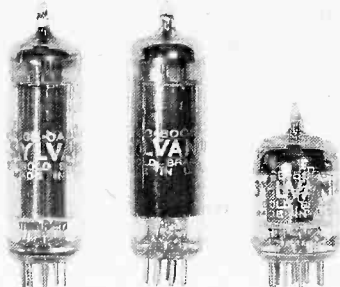


Technical Section

SPRING, 1965 □ VOL. 32, NO. 1

R. A. HUMPHREYS, TECHNICAL EDITOR This information in Sylvania News is furnished without assuming any obligations.



Gold Brand Premium Tubes For Industrial And Critical Commercial Service

Unlike the comparatively placid operating conditions in home entertainment equipment, electron tubes employed in many types of industrial and certain critical commercial equipments are subjected to and must withstand severe shock, vibration, extreme temperatures and a broad range of operating voltages. Added to these requirements is an expected average life of 10,000 hours.

Foremost in this equipment category are: airborne communications and navigation units employed by commercial airlines; mobile communications gear used by police, fire departments and public utilities; commercial broadcasting facilities; industrial process controls and cable TV equipment. The importance of reliability from the standpoint of efficient, economical operation, as well as human safety, is apparent.

These performance criteria demand premium tubes which are designed and manufactured to electrical and mechanical specifications that are tailored to the distinct needs of the application. Reliability must be built in, it cannot be tested in or obtained through selective sorting. Testing specifications must be objective reliability standards which assure the user that reliability has been built in. The modern electron tube is a highly refined, precision made component of unprecedented performance capability. Failure mechanisms are understood, whether chemical, physical, electrical, or an interrelated combination of all.

The Gold Brand line of premium

tubes for industrial service was announced by Sylvania approximately a decade ago. The line was established on a comprehensive knowledge of the special requirements of users obtained from an elaborate field research program which is continued today. The current line is given in Table I along with the commercial counterpart. Both military and commercial prototypes were thoroughly evaluated against an application-tailored specification, which embodied the proven principles of military specifications, to determine specific weaknesses and the corrective measures required.

Typical tests and controls applied

to the Gold Brand line include: Multiple Life Tests at high temperature and room temperature conditions; 500 g Impact Shock Tests, Extended 2.5 g Fatigue and 10 g Vibration Tests; Thermal Shock Tests (Glass Strain); Low Pressure Breakdown (High Altitude); Basic Tube Parameters—controlled to 0.65% AQL; Noise and Vibration to 2.5% AQL; and Continuity and Shorts to 0.4% AQL.

Built-in features reflected in these controls are: exceptional uniformity of electrical characteristics, stability throughout life, 10,000-hour life capability and extreme physical ruggedness.

TABLE I
GOLD BRAND TUBE TYPES

Suggested GB Replacement	Prototype	Suggested GB Replacement	Prototype
GB-OA2WA	OA2	GB-5725	6AS6
GB-OB2WA	OB2	GB-5726	6AL5
GB-5Y3WGTA	5Y3GT	GB-5727	2D21
GB-6BQ7A	6BQ7A	GB-5749	6BA6
GB-6CY5	6CY5	GB-5750	6BE6
GB-6DJ8	6DJ8	GB-5751	12AX7
GB-6J4WA	6J4	GB-5814A	12AU7
GB-6SL7WGT	6SL7GT	GB-5931	5U4G, GB
GB-6SN7WGT	6SN7GT	GB-5932	6L6G, GA, GB, GC
GB-6X4WA	6X4	GB-5933	807
GB-6X5WGT	6X5GT	GB-6005	6AQ5
GB-7AK7	—	GB-6080	6AS7G, GA
GB-407A	407A	GB-6101	6J6
GB-408A	408A	GB-6135	6C4
GB-5654	6AK5	GB-6136	6AU6
GB-1219/5670	—	GB-6186	6AG5
GB-1220/5654	—	GB-6189	12AU7
GB-1252/6U8A	6U8A	GB-6201	12AT7
GB-5670	2C51	GB-7327	—
GB-5687	5687	GB-7550	—

