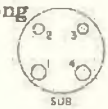
No. 2 on octal	to No.	1 on miniature
3	to	2
4	to	3
5	to	6
7	to	7
8	to	5

3S4	3E5	G	Parallel circuits only. Same as 3Q4 to 3E5.
	3Q4	G	No changes.
	3V4	G	Same as 3Q4 to 3V4.
3V4	3A4	P	Parallel circuits only. Reverse 3A4 to 3V4 procedure.
	3E5	G	Parallel circuits only. No changes.
	3Q4	G	Reverse 3Q4 to 3V4 procedure.
	3S4	G	
4A6			No practical substitute.
5A6			No practical substitute.
5AX4	5AZ4	G	No changes.
	5U4	G	
	5V4	G	
	5W4	G	
	5Y3	G	
	5Z4	G	
5AZ4	5AX4	G	No changes.
	5U4	G	
	5V4	G	
	5W4	G	
	5Y3	G	
	5Z4	G	
5R4GY	5T4	G	No changes. Use only where inverse peak voltage does not exceed 450 volts per plate.
	5U4	G	
	5V4	P	
	5Y3	P	
	5Z4	P	
	5X4	G	Same as 5T4 to 5Y4
	5Y4	P	
	5Z3	G	Where inverse peak voltage per plate does not exceed 450 volts. Change
	80	P	socket to four prong and rewire as follows:
	83	G	
	83V	G	

No. 2 on octal	to No.	1 on four prong
4	to	2
6	to	3
8	to	4

5T4	5AX4	G	No changes.
	5AZ4	G	
	5U4	G	
	5V4	G	
	5W4	G	
	5Y3	G	
	5Z4	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
5T4	5Y4	G	Make adaptor as follows:
			No. 1 on base to No. 1 on top
			2 to 8
			4 to 3
			6 to 5
			8 to 7
5U4	5AX4	G	No changes.
	5AZ4	G	
	5T4	G	
	5V4	G	
	5W4	G	
	5Y3	G	
	5Z4	G	
	5Y4	G	Same as 5T4 to 5Y4.
	5Z3	E	Same as 5R4GY to 5Z3.
	80	G	
	83	G	
	83V	G	
5V4	5AX4	G	No changes.
	5AZ4	G	
	5T4	G	
	5U4	G	
	5W4	G	
	5Y3	G	
	5Z4	G	
	5Y4	G	Same as 5T4 to 5Y4.
	5Z3	G	Same as 5R4GY to 5Z3.
	80	G	
	83	G	
	83V	G	
5W4	5AX4	G	No changes.
	5AZ4	G	
	5T4	G	
	5U4	G	
	5V4	G	
	5Y3	G	
	5Z4	G	
	5Y4	G	Same as 5T4 to 5Y4.
	5Z3	G	Same as 5R4GY to 5Z3.
	80	G	
	83	G	
	83V	G	
5X3	5Z3	G	No changes.
	80	G	
	83	G	
	83V	G	
	1275	G	
5X4	5T4	G	Rewire as follows:
	5U4	G	
	5V4	G	No. 7 to No. 2
	5Y3	G	3 to 4
	5Z4	G	5 to 6

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
5X4	5Y4	G	No changes.
	5Z3	G	Change octal to four prong socket and rewire as follows:
	80	P	 No. 3 on octal to No. 2 on four prong 5 to 3 7 to 1 8 to 4 
	83	G	
	83V	G	
5Y3	5AX4	G	No changes.
	5AZ4	G	
	5T4	G	
	5U4	G	
	5V4	G	
	5W4	G	
	5Z4	G	
	5Y4	E	Same as 5T4 to 5Y4.
	5Z3	G	Change socket to four prong and rewire as follows:
	80	E	 No. 2 on octal to No. 1 on four prong 4 to 2 6 to 3 8 to 4 
	83	G	
	83V	G	
5Y4	5T4	G	Same as 5X4 to 5T4.
	5U4	G	
	5V4	G	
	5W4	E	
	5Y3	E	
	5X4	G	No changes.
	5Z3	G	Same as 5X4 to 5Z3.
	80	E	
	83	G	
	83V	G	
5Z3	5AX4	G	Same as 80 to 5U4.
	5AZ4	G	
	5T4	G	
	5U4	E	
	5V4	G	
	5W4	G	
	5Z4	G	
	5X3	E	No changes.
	80	G	
	83	G	
	83V	G	
	1275	G	
	5X4	E	Change four prong to octal socket and rewire as follows:
			 No. 1 on four prong to No. 7 on octal 2 to 3 3 to 5 4 to 8 

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
5Z4	5AX4	G	No changes.
	5AZ4	G	
	5T4	G	
	5U4	G	
	5V4	G	
	5W4	G	
	5Y3	G	
	5Y4	G	Same as 5T4 to 5Y4.
6A3	6A5	E	Same as 6A3 to 6B4. No. 8 is cathode and filament tap.
	6B4	E	Change socket to octal and rewire as follows: No. 1 on four prong to No. 2 on octal 2 to 3 3 to 5 4 to 7  
6A4	52	G	No changes.
6A4/LA	6F6	G	Parallel circuits only. Change socket to octal and rewire as follows:
	6G6	G	No. 1 on five prong to No. 2 on octal
	6K6	G	2 to 3
	6U6	G	3 to 5
	6V6	G	4 to 4
			5 to 7 and 8  
	41	G	Parallel circuits only. Change socket to six prong and rewire as follows:
	42	G	No. 1 on five prong to No. 1 on six prong
			2 to 2
			3 to 4
			4 to 3
			5 to 5 and 6  
6A5	6A3	E	Reverse 6A3 to 6B4 procedure.
	6B4	E	Connect a 20 ohm resistor from No. 2 to No. 8. Connect a 20 ohm resistor from No. 7 to No. 8.
6A6	6E6	G	Parallel circuits only. No changes.
	6N7	G	Reverse 6N7 to 6A6 procedure.
	79	G	Reverse 79 to 6A6 procedure.
6A7	6A8	E	Change socket to octal and rewire as follows:
	6J8	E	No. 1 on seven prong to No. 2 on octal
	6K8	E	2 to 3
			3 to 4
			4 to 6
			5 to 5
			6 to 8
			7 to 7
			cap to cap  
	6D8	E	Same as 6A7 to 6A8. Parallel circuits only.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6A7	7A8 7B8 7J7 7S7	E E E E	Change socket to loctal and rewire as follows:  No. 1 on seven prong to No. 1 on loctal 2 to 2 3 to 5 4 to 3 5 to 4 6 to 7 7 to 8 cap to 6 
	7Q7	G	Change socket to loctal and rewire as follows:  No. 1 on seven prong to No. 1 on loctal 2 to 2 4 to 3 5 to 4 6 to 7 and 5 7 to 8 cap to 6  Must be well shielded.
6A8	6A7	E	Change socket to seven prong and rewire as follows:  No. 2 on octal to No. 1 on seven prong 3 to 2 4 to 3 5 to 5 6 to 4 7 to 7 8 to 6 cap to cap 
	6D8	E	Parallel circuits only. No changes.
	6J8 6K8	E E	No changes.
	7A8	G	Same as 6D8 to 7A8 but in parallel circuit only.
	7B8	G	Same as 6D8 to 7A8
	7J7	G	Same as 6J8 to 7J7
	7Q7	G	Change socket to loctal and rewire as follows:  No. 2 on octal to No. 1 on loctal 3 to 2 5 to 4 6 to 3 7 to 8 8 to 7 and 5 cap to 6  Must be well shielded. Realign if necessary.
6AB4	6C4	G	Remove and tape up any wires anchored on No. 5.
	6J4	P	Parallel circuits only. Rewire as follows: No. 7 to No. 2 1 to 7 Do not use blank connections on socket.

RECEIVING TUBE SUBSTITUTION GUIDE

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AB4	6N4	P	Parallel circuits only. Rewire as follows: Reverse No. 6 and No. 7 Connect No. 1 to No. 5 Remove and tape any wires connected to unused pins.
	9002	P	Rewire as follows: Remove and tape up any wires anchored on pins No. 2 and No. 5
6AB5/6N5	6E5	P	Parallel circuits only. No changes.
	6U5/6G5	P	Parallel circuits only. No changes.
6AB6	6AC6	G	Parallel circuits only. No changes.
	6B5	G	Change socket to six prong and rewire as follows: No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to 4 7 to 6 8 to 5
	6N6	G	No changes.
6AB7/1853	6AC7/1852	G	No changes.
	6AJ7	G	No changes.
	6SD7 6SE7 6SJ7 6SK7 6SS7 5693	G G G G G G	Parallel circuits only. No changes.
	7V7	G	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 4 4 to 6 5 to 7 6 to 3 7 to 8 8 to 2
	7W7	G	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 5 4 to 6 5 to 4 or 7 6 to 3 7 to 8 8 to 2
6AC5G	6AC5GT 6AC5GT/G	E E	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AC5GT	6AC5G	E	No changes.
	6AC5GT/G	E	
6AC6	6AB6	G	Parallel circuits only. No changes.
6AC7	7W7	G	Same as 6AB7/1853 to 7W7.
6AC7/1852	6AB7/1853	G	No changes.
	6AH6	G	Change socket to miniature and rewire as follows:

No. 2 on octal		to No. 3 on miniature
3	to	2
4	to	1
5	to	7
6	to	6
7	to	4
8	to	5

	6AJ7	G	No changes.
	6SD7	G	Parallel circuits only. No changes.
	6SE7	G	
	6SJ7	G	
	6SK7	G	
	6SS7	G	
	5693	G	
	7V7	G	Same as 6AB7/1853 to 7V7.
6AD4	6K4	G	No changes.
6AD5	6AE5	G	No changes.
	6AF5	G	
	6C5	G	
	6J5	G	
	6P5	G	
	6F5	E	Rewire as follows:

Remove wires from No. 3 and connect to No. 4. Connect grid lead to No. 5. This pin may be used for anchor. Extend to grid cap.

	6K5	G	Rewire as follows:

Connect terminal No. 5 to grid cap. This terminal may be used as an anchor.

	7B4	G	Change socket to loctal and rewire as follows:

No. 2 on octal		to No. 1 on loctal
3	to	2
5	to	6
7	to	8
8	to	7

6AD6	6AF6	G	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AD7	6F7	G	Parallel circuits only. Change socket to seven prong and rewire as follows No. 1 on octal to No. 5 on seven prong 2 to 1 3 to 2 4 to 3 5 to cap 6 to 4 7 to 7 8 to 6
	6P7	G	Parallel circuits only. Remove wires from No. 5 and extend to grid cap. Rewire as follows: No. 4 to No. 5 3 to 4 7 to 3 1 to 7
6AE5	6AD5 6AF5 6C5 6J5 6P5		No changes.
6AE6	6AH7	G	Parallel circuits only. Rewire as follows: Remove and tape up any wires on No. 1 No. 3 to No. 4 2 to 8 4 to 6 Connect No. 4 and No. 2 together Connect No. 1 and No. 5 together
	6N7	P	Parallel circuits only. Rewire as follows: No. 4 to No. 6 Connect No. 4 and No. 5 together.
6AF5	6AD5	G	No changes.
	6AE5	G	
	6C5	G	
	6J5	G	
	6P5	G	
6AF6	6AD6	G	No changes.
6AF7			No practical substitute.
6AG5	6AJ5	P	Parallel circuits only. No changes.
	6AK5	G	Parallel circuits only. No changes.
	6AU6	G	No changes.
	6BC5	G	No changes.
	5590	G	Parallel circuits only. No changes.
	5591	G	
	9001	G	
	9003	G	
6AG6G			No practical substitute.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AG7	6AK7	E	No changes.
6AH5	6AL6	G	Rewire as follows: No. 4 to cap 1 to 4 6 to 5
	6L6	G	Rewire as follows: No. 4 to No. 3 1 to 4 6 to 5
6AH6*	6AJ5	P	Parallel circuits only. No changes.
	6AK5	P	
	6AS6	P	Parallel circuits only. Rewire as follows: Reverse No. 2 and No. 7
	6AU6	P	Parallel circuits only. No changes.
	6BC5	G	Parallel circuits only. No changes.
	6BD6	P	Parallel circuits only. No changes.
	EF50	P	Parallel circuits only. Reverse EF50 to 6BA6 procedure.
6AH7	6AE6	G	Parallel circuits only. Reverse 6AE6 to 6AH7 procedure.
	6C8	G	Rewire as follows: Connect wire from No. 1 to grid cap. Remove wires from No. 2 No. 8 to No. 2 4 to 8 Connect wires removed from No. 2 to No. 4.
	8SN7	P	Parallel circuits only. Rewire as follows: Reverse No. 2 and No. 3 Remove wires from No. 4 No. 5 to No. 4 6 to 5 Connect wires removed from No. 4 to No. 6.
	7N7	P	Parallel circuits only. Change socket to loctal and rewire as follows: No. 1 on octal to No. 4 on loctal 2 to 2 3 to 3 4 to 7 5 to 5 6 to 6 7 to 8 8 to 1
6AJ5	6AG5	P	Parallel circuits only. No changes.
	6AK5	P	No changes.
	6AU6	P	Parallel circuits only. No changes.

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AJ7	6AB7/1853	G	No changes.
	6AC7/1852	G	
	6SD7	G	Parallel circuits only. No changes.
	6SE7	G	
	6SJ7	G	
	6SK7	G	
	6SS7	G	
	5693	G	
6AK5	6AG5	G	Parallel circuits only. No changes.
	6AH6	G	Parallel circuits only. Connect No. 2 and No. 7 together.
	6AJ5	P	No changes.
	6AU6	P	Parallel circuits only. No changes.
6AK6	6AR5	G	Parallel circuits only. Rewire as follows: Connect No. 2 and No. 7 together
6AK7	6AG7	E	No changes.
6AL5	6H6	G	Where space permits. Change socket to octal and rewire as follows: No. 1 on miniature to No. 8 on octal 2 to 3 3 to 2 4 to 7 5 to 4 7 to 5  
6AL6	6AH5	G	Reverse 6AH5 to 6AL6 procedure.
	6L6	E	Rewire as follows: cap to No. 3
6AL7			No practical substitute.
6AM5	6AQ5	P	Parallel circuits only. No. 7 to No. 6
	6AR5	P	Parallel circuits only. Rewire as follows: No. 7 to No. 6
6AM6	6AH6	G	Parallel circuits only. Same as 6AM6 to 6AU6.
	6AK6	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AM6	6AU6	G	Rewire as follows:
	6BA6	G	Remove wires from No. 2
	6BD6	G	No. 6 to No. 2
			7 to 6
			Connect wires removed from No. 2 to No. 7.
6AN5	6AQ5	G	Rewire as follows;
			No. 7 to No. 2
6AN6			No practical substitute.
6AN7			No practical substitute.
6AQ5	6AM5	P	Parallel circuits only. Rewire as follows:
			No. 7 to No. 1
			6 to 7
	6AN5	G	Parallel circuits only. Rewire as follows:
			No. 7 to No. 1
	6AR5	G	Rewire as follows:
			No. 7 to No. 1
	6AS5	G	Parallel circuits only. Reverse 6AS5 to 6AQ5 procedure.
	6BF5	P	Parallel circuits only. No changes.
	6V6	G	Where space permits. Change socket to octal and rewire as follows:
			No. 1 on miniature to No. 5 on octal
			2 to 8
			3 to 2
			4 to 7
			5 to 3
			6 to 4
			7 to 5
6AQ6	6BD7	G	Parallel circuits only. Reverse 6BD7 to 6AQ6 procedure.
	6AT6	G	Parallel circuits only. No changes.
	6AV6	G	
	6BF6	G	
	6BK6	G	
	6BT6	G	
	6BU6	G	
6AQ7	6AW7	G	Rewire as follows:
			Remove wires from No. 1
			No. 2 to No. 1
			4 to 2
			Connect wires removed from No. 1 to No. 4.
			Remove wires from No. 3
			No. 5 to No. 3
			6 to 5
			Connect wires removed from No. 3 to No. 6.

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TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AR5	6AK6	G	Parallel circuits only. Rewire as follows: Connect No. 2 to No. 7 together.
	6AM5	P	Parallel circuits only. Rewire as follows: No. 6 to No. 7
	6AQ5	G	Parallel circuits only. No changes. Any wires connected to terminal No. 7 must be removed and taped up.
	6AS5	G	Parallel circuits only. Reverse 6AS5 to 6AR5 procedure.
6AR6	6F6	G	Parallel circuits only. Rewire as follows: No. 8 to No. 2 1 to 8 5 to 4 7 to 5 6 to 7
	6G6	G	
	6K6	G	
	6L6	G	
	6U6	G	
	6V6	G	
	6W6	G	
	6Y6	G	
	5824	G	
6AR7			No practical substitute.
6AS5	6AN5	G	Parallel circuits only. Rewire as follows: Reverse No. 1 and No. 2 5 to 1 7 to 5
	6AQ5	G	Parallel circuits only. Rewire as follows: Reverse No. 1 and No. 2 5 and 7
	6AR5	G	Parallel circuits only. Rewire as follows: Reverse No. 1 and No. 2 5 to 1 7 to 5
6AS6	6AH6	P	Parallel circuits only. Rewire as follows: Reverse No. 2 and No. 7
	6BH6	G	Parallel circuits only. No changes.
	6BJ6	G	
	6CB6	G	
6AS7G			No practical substitute.
6AT6	6AQ6	G	Parallel circuits only. No changes.

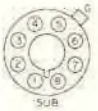
TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AT6	6AV6	G	No changes.
	6BF6	G	
	6BK6	G	
	6BT6	G	
	6BU6	G	
	6BD7	G	Parallel circuits only. Reverse 6BD7 to 6AQ6 procedure.
6AU5	6AV5	G	Parallel circuits only. No changes.
	6BD5	G	
6AU6 *	6AG5	P	No changes.
	6AJ5	P	Parallel circuits only. No changes.
	6AK5	P	
	6BA6	G	No changes.
	6BH6	G	Parallel circuits only. Rewire as follows: Reverse No. 2 and No. 7
	EF50	G	Reverse EF50 to 6BA6 procedure.
6AV5	6AU5	G	No changes.
	6BD5	G	
	6BQ6	G	Parallel circuits only. Reverse 6BQ6 to 6BD5 procedure.
6AV6	6AQ6	G	Parallel circuits only. No changes.
	6AT6	G	No changes.
6AW7	6AQ7	G	Reverse 6AQ7 to 6AW7 procedure.
6AX5	6AX6	E	Parallel circuits only. Tie Nos. 4 and 8 together.
	6BY5	E	Parallel circuits only. Rewire as follows: Connect Nos. 1 and 8 together; also Nos. 3 and 4.
	6W5	G	Parallel circuits only. No changes.
	6X5	G	
	6ZY5	G	
	1274	G	
6AX6	6AX5	G	Can be used only where No. 4 and No. 8 in 6AX6 are connected together without change.
	6W5	G	
	6X5	G	
	6ZY5	G	
	1274	G	

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AX6	6BY5	E	Parallel circuits only. Rewire as follows: No. 4 to No. 1 3 to 4
6B4	6A3	G	Reverse 6A3 to 6B4 procedure.
	6A5	E	No changes but remove any wires anchored on No. 8.
6B5	6AB6	E	Same as 6B5 to 6N6. Parallel circuits only.
	6N6	E	Change socket to octal and rewire as follows: No. 1 on six prong to No. 2 on octal 2 to 3 3 to 4 4 to 5 5 to 8 6 to 7  
	42	P	No changes.
6B6	6Q7	E	No changes.
	6SQ7	E	Make adaptor as follows: No. 1 on base to No. 1 on top 2 to 8 3 to 6 4 to 4 5 to 5 7 to 7 8 to 3 Extend No. 2 on top to grid connection.
	6T7	E	Parallel circuits only. No changes.
	7B6	G	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 2 4 to 5 5 to 6 7 to 8 8 to 4 or 7 cap to 3  
	7C6	E	Same as 6B6 to 7B6. Parallel circuits only.
	75	E	Change socket to six prong and rewire as follows: No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to 4 7 to 6 8 to 5 cap to cap  
6B7	2B7	E	Heater voltage-current ratings differ.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6B7	6B8	E	Change socket to octal and rewire as follows:

No. 1 on seven prong	to No.	2 on octal
2	to	3
3	to	6
4	to	4
5	to	5
6	to	8
7	to	7
cap	to	cap



	7E7	G	Change socket to loctal and rewire as follows:

No. 1 on seven prong	to No.	1 on loctal
2	to	2
3	to	5
4	to	3
5	to	4
6	to	7
7	to	8
cap	to	6

6B8	6B7	E	Reverse 6B7 to 6B8 procedure.
	7E7	G	Change socket to loctal and rewire as follows:

No. 2 on octal	to No.	1 on loctal
3	to	2
4	to	3
5	to	4
6	to	5
7	to	8
8	to	7
cap	to	6

6BA5	6BH6	P	Change to miniature and connect as follows:
	6BJ6	P	

The 6BA5 base numbers 1 to 6 clockwise; an arrow indicates plate lead No. 1.

