

SYLVANIA TUBE SUBSTITUTION MANUAL

• quick references for
substitutions of critical
radio and television tubes



SYLVANIA  **ELECTRIC**
PRODUCTS INC., EMPORIUM, PENNA.

SUBSTITUTION CHART FOR TELEVISION PICTURE TUBES

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

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

good replacement.

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

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

To each of those indicated Refer to page 34		Type										
Original Type	Replacement Type	A	B	C	D	E	F	G	H	I	J	
3KP4	3GP1A										H	J
	3JP1											H
3NP4	None											
5BP4	5NP4	No changes										
	7EP4	A -1N										
5HP4	5NP4	No changes										
5TP4	None											
7DP4	10DP4	A +1N										
	5BP4-A	A +1N										
	7EP4	-1										
7GP4	7JP4	No changes										
	10HP4	A +1N										
	8BP4	A +1										
7JP4	7GP4	F										
	10HP4	A +1N										
	8BP4	A +1										
8AP4	10MP4	A +2N C D2										
	12VP4	A +3N C D2										
	10BP4	A +3N C D2										
	10FP4	A +3N C										
	12JP4	A +3 C										
	12UP4	A +4N D2										
9AP4	12AP4	A +4N										
10BP4	18CP4	-1 C										
	10FP4	E										
	12JP4	G										
	12KP4	A										

To each of those indicated Refer to page 34		Type										
Original Type	Replacement Type	A	B	C	D	E	F	G	H	I	J	
10BP4	12LP4	A +1										
(Continued)	12UP4	A +1 G										
	14BP4	A										
	14CP4	A -1 D1										
10CP4	10BP4	+1 C D2										
	10FP4	+1 G										
	12JP4	A +3N										
	12EP4	A +1 C										
	12LP4	A +1N C D2										
	12UP4	A +2 C D2										
	14BP4	A C D2										
	14CP4	A C E G										
10DP4	7DP4	A -3N										
	10BP4	D2										
	18CP4	-1 G										
	12JP4	A										
	12EP4	A +1 D2										
	12LP4	A +1 C D2										
	14BP4	A -1 D2										
	14CP4	A -1 D1										
10HP4	7GP4	A -4N										
	7JP4	A -4N										
	18CP4	-N										
	8BP4	A -2N										
10MP4	8AP4	A -2N C D1										
	13VP4	A +1 D1										
	Also 10" types under 10BP4 but add note	A										
12AP4	9AP4	A -4N										
12JP4	12KP4	A C										

□ Indicates rectangular tubes

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

PICTURE TUBES

For details of design features Refer to page 24

Type	Model	Pin No.														
		1	2	3	4	5	6	7	8	9	10					
15CP4 (Cont'd)	15CP4	A	-1N	C	D1											
	15HP4	A	-N													
	16JP4	A	-N													
	16LP4	A	+N													
	16ZP4	A	+N													
15DP4	15CP4	A	+E													
	16AP4	A	+N													
	16CP4	A	+N													
	16DP4	A	+N													
	16EP4	A	-E													
	16FP4	A	-N													
	16HP4	A	+N													
	16JP4	A	+N													
	16LP4	A	+N													
	16ZP4	A	+N													
	20BP4	A	+N													
	17AP4	A	+N													
	17BP4	A	-E													
	17SP4	A	-N													
	16AP4	16CP4	A	-N												
16LP4		A	-N													
20BP4		A	+N													
16CP4		A	+N													
16TP4		A	+N													
17AP4		A	+N													
17BP4		A	-E													
19AP4		A	-N													
19DP4		A	-N													
19EP4		A	-E													
16CP4		16AP4	A	-E												
		16CP4	A	+N												
		16LP4	A	+N												
		16ZP4	A	+N												
		16CP4	A	+N												
	16TP4	A	-E													
	17AP4	A	-E													
	17BP4	A	-E													
	19AP4	A	+N													
	19DP4	A	+N													
	19EP4	A	-E													
	20BP4	A	+N													
	16DP4	16AP4	A	+N												
		16CP4	A	+N												
		16EP4	A	-E												
16FP4		A	-N													
16HP4		A	+N													
16JP4		A	+N													
16LP4		A	+N													
16TP4		A	-E													
16TP4		A	-E													
16TP4		A	-E													
16TP4		A	-E													
16TP4		A	-E													
16TP4		A	-E													
16TP4		A	-E													

For details of design features Refer to page 24

Type	Model	Pin No.													
		1	2	3	4	5	6	7	8	9	10				
16EP4 (Cont'd)	16CP4	A	-E												
	16EP4	A	-E												
	16TP4	A	-E												
	16TP4	A	-E												
	16TP4	A	-E												
16FP4	16CP4	A	+E												
	16EP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16TP4	A	+E												
	16GP4	16EP4	A	+E											
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												
16EP4		A	+E												

□ indicates rectangular tubes.
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For details of changes indicated
Refer to page 34