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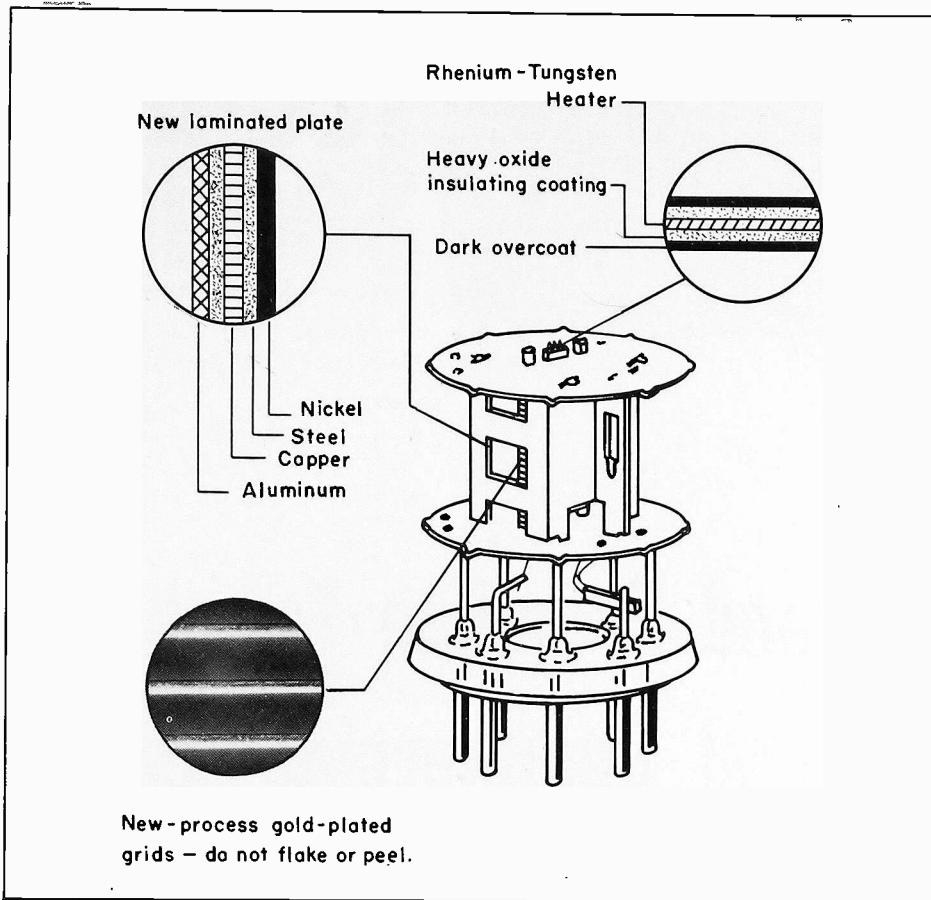


Figure 1—Structural Advances in Heater and Plate Design.

These qualities are achieved through the use of special processes, materials and methods which emanate from continuous research programs.

Rhenium-Tungsten Heater

Ranking highest among the causes of electron tube failure had been heater burn-out. Research uncovered that combining rhenium with tungsten produced a much more ductile heater wire than pure tungsten. The result has been the virtual elimination of heater failure due to wire embrittlement or breakage.

For a given diameter, rhenium-tungsten wire has a higher ohmic resistance than pure tungsten wire. This characteristic has enabled the use of larger wire diameters for added physical strength.

Heater Over-Coat

To insulate the heater from the cathode electrically, a heavy oxide coating is applied to the heater wire, **Figure 1**. A dark colored outer-coating is now applied over the oxide layer to improve heat transfer by radiation from the heater to the cathode, thereby allowing optimum cathode temperature to be obtained

at a lower heater operating temperature.

Several recent advances in cathode design incorporated in Gold Brand tubes have greatly improved the stability of electrical characteristics and have extended useful tube life.