No. 1 on 6BA5 base	to No.	5 on miniature
2	to	2
3	to	1
4	to	3 and 7
5	to	6
6	to	4

6BA6	6AU6	G	No changes.
	6BD6	G	
	EF50	G	Reverse EF50 to 6BA6 procedure.
6BA7	6BE6	G	Change socket to miniature and rewire as follows:

No. 1 on noval	to No.	6 on miniature
2	to	1
3	to	2
4	to	3
5	to	4
6	to	2
7	to	7
9	to	5

6BC5	6AG5	P	No changes.
	6AJ5	P	Parallel circuits only. No changes.
	6AK5	P	
	9001	P	
	9003	P	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6BC7			No practical substitute.
6BD5	6AU5	P	Parallel circuits only. No changes.
	6AV5	P	
	6BQ6	G	Parallel circuits only. Reverse 6BQ6 to 6BD5 procedure.
6BD6	6AH6	P	Parallel circuits only. No changes.
	EF50	G	Reverse EF50 to 6BA6 procedure.
6BD7	6AQ6	G	Parallel circuits only. Change socket to miniature and rewire as follows:
	6AT6	G	
	6BF6	G	
	6BT6	G	
	6BU6	G	

	No. 1 on noval	to No.	7 on miniature
	2	to	1
	3	to	2
	4	to	3
	5	to	4
	6	to	5
	8	to	6

6BE6	6BA7	G	Change socket to nine pin noval and rewire as follows:

	No. 1 on miniature	to No.	2 on noval
	2	to	3
	3	to	4
	4	to	5
	5	to	9
	6	to	1
	7	to	7

	5915	G	No changes.
6BF5	6AQ5	P	Parallel circuits only. No changes.
	6AR5	P	Parallel circuits only. Short No. 7 to No. 1.
6BF6	6BD7	G	Parallel circuits only. Reverse 6BD7 to 6AQ6 procedure.
	6BU6	G	No changes.
6BF7	6BG7	E	
6BG6	6BQ6	P	Parallel circuits only. Rewire as follows:

No. 8	to No.	4
3	to	8

	6CD6	P	Parallel circuits only. No changes. Sometimes it is necessary to increase wattage rating of screen resistor.
6BG7	6BF7	E	No changes.
6BH6	6BJ6	G	No changes.
	6AS6	G	Parallel circuits only. No changes.
	6BC5	P	
	6CB6	G	
6BJ6	6AS6	G	Parallel circuits only. No changes.
	6BC5	P	
	6CB6	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6BJ6	6BH6	G	No changes.
6BK6	6AT6	G	No changes.
	6AV6	G	
	6BF6	G	
	6BT6	G	
	6BU6	G	
6BN6			No practical substitute.
6BQ6	6AV5	G	Parallel circuits only. Rewire as follows:
	6BD5	G	No. 5 to No. 1 8 to 3 cap to 5 4 to 8
	6BG6	P	Parallel circuits only. Rewire as follows: No. 8 to No. 3 4 to 8
	6CD6	P	Where extra filament current is available. Parallel circuits only. Rewire as follows: No. 8 to No. 3 4 to 8
6BT6	6AQ6	G	Parallel circuits only. No changes.
	6BD7	G	Parallel circuits only. Reverse 6BD7 to 6AQ6 procedure.
	6BK6	G	No changes.
6BU6	6BD7	G	Parallel circuits only. Reverse 6BD7 to 6AQ6 procedure.
	6BF6	G	No changes.
6BY5	6AX5	G	Parallel circuits only. Where No. 1 and No. 5 are connected together, change connections as follows:
	6W5	G	
	6X5	G	
	6ZY5	G	No. 4 to No. 3
	1274	G	
6C4	6AB4	G	Rewire as follows: Connect No. 5 to No. 1
	6J4	P	Parallel circuits only. Rewire as follows: No. 7 to No. 2 1 to 7 5 to 7

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6C4	6AD5 6AE5 6AF5 6C5 6J5 6P5	P P P P P P	Parallel circuits only. Where space permits, change socket to octal and rewire as follows:  No. 1 on miniature to No. 3 on octal 3 to 2 4 to 7 5 to 3 6 to 5 7 to 8 
	6L5	P	Where space permits. Same as 6C4 to 6AD5.
	6N4	P	Parallel circuits only. Rewire as follows: No. 1 to No. 5 Reverse No. 6 and No. 7.
	7A4 7B4	G P	Parallel circuits only. Where space permits. Change socket to loctal and rewire as follows:  No. 1 on miniature to No. 2 on loctal 3 to 1 4 to 8 5 to 2 6 to 6 7 to 7 
	9002	P	No changes.
6C5	6AD5 6AE5 6AF5	G G G	No changes.
	6C4	G	Reverse 6C4 to 6AD5 procedure.
	6F5	G	Make adaptor as follows: No. 1 on base to No. 1 on top 2 to 2 3 to 4 5 to cap 7 to 7 8 to 8
	6J5 6P5	G G	No changes.
	7A4	G	Same as 6J5 to 7A4.
	7B4	G	Same as 6J5 to 7A4
	37 76	G G	Change socket to five prong and rewire as follows:  No. 2 on octal to No. 1 on five prong 3 to 2 5 to 3 7 to 5 8 to 4 
6C6*	6D6	G	No changes.

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6C6	6D7	G	Change socket to seven prong and rewire as follows:
	6E7	G	

No. 1 on six prong	to No.	1 on seven prong
2	to	2
3	to	3
4	to	4
5	to	6
6	to	7
cap	to	cap

	6J7	E	Change socket to octal and rewire as follows:
	6K7	G	
	6U7	G	

No. 1 on six prong	to No.	2 on octal
2	to	3
3	to	4
4	to	5
5	to	8
6	to	7
cap	to	cap

	6S7	G	Same as 6C6 to 6J7. Parallel circuits only.
	6SJ7	E	Change socket to octal and rewire as follows:
	6SK7	G	

No. 1 on six prong	to No.	2 on octal
2	to	8
3	to	6
4	to	3
5	to	5
6	to	7
cap	to	4

	6W7	G	Same as 6C6 to 6J7. Parallel circuits only.
	7A7	G	Change socket to loctal and rewire as follows:

No. 1 on six prong	to No.	1 on loctal
2	to	2
3	to	3
4	to	4
5	to	7
6	to	8
cap	to	6

	7B7	G	Same as 6C6 to 7A7. Parallel circuits only.
	7C7	G	
	77	E	No changes.
	78	E	
	1221	E	
6C7	6Q7	G	Make adaptor as follows:
	6R7	G	

No. 1 on base	to No.	2 on top
2	to	3
4	to	4
5	to	5
6	to	8
7	to	7

	6T7	G	Same as 6C7 to 6Q7. Parallel circuits only.
6C8	6F8	G	Parallel circuits only. No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6C8	7F7	G	Change socket to loctal and rewire as follows:

No. 2 on octal	to No.	1 on loctal
3	to	3
4	to	2
5	to	5
6	to	6
7	to	8
8	to	7
cap	to	4

6CB6	6AS6	P	Parallel circuits only. No changes.
	6BK6	P	
	6BJ6	P	
6CD6	6BG6	G	Parallel circuits only. No changes.
	6BQ6	P	Parallel circuits only. Rewire as follows:

No. 8	to No. 4
3	to 8

6D4			No practical substitute.
6D6	6C6	G	No changes.
	6D7	G	Same as 6C6 to 6D7.
	6E7	G	Same as 6C6 to 6D7.
	6J7	G	Same as 6C6 to 6J7.
	6K7	E	
	6S7	G	Same as 6C6 to 6J7. Parallel circuits only.
	6SJ7	G	Same as 6C6 to 6SJ7.
	6SK7	E	
	6U7	G	Same as 6C6 to 6J7.
	6W7	G	Same as 6C6 to 6J7. Parallel circuits only.
	7A7	E	Same as 6C6 to 7A7.
	7B7	G	Same as 6C6 to 7A7. Parallel circuits only.
	7C7	G	
	39/44	G	Same as 78 to 39/44.
	77	G	No changes.
	78	E	
6D7	6E7	G	No changes.
6D8	6A7	G	Parallel circuits only. Reverse 6A7 to 6A8 procedure.
	6A8	G	Parallel circuits only. No changes.
	6J8	G	
	6K8	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6D8	7A8	G	Change socket to loctal and rewire as follows:

No. 2 on octal	to No.	1 on loctal
3	to	2
4	to	5
5	to	4
6	to	3
7	to	8
8	to	7
cap	to	6

	7B8	G	Same as 6D8 to 7A8. Parallel circuits only.
	7J7	G	
	7S7	G	
	7Q7	G	Same as 6A8 to 7Q7. Parallel circuits only.
	12A8	P	Series circuits only. No changes.
	12K8	P	
6E5	2E5	E	Heater voltage - current ratings differ.
	6AB5/6N5	P	Parallel circuits only. No changes.
	6T5	E	No changes.
	6U5/6G5	E	
6E6	6A6	G	Parallel circuits only. No changes.
6E7	6D7	G	No changes.
6E8			No practical substitute.
6F4	6L4	P	No changes.
6F5	6AD5	G	Make adaptor as follows:

No. 1 on base	to No.	1 on socket
2	to	2
4	to	3
7	to	7
8	to	8
Connect grid cap	to	5 on base.

	6C5	G	Reverse 6C5 to 6F5 procedure.
	6J5	G	
	6K5	E	Change connections as follows:

No. 4	to No. 3

	6SF5	E	Make adaptor as follows:

No. 1 on base	to No.	1 on top
2	to	8
4	to	5
7	to	7
8	to	2
cap	to	3

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6F5	7A4 7B4	G G	Change socket to loctal and rewire as follows:  No. 2 on octal to No. 1 on loctal 4 to 2 7 to 8 8 to 7 cap to 6 
6F6 *	6A4/LA	P	Parallel circuits only. Reverse 6A4/LA to 6F6 procedure.
	6AD7	G	Parallel circuits only. Remove and tape up any wires on Nos. 1 and 6.
	6AR6	G	Where additional filament current is available. Reverse 6AR6 to 6F6 procedure.
	6G6 6K6 6L6 6U6 6V6	P G G G G	Parallel circuits only. No changes.
	7B5 7C5	G G	Same as 6K6 to 7B5.
	38	G	Parallel circuits only. Change socket to five prong and rewire as follows  No. 2 on octal to No. 1 on five prong 3 to 2 4 to 3 5 to cap 7 to 5 8 to 4 
	41	G	Same as 6F6 to 42. Parallel circuits only.
	42	E	Change socket to six prong and rewire as follows:  No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to 4 7 to 6 8 to 5 
	89	G	Parallel circuits only. Change socket to six prong and rewire as follows:  No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to cap 7 to 6 8 to 5 short 4 and 5 together. 
6F7	6P7	E	Change socket to octal and rewire as follows:  No. 1 on seven prong to No. 2 on octal 2 to 4 3 to 5 4 to 6 5 to 7 6 to 8 7 to 3 cap to cap 
6F8	6C8	G	Parallel circuits only. No changes.

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6G5	6AB5	G	Parallel circuits only. No changes.
	6E5	G	No changes.
	6T5	G	
	6U5	G	
6G6	6A4/LA	G	Parallel circuits only. Reverse 6A4/LA to 6F6 procedure.
	6F6	G	Parallel circuits only. No changes.
	6K6	G	
	6V6	G	
	12A6	P	Series circuits only. No changes.
	41	G	Same as 6F6 to 42. Parallel circuits only.
	42	G	
	89	G	Same as 6F6 to 89. Parallel circuits only.
6H4	6H6	G	Parallel circuits only. Rewire as follows: No. 4 to No. 3 Connect No. 3 and No. 5 together. Connect No. 4 and No. 8 together.
6H5	6U5/6G5	E	No changes.
6H6	6AL5	G	Same as 12H6 to 12AL5.
	6W5	P	Parallel circuits only. Tie Nos. 4 and 8 together.
	6X5	P	
	6ZY5	P	Tie Nos. 4 and 8 together.
	7A6	E	Parallel circuits only. Change socket to loctal and rewire as follows:  No. 1 on octal to No. 5 on loctal 2 to 1 3 to 3 4 to 2 5 to 6 7 to 8 8 to 7 
	7Y4	P	Parallel circuits only. Change socket to loctal and rewire as follows:
	7Z4	P	 No. 2 on octal to No. 1 on loctal 3 to 3 4 and 8 to 7 5 to 6 7 to 8 8 to 7 
6H8			No practical substitute.
6J4	6AB4	P	Parallel circuits only. Rewire as follows: Nos. 1 and 5 to 6 7 to 1 2 to 7

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6J4	6C4	G	Parallel circuits only. Reverse 6C4 to 6J4 procedure.
	6N4	G	Parallel circuits only. Rewire as follows: Reverse Nos. 5 and 7 No. 6 to No. 7
	9002	G	Parallel circuits only. Rewire as follows: Nos. 1 and 5 to No. 6 7 to 1
6J5	6AD5	G	No changes.
	6AE5	G	
	6AF5	G	
	6C5	G	
	6F5	G	Same as 6C5 to 6F5.
	6K5	G	Change connections as follows: No. 5 to cap.
	6L5	G	Parallel circuits only. No changes.
	6P5	G	No changes.
	7A4	E	Change socket to loctal and rewire as follows:
	XXL	E	No. 2 on octal to No. 1 on loctal 3 to 2 5 to 6 7 to 8 8 to 7
	37	G	Same as 6C5 to 37.
	76	G	
6J6	5687	P	Parallel circuits only. Change socket to noval and rewire as follows:
			No. 1 on miniature to No. 9 on noval 2 to 1 3 to 4 4 to 5 5 to 2 8 to 7 7 to 3 and 6
6J7*	6C6	E	Reverse 6C6 to 6J7 procedure.
	6D6	E	
	6D7	G	Change socket to seven prong and rewire as follows:
	6E7	G	No. 2 on octal to No. 1 on seven prong 3 to 2 4 to 3 5 to 4 7 to 7 8 to 6 cap to cap
	6K7	G	No changes.
	6S7	G	Parallel circuits only. No changes.

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6J7	6SH7	G	Make adaptor as follows:
	6SJ7	E	
	6SK7	G	

No. 1 on base	to No.	1 on top
2	to	2
3	to	8
4	to	6
5	to	3
7	to	7
8	to	5
cap	to	4

	6U7	G	No changes.
	6W7	G	Parallel circuits only. No changes.
	7A7	G	Change socket to loctal and rewire as follows:
	7H7	G	
	7L7	G	

No. 1 on octal	to No.	5 on loctal
2	to	1
3	to	2
4	to	3
5	to	4
7	to	8
8	to	7
cap	to	6

	7B7	G	Same as 6J7 to 7L7. Parallel circuits only.
	7C7	G	
	7G7	G	Same as 6J7 to 6L7.
	39/44	G	Same as 6K7 to 39/44.
	36	G	
	77	E	Reverse 6C6 to 6J7 procedure.
	78	G	
	1221	E	Reverse 6C6 to 6J7 procedure.
	1223	E	No changes.
	1232	E	Same as 6J7 to 6L7.
	1620	E	No changes.
6J8	6A7	G	Same as 6A8 to 6A7.
	6A8	G	No changes.
	6D8	G	Parallel circuits only. No changes.
	6K8	G	No changes.
	7A8	G	Same as 6D8 to 7A8. Parallel circuits only.
	7B8	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6J8	7J7	G	Change socket to loctal and rewire as follows:
	7S7	G	

No. 2 on octal	to No. 1 on loctal
3	to 2
4	to 5
5	to 4
6	to 3
7	to 8
8	to 7
cap	to 6

	7Q7	G	Same as 6A8 to 7Q7.
6K4	6AD4	E	No changes.
6K5	6AD5	G	Make adaptor as follows:

No. 2 on base	to No. 2 on cap
3	to 3
7	to 7
8	to 8

Connect grid cap to No. 5 on base. This substitution can also be made by merely connecting the grid cap to No. 5 on the socket.

	6AE5	G	Change connection as follows: cap to No. 5.
	6C5	G	
	6J5	G	
	6F5	G	Change connections as follows:

No. 3	to No. 4

	6Q7	G	Cut off pins Nos. 4 and 5.
	6SF5	G	Make adaptor as follows:

No. 1 on base	to No. 1 on top
2	to 8
3	to 5
7	to 7
8	to 2
cap	to 3

	7A4	G	Change socket to loctal and rewire as follows:
	7B4	G	

No. 2 on octal	to No. 1 on loctal
3	to 2
7	to 8
8	to 7
cap	to 6

6K6	6A4/LA	P	Parallel circuits only. Reverse 6A4/LA to 6F6 procedure.
	6AD7	G	Parallel circuits only. Remove and tape up any wires anchored on pins Nos. 1 and 6.
	6AR6	P	Where additional filament current is available. Reverse 6AR6 to 6F6 procedure.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6K6	6F6	G	Parallel circuits only. No changes.
	6G6	P	
	6L6	G	
	6U6	G	
	6V6	G	
	7A5	G	Same as 6K6 to 7B5. Parallel circuits only.
	7B5	E	Change socket to loctal and rewire as follows:

No. 2 on octal	to No.	1 on loctal
3	to	2
4	to	3
5	to	6
7	to	8
8	to	7

	7C5	G	Same as 6K6 to 7B5. Parallel circuits only.
	38	G	Same as 6F6 to 38. Parallel circuits only.
	41	E	Same as 6F6 to 42. Parallel or series circuits.
	42	G	Same as 6F6 to 42. Parallel circuits only.
	89	G	Same as 6F6 to 89. Parallel or series circuits.
6K7	6AU6	G	Change socket to miniature and rewire as follows:
	6BA6	G	
	6BD6	G	

No. 2 on octal	to No.	3 on miniature
3	to	5
4	to	6
5	to	2
7	to	4
8	to	7
cap	to	1

	6C6	G	Reverse 6C6 to 6J7 procedure.
	6D6	E	
	6D7	G	Same as 6J7 to 6D7.
	6E7	G	
	6J7	G	No changes.
	6Q7	P	Cut off pins No. 4 and No. 5. Emergency substitution.
	6S7	G	Parallel circuits only. No changes.
	6SH7	G	Same as 6J7 to 6SJ7.
	6SJ7	G	
	6SK7	E	
	6SS7	G	Same as 12K7 to 12SK7. Parallel circuits only.
	6U7	G	No changes.
	6W7	G	Parallel circuits only. No changes.