TYPE		1	2	3	4	5	6	7	8	9	10	11	12
16JP4	16TP4	-3/2											
(Cont'd)	16BP4	+3/2											
	16KP4	A -2											
	16MP4	+1 1/2											
	16QP4	A -1 1/2											
	16RP4	A -2											
	16TP4	A +2 1/2											
	16UP4	A +2 1/2											
	16XP4	A -2											
	16ZP4	+1 1/2											
	17AP4	A -2											
	17BP4	A -1 1/2											
	18EP4	A +3/2											
	20BP4	A +3/2											
16KP4	16RP4												
	16QP4	+3/2											
	16TP4	-3/2											
	16UP4	-3/2											
	16XP4	A -2											
	17AP4	A -3/2											
	17BP4	A +3/2											
	18EP4	A +3/2											
	20BP4	A +3/2											
If cabinet space permits, round types listed under 16YP4 may also be used.													
16LP4	16AP4	A -3/2											
	16CP4	A -3/2											
	16EP4	A -3/2											
	16GP4	A -3/2											
	16HP4	A -3/2											
	16IP4	A -3/2											
	16JP4	A -3/2											
	16KP4	A -3/2											
	16LP4	A -3/2											
	16MP4	A -3/2											
	16NP4	A -3/2											
	16OP4	A -3/2											
	16PP4	A -3/2											
	16QP4	A -3/2											
	16RP4	A -3/2											
	16SP4	A -3/2											
	16TP4	A -3/2											
	16UP4	A -3/2											
	16XP4	A -3/2											
	16YP4	A -3/2											
	16ZP4	A -3/2											
	17AP4	A -3/2											
	17BP4	A -3/2											
	18EP4	A -3/2											
	20BP4	A -3/2											
16QP4	16KP4												
	16RP4												
	16TP4												
	16UP4												
	16XP4												
	17AP4												
	17BP4												
	18EP4												
	20BP4												
If cabinet space permits, round types listed under 16WP4 may also be used.													
16RP4	16KP4												
	16QP4												
	16TP4												
	16UP4												

□ Indicates rectangular tubes.

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For details of changes indicated
Refer to page 34

TYPE		1	2	3	4	5	6	7	8	9	10	11	12
16RP4	16XP4												
(Cont'd)	17AP4	A											
	17BP4	A +3/2											
If cabinet space permits, round types listed under 16YP4 may also be used.													
16SP4	16AP4	+3											
	16CP4	+4 1/2											
	16DP4	+2 1/2											
	16EP4	+2 1/2											
	16FP4	+3											
	16GP4	+3											
	16HP4	+4											
	16IP4	+3 1/2											
	16JP4	A +1 1/2											
	16LP4	+2											
	16MP4	+4 1/2											
	16NP4	A +1 1/2											
	16OP4	A +1 1/2											
	16PP4	A +3/2											
	16QP4	A +3/2											
	16RP4	A +3/2											
	16SP4	A +3/2											
	16TP4	A +3/2											
	16UP4	A +3/2											
	16XP4	A +3/2											
	16YP4	A +3/2											
	16ZP4	A +3/2											
	17AP4	A +3/2											
	17BP4	A +3/2											
	18EP4	A +3/2											
	19EP4	A +3/2											
	19FP4	A +3/2											
	19GP4	A +3/2											
	20BP4	A +3/2											
	22AP4	A +3/2											
16TP4	16KP4												
	16QP4												
	16RP4												
	16UP4												
	16XP4												
	17AP4												
	17BP4												
	18EP4												
	19EP4												
	19FP4												
	19GP4												
	20BP4												
	22AP4												
16UP4	16KP4												
	16QP4												
	16RP4												
	16UP4												
	16XP4												
	17AP4												
	17BP4												
	18EP4												
	19EP4												
	19FP4												
	19GP4												
	20BP4												
	22AP4												