Powdered Metal Cathode

Cathode sleeves are now manufactured from base metal produced by cold rolling a blend of powdered metals. This new process minimizes the introduction of contaminants that are known to cause interface build-up, gm slump and interelement leakage. The precise control of mixing in the powdered state eliminates unwanted impurities to a degree never before achieved.

The inherent textured property of surface of cathode sleeves produced from powdered metal provides an interlocking type bond between the emissive coating and the sleeve, thereby curtailing peeling and flaking of the emissive coating which can be a cause of permanent and intermittent shorts between tube elements, particularly grid to cathode.

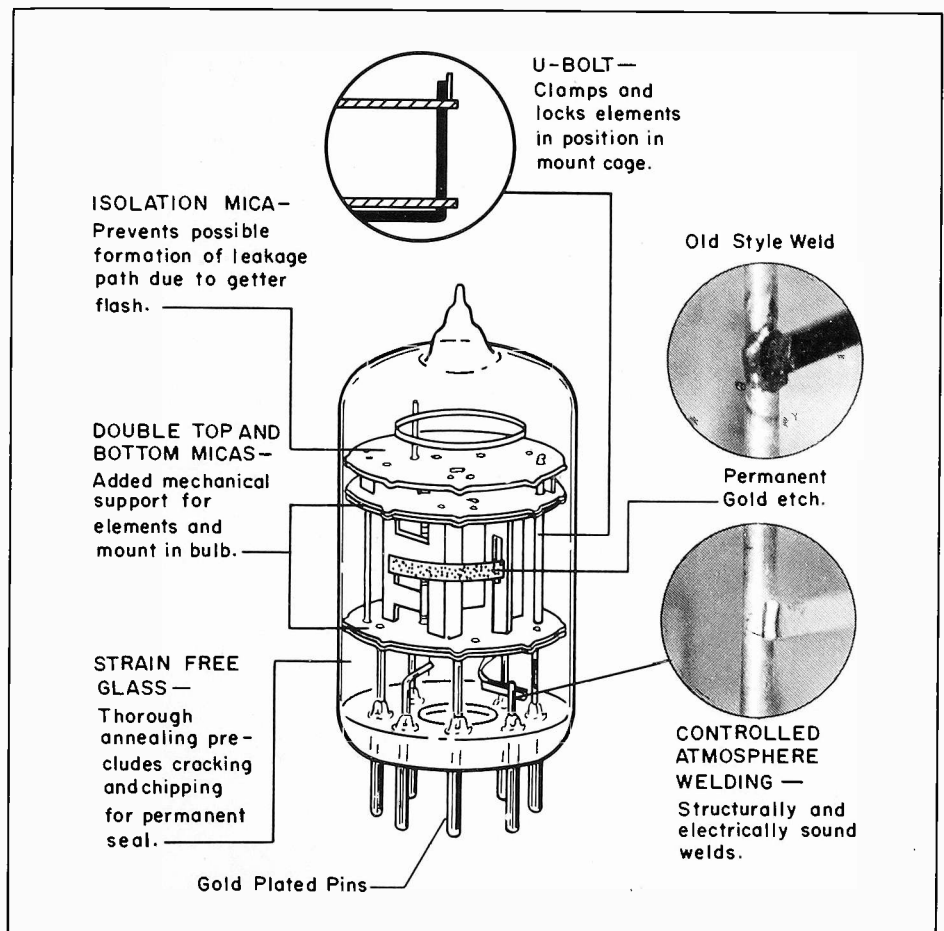


Figure 2—Construction Extras to Build in Mechanical Ruggedness.

SYLVANIA

PICTURE TUBE INTERCHANGEABILITY GUIDE

The new guide provides the most up-to-date picture tube replacement information and reflects Sylvania's continuing program to streamline the Silver Screen 85 Line.

In recent months, Sylvania has announced the addition of over 60 new picture tube types—all available from your Sylvania distributor.