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TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6K7	XXL	P	Change socket to loctal and rewire as follows:
	7A4	P	Remove No. 4 and tape up

No. 2 on octal	to No.	1 on loctal
3	to	2
8	to	7
7	to	8
cap	to	6

	7A7	E	Change socket to loctal and rewire as follows:
	7H7	G	
	7L7	G	

No. 1 on octal	to No.	5 on loctal
2	to	1
3	to	2
4	to	3
5	to	4
7	to	8
8	to	7
cap	to	6

	7B7	G	Same as 6K7 to 7A7. Parallel circuits only.
	7C7	G	
	7G7	G	
	39/44	E	Change socket to five prong type and rewire as follows:

No. 2 on octal	to No.	1 on five prong
3	to	2
4	to	3
5	to	4
7	to	5
8	to	4
cap	to	cap

	77	G	Reverse 6C6 to 6J7 procedure.
	78	E	
	1232	G	Same as 6K7 to 7A7. Parallel circuits only.
6K8	6A8	G	No changes.
	6J8	G	
	7J7	G	Same as 6J8 to 7J7.
	7S7	G	
	7Q7	G	Same as 12A8 to 14B8.
6L4	6F4	P	No changes.
	955	G	Parallel circuits only. Refer to base diagram for changes.
6L5	6AD5	G	Parallel circuits only. No changes.
	6AE5	G	
	6C5	G	Parallel circuits only. No changes.
	7A4	G	Same as 6J5 to 7A4. Parallel circuits only.
	XXL	G	
	37	G	Same as 6C5 to 37. Parallel circuits only.
	76	G	
6L6	6AD7	G	Remove and tape up any wires anchored on pins Nos. 1 and 6.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6L6	6AL6	G	Rewire as follows: Connect No. 3 to cap.
	6AR6	G	Reverse 6AR6 to 6F6 procedure.
	6F6 6K6 6U6 6V6	G G G G	Parallel circuits only. No changes.
	1614	E	No changes.
6L7	1612	E	No changes.
6M5			No practical substitute.
6M6G			No practical substitute.
6M7G			No practical substitute.
6M8GT			No practical substitute.
6N4	6AB4	G	Parallel circuits only. Reverse 6AB4 to 6N4 procedure.
	6J4	G	Parallel circuits only. Reverse 6J4 to 6N4 procedure.
6N5	6AB5	E	See 6AB5 substitutes.
6N6	6AB6	G	Parallel circuits only. No changes.
	6B5	E	Change socket to six prong and rewire as follows:  No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to 4 7 to 6 8 to 5 
6N7	6A6	G	Change socket to seven prong and rewire as follows:  No. 2 on octal to No. 1 on seven prong 3 to 2 4 to 3 5 to 5 6 to 6 7 to 7 8 to 4 
	6AE6	P	Parallel circuits only. Reverse 6AE6 to 6N7 procedure.
	6Y7 6Z7	G G	Parallel circuits only. No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6N7	79	G	Change socket to six prong and rewire as follows:

No. 2 on octal	to No.	1 on six prong
3	to	2
4	to	3
5	to	cap
6	to	5
7	to	6
8	to	4

6N8	7R7	P	Change socket to loctal and rewire as follows:

No. 1 on noval	to No.	5 on loctal
2	to	6
3	to	7
4	to	1
5	to	8
6	to	2
7	to	3
8	to	4
9	to	7

6P5	6AD5	G	No changes.
	6AE5	G	
	6AF5	G	
	6C5	G	
	6J5	G	
	6L5	G	Parallel circuits only. No changes.
	7A4	G	Same as 6J5 to 7A4.
	37	G	Same as 6C5 to 37.
	76	G	
6P7	6F7	E	Change socket to seven prong and rewire as follows:

No. 2 on octal	to No.	1 on seven prong
3	to	7
4	to	2
5	to	3
6	to	4
7	to	5
8	to	6
cap	to	cap

6P8G			No practical substitute.
6Q5G			No practical substitute.
6Q6			No practical substitute.
6Q7	6B6	E	No changes.
	6C7	G	Change socket to seven prong type and rewire as follows:

No. 2 on octal	to No.	1 on seven prong
3	to	2
4	to	4
5	to	5
7	to	7
8	to	6
cap	to	cap

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6Q7	6SQ7 6SR7	E. G	Same as 12Q7 to 12SQ7.
	6R7	G	No changes.
	6T7	G	Parallel circuits. No changes.
	6V7	G	No changes.
	7B6 7E6	E G	Change socket to loctal and rewire as follows:  No. 2 on octal to No. 1 on loctal 3 to 2 4 to 5 5 to 6 7 to 8 8 to 7 or 4 cap to 3 
	7C6	G	Same as above. Parallel circuits only.
	75 85	E G	Change socket to six prong type and rewire as follows:  No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to 4 7 to 6 8 to 5 cap to cap 
6R4			No practical substitute.
6R6	6K7 6U7	G G	Rewire as follows: No. 3 to No. 4 5 to 3 Short Nos. 5 and 8 on socket together.
6R7	6C7	G	Same as 6Q7 to 6C7.
	6Q7	G	No changes.
	6SQ7 6SR7	G E	Same as 12Q7 to 12SQ7.
	6T7	G	Parallel circuits only. No changes.
	6V7	G	No changes.
	7B6	G	Same as 6Q7 to 7B6.
	7C6	E	Parallel circuits only. Same as 6Q7 to 7B6.
	7E6	G	Same as 6Q7 to 7B6.
	75 85	G E	Same as 6Q7 to 75.
6R8	6T8	G	No changes.
6S4			No practical substitute.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6S6			No practical substitute.
6SA7	7Q7	G	Same as 12SA7 to 14Q7.
	6SB7Y	G	No changes.
	6SD7	P	Same as 12SA7 to 12SK7.
	6SH7	P	
	6SK7	P	
6S8GT			No practical substitute.
6S7	6D6	G	Parallel circuits only. Reverse 6C6 to 6J7 procedure.
	6D7	G	Same as 6J7 to 6D7. Parallel circuits only.
	6E7	G	
	6J7	G	Parallel circuits only. No changes.
	6K7	G	
	6SJ7	G	Parallel circuits only. Same as 12K7 to 12SK7.
	6SK7	G	
	6SS7	E	Same as 12K7 to 12SK7.
	6U7	G	Parallel circuits only. No changes.
	6W7	G	No changes.
	7A7	G	Parallel circuits only. Same as 12K7 to 7B7.
	7B7	G	Same as 12K7 to 7B7.
	7C7	G	
	12K7	P	Series circuits only. No changes.
	12SK7	P	Series circuits only. Same as 12K7 to 12SK7.
	14A7/12B7	P	Series circuits only. Same as 12K7 to 7B7.
	39/44	G	Parallel circuits only. Same as 6K7 to 39/44.
	77	G	Parallel circuits only. Reverse 6C6 to 6J7 procedure.
	78	G	
	666	G	
6SB7Y	6BE6	G	Change socket to miniature and rewire as follows:

No. 1 on octal	to No.	2 on miniature
2	to	3
3	to	5
4	to	6
5	to	1
6	to	2
7	to	4
8	to	7

6SC7	6C8	G	Same as 6SC7 to 6F8.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6SC7	6F8	G	Make adaptor as follows: No. 1 on base to No. 1 on top 2 to 3 3 to cap 4 to 5 5 to 6 6 to 4 and 8 7 to 7 8 to 2 Parallel circuits only.
	6SL7	G	Make adaptor as follows: No. 2 on base to No. 2 on top 3 to 1 4 to 4 5 to 5 6 to 3 and 6 7 to 7 8 to 8
	6SN7	G	Same as 6SC7 to 6SL7. Parallel circuits only.
	7F7	G	Change socket to loctal and rewire as follows: No. 2 on octal to No. 3 on loctal 3 to 4 4 to 5 5 to 6 6 to 2 and 7 7 to 1 8 to 8  
6SD7	6AB7/1853	G	Parallel circuits only. No changes.
	6AC7/1852	G	
	6SS7	G	
	6SE7	G	No changes.
	6SJ7	G	No changes.
	6SK7	G	
	5693	G	
6SE7	6AB7/1853	G	Parallel circuits only. No changes.
	6AC7/1852	G	
	6SS7	G	
	6SD7	G	No changes.
	6SJ7	G	No changes.
	6SK7	G	
	5693	G	
6SF5	6F5	E	Reverse 6F5 to 6SF5 procedure.
	6K5	G	Make adaptor as follows: No. 1 on base to No. 1 on top 2 to 8 3 to cap 5 to 3 7 to 7 8 to 2

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6SF5	7B4	G	Change socket to loctal and rewire as follows. Parallel circuits only:

No. 2 on octal	to No. 7 on loctal
3	to 6
5	to 2
7	to 1
8	to 8

6SF7	6SV7	G	No changes.
6SG7	6AB7	G	Parallel circuits only. No changes.
	6AC7	G	
	6AG5	G	Change socket to miniature and rewire as follows:
	6BC5	G	

No. 2 on octal	to No. 3 on miniature
3 and 5	to 2
4	to 1
6	to 6
7	to 4
8	to 5

	6AJ5	G	Same as 6SG7 to 6AG5. Parallel circuits only.
	6AK5	G	
	6AN5	G	
	5591	G	
	9001	G	
	9003	G	
	6SH7	G	No changes. Cathode and suppressor grid are internally connected in the
	6SJ7	G	6SG7. In a limited number of circuits this substitution does operate. In
	6SK7	G	these cases short pins 3 and 5 together.
6SH7	6AB7	G	Parallel circuits only. No changes.
	6AC7	G	
	6AG5	G	Same as 6SG7 to 6AG5.
	6BC5	G	
	6AJ5	G	Same as 6SG7 to 6AG5. Parallel circuits only.
	6AK5	G	
	6AN5	G	
	5591	G	
	9001	G	
	9003	G	
	6SG7	G	No changes.
	6SJ7	G	
	6SK7	G	
	7G7/1232	G	Parallel circuits only. Change socket to loctal and rewire as follows:

No. 1 on octal	to No. 5 on loctal
2	to 1
3	to 4
4	to 6
5	to 7
6	to 3
7	to 8
8	to 2

6SJ7	6C6	E	Reverse 6C6 to 6SJ7 procedure.
	6D6	G	
	77	E	
	78	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6SJ7	6D7	G	Change socket to seven prong type and rewire as follows:
	6E7	G	

No. 2 on octal		to No. 1 on seven prong
3	to	4
4	to	cap
5	to	6
6	to	3
7	to	7
8	to	2

6J7	E	Same as 12SK7 to 12K7.
6K7	G	
6U7	G	
6S7	G	Same as 12SK7 to 12K7. Parallel circuits only.
6W7	G	
6SK7	G	No changes.
5693	E	
6SS7	G	Parallel circuits only. No changes.
7A7	G	Same as 12SJ7 to 7B7.
7B7	G	Same as 12SJ7 to 7B7. Parallel circuits only.
7C7	G	
6SK7	6AB7	G	Parallel circuits only. No changes.
	6AC7	G	
	6AH6	G	Same as 6SK7 to 6AU6. Parallel circuits only.
	6AK6	G	
	6AU6	G	Change socket to miniature and rewire as follows:
	6BA6	G	
	6BD6	G	

No. 2 on octal		to No. 3 on miniature
3	to	2
4	to	1
5	to	7
6	to	6
7	to	4
8	to	5

6C6	G	Reverse 6C6 to 6SJ7 procedure.
6D6	E	
77	G	
78	E	
6D7	G	Same as 6SJ7 to 6D7.
6E7	G	
6J7	G	Same as 12SK7 to 12K7.
6K7	E	
6U7	G	
6S7	G	Same as 12SK7 to 12K7. Parallel circuits only.
6W7	G	
6SG7	G	No changes.
6SH7	G	
6SJ7	G	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6SK7	6SS7	G	Parallel circuits only. No changes.
	36	G	Change socket to five prong and rewire as follows:
	39/44	E	No. 2 on octal to No. 1 on five prong 3 and 5 to 4 4 to cap 6 to 3 7 to 5 8 to 2
	7A7	E	Same as 12SJ7 to 7B7.
	7B7	E	Same as 12SJ7 to 7B7. Parallel circuits only.
	7C7	G	
6SL7	2C21	P	Reverse 2C21 to 6SN7 procedure.
	6C8	G	Same as 6SL7 to 6F8.
	6F8	G	Make adaptor as follows: No. 1 on base to cap on top 2 to 3 3 to 4 4 to 5 5 to 6 6 to 8 7 to 7 8 to 2
	6SC7	G	If the 6SL7 employs the two cathodes separately this substitution may be impractical. Reverse 6SC7 to 6SL7 procedure.
	6SN7	G	Parallel circuits only. No changes.
	6SU7	G	No changes.
	7F7	G	Change socket to loctal and rewire as follows: No. 1 on octal to No. 4 on loctal 2 to 3 3 to 2 4 to 5 5 to 6 6 to 7 7 to 1 8 to 8
	7N7	G	Same as 6SL7 to 7F7. Parallel circuits only.
	5691	E	No changes.
	5692	P	
6SN7	2C21	G	Reverse 2C21 to 6SN7 procedure.
	6F8	G	Same as 6SL7 to 6F8. Parallel circuits only.
	6SC7	G	Reverse 6SC7 to 6SL7 procedure. Parallel circuits only.
	6SL7	G	Parallel circuits only. No changes.
	7F7	G	Same as 6SL7 to 7F7. Parallel circuits only.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6SN7	7F8	G	Parallel circuits only. Change socket to loctal and rewire as follows:

No. 1 on octal	to No. 1 on loctal
2	to 3
3	to 4
4	to 8
5	to 6
6	to 5
7	to 7
8	to 2

	5691	P	No changes.
	5692	G	
6SQ7	6AQ6	G	Same as 6SQ7 to 6AT6. Parallel circuits only.
	6AT6	G	Change socket to miniature and rewire as follows:
	6AV6	G	
	6BF6	G	
	6BK6	G	
	6BT6	G	
	6BU6	G	

No. 2 on octal	to No. 1 on miniature
3	to 2
4	to 5
5	to 6
6	to 7
7	to 4
8	to 3

	6B6	G	Make adaptor as follows:

No. 1 on base	to No. 1 on top cap
2	to
3	to 8
4	to 4
5	to 5
7	to 7
8	to 2

	6C7	G	Change socket to seven prong and rewire as follows:

No. 2 on octal	to	cap on seven prong
3	to	6
4	to	4
5	to	5
6	to	2
7	to	1
8	to	7

	6Q7	E	Same as 6SQ7 to 6B6.
	6R7	G	Same as 6SQ7 to 6B6.
	6SR7	G	No changes.
	6ST7	G	Parallel circuits only. No changes.
	6T7	G	Same as 6SQ7 to 6B6. Parallel circuits only.
	6V7	G	
	7B6	E	Change socket to loctal and rewire as follows:
	7E6	G	

No. 2 on octal	to No. 3 on loctal
3	to 4 or 7
4	to 5
5	to 6
6	to 2
7	to 1
8	to 8

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6SQ7	7C6	G	Same as above. Parallel circuits only.
	75	E	Change socket to six prong and rewire as follows:
	85	G	No. 2 on octal to cap on six prong 3 to 5 4 to 3 5 to 4 6 to 2 7 to 1 8 to 6
6SR7	6AQ6	G	Same as 6SQ7 to 6AT6. Parallel circuits only.
	6AT6	G	Same as 6SQ7 to 6AT6.
	6AV6	G	
	6BF6	G	
	6BK6	G	
	6BT6	G	
	6BU6	G	
	6B6	G	Same as 6SQ7 to 6B6.
	6Q7	G	
	6C7	G	Same as 6SQ7 to 6C7.
	6R7	E	Same as 6SQ7 to 6B6.
	6V7	G	
	6SQ7	G	No changes.
	6ST7	G	Parallel circuits only. No changes.
	6SZ7	G	Parallel circuits only. No changes.
	6T7	G	Same as 6SQ7 to 6B6. Parallel circuits only.
	75	G	Same as 6SQ7 to 75.
	85	E	
6SS7	6AK6	G	Same as 6SK7 to 6AU6.
	6AH6	G	Same as 6SK7 to 6AU6. Parallel circuits only.
	6AU6	G	
	6BA6	G	
	6BD6	G	
	6S7	G	Same as 12SK7 to 12K7.
	6SG7	E	
	6W7	E	
	6SJ7	G	Parallel circuits only. No changes.
	6SK7	G	
	7B7	G	Same as 12SJ7 to 7B7.
	7C7	G	
	12K7	P	Same as 12SK7 to 12K7. Series circuits only.
	12SK7	P	Series circuits only. No changes.
	14A7/12B7	P	Same as 12SJ7 to 7B7. Series circuits only.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6ST7	6SQ7	G	Parallel circuits only. No changes.
	6SR7	G	
	6T7	E	Same as 6SQ7 to 6B6.
6SU7	6SL7	E	No changes.
	6SN7	P	
6SV7	6SF7	G	No changes.
6SZ7	6SQ7	G	Parallel circuits only. No changes.
	6SR7	G	
	6ST7	G	No changes.
6T5	2E5	E	Heater voltage-current ratings differ.
	6AB5	G	Parallel circuits only. No changes.
	6E5	G	No changes.
	6G5	G	
	6U5	G	
6T6			No practical substitute.
6T7	6B6	G	Parallel circuits only. No changes.
	6Q7	G	Parallel circuits only. No changes.
	6R7	G	
	6SQ7	G	Same as 12Q7 to 12SQ7. Parallel circuits only.
	6ST7	E	Same as 12Q7 to 12SQ7.
	6V7	G	Parallel circuits only. No changes.
	7B6	G	Same as 6Q7 to 7B6. Parallel circuits only.
	7C6	G	Same as 6Q7 to 7B6.
	12Q7	P	Series circuits only. No changes.
	12SQ7	P	Same as 12Q7 to 12SQ7. Series circuits only.
	75	G	Same as 6Q7 to 75. Parallel circuits only.
	85	G	
6T8*	6R8	G	No changes.
6U4	6W4	E	No changes.
6U5/6C5	6N5	E	Parallel circuits only. No changes.
6U5/6G5	2E5	E	Heater voltage-current ratings differ.
	6E5	E	No changes.
6U6	6A4/LA	P	Parallel circuits only. Reverse 6A4/LA to 6F6 procedure.
	6AR6	P	Where additional filament current is available. Reverse 6AR6 to 6F6 procedure.