PICTURE TUBES

For details of design indicated Refer to page 34												
TYPE	GENERAL CHARACTERISTICS	A	F	C	D	E	K	S	T	U	V	
												W
16VP4	17BP4	A +2										4
(Cont'd)	19AP4	A +4 1/2	G									6
	19DP4	A +4 1/2	D2									4
	19EP4	A +3 1/2										4
	19FP4	A +4 1/2	D2									4
	19GP4	A +4										4
	20BP4	A +11 1/2	C	E								4
	22AP4	A +3 1/2	C									5
16WP4	16AP4	+4 1/2	C									5
	16CP4	+4										5
	16DP4	+4										5
	16EP4	+4 1/2	C									4
	16FP4	+2 1/2	C D1									4
	16GP4	-3 1/2	C D1									7
	16HP4	+5 1/2										4
	16JP4	+3										4
	16KP4	+4 1/2										4
	16MP4	+4										4
	16NP4	A +1 1/2	D1									4
	16OP4	A +1	D1									4
	16SP4	-3 1/2										4, 7
	16TP4	A +3 1/2	D1									4, 7
	16UP4	A +3 1/2	D1									7
	16VP4	-3 1/2	D1									7
	16WP4A											4
	16XP4	A +1										4, 7
	16YP4	-3 1/2	D1									4, 7
	16ZP4	+3 1/2										4
	17AP4	A +3 1/2	D1									4, 7
	17BP4	A +3 1/2	D1									4
	18AP4	A +1 1/2	C D1									4
	19DP4	A +3 1/2										4
	19EP4	A +3 1/2	D1									4
	19FP4	A +4 1/2										4
	19GP4	A +3 1/2	D1									4
	20BP4	A +11	C	E								4
	22AP4	A +5	C D1									4
16WP4A	Same as listed above for type 16WP4 with addition of note K for types not having note 4.											
16XP4	16KP4		D1									4
	16QP4	+3 1/2										4
	16RP4		D1									4, 7
	16SP4	-3 1/2	D1									4, 7
	16UP4	A										4, 7
	17BP4	A +3 1/2	D1									4
	If cabinet space permits, round types listed under 16WP4 may also be used.											
16TP4	Same types as listed for 16VP4 with addition of note K for types not having note 4.											
16ZP4	16LP4	Also any type listed under 16LP4 with same changes.										
17AP4	16QP4	A +3 1/2	D2									K
	16KP4	A										K
	16RP4	A										K
	16TP4	A -3 1/2										K
	16UP4	A -3 1/2										K
	16XP4	A	D2									K
	17BP4	A +3 1/2	D1									7
	If cabinet space permits, round types listed under 16KP4 may also be used.											
17BP4	17AP4	A -3 1/2										7
	16QP4	A	D2									K
	16KP4	A -3 1/2										K
	16RP4	A -3 1/2										K
	16TP4	A -1										K, 7
	16UP4	A -1										K, 7
	16XP4	A -3 1/2	D2									K
17BP4	If cabinet space permits, round types listed under 16KP4 may also be used.											
17BP4	17AP4	A -3 1/2										7
	16QP4	A	D2									K
	16KP4	A -3 1/2										K
	16RP4	A -3 1/2										K
	16TP4	A -1										K, 7
	16UP4	A -1										K, 7
	16XP4	A -3 1/2	D2									K
17BP4	If cabinet space permits, round types listed under 16KP4 may also be used.											
17BP4	17AP4	A -3 1/2										7
	16QP4	A	D2									K
	16KP4	A -3 1/2										K
	16RP4	A -3 1/2										K
	16TP4	A -1										K, 7
	16UP4	A -1										K, 7
	16XP4	A -3 1/2	D2									K
17BP4	If cabinet space permits, round types listed under 16KP4 may also be used.											
17BP4	17AP4	A -3 1/2										7
	16QP4	A	D2									K
	16KP4	A -3 1/2										K
	16RP4	A -3 1/2										K
	16TP4	A -1										K, 7
	16UP4	A -1										K, 7
	16XP4	A -3 1/2	D2									K

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SYLVANIA SUBSTITUTION MANUAL

NOTES FOR PICTURE TUBE SUBSTITUTION CHART

- A. Make adjustment for different bulb diameter or shape.
 - B. Number of inches the replacement tube is longer (+) or shorter (-) than the original tube.
 - C. Change anode connector to type required for the substitute tube.
 - D. Add or change permanent magnet type ion trap magnet. D1 indicates single field and D2 double field type required. When no change is indicated by notes D or E, the type of ion trap magnet used on the original tube should be used.
 - E. Remove the ion trap magnet. If the ion trap magnet is the permanent magnet type, just remove it with the tube; if it is the coil type magnet leave it in the circuit and put it somewhere in the cabinet, out of the way, so that no circuit changes will be necessary.
 - F. Suggested only if the operating conditions of the receiver do not exceed the maximum ratings of the substitute tube.
 - G. Requires change of deflection yoke to 30° type and possibly a new horizontal output transformer and/or tube.
 - H. Change in picture tube socket is required.
 - K. Original tube had an external coating which provided a high voltage filter capacitor. Additional external capacitance may be required to replace that normally supplied by the original picture tube.
- (1) Increase in power supply voltage may be necessary for optimum performance.
 - (2) May be used only when no potential is required between heater and cathode.
 - (4) Replacement type has coating on bulb which provides filter capacitance. Be sure this coating is grounded. The underwriter's safety code requires that the total high voltage filter capacity be limited to 2000 µfd at the usual operating voltage. The original filter capacitance should be disconnected in most cases.
 - (6) Substitution of a metal case tube for a coated glass tube may also require rearrangement of any parts near the metal case to prevent corona discharge and removal of any contacts formerly grounding the bulb coating. Additional insulation is usually necessary at the case lip since a wood cabinet alone is not sufficient to protect the user.
 - (7) Substitution of a short-neck, wide-angle picture tube for a long-neck tube may require a change in focus coil and/or deflection coil.
 - (8) Substitution of triode types for this triode type requires the addition of a 250-300 volt source of accelerator voltage. A voltage divider drawing 30 µa is a possible solution.

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