Up-to-date interchangeability information plus the latest tube types provides you with the most outstanding picture tube line in the industry.

Type	Replace with Type	Replacement* Classification	Type	Replace with Type	Replacement* Classification	Type	Replace with Type	Replacement* Classification	Notes:
14BP4	14CP4A	Direct	19BVP4	19AVP4	C	21CZP4	21DEP4A	A	<p>* Replacement information is based primarily on electrical and mechanical similarity of the picture tube types covered. The technician should make certain that replacement is in accord with all safety precautions required by the TV receiver for picture tube insulation or mechanical mounting.</p> <p>A. Replacement type does not require an external ion trap magnet.</p> <p>B. The ball-type anode contact must be replaced with cavity-type contact.</p> <p>C. Neck length and/or overall length of replacement type is slightly greater, or less.</p> <p>D. External conductive coating must be grounded.</p> <p>E. Maximum anode voltage of replacement type is slightly less.</p> <p>F. The 21EAP4 has a 2.35 volt/600 milliamperere heater, and type 21EVP4 employs a 2.68 v, 450 ma heater. The 21FDP4 has a 6.3 volt/600 milliamperere heater. Instructions for necessary minor set modification are packaged with each replacement Type 21FDP4.</p> <p>G. Following precautions are necessary:</p> <ol style="list-style-type: none"> The high voltage filter condenser if any, must be removed from receiver since it is replaced by the capacitance of the tube. Care must be taken that the external coating does not contact any support straps or brackets which might result in voltage appearing on trim or external hardware of the receiver. <p>H. Type 24AVP4 has a 2.35 volt/600 ma heater. Type 24BEP4 has a 6.3 volt/600 ma heater. Instructions for minor set modifications are packaged with each 24BEP4.</p>
14BP4A	14CP4A	Direct	19BWP4	19AYP4	Direct	21DAP4	21DEP4A	Direct	
14CP4	14CP4A	Direct	19CFP4	19CHP4	Direct	21DEP4	21DEP4A	Direct	
14DP4	14CP4A	D, G	19CKP4	19CHP4	Direct	21DMP4	21FAP4	D	
14EP4	14CP4A	Direct	19DAP4	19CZP4	Direct	21DNP4	21CBP4A	A, D	
14HP4	14QP4A	Direct	19DQP4	19DWP4	Direct	21DQP4	21DLP4	Direct	
14NP4	14WP4	A	19DNP4	19DKP4	Direct	21EAP4	21FDP4	F	
14NP4A	14WP4	A	19ELP4	19AVP4	Direct	21EP4	21EP4B	D, G	
14QP4	14QP4A	Direct	19DRP4	19EDP4	Direct	21EP4A	21EP4B	Direct	
14RP4	14WP4	A	19EHP4	19EDP4	Direct	21ESP4	21FAP4	Direct	
14RP4A	14WP4	A	19XP4	19AVP4	Direct	21EVP4	21FDP4	F	
14SP4	14WP4	A	19YP4	19BTP4	Direct	21FLP4	21CBP4A	Direct	
14XP4	14XP4A	Direct	19ZP4	19AVP4	C	21FP4	21FP4C	D, G	
14ZP4	14WP4	Direct	20CP4	20DP4C	D, G	21FP4A	21FP4C	Direct	
16AP4	16AP4A	Direct	20CP4A	20DP4C	Direct	21WP4	21WP4A	Direct	