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6U6	6F6	G	Parallel circuits. No changes.
	6G6	P	
	6K6	G	
	6L6	P	
	6V6	G	
	6W6	P	
6U7	6AU6	G	Same as 6K7 to 6AU6.
	6BA6	G	
	6BD6	G	
	6C6-77	G	Reverse 6C6 to 6J7 procedure.
	6D6-78	G	
	6D7	G	Same as 6J7 to 6D7.
	6E7	G	
	6K7	G	No changes.
	6S7	G	Same as 6J7 to 6SJ7.
	6SH7	G	
	6SJ7	G	
	6SK7	G	
	6SS7	G	
	6W7	G	
	7A7	G	Same as 6K7 to 7A7.
	7B7	G	Same as 6K7 to 7A7. Parallel circuits only.
	7C7	G	
	7G7	G	
	36	G	Same as 6K7 to 39/44.
	39/44	G	
6V4	6X4	E	Reverse 6X4 to 6V4 procedure.
	6X5	G	Where space permits, reverse 6X5 to 6V4 procedure.
6V6	6A4/LA	P	Parallel circuits only. Reverse 6A4/LA to 6F6 procedure.
	6AD7	G	Parallel circuits only. Remove and tape up any wires anchored on pins Nos 1 and 6.
	6AQ5	G	Reverse 6AQ5 to 6V6 procedure.
	6AR6	P	Where additional filament current is available. Reverse 6AR6 to 6F6 procedure.
	6F6	G	Parallel circuits only. No changes.
	6G6	P	
	6K6	G	
	6L6	G	Parallel circuits only. No changes.
	6U6	G	
	6Y6	G	
	7A5	G	Parallel circuits only. Remove and tape up any wires anchored on pins Nos. 1 and 6.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6V6	7B5	G	Same as 6K6 to 7B5.
	7C5	G	
	38	G	Same as 6F6 to 38. Parallel circuits only.
	41	G	Same as 6F6 to 41. Parallel circuits only.
	42	G	
	89	G	Same as 6F6 to 89. Parallel circuits only.
6V7	6C7	G	Same as 6Q7 to 6C7.
	6R7	G	No changes.
	6SQ7	G	Same as 12Q7 to 12SQ7.
	6SR7	G	
	6T7	G	Parallel circuits only. No changes.
	7B6	G	Same as 6Q7 to 7B6.
	7C6	G	Same as 6Q7 to 7B6. Parallel circuits only.
	7E6	G	Same as 6Q7 to 7B6.
	75	G	Same as 6Q7 to 75.
	85	G	
6W4	6U4	E	No changes.
6W5	0Z4	G	No changes. Do not use where AC plate voltage exceeds 250 volts per plate.
	6AX5	G	Parallel circuits only. No changes.
	6AX6	E	Parallel circuits only. Tie No. 4 and No. 8 together.
	6BY5	G	Parallel circuits only. Rewire as follows: Connect Nos. 1 and 8 together No. 3 to No. 4
	6X5	G	Parallel circuits only. No changes.
	6ZY5	G	
	6Z6	G	Parallel circuits only. Short Nos. 4 and 8.
	7Y4	G	Same as 6X5 to 7Y4.
	7Z4	G	
	1274	G	No changes. Parallel circuits only.
6W6	6AR6	G	Reverse 6AR6 to 6F6 procedure.
	6L6	G	Parallel circuits only. No changes.
6W7	6C6-77	G	Parallel circuits only. Reverse 6C6 to 6J7 procedure.
	6D6-78	G	
	6D7	G	Same as 6J7 to 6D7. Parallel circuits only.
	6E7	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6W7	6J7	G	Parallel circuits only. No changes.
	6K7	G	
	6S7	G	No changes.
	6SH7	G	Same as 6J7 to 6SJ7. Parallel circuits only.
	6SJ7	G	
	6SK7	G	
	6U7	G	Parallel circuits only. No changes.
	7A7	G	Same as 6K7 to 7A7. Parallel circuits only.
	7B7	G	Same as 6K7 to 7A7.
	7C7	G	
	7H7	G	Same as 6K7 to 7A7. Parallel circuits only.
	7L7	G	Same as 6K7 to 7A7. Parallel circuits only.
	12J7	P	No change. Series circuits only.
	12K7	P	
	77-6C6	G	Reverse 6C6 to 6J7 procedure. Parallel circuits only.
	78-6D6	G	
6X4	6V4	E	Change socket to noval and rewire as follows: No. 1 on miniature to No. 1 on noval 3 to 4 4 to 5 6 to 7 7 to 3  
	6X5	E	Where space permits. Change socket to octal and rewire as follows: No. 1 on miniature to No. 3 on octal 3 to 2 4 to 7 6 to 5 7 to 8  
	84/6Z4	G	Parallel circuits only. Where space permits, reverse 84/6Z4 to 6X4 procedure.
	5726	G	Parallel circuits only. Reverse 5726 to 6X4 procedure.
6X5	6AX5	G	Parallel circuits only. No changes.
	6AX6	G	Parallel circuits only. Tie no. 4 and no. 8 together.
	6BY5	G	Parallel circuits only. Rewire as follows: Connect Nos. 1 and 8 together No. 3 to No. 4
	6V4	G	Change socket to noval and rewire as follows: No. 2 on octal to No. 4 on noval 3 to 1 5 to 7 7 to 5 8 to 3  

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6W7	6J7	G	Parallel circuits only. No changes.
	6K7	G	
	6S7	G	No changes.
	6SH7	G	Same as 6J7 to 6SJ7. Parallel circuits only.
	6SJ7	G	
	6SK7	G	
	6U7	G	Parallel circuits only. No changes.
	7A7	G	Same as 6K7 to 7A7. Parallel circuits only.
	7B7	G	Same as 6K7 to 7A7.
	7C7	G	
	7H7	G	Same as 6K7 to 7A7. Parallel circuits only.
	7L7	G	Same as 6K7 to 7A7. Parallel circuits only.
	12J7	P	No change. Series circuits only.
	12K7	P	
	77-6C6	G	Reverse 6C6 to 6J7 procedure. Parallel circuits only.
	78-6D6	G	
6X4	6V4	E	Change socket to noval and rewire as follows:

No. 1 on miniature	to No. 1 on noval
3	to 4
4	to 5
6	to 7
7	to 3

	6X5	E	Where space permits. Change socket to octal and rewire as follows:

No. 1 on miniature	to No. 3 on octal
3	to 2
4	to 7
6	to 5
7	to 8

	84/6Z4	G	Parallel circuits only. Where space permits, reverse 84/6Z4 to 6X4 procedure.
	5726	G	Parallel circuits only. Reverse 5726 to 6X4 procedure.
6X5	6AX5	G	Parallel circuits only. No changes.
	6AX6	G	Parallel circuits only. Tie no. 4 and no. 8 together.
	6BY5	G	Parallel circuits only. Rewire as follows:

Connect Nos. 1 and 8 together
No. 3 to No. 4

	6V4	G	Change socket to noval and rewire as follows:

No. 2 on octal	to No. 4 on noval
3	to 1
5	to 7
7	to 5
8	to 3

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6X5	6W5	G	Parallel circuits only. No changes.
	6X4	G	Reverse 6X4 to 6X5 procedure.
	6Y5	E	Parallel circuits only. Change socket to six prong and rewire as follows:

No. 2 on octal	to No.	1 on six prong
3	to	3
5	to	5
7	to	6
8	to	4

	0Z4	E	No changes. Do not use where AC plate voltage exceeds 250 volts per plate.
	6Z5	G	Same as 6X5 to 6Y5. Parallel circuits only.
	6Z6	G	Same as 6W5 to 6Z6.
	6ZY5	G	Parallel circuits only. No changes.
	7Y4	E	Parallel circuits only. Change socket to loctal and rewire as follows:

No. 2 on octal	to No.	1 on loctal
3	to	3
5	to	6
7	to	8
8	to	7

	7Z4	G	Same as 6X5 to 7Y4.
	84	E	Change socket to five prong and rewire as follows:

No. 2 on octal	to No.	1 on five prong
3	to	2
5	to	3
7	to	5
8	to	4

	1274	G	Parallel circuits only. No changes.
6X6G			No practical substitute.
6Y3G			No practical substitute.
6Y5	6X5	G	Parallel circuits only. Reverse 6X5 to 6Y5 procedure.
	6Z5	G	Rewire as follows:

Connect Nos. 2 and 6 together.

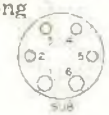
6Y6	6AR6	G	Reverse 6AR6 to 6F6 procedure.
	6G6	P	Parallel circuits only. No changes.
	6K6	G	
	6L6	G	
	6U6	G	
	6V6	G	
	7A5	G	Same as 6K6 to 7B5. Parallel circuits only.
	7B5	G	Same as 6K6 to 7B5. Parallel circuits only.
	7C5	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6Y7*	6A6	G	Change socket to seven prong and rewire as follows:

No. 2 on octal	to No.	1 on seven prong
3	to	2
4	to	3
5	to	5
6	to	6
7	to	7
8	to	4

	6N7	G	Parallel circuits only. No changes.
	6Z7	G	
6Z3	1V	E	No changes.
6Z4	6Y5	G	Parallel circuits only. Change socket to six prong and rewire as follows:

No. 1 on five prong	to No.	1 on six prong
2	to	3
3	to	5
4	to	4
5	to	6



6Z5	6Y5	E	No changes for six volt operation.
6Z7	6A6	G	Same as 6Y7 to 6A6. Parallel circuits only.
	6N7	G	Parallel circuits only. No changes.
	6Y7	G	
6ZY5	0Z4	G	No changes. Do not use where AC plate voltage exceeds 250 volts per plate.
	6AX5	G	Paralled circuits only. No changes.
	6AX6	G	Parallel circuits only. Tie Nos. 4 and 8 together.
	6BY5	G	Parallel circuits only. Rewire as follows:

Connect Nos. 1 and 8 together
No. 3 to No. 4

	6W5	G	Parallel circuits only. No changes.
	6X5	G	Parallel circuits only. No changes.
	6Y5	G	Same as 6X5 to 6Y5. Parallel circuits only.
	6Z5	G	
	7Y4	G	Same as 6X5 to 7Y4. Parallel circuits only.
	7Z4	G	
	84	G	Same as 6X5 to 84. Parallel circuits only.
	1274	G	Parallel circuits only. No changes.

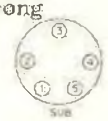
* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7A4	6AE5	G	Change socket to octal and rewire as follows:

No. 2 on loctal	to No.	3 on octal
1	to	2
6	to	5
7	to	8
8	to	7

	6C5	G	Reverse 6J5 to 7A4 procedure.
	6J5	G	Reverse 6J5 to 7A4 procedure.
	6L5	G	Same as 7A4 to 6AE5. Parallel circuits only.
	7B4	G	No changes.
	XXL	E	
	37	G	Change socket to five prong and rewire as follows
	76	G	

No. 1 on loctal	to No.	1 on five prong
2	to	2
6	to	3
7	to	4
8	to	5



7A5	6F6	E	Parallel circuits only. Change socket to octal and rewire as follows.
	6K6	G	
	6L6	G	
	6U6	G	
	6V6	G	
	6Y6	G	

No. 1 on loctal	to No.	2 on octal
2	to	3
3	to	4
6	to	5
7	to	8
8	to	7

	7B5	G	Parallel circuits only. No changes.
	7C5	G	
7A6	6H6	E	Reverse 6H6 to 7A6 procedure.
	5679	E	No changes. Do not use unused terminals for anchor.
7A7	6C6	G	Reverse 6C6 to 7A7 procedure.
	6D6	E	
	77	G	
	78	E	
	6D7	G	Change socket to seven prong and rewire as follows:
	6E7	G	

No. 1 on loctal	to No.	1 on seven prong
2	to	2
3	to	3
4	to	4
6	to	cap
7	to	6
8	to	7

	6J7	G	Reverse 6K7 to 7A7 procedure
	6K7	E	
	6S7	G	Parallel circuits only. Reverse 6K7 to 7A7 procedure.
	6SH7	G	Reverse 12SJ7 to 7B7 procedure.
	6SJ7	G	
	6SK7	E	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7A7	6SS7	G	Parallel circuits only. Reverse 12SJ7 to 7B7 procedure.
	6U7	G	Reverse to 6K7 to 7A7 procedure.
	6W7	G	Parallel circuits only. Reverse to 6K7 to 7A7 procedure.
	7B7	G	Parallel circuits only. No changes.
	7C7	G	
	7H7	G	No changes.
	7L7	G	
	39/44	E	Change socket to five prong and rewire as follows:

No. 1 on loctal	to No.	1 on five prong
2	to	2
3	to	3
4	to	4
6	to	cap
7	to	4
8	to	5

7A8	6A7	E	Parallel circuits only. Reverse 6A7 to 7B8 procedure.
	6A8	E	Parallel circuits only. Reverse 6D8 to 7A8 procedure.
	6D8	G	Reverse 6D8 to 7A8 procedure.
	7B8	E	Parallel circuits only. No changes.
	7J8	G	
	7S7	G	
	7Q7	G	Parallel circuits only. Remove and tape up wires on No. 5. Connect Nos. and 8 together.
	12A8	P	Series circuits only. Reverse 12A8 to 14B8 procedure.
	14B8	P	Series circuits only. No changes.
	14J7	P	
	14S7	P	
7AB7	7AD7	P	Same as 7AB7 to 7AG7. Parallel circuits only.
	7AJ7	P	
	7AK7	P	
	7G7	P	
	7H7	P	
	7L7	P	
	7T7	P	
	7V7	P	
	7AG7	G	Rewire as follows:
	7AH7	G	Remove wires from No. 1
	7B7	G	No. 2 to No. 1
	7C7	G	3 to 2
			Connect wires removed from No. 1 to No. 3
			Remove wires from No. 8
			No. 7 to No. 8
			6 to 7
			5 to 6
			Connect wires removed from No. 8 to No. 7
			Connect No. 4 and No. 7 together.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7AB7	1204	E	No changes.
7AD7	7AG7	P	Parallel circuits only. No changes.
	7AH7	P	
	7AJ7	P	
	7AK7	P	
	7B7	P	
	7C7	P	
	7G7	P	
	7H7	P	
	7L7	P	
	7T7	P	
	7V7	P	
7AF7	7F7	G	No changes.
	7N7	G	Parallel circuits only. No changes.
7AG7	7AH7	G	No changes.
	7B7	P	
	7C7	P	
	7AJ7	P	Parallel circuits only. No changes.
	7AK7	P	
	7G7	G	
	7H7	G	
	7L7	G	
	7T7	G	
	7V7	G	
7AH7	7AG7	G	No changes.
	7B7	P	
	7C7	P	
	7AJ7	G	Parallel circuits only. No changes.
	7AK7	P	
	7G7	P	
	7H7	P	
	7L7	P	
	7T7	P	
	7V7	P	
7AJ7	7AH7	G	Parallel circuits only. No changes.
	7AK7	P	
	7B7	P	
	7C7	P	
	7G7	P	
	7V7	P	
	7H7	P	No changes.
	7L7	P	
	7T7	P	
7AK7	7AH7	P	Parallel circuits only. No changes.
	7AJ7	P	
	7B7	P	
	7C7	P	
	7G7	P	
	7H7	P	
	7L7	P	
	7T7	P	
	7V7	P	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7B4	6AD5	G	Reverse 6J5 to 7A4 procedure.
	6AE5	G	
	6F5	G	Change socket to octal and rewire as follows.

No. 1 on loctal	to No.	2 on octal
2	to	4
6	to	cap
7	to	8
8	to	7

	6J5	G	Reverse 6J5 to 7A4 procedure.
	6K5	G	Reverse 6K5 to 7B4 procedure.
	6P5	G	Reverse 6J5 to 7A4 procedure.
	7A4	G	No changes.
	XXL	G	
7B5	6AD7	G	Parallel circuits only. Reverse 6K6 to 7B5 procedure. Remove and tape any wires anchored on unused pins.
	6F6	G	Parallel circuits only. Reverse 6K6 to 7B5 procedure.
	6K6	E	Reverse 6K6 to 7C5 procedure.
	6L6	G	Parallel circuits only. Reverse 6K6 to 7B5 procedure.
	6U6	G	
	6V6	G	
	6Y6	G	
	7A5	G	Parallel circuits only. No changes.
	7C5	G	
	41	G	Change socket to six prong and rewire as follows:
	42	E	

No. 1 on loctal	to No.	1 on six prong
2	to	2
3	to	3
6	to	4
7	to	5
8	to	6

7B6	6B6	E	Reverse 6B6 to 7B6 procedure.
	6Q7	E	Reverse 6Q7 to 7B6 procedure.
	6R7	G	
	6SQ7	E	Reverse 6SQ7 to 7B6 procedure.
	6T7	G	Parallel circuits only. Reverse 6Q7 to 7B6 procedure.
	7C6	G	Parallel circuits only. No changes.
	7E6	G	No changes.
	75	E	Reverse 75 to 7E6 procedure.
	85	G	Reverse 75 to 7E6 procedure.
7B7	6C6	G	Parallel circuits only. Reverse 6C6 to 7A7 procedure.
	6D6	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7B7	6D7	G	Same as 7A7 to 6D7. Parallel circuits only.
	6E7	G	
	6J7	G	Parallel circuits only. Reverse 6J7 to 7L7 procedure.
	6K7	G	Parallel circuits only. Reverse 6K7 to 7A7 procedure.
	6S7	G	Reverse 6K7 to 7A7 procedure.
	6SH7	G	Parallel circuits only. Reverse 12SJ7 to 7B7 procedure.
	6SJ7	G	
	6SK7	G	
	6SS7	G	Reverse 12SJ7 to 7B7 procedure.
	6U7	G	Parallel circuits only. Reverse 6K7 to 7A7 procedure.
	6W7	G	Reverse 6K7 to 7A7 procedure.
	7A7	G	Parallel circuits only. No changes.
	7C7	G	No changes.
	7H7	G	Parallel circuits only. No changes.
	12J7	P	Series circuits only. Reverse 6K7 to 7A7 procedure.
	12K7	P	
	12SG7	P	Series circuits only. Reverse 12SJ7 to 7B7 procedure.
	12SH7	P	
	12SJ7	P	
	12SK7	P	
	14A7/12B7	P	Series circuits only. No changes.
	39/44	G	Same as 7A7 to 39/44. Parallel circuits only.
	77	G	Parallel circuits only. Reverse 6C6 to 7A7 procedure.
	78	G	
7B8	6A7	G	Reverse 6A7 to 7B8 procedure.
	6A8	G	Reverse as 12A8 to 14B8 procedure.
	6D8	G	Parallel circuits only. Reverse 12A8 to 14B8 procedure.
	6J8	E	Reverse 12A8 to 14B8 procedure.
	6K8	E	
	7A8	G	Parallel circuits only. No changes.
	7J7	G	No changes.
	7S7	G	No changes.
7C4	12C8A	E	No changes.
	9006	G	Change socket to miniature and rewire as follows:

