

Tripple Triode Substitutions

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With the shortage of 6C10 and 6K11 compactron triodes, many people have been attempting to substitute other triodes that are still available. Unfortunately, the substitutions seldom work. There are 13 compactron triodes that are interchangeable physically, but their characteristics are quite different as shown below.

* These tubes have an internal shield

Tube	Heater	Plate Watts	Max Plate V	Max Plate mA	Gain	M.
Conductance Plate Resistance						
6AC10	: 6.3V 0.6A	2/2/2W	330/330/330V	9/9/9mA	62/62/62x	
5800/5800/5800Gm 10700/10700/10700rp						
6AK10	: 6.3V 0.9A	2/2/2W	330/330/330V	10/10/10mA	53/53/53x	
7000/7000/7000Gm 7500/7500/7500rp						
6AV11	:* 6.3V 0.6A	2/2/2W	330/330/330V	10.5/10.5/10.5mA	17/17/17x	
2200/2200/2200Gm 7700/7700/7700rp						
6BK11	:* 6.3V 0.6A	0.4/0.4/0.4W	330/330/330V	1.6/1.2/1.2mA	70/100/100x	
1550/1600/1600Gm 45000/62500/62500rp						
6C10	:* 6.3V 0.6A	1/1/1W	330/330/330V	1.2/1.2/1.2mA	100/100/100x	
1600/1600/1600Gm 62500/62500/62500rp						
6D10	:* 6.3V 0.45A	2/2/2W	330/330/330V	4.2/4.2/4.2mA	57/57/57x	
4200/4200/4200Gm 13600/13600/13600rp						
6K11	:* 6.3V 0.6A	0.275/0.3/0.3W	330/330/330V	10.5/1.2/1.2mA	17/100/100x	
2200/1600/1600Gm 7700/62500/62500rp						
6Q11	:* 6.3V 0.6A	3/1.2/1.2W	330/330/330V	22/22/1.2mA	18/100/100x	
2500/1600/1600Gm 7000/62500/62500rp						
6U10	: 6.3V 0.6A	2/2/1W	330/330/330V	9.6/9.6/1.2mA	18/18/100x	
2300/2300/1600Gm 7700/7700/61000rp						
9AM10	: 9.5V 0.6A	2/2/2W	100/100/100V	8/8/8mA	64/64/64x	
6900/6900/6900Gm 9300/9300/9300rp						

Tube	Heater	Other specs
8AC10	: 8.4V 0.45A	--- same as 6AC10 ---
12AC10	: 12.6V 0.3A	--- same as 6AC10 ---
9AK10	: 9.5V 0.6A	--- same as 6AK10 ---

Possible substitutions (those marked with * may not work)

6AC10, 6AK10*, 6D10*, 8AC10*, 9AM10*

6C10, 6AC10*, 6BK11*

6K11, 6Q11

Alternatives:

An alternate solution to the lack of available tubes is to rewire the circuit to accept more readily available miniature tubes. The most difficult tube to find is the 6C10. this tube is essentially a tripple section 12AX7 tube. So one possible solution is to replace it with two 6AX7 tubes or two 12AX7 tubes wired for six volt operation. However this will double the heater current which could potentially cause trouble, plus 6AX7/12AX7 tubes tend to be expensive.

There are however other tubes that have the same characteristics as the 12AX7 that can be used instead. The 6AV6 is a single section of the 12AX7 with an added dual signal diode section.

Just ignore the diode section, or connect the plates to the cathode. This will still cause the heater current to be slightly higher (by 0.3A), but the 6AV6 is commonly available and low cost. Alternately a 6BK6 could be used instead of the 6AV6. They are not as commonly available as the 6AV6, but are still low cost and have the same triode characteristics as the 6C10.

If heater current is a problem, consider using the 6DR4 which has the same triode characteristics of the 6C10, but only 0.15mA of current, so three of them in parallel could draw 0.45mA. If you need to have exactly 0.6mA of heater current, then use one 6AV6 and two 6DR4 tubes. A little known 6V tube that has the same characteristics as the 12AX7 but with a 6V heater is the 6EU7. You could use a pair of these, or one of them and a 6AV6, 6BK6 or 6DR4 tube.

Another little known tube that has the same characteristics as the 12AT7 is the 12DT8. The difference is that the 12DT8 has an internal shield between the sections. The triode sections of the 12DT8 are exactly the same as the ones installed in the 12AT7. The 6DT8 tube is the same as the 12DT8 tube except the triode heaters are tied in parallel instead of in series.

Or if you want to get wierd, you could use three 6SF5 tubes. The 6SF5 is a single section of the 12AX7 tube inside a metal tube with an octal base, or the 6F5-GT which is the same thing in a glass octal tube, or even the 7B4 which is the same thing in a loktal tube.

There are also some other direct substitutes for the 12AX7 that can be wired for 6 volts; 12AD7, 12DF7, 12DM7, 12DT7, 6681, 7025, 7729 however these are rare so you will probably not find them.

There is also the 7689 which is a special version of the 6AX7 tube.

If you are willing to rewire for an different filament voltage, that opens up the tube selection a bit more. That would allow the use of the 12AV6, 12BK6, 7058, 7689 tubes as well as the 12F5 and 12SF5 tubes. And one of the odder ones being the 20EZ7 which is a 20 volt version of the 12AX7 tube.

If you cannot rewire the circuit, consider possibly using the 8AC10 in place of the 6AC10 as long as the heaters in the circuit are wired in parallel this will some times work ok, although as with the 6AC10, the gain of the tube is lower and with the lower voltage, there will be fewer electrons emitted from the cathode, so it won't work as well, but when there is no other alternative, it may be the only solution available.

Note: There are other tripple triode tubes available. Both in Compactron and 9 pin miniature style tubes. However, they have their cathodes tied together which makes them unusable as a substitute for the tripple triodes listed above.

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