16AVP4	16BCP4	Direct	20CP4B	20DP4C	D, G	21XP4	21XP4A	Direct	
16GP4	16GP4B	Direct	20CP4C	20DP4C	D, G	21YP4	21YP4A	Direct	
16GP4A	16GP4B	Direct	20CP4D	20DP4C	Direct	21ZP4	21ZP4B	D, G	
16GP4C	16GP4B	Direct	20DP4	20DP4C	D, G	21ZP4A	21ZP4B	Direct	
16KP4	16RP4A	Direct	20DP4A	20DP4C	Direct	23ANP4	23RKP4	Direct	
16KP4A	16RP4A	Direct	20DP4B	20DP4C	D, G	AR23ANP4	23BLP4	Direct	
16QP4	16RP4A	D, G	20HP4	20HP4D	D, G	23ATP4	23BLP4	Direct	
16RP4	16RP4A	Direct	20HP4A	20HP4D	Direct	23AUP4	23AHP4	E	
16WP4	16WP4A	D, G	20HP4B	20HP4D	D, G	23AWP4	23BJP4	Direct	
16XP4	16RP4A	D, G	20HP4C	20HP4D	D, G	23CP4	23CP4A	Direct	
16YP4	16WP4A	C, D	20LP4	20HP4D	Direct	AR23CP4	23AVP4	Direct	
17AP4	17BP4B	C, D	20MP4	20HP4D	Direct	23DLP4	23DLP4A	Direct	
17ATP4	17BJP4	A	21ACP4	21ACP4A	Direct	23DZP4	23EWP4A	Direct	
17ATP4A	17BJP4	A	21AFP4	21YP4A	D, G	23ENP4	23FEP4	Direct	
17AVP4	17BJP4	A	21ALP4	21CBP4A	A, D	23EWP4	23EWP4A	Direct	
17AVP4A	17BJP4	A	21ALP4A	21CBP4A	A, D	23FP4	23FP4A	Direct	
17BP4	17BP4B	D, G	21ALP4B	21CBP4A	A, D	23GP4	23CP4A	Direct	
17BP4A	17BP4B	Direct	21AMP4	21ACP4A	Direct	23HP4	23CP4A	Direct	
17BP4C	17BP4B	Direct	21AMP4A	21ACP4A	Direct	23KP4	23FP4A	Direct	
17BRP4	17BZP4	A	21ANP4	21CBP4A	A, D, G	23KP4A	23FP4A	Direct	
17BUP4	17BJP4	A, C, E	21ANP4A	21CBP4A	A, D, G	23MP4	23FP4A	Direct	
17BWP4	17BWP4	A	21AQP4	21ACP4A	D, G	23MP4A	23FP4A	Direct	
17CBP4	17BJP4	A, C, E	21AQP4A	21ACP4A	D, G	23UP4	23BQP4	Direct	
17CLP4	17BJP4	A	21ASP4	21XP4A	D	23WP4	23FP4A	Direct	
17CAP4	17BZP4	Direct	21ATP4	21CBP4A	A, D	23XP4	23BTP4	Direct	
17CKP4	17BZP4	Direct	21ATP4A	21CBP4A	A, D	23YP4	23BTP4	Direct	
17CSP4	17BWP4	G	21ATP4B	21CBP4A	A, D	24ADP4	24CP4A	Direct	
17CWP4	17DSP4	Direct	21AUP4	21AUP4A	Direct	24ALP4	24AHP4	D	
17DLP4	17DKP4	Direct	21AUP4B	21AUP4A	Direct	24ANP4	24AEP4	A	
17DTP4	17DKP4	Direct	21AVP4	21AUP4A	Direct	24AVP4	24BEP4	H	
17DZP4	17DXP4	Direct	21AVP4A	21AUP4A	Direct	24CP4	24CP4A	Direct	
17HP4	17HP4B	Direct	21AVP4B	21AUP4A	Direct	24DP4	24AEP4	A	
17HP4A	17HP4B	Direct	21AYP4	21XP4A	Direct	24DP4A	24AEP4	A	
17JP4	17BP4B	Direct	21BAP4	21CBP4A	Direct	24QP4	24CP4A	D	
17LP4	17LP4A	Direct	21BCP4	21YP4A	C, E	24TP4	24CP4A	Direct	
17QP4	17QP4A	Direct	21BNP4	21CBP4A	Direct	24VP4	24CP4A	Direct	
17RP4	17HP4B	Direct	21BSP4	21ACP4A	Direct	24VP4A	24CP4A	Direct	
17RP4C	17HP4B	Direct	21BTP4	21CBP4A	A	24XP4	24CP4A	D, G	
17UP4	17QP4A	Direct	21CBP4	21CBP4A	Direct	24YP4	24AEP4	A	
17VP4	17LP4A	Direct	21CBP4B	21CBP4A	Direct	24ZP4	24AEP4	Direct	
17VP4B	17LP4A	Direct	21CEP4	21DFP4	Direct	27EP4	27RP4	D, G	
17YP4	17QP4A	Direct	21CEP4A	21DFP4	E	27GP4	27RP4	D, G	
AR19AFP4	19AUP4	Direct	21CMP4	21CBP4A	A	27NP4	27RP4	Direct	
19AXP4	19AYP4	Direct	21CWP4	21CVP4	A				
19BLP4	19AVP4	Direct	21CXP4	21DSP4	Direct				