No. 1 on loctal	to	No. 3 on miniature
4	to	1
7	to	7
8	to	4

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7C5	6AD7	G	Parallel circuits only. Reverse 6K6 to 7B5 procedure. Do not anchor unused pins.
	6F6	G	Parallel circuits only. Reverse 6K6 to 7B5 procedure.
	6G6	G	
	6K6	G	
	6L6	G	
	6U6	G	
	6V6	E	
	6Y6	G	
	7A5	G	Parallel circuits only. No changes.
	7B5	G	Parallel circuits only. No changes.
	41	G	Same as 7B5 to 41. Parallel circuits only.
	42	G	
7C6	6B6	G	Parallel circuits only. Reverse 6Q7 to 7B6 procedure.
	6Q7	G	
	6R7	G	
	6SQ7	G	Parallel circuits only. Reverse 6SQ7 to 7B6 procedure.
	6ST7	G	Reverse 6SQ7 to 7B6 procedure.
	6T7	G	
	7B6	G	Parallel circuits only. No changes.
	12Q7	P	Series circuits only. Reverse 6Q7 to 7B6 procedure.
	12SQ7	P	Series circuits only. Reverse 6SQ7 to 7B6 procedure.
	12SR7	P	
	14B6	P	Series circuits only. No changes.
	14E6	P	
	75	G	Parallel circuits only. Reverse 75 to 7E6 procedure.
	85	G	
7C7	6C6	G	Parallel circuits only. Reverse 6C6 to 7A7 procedure.
	6D6	G	
	77	G	
	78	G	
	6D7	G	Same as 7A7 to 6D7. Parallel circuits only.
	6E7	G	
	6S7	G	Reverse 6K7 to 7A7 procedure.
	6SS7	G	Reverse 12SJ7 to 7B7 procedure.
	6W7	G	Reverse 6K7 to 7A7 procedure.
	7A7	G	Parallel circuits only. No changes.
	7B7	G	No changes.
	7H7	G	Parallel circuits only. No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7C7	12J7	P	Series circuits only. Reverse 6K7 to 7A7 procedure.
	12K7	P	
	12SG7	P	Series circuits only. Reverse 12SJ7 to 7B7 procedure.
	12SH7	P	
	12SJ7	P	
	12SK7	P	
	14A7/12B7	P	Series circuits only. No changes.
	36	G	Same as 7A7 to 39/44. Parallel circuits only.
	39/44	G	
7D7			No practical substitute.
7E5	7A4	P	Parallel circuits only. Rewire as follows:
	7B4	P	Remove wires from No. 1 No. 2 to No. 1 3 and 7 to 2 4 and 6 to 7 5 to 6 Connect wires removed from No. 1 to No. 6
	1201	E	No changes.
7E6	6B6	G	Reverse 6Q7 to 7B6 procedure.
	6Q7	G	
	6R7	G	Reverse 6Q7 to 7B6 procedure.
	6SQ7	G	Reverse 6SQ7 to 7B6 procedure.
	6SR7	G	Reverse 6SQ7 to 7B6 procedure.
	6T7	G	Parallel circuits only. Reverse 6Q7 to 7B6 procedure.
	75	G	Reverse 75 to 7E6 procedure.
	85	G	Reverse 75 to 7E6 procedure.
	7B6	G	No changes.
	7C6	G	Parallel circuits only. No changes.
7E7	6B8	G	Reverse 6B8 to 7E7 procedure.
	7R7	G	No changes.
7F7	6C8	G	Reverse 6C8 to 7F7 procedure.
	6F8	G	Parallel circuits only. Reverse 6C8 to 7F7 procedure.
	6SC7	G	Reverse 6SC7 to 7F7 procedure.
	6SL7	G	Reverse 6SL7 to 7F7 procedure.
	7AF7	G	No changes.
	7F8	G	Reverse 7F8 to 7F7 procedure.
	7N7	G	Parallel circuits only. No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7F8	2C51	P	Reverse 2C51 to 7F8 procedure.
	6F8	P	Parallel circuits only. Change socket to octal and rewire as follows: No. 1 on loctal to cap on octal 2 to 2 3 to 3 4 to 4 5 to 8 6 to 6 7 to 7 8 to 5
	7AF7	P	Same as 7F8 to 7F7.
	7F7	P	Rewire as follows: Remove wires from No. 1 No. 2 to No. 1 4 to 2 Connect wires removed from No. 1 to No. 4 Remove wires from No. 8 No. 7 to No. 8 5 to 7 Connect wires removed from No. 8 to No. 5
	7N7	P	Same as 7F8 to 7F7. Parallel circuits only.
	5670	E	Parallel circuits only. Reverse 2C51 to 7F8 procedure.
7G7	7A7	G	Parallel circuits only. No changes.
	7B7	G	
	7C7	G	
	7H7	G	
	7L7	G	
	7V7	G	No changes.
	1232	G	Parallel circuits only. No changes.
7G7/1232	6J7	G	Parallel circuits only. Reverse 6J7 procedure.
	6K7	G	
	6U7	G	
7H7	7A7	G	No changes.
	7B7	G	Parallel circuits only. No changes.
	7C7	G	
	7L7	G	No changes.
	7T7	G	
	7V7	G	Parallel circuits only. No changes.
	1231	G	
	1273	G	No changes.
7J7	6A8	E	Reverse 6J2 to 7J7 procedure.
	6B8	E	
	6K8	E	
	7B8	G	No changes.
	7s7	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7K7	7B6	G	Rewire as follows:
	7E6	G	No. 2 to No. 7 3 to 2 4 to 3
	7X7	G	Rewire as follows: Remove wires from No. 2 No. 3 to No. 2 4 to 3 Connect wires removed from No. 2 to No. 4
7L7	6J7	G	Reverse 6J7 to 7L7 procedure.
	6K7	G	Reverse 6K7 to 7A7 procedure.
	7A7	G	No changes.
	7G7	G	Parallel circuits only. No changes.
	7H7	G	No changes.
	7T7	G	No changes.
	7V7	G	Parallel circuits only. No changes.
7N7	6C8	G	Parallel circuits only. Reverse 6C8 to 7F7 procedure.
	6F8	G	Reverse 6C8 to 7F7 procedure.
	7AF7	G	Parallel circuits only. No changes.
	7F7	G	Parallel circuits only. No changes.
7Q7	6SA7	G	Reverse 12SA7 to 14Q7 procedure.
7R7	7E7	G	No changes.
7S7	6A7	G	Reverse 6A7 to 7B8 procedure.
	6A8	G	
	6J8	G	Reverse 6J8 to 7J7 procedure.
	6K8	G	
	7B8	G	No changes.
	7J7	G	
7T7	7A7	G	No changes.
	7B7	G	Parallel circuits only. No changes.
	7C7	G	Parallel circuits only. No changes.
	7G7	G	Parallel circuits only. No changes.
	7H7	G	No changes.
	7L7	G	No changes.
	7V7	G	No changes.
	1231	G	Parallel circuits only. No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
7T7	1273	G	No changes.
7V7	7B7	G	Parallel circuits only. No changes.
	7C7	G	
	7G7	G	No changes.
	1232	G	
	7W7	E	Rewire as follows: No. 4 to No. 5 Do not use No. 4 for anchor
7W7	7V7	E	Rewire as follows: No. 4 to No. 7 5 to 4
7X6	7Y4	G	Parallel circuits only. Rewire as follows: Connect Nos. 2 and 7 together. Cannot be used where 7X6 is employed as a doubler.
	7Z4	G	
7X7	7K7	G	Rewire as follows: Remove wires from No. 2 No. 4 to No. 2 3 to 4 Connect wires removed from No. 2 to No. 3
	XXFM	E	No changes.
7Y4	6X5	E	Reverse 6X5 to 7Y4 procedure.
	7X6	G	Parallel circuits only. No changes. If it is convenient, connect No. 2 and 7 together.
	7Z4	G	Parallel circuits only. No changes.
7Z4	6W5	G	Parallel circuits only. Reverse 6X5 to 7Y4 procedure.
	6X5	E	
	6ZY5	G	
	7X6	G	No changes. If it is convenient, connect Nos. 2 and 7 together.
	7Y4	G	Parallel circuits only. No changes.
10	10Y	E	No changes
	RK10	E	
	50	G	
	210	E	
	310	E	
10Y	10	E	No changes.
	RK10	E	
	50	G	
	210	E	
	310	E	
12A	71A	G	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12A5	12A6	G	12 volt operation only. Parallel circuits only. Change socket to octal and rewire as follows:

No.	1 on seven prong	to No.	2 on octal
	2	to	3
	3	to	4
	4	to	5
	5	to	8
	7	to	7

12A6	6G6	P	No changes. Series circuits.
	14A5	G	Same as 35L6 to 35A5.
12A8	12K8	G	No changes.
	14A7/12B7	P	Change socket to loctal and rewire as follows:

No.	2 on octal	to No.	1 on loctal
	3	to	2
	5	to	6
	6	to	3
	7	to	8
	8	to	7
	cap	to	4

Must be well shielded. Realign if necessary

	14B8	G	Change socket to loctal and rewire as follows:
	14J7	G	
	14S7	G	

No.	2 on octal	to No.	1 on loctal
	3	to	2
	4	to	5
	5	to	4
	6	to	3
	7	to	8
	8	to	7
	cap	to	6

12AH7	12AT7	G	Change socket to noval and rewire as follows:

No.	1 on octal	to No.	2 on noval
	2	to	3
	3	to	1
	4	to	8
	5	to	7
	6	to	6
	7	to	5
	8	to	4

	14AF7/XXD	G	Change socket to loctal and rewire as follows:
	14F7	G	

No.	1 on octal	to No.	4 on loctal
	2	to	2
	3	to	3
	4	to	7
	5	to	5
	6	to	6
	7	to	8
	8	to	1

12AL5	12H6	G	Where space permits. Same as 6AL5 to 6H6.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12AT6	12AV6	G	No changes.
	12BF6	P	
	12BK6	G	
	12BT6	P	
	12BU6	P	
	12SQ7	G	Where space permits. Reverse 12SQ7 to 12AT6 procedure.
	12SR7	P	
	12SW7	P	
12AT7*	12AH7	G	Where space permits. Reverse 12AH7 to 12AT7 procedure.
	12AU7	G	No changes.
	12AV7	G	Parallel circuits only. No changes.
	12AX7	G	No changes.
	12AY7	G	
	12BH7	G	Parallel circuits only. No changes.
12AU6	12AW6	G	Reverse Nos. 2 and 7.
	12BA6	G	No changes.
	12BD6	G	
12AU7*	12AT7	G	No changes.
	12AV7	G	Parallel circuits only. No changes.
	12AX7	G	No changes.
	12AY7	G	
12AV6	12AT6	G	No changes.
	12BF6	P	
	12BK6	G	
	12BT6	G	
	12BU6	G	
12AV7	12AT7	G	Parallel circuits only. No changes.
	12AU7	G	
	12AX7	G	
	12AY7	G	
	12BH7	G	
12AW6	12AU6	G	Rewire as follows:
	12BA6	G	Reverse No. 2 and No. 7
12AX7	12AT7	G	No changes.
	12AU7	G	
	12AV7	G	Parallel circuits only. No changes.
	12AY7	G	No changes.
	12BH7	G	Parallel circuits only. No changes.
12AY7	12AT7	G	No changes.
	12AU7	G	
	12AV7	G	Parallel circuits only. No changes.

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12AY7	12AX7	G	No changes.
	12BH7	G	Parallel circuits only. No changes.
12B6M			No practical substitute.
12B7	14A7	E	No changes.
12B8GT			No practical substitute.
12BA6	12AU6	G	No changes.
	12AV6	G	Reverse 12AW6 to 12AU6 procedure.
	12AW6	G	
12BA7	12BE6	G	Change socket to miniature and rewire as follows:

No. 1 on noval	to No. 6 on miniature
2	to 1
3	to 2
4	to 3
5	to 4
6	to 2
7	to 7
9	to 5

12BD6	12AU6	G	No changes.
	12AW6	G	Rewire as follows: Reverse No. 7 and No. 2
	12BA6	G	No changes.
12BE6	12BA7	G	Same as 6BE6 to 6BA7.
	12SA7	G	Where space permits. Reverse 12SA7 to 12BE6 procedure.
12BF6	12AT6	P	No changes.
	12AV6	P	
	12BK6	P	
	12BT6	P	
	12BU6	G	
12BH7	12AT7	G	Parallel circuits only. No changes.
	12AU7	G	
	12AV7	G	
	12AX7	G	
	12AY7	G	
12BK6	12AT6	G	No changes.
	12AV6	G	
	12BF6	P	
	12BT6	G	
	12BU6	G	
12BT6	12AT6	G	No changes.
	12AV6	G	
	12BF6	P	
	12BK6	G	
	12BU6	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12BU6	12AT6	P	No changes.
	12AV6	P	
	12BF6	G	
	12BK6	P	
	12BT6	P	
12C8	14E7	G	Change socket to loctal and rewire as follows:
	14R7	G	No. 2 on octal to No. 1 on loctal 3 to 2 4 to 3 5 to 4 6 to 5 7 to 8 8 to 7 cap to 6
12E5	1626	G	Parallel circuits only. No changes.
12F5	12J5	G	Rewire as follows: No. 4 to No. 3. Connect grid wire to No. 5.
	12SF5	E	Same as 6F5 to 6SF5.
12G7G			No practical substitute.
12H6	12AL5	E	Change socket to miniature and rewire as follows: No. 2 on octal to No. 3 on miniature 3 to 2 4 to 5 5 to 7 7 to 4 8 to 1
12J5	12F5	G	Rewire as follows: No. 3 to No. 4 Connect wire from No. 5 to grid cap.
	12SF5	G	Same as 12SF5 to 12J5.
	14A4	G	Same as 6J5 to 7A4.
	1626	G	Parallel circuits only. No changes.
12J7	6S7	P	Series circuits only. No changes.
	6W7	P	
	7B7	P	Same as 12K7 to 7B7 but in series circuits only.
	7C7	P	
	12B7	E	
	12K7	G	No changes.
	12SG7	G	Same as 12K7 to 12SK7.
	12SH7	G	
	12SJ7	E	
	12SK7	G	
	14A7	E	Same as 12K7 to 7B7 but in series circuits only.
12K7	6S7	P	Series circuits only. No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12K7	6SS7	G	Same as 12K7 to 12SK7. Series circuits only.
	6W7	E	Series circuits only. No changes.
	7B7	P	Change socket to loctal and rewire as follows, series circuits only:
	7C7	P	
	12B7	E	
	14A7	E	
	14C7	E	

No. 1 on octal	to No. 5 on loctal
2	to 1
3	to 2
4	to 3
5	to 4
7	to 8
8	to 7
cap	to 6

	12J7	G	No changes.
	12SK7	E	Make adaptor as follows:

No. 1 on base	to No. 1 on top
2	to 2
3	to 8
4	to 6
5	to 3
7	to 7
8	to 5
cap	to 4

12K8	12A8	G	No changes.
	14B8	G	Same as 12A8 to 14B8.
	14J7	G	
	14S7	G	
12L8	1644	G	No changes.
12Q7	6ST7	P	Same as 12Q7 to 12SQ7. Series circuits only.
	6T7	P	Series circuits only. No changes.
	7C6	P	Series circuits only. Same as 6Q7 to 7B6.
	14B6	E	
	14E6	G	
	12SQ7	E	Make adaptor as follows:

No. 1 on base	to No. 1 on top
2	to 8
3	to 6
4	to 4
5	to 5
7	to 7
8	to 3

12SA7	6SS7	P	Same as 12SA7 to 12SK7 series circuits.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12SA7	7A8	P	Series circuits only. Change socket to loctal and rewire as follows: No. 1 on octal to shield connection on loctal socket 2 to No. 1 3 to 2 4 to 5 5 to 4 6 to 7 7 to 8 8 to 6   The 7A8 heats faster than the other tubes and a 200 ohm 1/2 watt resistor must be connected across the filament terminals 2 and 7 or its life will be very short.
	7B7	P	Series circuits only. Change socket to loctal and rewire as follows:
	7C7	P	No. 2 on octal to No. 1 on loctal
	12B7/14A7	P	3 to 2 4 to 3 5 to 6 6 to 7 7 to 8 8 to 4  
	12BE6	G	Change socket to miniature and rewire as follows: No. 2 on octal to No. 3 on miniature 3 to 5 4 to 6 5 to 1 6 to 2 7 to 4 8 to 7  
	12J7	P	Make adapter as follows:
	12K7	P	No. 1 on base to No. 1 on cap 2 to 2 3 to 3 4 to 4 5 to cap 6 to 8 8 to 5
	12SJ7	P	Change connections as follows:
	12SK7	P	Reverse Nos. 6 and 3 Remove wire from No. 6 Move wire from No. 4 to 6 from 5 to 4 from 6 to 5 This uses suppressor grid as control grid and control as oscillator grid.
	14Q7	G	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 2 4 to 3 5 to 4 6 to 7 and 5 7 to 8 8 to 6  
12SC7	12SL7	G	Same as 6SC7 to 6SL7.
	1634	G	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12SF5	12F5	G	Reverse 6F5 to 6SF5 procedure.
	12J5	G	Rewire as follows: Reverse No. 2 and No. 8 Reverse No. 3 and No. 5
12SF7	12SK7 and Germanium Diode	P	Rewire as follows: Move wire from No. 2 to No. 4 6 to 8 8 to 2 4 to 6 Remove wires from No. 5 Connect No. 3 and No. 5 together Diode crystal from No. 3 or 5 to wires removed from No. 3
12SG7	12AU6 12BA6 12BD6	G G G	Change socket to miniature and rewire as follows: No. 2 on octal to No. 3 on miniature 3 to 7 4 to 1 5 to 7 6 to 6 7 to 4 8 to 5
	12SH7 12SJ7 12SK7	G G G	No changes.
12SH7	12AU6 12BA6 12BD6	G G G	Same as 12SG7 to 12BA6.
	12SG7 12SJ7 12SK7	G G G	No changes.
12SJ7	6S7 6W7	P P	Same as 12SK7 to 12K7. Series circuits only.
	12B7 14A7 14C7	G G G	Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 4 4 to 6 5 to 7 6 to 3 7 to 8 8 to 2
	12J7 12K7	G G	Same as 12SK7 to 12K7.
12SK7	6S7 6W7	P P	Same as 12SK7 to 12K7. Series circuits only.
	6SS7	P	No changes. Series circuits only.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12SK7	12AV6	G	Change socket to miniature and rewire as follows:
	12BA6	G	
	12BD6	G	

No. 2 on octal	to No.	3 on miniature
3	to	2
4	to	1
5	to	7
6	to	6
7	to	4
8	to	5

	12B7	E	Change socket to loctal and rewire as follows:
	14A7	E	
	14C7	G	

No. 1 on octal	to No.	5 on loctal
2	to	1
3	to	4
4	to	6
5	to	7
6	to	3
7	to	8
8	to	2

	12J7	G	Make adaptor as follows:
	12K7	E	

No. 1 on base	to No.	1 on top
2	to	2
3	to	5
4	to	cap
5	to	8
6	to	4
7	to	7
8	to	3

	12SG7	G	No changes.
	12SH7	G	
	12SJ7	G	
12SL7	12SC7	G	Reverse 6SC7 to 6SL7 procedure. If the 12SL7 employs the two cathodes separately this substitution may be impractical.
12SN7	12SL7	P	Parallel circuits only. No changes.
	12SX7	G	No changes.
12SQ7	6ST7	P	Series circuits. No changes.
	6T7	P	Same as 12SQ7 to 12Q7. Series circuits only.
	7C6	P	Same as 12SQ7 to 14B6. Series circuits only.
	12AT6	G	Change socket to miniature and rewire as follows:
	12AV6	G	
	12BK6	G	
	12BT6	G	
	12BU6	P	

No. 2 on octal	to No.	1 on miniature
3	to	2
4	to	5
5	to	6
6	to	7
7	to	3
8	to	4

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
12SQ7	12Q7	E	Make adaptor as follows: No. 1 on base to No. 1 on top cap 2 to 8 3 to 4 4 to 5 5 to 3 6 to 7 7 to 2 8 to
	12SR7	G	No changes.
	12SW7	P	No changes.
	14B6	E	Change socket to loctal and rewire as follows:
	14E6	G	No. 2 on octal to No. 3 on loctal 3 to 7 4 to 5 5 to 6 6 to 2 7 to 8 8 to 1
12SR7	12AT6	P	Same as 12SQ7 to 12AT6.
	12AV6	P	
	12BK6	P	
	12BT6	P	
	12BU6	G	
	12Q7	G	Same as 12SQ7 to 12Q7.
	12SQ7	G	No changes.
	12SW7	G	No changes.
	14B6	G	Same as 12SQ7 to 14B6.
	14E6	G	
12SW7	12AT6	P	Same as 12SQ7 to 12AT6.
	12AV6	P	
	12BK6	P	
	12BT6	P	
	12BU6	G	
	12SQ7	P	No changes.
	12SR7	G	
12SX7	12SL7	P	Parallel circuits only. No changes.
	12SN7	G	No changes.
12SY7	12SA7	G	No changes.
	14Q7	G	Same as 12SA7 to 14Q7.
12Z3	1V	G	Series Circuits only. No changes.
	14Z3	G	No changes.
12Z5			No practical substitute.
14A4	12J5	E	Reverse 6J5 to 7A4 procedure.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
14A5	12A6	E	Reverse 35L6 to 35A5 procedure.
	1284	P	No changes. Connect No. 4 to No. 7 for best results.
14A7/12B7	6S7	P	Reverse 12K7 to 7B7 procedure. Series circuits only.
	6W7	P	
	6SS7	P	Reverse 12SJ7 to 7B7 procedure. Series circuits only.
	7B7	P	Series circuits only. No changes.
	7C7	P	
	12B7	E	No changes.
	14C7	G	
	14H7	G	
	1280	G	
	1284	E	
	12J7	G	Reverse 12K7 to 7B7 procedure.
	12K7	E	
	12SH7	G	Reverse 12SJ7 to 7B7 procedure.
	12SJ7	G	
	12SK7	E	
14AF7/XXD	12AH7	G	Reverse 12AH7 to 14AF7/XXD procedure.
	14F7	G	No changes.
	14N7	G	Parallel circuits only. No changes.
14B6	7C6	P	Series circuits only. No changes.
	12Q7	E	Reverse 6Q7 to 7B6 procedure.
	14E6	G	No changes.
14B8	7A8	P	Series circuits only. No changes.
	12A8	G	Reverse 12A8 to 14B8 procedure.
	14J7	G	No changes.
	14S7	G	
14C5	14A5	G	Parallel circuits only. No changes.
14C7	7B7	P	Series circuits only. No changes.
	7C7	P	
	12B7	E	No changes.
	14A7	G	
	14H7	G	
	1280	G	
	1284	E	
14E6	12Q7	G	Reverse 6Q7 to 7B6 procedure.
	14B6	G	No changes.
14E7	12C8	G	Reverse 12C8 to 14E7 procedure.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
14E7	14R7	G	No changes.
14F7	12AH7	G	Reverse 12AH7 to 14AF7/XXD procedure.
	14AF7/XXD	G	No changes.
	14F8	G	Reverse 7F8 to 7F7 procedure.
14F8	14F7	G	Same as 7F8 to 7F7.
14H7	12B7	G	No changes.
	14A7	G	
	14C7	G	
	1280	G	
	1284	G	
14J7	7A8	P	Series circuits. No changes.
	14B8	G	No changes.
	14S7	G	
14N7	14AF7/XXD	G	Parallel circuits only. No changes.
14Q7	12SA7	G	Reverse 12SA7 to 14Q7 procedure.
14R7	12C8	G	Reverse 12C8 to 14E7 procedure.
	14E7	G	No changes.
14S7	7A8	P	Series circuits only. No changes. Put 200 or 250 ohm 1/2 watt resistor across filament terminals when substituting 7 volt for 12 volt types to compensate for faster heating.
	14B8	G	No changes.
	14J7	G	No changes.
14V7			No practical substitute.
14W7	12B7	G	No changes.
	14A7	G	
	14C7	G	
	14H7	G	
	1280	G	
	1284	G	
14Y4			No practical substitute.
15	1A4	G	Same as 15 to 1B4. Battery operation only. Parallel circuits.
	1B4	G	For battery operation only. Parallel circuits. Change socket to four prong type and rewire as follows: No. 1 on five prong to No. 1 on four prong 2 to 2 3 to 3 4 to 4 5 to 4 cap to cap

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
15	1E5	G	For battery operation only. Parallel circuits. Change socket to octal and rewire as follows:

No. 1 on five prong	to No.	2 on octal
2	to	3
3	to	4
4	to	7
5	to	7
cap	to	cap

	32	G	Same as 15 to 1B4. Battery operation only. Parallel circuits.
	34	G	
	951	G	
17			No practical substitute.
18			No practical substitute.
19	1J6	E	Change socket to octal and rewire as follows:

No. 1 on six prong	to No.	2 on octal
2	to	3
3	to	4
4	to	5
5	to	6
6	to	7

19BG6	25BQ6	P	Rewire as follows:

No. 8	to No.	4
3	to	8

19C8	19T8	G	No changes.
19T8	19C8	G	No changes.
20	X99	G	Parallel circuits only. No changes.
20J8			No practical substitute.
21A7			No practical substitute.
22			No practical substitute.
24A	35/51	G	Use as IF or RF amplifier. Does not make good detector.
	57	G	Change socket to six prong and rewire as follows:
	58	E	

No. 1 on five prong	to No.	1 on six prong
2	to	2
3	to	3
4	to	4 and 5
5	to	6
cap	to	cap

25A6	25B6	G	No changes.
	25C6	G	
	25L6	G	
	43	G	Change socket to six prong and rewire as follows:

No. 2 on octal	to No.	1 on six prong
3	to	2
4	to	3
5	to	4
7	to	6
8	to	5

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
25A6	5824	G	No changes.
25A7	32L7	E	No changes.
25AC5			This is a positive bias triode output tube. Operation can be accomplished by rewiring circuit and installing standard power amplifier tube.
25AV5	25BQ6	G	Rewire as follows: No. 8 to No. 4 3 to 8 5 to cap 1 to 5
25B5	25N6	G	Change socket to octal and rewire as follows:
	25B6	G	No. 1 on six prong to No. 2 on octal
	25C6	G	2 to 3
	25L6	G	3 to 4
			4 to 5
			5 to 8
			6 to 7
	43	G	No changes.
25B6	25A6	G	No changes.
	25B5	E	Reverse 25B5 to 25N6 procedure.
	25G6	G	No changes.
	25L6	G	
	25N6	G	
	43	G	Reverse 43 to 25L6 procedure.
	5824	E	No changes.
25B8GT			No practical substitute.
25BQ6	19BG6	G	Rewire as follows: No. 8 to No. 3 4 to 8 Insert 20 ohm 10 watt resistor in series with filament circuit.
	25AV5	G	Rewire as follows: No. 5 to No. 1 cap to 5 8 to 3 4 to 8
25C6	25A6	G	No changes.
	25B5	G	Reverse 25B5 to 25N6 procedure.
	25B6	G	No changes.
	25LG	G	
	25N6	G	No changes.
	43	G	Reverse 43 to 25L6 procedure.
	5824	G	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
25D8GT			No practical substitute.
25L6	25A6	G	No changes.
	25B5	G	Reverse 25B5 to 25N6 procedure.
	25B6	G	No changes.
	25C6	G	
	25N6	G	No changes.
	43	G	Reverse 43 to 25L6 procedure.
	5824	E	No changes.
25N6	25B5	G	Reverse 25B5 to 25N6 procedure.
25S	1B5	E	No changes.
25W4	25Z6	E	Rewire as follows: No. 8 to No. 2 3 to 4 Connect No. 4 and No. 8 together 3 and 5 together
25X6	25Z6	G	Where 25X6 is used by itself only. Replace line cord with 310 ohms. No changes.
	50X6	G	When 25X6 is used by itself, replace line cord or filament dropping resistor with 445 ohms. Change socket to loctal and rewire as follows: No. 2 on octal to No. 1 on loctal 3 to 3 4 to 2 5 to 6 7 to 8 8 to 7  
	50Y6	G	Where 25X6 is used by itself, replace line cord or filament dropping resistor with 445 ohms.
	50Y7	G	When 25X6 is used by itself, replace line cord or filament dropping resistor with 445 ohms. Do not use No. 6 for anchor.
	50Z7	G	
25Y4			No practical substitute.
25Y5	25Z5	E	No changes.
	25Z6	E	Same as 25Z5 to 25Z6.
25Z3			No practical substitute.
25Z4	25Z6	E	No changes. Remove and tape up wires on unused terminals.
25Z5	6J5	P	Connect 60 ohm 5 watt resistor in series with filament circuit, will not work in voltage doubler circuit. If one cathode is used by itself for field excitation connect 4 and 8 together.
	25Y5	E	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
25Z5	25Z6	E	Change socket to octal and rewire as follows: No. 1 on six prong to No. 2 on octal 2 to 3 3 to 4 4 to 8 5 to 5 6 to 7  
25Z6	6J5	P	Connect 60 ohm 5 watt resistor in series with filament circuit, will not work in voltage doubler circuit. If one cathode is used by itself for field excitation connect 4 and 3 together. Make adaptor as follows: No. 1 on base to No. 2 on top 2 and 5 to 3 and 5 3 and 4 to 8 6 to 7 Can be used only in half wave circuits. If the cathodes are separate supplies in a half wave circuit connect 4 and 8 together. Insert 10 watt 75 or 100 ohm resistor in series with the filament string.
	6SL7 6SN7	P P	Insert 75 or 100 ohm 10 watt resistor in series with the filament string.
	25AC5	P	No changes. Use only where 4 and 8 are connected together. Will not work in voltage doubler circuit. If one cathode is used by itself for field excitation tie 4 and 8 together.
	25W4	G	When 25Z6 is used as straight half wave rectifier. Rewire as follows: No. 3 to No. 5 4 and 8 to 3 2 to 8
	25Z4	G	Where 25Z6 is used as straight half wave rectifier only. Rewire as follows: No. 3 to No. 5 4 to 8
	25Z5	E	Change octal to six prong socket and rewire as follows: No. 2 on octal to No. 1 on six prong 3 to 2 4 to 3 5 to 5 7 to 6 8 to 4  
	35Z6	G	No changes.
26			No practical substitute.
26A6			No practical substitute.
26A7			No practical substitute.
26BK6	26C6	P	No changes.
26C6	26BK6	P	No changes.
26D6			No practical substitute.
27	56 485	G P	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
28D7	28D7W	E	No changes.
28D7W	28D7	E	No changes.
28Z5			No practical substitute.
30	1E4	P	Change socket to octal and rewire as follows:
	1G4	P	 No. 1 on four prong to No. 2 on octal 2 to 3 3 to 5 4 to 7 
	1H4	E	
	31	G	Parallel circuits only. No changes.
31	30	G	Parallel circuits only. No changes.
32	1A4	G	No changes. 34 does not make good detector.
	1B4	G	
	34	G	
	951	G	
32L7	25A7	E	No changes.
	70A7	G	No changes. Difference in filament current makes necessary line resistance the same. Use only where 32L7 does not have other tubes in series with it.
	70L7	G	Reverse 6 and 8. Cord is correct. Use only where 32L7 does not have other tubes in series with it.
	117L7	G	Remove or short out the filament resistor and reverse connections 4 and 5
	117M7	G	to socket.
	117N7	G	Remove or short out filament resistor. Change connections as follows:
	117P7	G	No. 6 to 7 8 to 6 1 to 8 4 to 5 5 to 4 Use only in conventional circuits where rectifier is first in the string and A.C. is connected to No. 7.
33	1F4	G	Parallel circuits only. No changes.
	950	E	
34	1A4	G	No changes.
	1B4	G	
	32	G	
	951	G	
35A5	6G6	P	Same as 35A5 to 35L6 but put a 250 ohm 10 watt resistor in series with the filament circuit.
	12A6	P	Same as above but put a 250 ohm 10 watt resistor in series with filament circuit.
	14A5	P	Put 125 ohm 10 W resistor in series with filament.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
35A5	35B5	E	Change socket to miniature and rewire as follows:
	50B5	G	No. 1 on loctal to No. 3 on miniature 2 to 5 3 to 6 6 to 1 7 to 2 8 to 4 Do not use No. 7 on miniature.
	35C5	E	Change socket to minature and rewire as follows:
	50C5	G	No. 1 on loctal to No. 3 on miniature 2 to 7 3 to 6 6 to 2 7 to 1 8 to 4 Do not use No. 5 on miniature.
	35L6	E	Change socket to octal and rewire as follows:
	50L6	G	No. 1 on loctal to No. 2 on octal 2 to 3 3 to 4 6 to 5 7 to 8 8 to 7
	50A5	G	No changes.
35B5	35A5	E	Where space permits. Change socket to loctal and rewire as follows.
	50A5	G	No. 1 on miniature to No. 6 on loctal 2 to 7 3 to 1 4 to 8 5 to 2 6 to 3 7 to 6
	35C5	E	Rewire as follows:
	50C5	G	Reverse No. 1 and No. 2 5 and 7
	35L6	E	Where space permits. Change socket to octal and rewire as follows:
	50L6	G	No. 1 on miniature to No. 5 on octal 2 to 8 3 to 2 4 to 7 5 to 3 6 to 4 7 to 5
	50B5	G	No changes.
35C5	35A5	E	Where space permits, change socket to loctal and rewire as follows:
	50A5	C	No. 1 on miniature to No. 7 on loctal 2 to 6 3 to 1 4 to 8 5 to 6 6 to 3 7 to 2

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
35L6	6G6	P	Put 250 ohm 10 watt resistor in series with filament circuit.
	12A6	P	Insert 150 ohms resistance in series with the filament circuit.
	12J5	P	Insert 150 ohms resistance in series with the filament circuit.
	35A5	E	Change socket to loctal and rewire as follows:
	50A5	G	No. 2 on octal to No. 1 on loctal 5 to 2 4 to 3 5 to 6 8 to 7 7 to 8
	35B5	E	Change socket to miniature and rewire as follows:
	50B5	G	No. 2 on octal to No. 3 on miniature 3 to 5 4 to 6 5 to 1 7 to 4 8 to 2 Do not use No. 7 on miniature.
	35C5	E	Change socket to miniature and rewire as follows:
	50C5	G	No. 2 on octal to No. 3 on miniature 3 to 7 4 to 6 5 to 2 7 to 4 8 to 1 Do not use terminal No. 5 on miniature.
	50C6	G	No changes.
	50L6	G	
35W4	35Y4	E	Where space permits. Reverse 35Y4 to 35W4 procedure.
	35Z3	E	
	35Z5	E	
	117Z3	G	Where 35W4 is used by itself only. Remove line cord resistor or filament dropping resistor and replace with ordinary line cord. Rewire as follows: Remove and tape up any wires on No. 6 No. 7 to No. 6 Pilot light will not burn. In order to light pilot light, connect 40 ohm 1 watt resistor in series with filament and connect pilot light across it.
35Y4	35W4	E	Change socket to miniature and rewire as follows:
			No. 1 on loctal to No. 3 on miniature 2 to 5 4 to 6 7 to 7 8 to 4
	35Z3	E	No change is necessary but pilot light will not light. Pilot light can be lit by same method as used from 35Z5 to 35Z4.

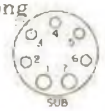
TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
35Y4	35Z5	E	Change socket to octal and rewire as follows:  No. 1 on loctal to No. 2 on octal 2 to 5 4 to 3 7 to 8 8 to 7 
35Z3	7A6	P	Move wire from No. 2 to No. 3. Short 3 and 6 together and 2 and 7 together. Connect 200 ohm 10W resistor in series with filament circuit.
	35W4	E	Change socket to miniature and rewire as follows:  No. 1 on loctal to No. 3 on miniature 2 to 5 7 to 7 8 to 4  Do not anchor on unused terminals.
	35Y4	E	No changes. Remove wires, if any, from pin No. 4 and tape them up.
	35Z4	E	Change socket to octal and rewire as follows:
	35Z5	E	 No. 1 on loctal to No. 2 on octal 2 to 5 7 to 8 8 to 7 
	45Z5	G	Same as 35Z3 to 35Z4.
35Z4	12J5	P	Add 150 ohm 5W resistor in series with filaments. Short Nos. 3 and 5.
	35W4	E	Change socket to miniature and rewire as follows:  No. 2 on octal to No. 3 on miniature 5 to 5 7 to 4 8 to 7  Do not connect to unused terminals.
	35Y4	E	Change socket to loctal and rewire as follows:
	35Z3	E	 No. 2 on octal to No. 1 on loctal 5 to 2 7 to 8 8 to 7 
	35Z5	E	No change is necessary but remove wires, if any, from pin No. 3 and tape them up.
35Z5	12J5	P	Add 150 ohm 5W resistor in series with filaments. Remove wires from No. 3 and connect to No. 2 through 25 or 30 ohm 1W resistor. Short Nos. 3 and 5.
	35W4	E	Change socket to miniature and rewire as follows:  No. 2 on octal to No. 3 on miniature. 3 to 6 5 to 5 7 to 4 8 to 7  Do not connect to unused terminals.
	35Y4	E	Change socket to loctal and rewire as follows:  No. 2 on octal to No. 1 on loctal 3 to 4 5 to 2 7 to 8 8 to 7 

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
35Z5	35Z4	E	No change is necessary but pilot light will not light. In order to light the pilot light,put a 40 ohm resistor in series with the filaments and connect the pilot light across it. This resistor must have a 1 watt rating.
	45Z5	G	No changes.
35Z6	25Z6	G	No change, unless 35Z6 is used singly in which case put 35 ohm 10 watt resistor in filament string.
	50Z6	G	No changes. Where a full set of five or six tubes are used, little change in operation will be noted. If 35Z6 is used by itself, this substitution may not be satisfactory.
35/51	24A	G	No changes.
36	6C6	E	Same as 37/44 to 6D6.
	6D6	G	
	39/44	G	No changes.
	77	E	Same as 39/44 to 6D6.
	78	G	
37	76	E	No changes.
38	41	G	Parallel circuits only. Reverse 41 to 38 procedure.
	42	G	
39/44	6C6	G	Change socket to six prong and rewire as follows:
	6D6	E	
	77	G	
	78	E	

No.	1 on five prong	to No.	1 on six prong
	2	to	2
	3	to	3
	4	to	4 and 5
	5	to	6
	cap	to	cap

	6J7	G	Reverse 6K7 to 39/44 procedure.
	6K7	E	
	6S7	G	Reverse 6K7 to 39/44 procedure. Parallel circuits only.
	6SH7	G	Reverse 6SK7 to 39/44 procedure.
	6SJ7	G	
	6SK7	E	
	6SS7	G	Reverse 6SK7 to 39/44 procedure. Parallel circuits only.
	6U7	G	Reverse 6K7 to 39/44 procedure.
	6W7	G	
	7A7	E	Reverse 7A7 to 39/44 procedure.
	7H7	G	
	7L7	G	
	7B7	G	Reverse 7A7 to 39/44 procedure. Parallel circuits only.
	7C7	G	
	36	G	No changes.
40	00A	G	No changes.
	01A	G	
	12A	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
41	6A4/LA	G	Parallel circuits only. Reverse 6A4/LA to 42 procedure.
	6AD7	G	Reverse 6F6 to 41 procedure. Parallel circuits only. Connect nothing to unused pins.
	6AR5	G	Change socket to miniature and rewire as follows: No. 1 on six prong to No. 3 on miniature 2 to 5 3 to 6 4 to 1 5 to 2 6 to 4  
	6F6	G	Parallel circuits only. Reverse 6F6 to 41 procedure.
	6G6	P	
	6L6	G	
	6U6	G	
	6V6	G	
	6K6	E	Reverse 6F6 to 41 procedure.
	7A5	G	Parallel circuits only. Reverse 7B5 to 41 procedure.
	7B5	E	Reverse 7B5 to 41 procedure.
	7C5	G	Parallel circuits only. Reverse 7B5 to 41 procedure.
	38	G	Parallel circuits only. Change socket to five prong and rewire as follows: No. 1 on six prong to No. 1 on five prong 2 to 2 3 to 3 4 to cap 5 to 4 6 to 5  
	42	G	No changes.
	89	G	Change socket connections as follows: Move wire from No. 4 to cap. Short Nos. 4 and 5 together.
42	6A4/LA	G	Parallel circuits only. Reverse 6A4/LA to 42 procedure.
	6AD7	G	Parallel circuits only. Reverse 6F6 to 41 procedure. Remove and tape up any wires connected to unused pins.
	6AR5	G	Same as 41 to 6AR5. Parallel circuits only.
	6B5	G	No changes.
	6F6	E	Reverse 6F6 to 41 procedure.
	6G6	P	Parallel circuits only. Reverse 6F6 to 41 procedure.
	6K6	G	
	6L6	G	
	6U6	G	
	6V6	G	
	7A5	G	Reverse 7B5 to 41 procedure.
	7B5	G	Parallel circuits only. Reverse 7B5 to 41 procedure.
	7C5	G	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
43	38	G	Same as 41 to 38. Parallel circuits only.
	41	G	No changes.
	89	G	Same as 41 to 89. Parallel circuits only.
43	25A6	G	Reverse 25A6 to 43 procedure.
	25L6	E	Change socket to octal and rewire as follows: No. 1 on six prong to No. 2 on octal 2 to 3 3 to 4 4 to 5 5 to 6 6 to 7  
45	2A3	G	No changes.
45Z3	35W4	G	Where 45Z3 is used by itself only, remove 960-ohm line cord resistor or filament dropping resistor and replace with 550-ohm. Rewire as follows: No. 1 to No. 3 2 to 5 6 to 5 Reverse Nos. 4 and 7 Do not anchor to unused terminals.
	117Z3	G	Where 45Z3 is used by itself only, remove line cord resistor or filament dropping resistor and replace with ordinary line cord. Rewire as follows: No. 7 to No. 3 2 and 6 to 5 4 to 6 1 to 4
45Z5	35Z5	G	No changes.
46	47	G	Only when 46 is operated as class A with plate and screen tied together.
47	2A5	G	Change socket to six prong type and rewire as follows: No. 1 on five prong to No. 1 on six prong 2 to 2 3 to 4 4 to 3 5 to 6 Connect 5 and 6 together.  
	46	P	Remove wire from No. 4 and short Nos. 2 and 4 together.
	59	G	Change socket to seven prong and rewire as follows: No. 1 on five prong to No. 1 on seven prong 2 to 2 3 to 4 4 to 3 5 to 5,6 and 7  
	1619	G	Parallel circuits only. Make adaptor as follows: No. 1 on base to No. 2 on top 2 to 3 3 to 5 4 to 4 5 to 7 and 8 There are or will be many used 1619 tubes available.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
48			No practical substitute.
49			No practical substitute.
50	10	G	No changes.
50A5	35A5	E	No changes. Place 100-ohm resistor in filament circuit.
	35B5	E	Same as 35A5 to 35B5. Place 100-ohm 10-W resistor in series with filaments.
	35C5	E	Same as 35A5 to 35C5. Place 100-ohm 10-W resistor in series with filament.
	35L6	E	Same as 35A5 to 35L6. Place 100-ohm resistor in filament circuit.
	50B5	E	Same as 35A5 to 35B5.
	50C5	E	Same as 35A5 to 35C5.
	50C6	G	Same as 35A5 to 35L6.
	50L6	E	
50AX6	50Z6	G	No changes.
50B5	35B5	E	Place 100 ohms 5 watts in series with filament.
	50A5	G	Where space permits. Same as 35B5 to 35A5.
	50C5	E	Same as 35B5 to 35C5.
	50L6	G	Where space permits. Same as 35B5 to 35L6.
50C5	50A5	G	Where space permits. Same as 35C5 to 35A5.
	50L6	E	Where space permits. Reverse 35L6 to 35C5 procedure.
50C6	35L6	G	Place 100-ohm 10-W resistor in series with filament.
	50A5	G	Same as 35L6 to 35A5.
	50L6	G	No changes.
50L6	12A6	P	No changes. Connect a 250-ohm 10-W resistor in series with the filament circuit.
	12J5	P	Emergency substitution. Works well at low volume. Put 250-ohm 10-w resistor in series with filaments.
	35A5	E	Same as 35L6 to 35A5. Place 100-ohm 5-w resistor in series with filaments.
	35B5	E	Same as 35L6 to 35B5. Place 100-ohm 10-w resistor in series with filament.
	35C5	E	Same as 35L6 to 35C5. Place 100-ohm 10-w resistor in series with filament.
	35L6	E	Place 100-ohm 5-w resistance in series with filaments.
	50B5	E	Same as 35L6 to 35B5.
	50C5	E	Same as 35L6 to 35C5.
	70A7	P	Remove and tape up wires connected to No. 6 or cut off No. 6 pin on 70A7.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
50X6	25X6	G	Insert 160-ohm 10-w resistor in series with filament. Reverse 25X6 to 50X6 procedure.
	50Y6	G	Reverse 25X6 to 50X6 procedure.
	50Y7	E	Change socket to octal and rewire as follows:
	50Z7	E	No. 1 on loctal to No. 2 on octal 2 to 4 3 to 3 6 to 5 7 to 8 8 to 7 Do not use No. 6 for anchor.
50Y6	50Z7	E	No changes. Disconnect wires from pin No. 6, if any.
50Y7	25X6	G	Insert 160-ohm 10-w resistor in series with filament. Reverse 25X6 to 50Y7 procedure.
	50X6	G	Only when No. 7 filament tap on 50Y7 is not used. Reverse 50X6 to 50Y7 procedure.
	50Y6	G	Only when No. 7 filament tap on 50Y7 is not used. Reverse 25X6 to 50Y7 procedure.
	50Z7	G	No changes.
50Z6	25Z6	E	No changes. Place 83-ohm 20-w resistor in series with filament.
	35Z6	E	Place 50-ohm resistor in series with filament.
	50AX6	E	No changes.
50Z7	50Y6	E	No changes are necessary but pilot light will not light. You may light pilot light by inserting 40 ohms resistance in series with the filament circuit and connecting the pilot light across it.
	50Y7	G	No changes.
EF50	6AH6	G	Same as EF50 to 6AU6. Parallel circuits only.
	6AK6	G	
	6AU6	G	Change socket to miniature and rewire as follows:
	6BA6	G	No. 1 on noval to No. 3 on miniature 2 to 6 3 to 5 4 to 2 6 to 7 7 to 1 9 to 4
	6BD6	G	
52			No practical substitution.
VT52	10	P	Parallel circuits only. No changes.
	50	P	
53	5608-A	E	No changes.
55	2A6	E	No changes.
55S	2A6	E	No changes.
	55	E	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
56	27	G	No changes.
	485	G	No changes.
56AS	37	E	Parallel circuits only. No changes.
	76	E	
56S	27	E	No changes.
	56	E	
57	58	G	No changes.
57AS	6C6	E	Parallel circuits only. No changes.
	77	E	
57S	57	E	No changes.
	58	E	
58	57	G	No changes. 58 is not a good second detector.
58AS	6D6	E	Parallel circuits only. No changes.
	78	E	
58S	57	E	No changes.
	58	E	
59	47	G	Reverse 47 to 59 procedure.
	1619	G	Parallel circuits only. Make adaptor as follows: No. 1 on base to No. 2 on top 2 to 3 3 to 4 4 to 5 5 and 6 to 8 7 to 7 There are or will be many used 1619 tubes available.
70A7	32L7	G	No changes. Where no other tubes in series with the 70A7 which has 150 mil filament instead of 0.3 amp.
	70L7	E	Change connection as follows: No. 8 to No. 6 6 to 8 Connect Nos. 7 and 8 together. Pilot light will not light but may be lit by same procedure as 50Z7 to 50Y6.
	117L7	E	Remove the line cord resistor and replace with straight AC cord. Reverse connections to 4 and 5.
	117M7	E	
	117N7	E	Remove line resistor cord and replace with straight AC cord.
	117P7	E	Remove wire from No. 8 Move No. 1 to No. 8 Reverse Nos. 4 and 5 Move No. 6 to No. 7 Place No. 8 on No. 6
70L7	32L7	G	Cord is correct. If 32L7 is alone in circuit. Reverse Nos. 6 and 8.
	70A7	E	Change connections as follows: No. 6 to No. 8 8 to 6