Gold Brand Premium Tubes—(cont'd)

Duplex Emissive Coating

The gradual loss in gain or power output that occurs as an electron tube ages, is generally attributable to loss of emission caused by normal deterioration of the cathode coating. Duplex emissive coatings have been developed which greatly extend life. These coatings are actually a mixture of different emissive materials which are progressively activated. This built-in booster effect maintains the emissive level thereby reducing the usual gm slump.

High Thermal Conductivity Plates

Many varied and specialized techniques are used to achieve plate dissipation capabilities that amply fulfill application requirements. The most recent innovation is a laminated design comprised of as many as five different materials, **Figure 1**. The new design conducts heat much more uniformly and radiates it much more efficiently. A higher dissipation

safety factor is thereby attained for critical applications and "hot spots" and resultant "gassing" which lead to premature replacement are eliminated.

Gold Plated Grids

Gold plated grids are commonplace in reliable industrial tubes as an effective measure in preventing grid emission. Methods of plating used in the past sometimes led to flaking and peeling of the gold which further caused interelement shorts. A strong molecular bond is now achieved, forming essentially one solid material, rather than depending on adhesive action.

Structural Features

Numerous special techniques are employed in the structural design of Gold Brand tubes to achieve physical ruggedness essential in industrial service, **Figure 2:**

Double Micas — Double top and bottom micas with additional contact points support elements

more securely by increasing the bearing surface and by providing a tighter mount-bulb fit.

U-Bolt — The principle of the U-bolt is applied between the top and bottom of the micas to clamp and lock the mount cage together as a rigid unit.

These two features greatly improve shock and vibration characteristics thereby minimizing microphonic tendencies under extreme conditions.

Controlled Atmosphere

Welding — By executing all welds in a reducing atmosphere, cleaner, more uniform and rugged

welds are obtained. Weld splash is greatly reduced, minimizing loose and dangling metallic particles.

Gold Plated Pins — The base pins on miniature types are gold plated to resist corrosion and assure low contact resistance.

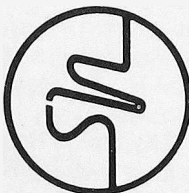
In conclusion, Gold Brand Tubes are carefully design engineered to application requirements and the appropriate special materials and constructional features which have been described are employed based on a thorough analysis of individual needs.

Editor's Note —

Space limitations prevented a thorough treatment of either structural innovations or electrical and mechanical specifications in this issue. A detailed brochure No. ET-2963 entitled SYLVANIA GOLD BRAND ELECTRONIC TUBES can be obtained from Sylvania distributors or by writing to Sylvania Electric Products Inc., Central Advertising Distribution Department, 1100 Main Street, Buffalo, New York 14209.

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R. A. HUMPHREYS, TECHNICAL EDITOR This information in Sylvania News is furnished without assuming any obligations.

Industrial Receiving Tube Replacement Guide

This guide lists industrial quality direct replacements for the most frequently encountered tube types in CATV, Broadcast, Mobile Communications and Aviation Equipment.