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
70L7	117L7	E	Remove line resistor cord and replace with straight AC cord.
	117M7	E	Reverse Nos. 4 and 5 Reverse 6 and 8
	117N7	E	Remove line cord resistor and replace with straight AC cord.
	117P7	E	Reverse Nos 4 and 5 No. 8 on No. 7 1 on 8
71A	482	G	No changes. If push-pull circuit, both tubes must be changed to avoid hum.
	483	G	
75	6AQ6	G	Same as 75 to 6AT6. Parallel circuits only.
	6AT6	G	Change socket to miniature and rewire as follows:
	6AV6	G	No. 1 on six prong to No. 3 on miniature
	6BF6	G	2 to 7
	6BK6	G	3 to 5
	6BT6	G	4 to 6
	6BU6	G	5 to 2
			6 to 4
			cap to 1
	6B6	E	Change socket to octal and rewire as follows:
	6Q7	E	No. 1 on six prong to No. 2 on octal
	6R7	G	2 to 3
			3 to 4
			4 to 5
			5 to 8
			6 to 7
			cap to cap
	6C6	P	Emergency substitution. No changes but considerable loss of volume.
	6SQ7	E	Reverse 6SQ7 to 75 procedure.
	6SR7	G	
	6T7	G	Same as 75 to 6Q7. Parallel circuits only.
	6V7	G	Same as 75 to 6Q7.
	7B6	E	Change socket to loctal and rewire as follows:
	7E6	G	No. 1 on six prong to No. 1 on loctal
			2 to 2
			3 to 5
			4 to 6
			5 to 4 or 7
			6 to 8
			cap to 3
	7C6	G	Same as above. Parallel circuits only.
	85	G	No changes. Sometimes works excellent, other times not so well.
76	6AE5	G	Reverse 6C5 to 37 procedure.
	6C5	E	Reverse 6C5 to 37 procedure.
	6J5	G	Reverse 6C5 to 37 procedure.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
76	6L5	G	Reverse 6C5 to 37 procedure.
	6P5	G	Reverse 6C5 to 37 procedure.
	7A4	E	Reverse 7A4 to 37 procedure.
	7B4	G	
	XXL	E	
	37	E	No changes.
77	6C6	E	No changes.
	6D7	G	Same as 6C6 to 6D7.
	6E7	G	
	6J7	E	
	6K7	G	Same as 6C6 to 6J7.
	6S7	G	Same as 6C6 to 6J7. Parallel circuits only.
	6SH7	G	Same as 6C6 to 6SJ7.
	6SJ7	E	Same as 6C6 to 6SJ7.
	6SK7	G	Same as 6C6 to 6SJ7.
	6U7	G	Same as 6C6 to 6J7.
	6W7	G	Same as 6C6 to 6J7. Parallel circuits only.
	7A7	G	Same as 6C6 to 7A7.
	7B7	G	Same as 6C6 to 7A7. Parallel circuits only.
	7C7	G	
	7H7	G	Same as 6C6 to 7A7.
	7L7	G	Same as 6C6 to 7A7.
	1221	E	No changes.
78	6D6	E	No changes.
	6D7	G	Same as 6C6 to 6D7.
	6E7	G	
	6J5	G	Same as 6C6 to 6J7.
	6K7	E	
	6S7	G	Same as 6C6 to 6J7. Parallel circuits only.
	6SH7	G	Same as 6C6 to 6SJ7.
	6SJ7	G	Same as 6C6 to 6SJ7.
	6SK7	E	Same as 6C6 to 6SJ7.
	6U7	G	Same as 6C6 to 6J7.
	6W7	G	Same as 6C6 to 6J7. Parallel circuits only.
	7A7	E	Same as 6C6 to 7A7.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
78	7B7	G	Same as 6C6 to 7A7. Parallel circuits only.
	7C7	G	Same as 6C6 to 7A7. Parallel circuits only.
	7H7	G	Same as 6C6 to 7A7.
	7L7	G	Same as 6C6 to 7A7.
	39/44	E	Change socket to five prong type and rewire as follows:

No. 1 on six prong	to No.	1 on five prong
2	to	2
3	to	3
4, remove and tape up		
5	to	4
6	to	5
cap		cap

79*	6A6	G	Parallel circuits only. Change socket to seven prong and rewire as follows:

No. 1 on six prong	to No.	1 on seven prong
2	to	2
3	to	3
4	to	4
5	to	6
6	to	7
cap	to	5

	6N7	G	Parallel circuits only. Reverse 6N7 to 79 procedure.
	6Y7G	G	Reverse 6N7 to 79 procedure.
	6Z7	G	Parallel circuits only. Reverse 6N7 to 79 procedure.
80	5T4	G	Change socket to octal and rewire as follows:
	5U4	G	
	5V4	G	
	5W4	G	
	5Y3	E	
	5Z4	G	

No. 1 on four prong	to No.	2 on octal
2	to	4
3	to	6
4	to	8

	5X4	G	Reverse 5X4 to 5Z3 procedure.
	5Y4	E	
	83V	G	No changes.
	83	G	
	5Z3	G	No changes.
81	10	P	No changes.
	50	P	
82	2A3	P	No changes.
	45	P	
83	5T4	G	Same as 80 to 5U4.
	5U4	G	
	5X4	G	Reverse 5X4 to 5Z3 procedure.
	5Z3	G	No changes.

* See Addendum at back of this section.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
83V	5T4	G	Same as 80 to 5U4.
	5U4	G	
	5V4	G	
	5W4	G	
	5Y3	G	
	5Z3	G	No changes.
	5Z4	G	Same as 80 to 5U4.
	80	G	No changes.
	83	G	
84	7Y4	E	Change socket to loctal and rewire as follows: No. 1 on five prong to No. 1 on loctal 2 to 3 3 to 6 4 to 7 5 to 8  
84/6Z4	6X4	G	Parallel circuits only. Change socket to miniature and rewire as follows: No. 1 on five prong to No. 3 on miniature 2 to 1 3 to 6 4 to 7 5 to 4  
	6X5	E	Change socket to octal and rewire as follows: No. 1 on five prong to No. 2 on octal 2 to 3 3 to 5 4 to 8 5 to 7  
85	6AQ6	G	Same as 75 to 6AT6. Parallel circuits only.
	6AT6	G	Same as 75 to 6AT6.
	6AV6	G	
	6B6	G	Same as 75 to 6Q7.
	6BF6	G	Same as 75 to 6AT6.
	6BK6	G	
	6BT6	G	
	6BU6	G	
	6Q7	G	Same as 75 to 6Q7.
	6R7	E	
	6SQ7	G	Reverse 6SQ7 to 75 procedure.
	6SR7	E	
	6T7	G	Same as 75 to 6Q7. Parallel circuits only.
	6V7	G	Same as 75 to 6Q7.
	7B6	G	Same as 75 to 7E6.
	7C6	G	Same as 75 to 7E6. Parallel circuits only.
	7E6	G	Same as 75 to 7E6.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
85	75	G	No changes.
85AS	85	E	No changes.
89	6K6	G	Same as 6F6 to 89. Parallel or series circuits.
	41	G	Reverse 41 to 89 procedure.
	42	G	Parallel circuits only. Reverse 41 to 89 procedure.
99V			No practical substitution.
X99	20	G	Parallel circuits only. No changes.
117L7	32L7	G	Place 280-ohm cord or 50-w resistor in series with filaments. Reverse socket connections Nos. 4 and 5.
	70A7	G	Place 300-ohm cord or 10-w resistor in series with filaments. Reverse socket connections Nos. 4 and 5.
	70L7	G	Place 300-ohm 10-w resistor in series with filaments. Reverse socket connections Nos. 4 and 5, also 6 and 8.
	117M7	E	No changes.
117L7 or 117M7	117N7 or 117P7	E	Make adaptor as follows: No. 1 on base to No. 8 on top 2 to 2 3 to 3 4 to 4 5 to 5 7 to 7 8 to 6 AC line must connect to No. 7
117L7/M7	25A7	G	Connect 300-ohm line cord in place of AC cord and change connections as follows: Reverse Nos. 4 and 5.
117M7	32L7	G	Same as 117L7 to 32L7.
	70A7	G	Same as 117L7 to 70A7.
	70L7	G	Same as 117L7 to 70L7.
117N7	25A7	G	Connect 300-ohm line cord in place of AC cord and change connections as follows: No. 6 to No. 7 8 to 6 1 to 8 Reverse Nos. 4 and 5.
	32L7	G	Remove and tape up any wire anchored on No. 1. Place 280-ohm cord or 50-w resistor in series with filaments. Reverse socket connections Nos. 4 and 5. Move No. 8 to No. 1.
	70A7	G	Place 300-ohm cord or 10-w resistor in series with filaments. Reverse socket connections Nos. 4 and 5. Move No. 8 to No. 1 and No. 6 to No. 8.
	70L7	G	Remove and tape up any wires connected to No. 1. Place 300-ohm cord or 10-w resistor in series with filaments. Reverse Nos. 4 and 5, move No. 8 to No. 1 and short Nos. 7 and 8 together. For use in circuits where AC line is connected to No. 7.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
117N7	117P7	E	No changes.
117P7	25A7	G	Same as 117N7 to 25A7. Cord or resistor must dissipate 90 w.
117Z3	35W4	G	Replace line cord with 533-ohm resistor cord. Rewire as follows: No. 6 to No. 7 Do not use No. 6 for anchor.
	45Z3	G	Replace line cord with 960-ohm resistor cord. Rewire as follows. No. 3 to No. 1 4 to 7 5 to 2 6 to 4 Do not use unused terminals for anchors.
	117Z4	G	Where space permits. Change socket to octal and rewire as follows:  No. 3 on miniature to No. 2 on octal 4 to 7 5 to 5 6 to 6 
117Z4	117Z3	G	Reverse 117Z3 to 117Z4 procedure.
	117Z6	E	No change except to remove and tape up any wires which may be anchored to Nos. 3 and 4.
117Z6	6X5	P	Connect 200-ohm 100-w resistor in series with filament. Use only where Nos. 4 and 8 are tied together.
	25Z6	G	Connect 300-ohm line cord or 50-w resistor in series with filament.
	50Y6	E	No change except that a 450-ohm 20-w resistor or line cord must be used in series with the filament.
	50Z6	E	Connect 220-ohm line cord in place of AC cord.
	50Z7	E	Connect 440-ohm line cord in place of AC cord.
182B/482B	71A	E	No changes.
	183/483	E	
183/483	71A	E	No changes.
	182B/482B	E	
210T	VT52	P	No changes.
	10	E	
	50	G	
485	27	G	No changes in connections but put one inch piece of screen wire doubled in series with one side of filament winding.
	56	G	Same as 485 to 27.
864			No practical substitute.
950	1F4	G	No changes.
	33	G	Parallel circuits only. No changes.
954	956	E	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
955	5731	P	No changes.
956	954	E	No changes.
957	958A	G	Parallel circuits only. No changes.
958A	957	G	Parallel circuits only. No changes.
959			No practical substitute.
FM1000			No practical substitute.
1005/CK1005	0Y4	G	No changes.
	0Z4A	G	
CK1013	5517	E	No changes.
1201	7E5	E	No changes.
1203	7C4	E	No changes.
1204	7AB7	E	No changes.
1206	7G8	E	No changes.
1221	6C6	E	No changes.
	77	E	
1223	6J7	E	No changes.
1229	1A4	E	No changes.
	1B4	E	
	32	E	
	951	E	
1230	30	E	No changes.
1231	7G7	G	No changes.
	7V7	G	
1232	7G7	E	No changes.
1247			No practical substitute.
1265			No practical substitute.
1266			No practical substitute.
1267	0A4	G	No changes.
1273	7A7	G	No changes.
	7AJ7	G	
	7H7	G	
	7L7	G	
	7T7	G	
1274	6AX5	G	Parallel circuits only. No changes.
	6W5	G	
	6ZY5	G	
	6AX6	G	No change necessary but tie Nos. 4 and 8 together if convenient.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
1274	6BY5	G	Parallel circuits only. Rewire as follows: Connect Nos. 1 and 8 together No. 3 to No. 4
	6X5	E	No changes.
	7Y4	E	Same as 6X5 to 7Y4. Parallel circuits only.
	7Z4	E	
1275	5X3	G	No changes.
	5Z3	E	
	80	G	
	83	G	
	83V	G	
1276			No practical substitute.
1280	12B7	G	No changes.
	14A7	G	No changes.
	14C7	G	
	14H7	E	
	1284	G	
1284	12B7	G	No changes.
	14A7	G	
	14C7	G	
	14H7	G	
	1280	G	
1291	3B7	E	No changes.
1293	1LE3	G	Parallel circuits only. No changes.
1294	1R4	E	No changes.
1299	3D6	E	No changes.
1612	6L7	E	No changes.
1614	6L6	E	No changes.
1619	2A5	G	Reverse 2A5 to 1619 procedure.
1620	6J7	E	No changes.
1626	12E5	G	Parallel circuits only. No changes.
	12J5	G	
1629			No practical substitute.
1634	12SC7	G	No changes.
1644	12L8	G	No changes.
1654			No practical substitute.
2050	2051	E	No changes.
2051	2050	E	No changes.
5517	CK1013	E	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
5517/CK1013			No practical substitute.
5590	6AG5	P	Parallel circuits only. No changes.
	6BC5	G	
	5591	G	No changes.
	9001	G	
	9003	G	
5591	6BC5	P	Parallel circuits only. No changes.
	6AG5	G	
	5590	G	No changes.
	9001	G	
	9003	G	
5608-A	53	E	No changes.
5618	2E30	G	Parallel circuits only. Rewire as follows:
	5812	G	Remove wires from No. 4 No. 1 to No. 4 6 to 1 3 to 6 7 to 3 5 to 7 2 to 5 Connect wires removed from No. 4 to No. 2.
5635			No practical substitute.
5636			No practical substitute.
5643			No practical substitute.
5646			No practical substitute.
5647			No practical substitute.
5654	6AJ5	G	No changes.
	6AK5	G	
5670	7F8	G	Where space permits. Same as 2C51 to 7F8. Parallel circuits only.
5672	5678	G	No changes.
5676	5677	P	Parallel circuits only. No changes.
5677	5676	G	Parallel circuits only. No changes.
5678	5672	G	No changes.
5679	7A6	E	Where No. 4 is not used on 5679. No changes.
5686			No practical substitute.
5687	6J6	G	Parallel circuits only. Reverse 6J6 to 5687 procedure.
5691	6SL7	E	Parallel circuits only. No changes.
	6SN7	P	No changes.
	5692	P	

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
5692	6SN7	G	No changes.
	5691	P	
5693	6SJ7	E	No changes.
	6SK7	P	
5694			No practical substitute.
5697			No practical substitute.
5702	5784	G	No changes.
5703	5744	P	No changes.
5704			No practical substitute.
5718	5719	P	No changes.
5719	5718	P	No changes.
5722			No practical substitute.
5725	6AJ5	P	No changes.
	6AK5	P	
5726	6X4	G	Parallel circuits only. Rewire as follows: No. 7 to No. 6 1 and 5 to 7 2 to 1
5731	955	P	No changes.
5744	5703	P	No changes.
5783			No practical substitute.
5784	5702	G	No changes.
5785			No practical substitute.
5787			No practical substitute.
5812	2E30	G	No changes.
5823			No practical substitute.
5824	25A6	P	No changes.
	25B6	E	
	25C6	P	
	25L6	E	
5840	5899	G	No changes.
	5900	G	
	5901	G	
5847			No practical substitute.
5879			No practical substitute.
5896			No practical substitute.
5897	5898	P	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
5898	5897	P	No changes.
5899	5840	G	No changes.
	5900	G	
	5901	G	
5900	5840	G	No changes.
	5899	G	
	5901	G	
5901	5840	G	No changes.
	5899	G	
	5900	G	
5910			No practical substitute.
5915	6BE6	E	No changes.
5931			No practical substitute.
5932			No practical substitute.
9001	5590	P	No changes.
	5591	G	
	9003	G	
9002	6AB4	P	Rewire as follows: No. 2 to No. 7 5 to 1
9003	5590	G	No changes.
	9001	G	
9004			No practical substitute.
9005			No practical substitute.
9006			No practical substitute.
X6030			No practical substitute.
XXFM	7X7	E	No changes.
XXL	6C5	E	Reverse 6J5 to XXL procedure.
	6J5	E	Reverse 6J5 to XXL procedure.
	6K7	E	Reverse 6K7 to XXL procedure.
	7A4	E	No changes.

TUBE.	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6AH6	6AC7	G	Change socket to octal and rewire as follows:  No. 1 on miniature to No. 4 on octal 2 to 3 3 to 2 4 to 7 5 to 8 6 to 6 7 to 5  Connect pin 1 on octal to common ground on chassis.
6AU6	6BJ6	G	Parallel circuits only. Rewire as follows: Interchange leads between pins 2 and 7.
6T8	6AL5 6AQ6	G	The 6T8 is a triple-diode triode tube. If a 6R8 is not available as a substitute, two tubes can be used if space permits. Of the tube combinations listed here one tube is a double diode (the 6AL5) while the other tubes are double-diode triode types. Of the substitute tubes only those elements necessary to perform the required functions are used.
	6AL5 6AT6	G	
	6AL5 6AV6	G	
	6AL5 12AV6	G	
12AT7	7F8	G	Change socket to loctal and rewire as follows:  No. 1 on noval to No. 3 on loctal 2 to 1 3 to 4 4 to 2 5 to 2 6 to 6 7 to 8 8 to 5 9 to 7 
12AU7	6SN7	G	Change socket to octal and rewire as follows:  No. 1 on noval to No. 2 on octal 2 to 1 3 to 3 4 to 7 5 to 7 6 to 5 7 to 4 8 to 6 9 to 8  The above filament rewiring applies only if the leads from pins 4 and 5 on the noval are tied together or to the same point.
	12BH7	G	Parallel circuits only. No changes.
1B4	1E5GP	E	No changes.
1E5GP	1B4	E	No changes.
6C6	1603 7700	E E	No changes.
6F6	1611	E	No changes.
6J7	7000	E	No changes.

TUBE	SUB.	PERF.	CIRCUIT CHANGES NECESSARY
6Y7G	79	G	Reverse 6N7 to 79 procedure.
79	6Y7G	G	Reverse 6N7 to 79 procedure.
1603	6C6	E	No changes.
	7700	E	
1611	6F6	E	No changes.
7000	6J7	E	No changes.
7700	6C6	E	No changes.
	1603	E	

IDENTICAL TUBES WITH UNLIKE HEATER VOLTAGE AND CURRENT RATINGS

Substitute high voltage tubes for low voltage tubes in series circuits only with suitable shunt resistor when required. Substitute low voltage tubes for high voltage tubes in parallel circuits with voltage dropping resistor in series with filament -- in series circuits with suitable shunt resistor. For all cases see instructions in Section 1. The performance for each substitution is excellent.

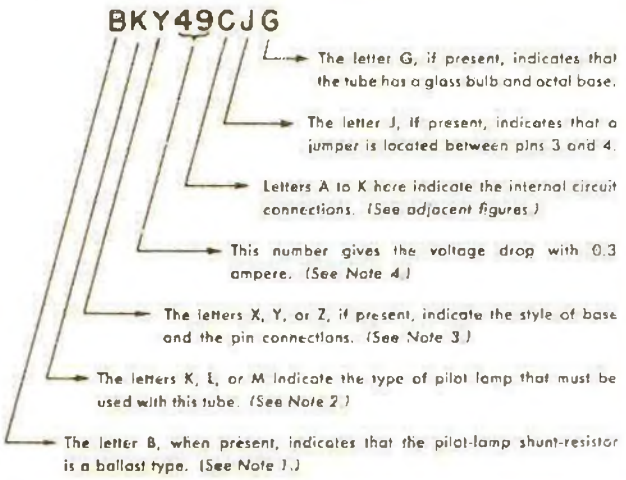
TUBE	SUB.	TUBE	SUB.	TUBE	SUB.
2A3	6A3	7B6	14B6	14B8	7B8
2A5	42	7B8	14B8	14E6	7E6
2A6	75	7E6	14E6	14E7	7E7
2A7	6A7	7E7	14E7	14F7	7F7
2B7	6B7	7F7	14F7	14F8	7F8
6A3	2A3	7F8	14F8	14J7	7J7
	1276	7J7	14J7	14N7	7N7
6A6	53	7N7	14N7	14N7	7N7
6A7	2A7	7Q7	14Q7	14Q7	7Q7
6A8	12A8GT	7R7	14R7	14R7	7R7
6B7	2B7	12A8GT	6A8	25B8GT	12B8G
6B8	12C8	12B8G	25B8GT	25L6	1632
6F5	12F5GT	12C8	6B8	30	RK42
6H6	12H6	12F5GT	6F5	42	2A5
6J5	12J5GT	12H6	6H6	53	6A6
6J7	12J7GT	12J5GT	6J5	55	85
6K7	12K7GT	12J7GT	6J7	56	56AS
6K8	12K8	12K7GT	6K7		76
6L6	1631	12K8	6K8	56AS	56
6Q7	12Q7GT	12Q7GT	6Q7		76
6SA7	12SA7	12SA7	6SA7	57	57AS
6SC7	12SC7	12SC7	6SC7	57AS	57
	1634	12SF5	6SF5	58	58AS
6SF5	12SF5	12SF7	6SF7	58AS	58
6SF7	12SF7	12SG7	6SG7	75	2A6
6SG7	12SG7	12SH7	6SH7	76	56
6SH7	12SH7	12SJ7	6SJ7	85	55
6SJ7	12SJ7	12SK7	6SK7	1276	2A3
6SK7	12SK7	12SL7GT	6SL7GT		6A3
6SL7GT	12SL7GT	12SN7GT	6SN7GT	1631	6L6
6SN7GT	12SN7GT		1633	1632	25L6
	1633	12SQ7	6SQ7	1633	6SN7GT
6SQ7	12SQ7	12SR7	6SR7		12SN7GT
6SR7	12SR7	14A4	7A4	1634	6SC7
7A4	14A4	14B6	7B6	RK42	30

BALLAST TUBE AND RESISTOR NUMBERING CODES

FOR AC-DC RECEIVERS USING 0.3 AMP. SERIES CONNECTED HEATERS

There are two numbering codes now in use for ballast and resistor tubes. Both codes use parts of the type designation to indicate the various divisions of the tube's service. For example, type numbers in the first system (A) might be BKX51DJ or L55B and, in the second system (B), might be 200R44 or 200R. These letter and number combinations are explained by the following examples.

SYSTEM A



NOTE 1.

"Ballast" action indicates that the pilot lamp shunt resistor has low starting resistance when cold, protecting the lamp filament from the initial current surge, and has much higher resistance when hot, applying full operating voltage to the lamp.

NOTE 2.

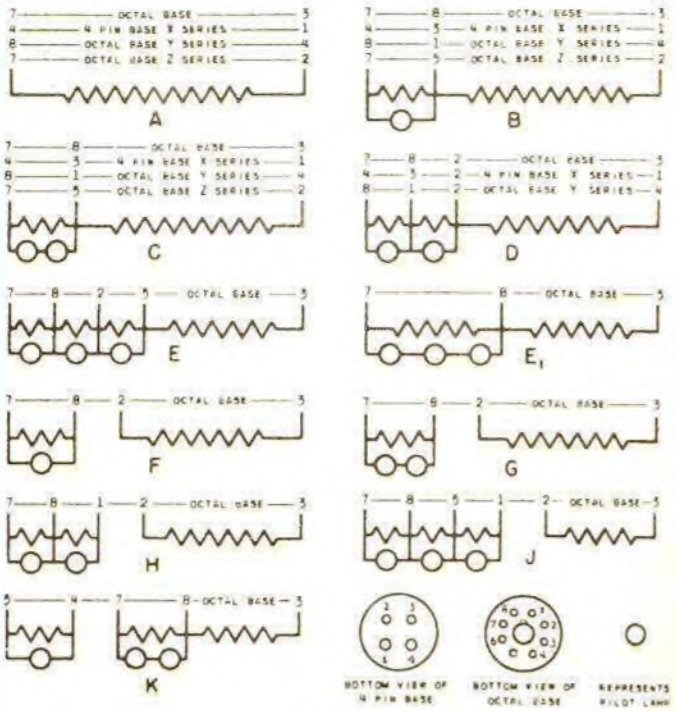
Tube Letter	Lamp No.	Volts	Amperes	Bead Color
K	40 and 47	6.3	0.15	Brown
L	44 and 46	6.3	0.25	Blue
M	50 and 51	7.5	0.2	White

NOTE 3.

X denotes a 4 pin base and metal shell. Y or Z denote octal bases but with different pin connections. (See Figures A to K.)

NOTE 4.

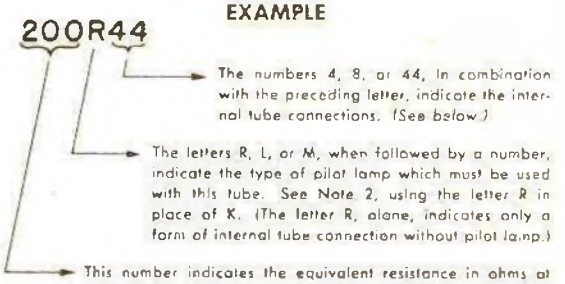
This number includes the drop in the series resistor plus the drop in the pilot lamp and its shunt. The number represents the difference between the sum of the heater voltages and the line voltage of 117.5 volts. Tubes are made with the following numbers: 98, 92, 86, 80, 73, 67, 61, 55, 49, 42, 36, 30, 23, 17, 11. The number to be used is the one closest to the voltage difference mentioned above.

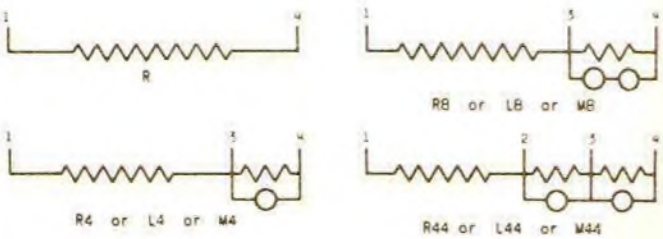


SYSTEM B

All tubes under System B have glass bulbs and 4 pin bases and their type designations start with a number.

EXAMPLE

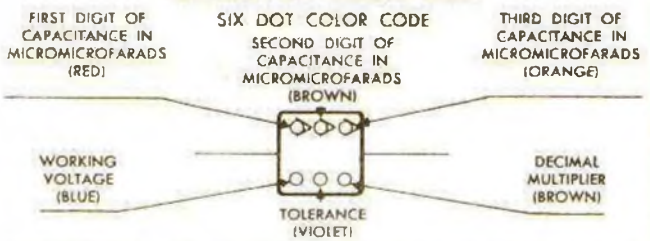




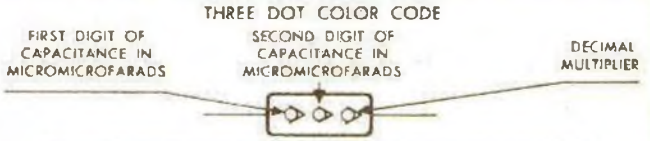
Courtesy TUNG-SOL Lamp Works, Inc.

RTMA CAPACITOR, RESISTOR, AND TRANSFORMER COLOR CODES

CAPACITOR COLOR CODE



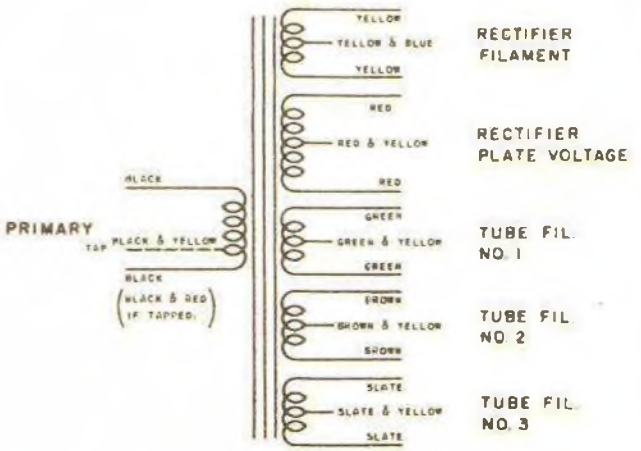
EXAMPLE: 2130 μμf. ±7%, 600 W.V. (Values for color shown in the above parenthesis)



COLOR	DIGIT NUMERAL	DECIMAL MULTIPLIER	TOLERANCE	WORKING VOLTAGE
BLACK	0	1	20%	—
BROWN	1	10	1%	100
RED	2	100	2%	200
ORANGE	3	1000	3%	300
YELLOW	4	10000	4%	400
GREEN	5	—	5%	500
BLUE	6	—	6%	600
VIOLET	7	—	7%	700
GRAY	8	—	8%	800
WHITE	9	—	9%	900
GOLD	—	0.1	—	1000
SILVER	—	0.01	10%	—

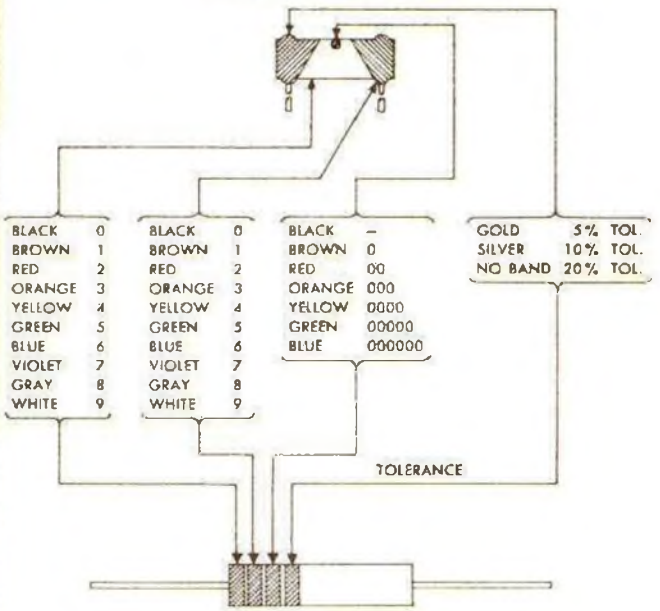
POWER TRANSFORMER LEAD COLOR CODE

Power transformer leads in radio receivers may be identified by the following colors (or color patterns) on the lead coverings.



Courtesy IUNG-SOL Lamp Works, Inc.

RESISTOR COLOR CODE



RESISTANCE VALUE: The nominal resistance value in ohms is identified by a three digit symbol. The first two digits are the first two figures of the resistance value in ohms. The third digit specifies the number of zeros which follow the first two figures.

I-F TRANSFORMER LEAD COLOR CODE

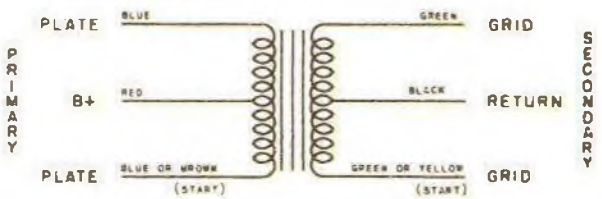
I-F transformer leads in radio receivers may be identified by the following colors on the lead coverings.

PLATE LEAD	BLUE	GRID (or diode lead)	GREEN
B+ LEAD	RED	GRID RETURN	BLACK

FOR "FULL-WAVE" TRANSFORMER SECOND DIODE LEAD WILL BE GREEN-BLACK.

AUDIO TRANSFORMER LEAD COLOR CODE

Interstage and Output Audio Transformer leads in radio receivers may be identified by the colors on the lead coverings as shown.



In cases where use is made of a single primary and/or a single secondary, the upper half of the diagram indicates the color coding. The brown and yellow leads indicate the start of the primary and secondary windings respectively and will be used in place of the blue and green (as shown) where polarity indications are required.

PILOT LAMP TABLE

Lamp No.	Volts	Amperes	Bead Color	Miniature Base	Bulb Type
40	6-8	0.15	Brown	Screw	T-3 1/4
41	2.5	0.50	White	Screw	T-3 1/4
42	3.2	0.35	Green	Screw	T-3 1/4
43	2.5	0.50	White	Bayonet	T-3 1/4
44	6-8	0.25	Blue	Bayonet	T-3 1/4
45	3.2	0.35	White	Bayonet	T-3 1/4
46	6-8	0.25	Blue	Screw	T-3 1/4
47	6-8	0.15	Brown	Bayonet	T-3 1/4
48	2.0	0.06	Pink	Screw	T-3 1/4
49	2.0	0.06	Pink	Bayonet	T-3 1/4
50	6-8	0.20	White	Screw	G-3 1/2
51	6-8	0.20	White	Bayonet	G-3 1/2
55	6-8	0.40	White	Bayonet	G-4 1/2
232	2.9	0.17	White	Screw	T-3 1/4
292A	2.9	0.17	White	Bayonet	T-3 1/4
1455	18.0	0.25	Brown	Screw	G-5
1455A	18.0	0.25	Brown	Bayonet	G-5
1490	3.2	0.15	- - -	Bayonet	T-3 1/4

GERMANIUM CRYSTAL DIODE CHARACTERISTICS

Germanium Crystal	Min. Forward Current at +1v (Ma)	Max. Reverse Current (Microamp.)	Peak Inverse Voltage (Volts)	Average Anode Rect. Current (Ma)	Peak Anode Rect. Current (Ma)
1N34 1N34A	5.0	50 at -10v 800 at -50v	75	40	150
1N35°	7.5	10 at -3v	75	22.5	60
1N38 1N38A	3.0	6 at -3v 625 at -100v	120	40	150
1N39	3.0	200 at -100v 800 at -200v	225	40	150
1N40°°	12.75 (at 1.5 volts)	50 at -10v	75	22.5	60
1N41°°	12.75 (at 1.5 volts)	50 at -10v	75	22.5	60
1N42°°	12.75 (at 1.5 volts)	6 at -3v 625 at -100v	120	22.5	60
1N48	4.0	833 at -50v	85	50	150
1N51	2.5	1670 at -50v	50	25	100
1N52	4.0	150 at -50v	85	50	150
1N54 1N54A	5.0	10 at -10v	75	40	150
1N55 1N55A	3.0	300 at -100v 800 at -150v	170	40	150
1N56 1N56A	15.0	300 at -30v	50	50	200
1N57	4.0	500 at -75v	90	40	150
1N58 1N58A	4.0	800 at -100v	115	40	150
1N60†	†	†	70	40	150
1N63	4.0	50 at -50v	125	50	150
1N64	Tested for efficiency in 44 Mc video detector circuit.				
1N65	2.5	250 at -50v	85	50	150
1N69†	5.0	350 at -50v	75	40	125
1N70†	3.0	410 at -50v	125	30	90
1N71††	15.0	300 at -30v	50	50	200

NOTE: Crystals 1N48, 1N51, 1N52, 1N63, 1N64, and 1N65 are General Electric types, all others are Sylvania types unless otherwise indicated.

° Units are matched in the forward direction at +1 volt so that the current flowing through the higher resistance unit is within 10% of that in the lower resistance unit. Ratings shown are for each diode.

°° Consists of 4 specially selected and matched germanium diodes whose resistances are balanced within ± 2.5% in the forward direction at 1.5 volts. For additional balance, the forward resistance of each pair of varistor crystals are matched within 3 ohms. Ratings shown above are for each diode.

† Units are tested in a circuit employing an input of 1.8 volts rms at 40 mc. 70% modulated at 400 cycles. Demodulated output across a 4700 ohm resistor shunted by a 5 mmf capacitor is a minimum of 1.1 volts peak to peak.

† JAN types

†† Consists of four matched low impedance germanium diodes each of which, with a voltage of one volt impressed in the forward direction, will pass a current within one ma of the average current of the four. Ratings shown above are for each diode.