The first column gives the numbers of tube types most frequently used in original equipment. The second column shows premium types which were subsequently introduced and are tailored to meet critical requirements of the equipment application. Tube types given in the third column are generally superior or at least equivalent to the original tube type.

MOBILE COMMUNICATIONS EQUIPMENT

Original Tube Type	Sylvania Industrial Replacements	
	Premium ①	Standard
OA2 OB2 2E26 5V4 5Y3GT	GB-OA2WA GB-OB2WA — — GB-5Y3WGTA	OA2WA OB2WA 2E26 5V4GA 5Y3WGTA
6AB4 6AG5 6AK5 6AL5 6AN8	— GB-6186 GB-5654 6663/6AL5 ⑥ 7258 ⑥	6AB4 6AG5 6AK5 6AL5 6AN8
6AQ5, A 6AU6, A 6BA6 6BE6 6BH6	6669/6AQ5A ⑥ — 6660/6BA6 ⑥ GB-5750 6661/6BH6 ⑥	6AQ5A 6AU6A 6BA6 6BE6 6BH6



- MOBILE COMMUNICATIONS EQUIPMENT
- BROADCASTING AND CATV EQUIPMENT
- AVIATION EQUIPMENT

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MOBILE COMMUNICATIONS EQUIPMENT (cont'd)

Original Tube Type	Sylvania Industrial Replacements		Original Tube Type	Sylvania Industrial Replacements	
	Premium ①	Standard		Premium ①	Standard
6BJ6 6BN6 6BQ7, A 6BZ6 6BZ7	6662/6BJ6 ⑥ — GB-6BQ7A — —	6BJ6 6BN6 6BQ7A 6BZ6 6BZ7	5933 6146A, 6146B/ 8298A 6186 6360	GB-5933 — GB-6186 —	5933 6146B/8298A 6186/6AG5WA 6360
6CB6, A 6CL6 6CX8 6CY5 6DT6	6676/6CB6A ⑥ 6677/6CL6 ⑥ — GB-6CY5 —	6CB6A 6CL6 6CX8 6CY5 6DT6	6660/6BA6 ⑥ 6661/6BH6 ⑥ 6662/6BJ6 ⑥ 6663/6AL5 ⑥ 6669/6AQ5A ⑥	GB-5749 — — GB-5726 GB-6005	6660/6BA6 6661/6BH6 6662/6BJ6 6663/6AL5 6669/6AQ5A
6EA8 6EV5 6GK6 6J6 6L6G, GC	— — — GB-6101 GB-5932	6EA8 6EV5 6GK6 6J6A 6L6GC	6676/6CB6A ⑥ 6677/6CL6 ⑥ 6678/6U8A ⑥ 6679/12AT7 ⑥ 6680/12AU7 ⑥	— — GB-1252/6U8A GB-6201 GB-6189; GB-5814A	6676/6CB6A 6677/6CL6 6678/6U8A 6679/12AT7 6680/12AU7
6U8, A 6V6GT, GTA 6X4 6X5 12AB5	6678/6U8A ⑥ — GB-6X4WA GB-6X5WGT 7061 ⑥	6U8A 6V6GTY 6X4 6X5GT 12AB5	6681/12AX7 ⑥ 6883 7054 ⑥ 7055 ⑥ 7056 ⑥	GB-5751 — — — —	6681/12AX7 6883 7054 7055 7056
12AL5 12AU7, A 12AX7 12BW4 807	7055 ⑥ 6680/12AU7A ⑥ 6681/12AX7 ⑥ — GB-5933 ④	— 12AU7A 12AX7 12BW4 807	7057 ⑥ 7058 ⑥ 7059 ⑥ 7060 ⑥ 7061 ⑥	— — — — —	7057 7058 7059 7060 7061
5654 5763 5881 5932	GB-5654 — — GB-5932	5654/6AK5W 5763 5881 5932	7167 ⑥ 7258 ⑥ 8077 ⑥	— — —	7167 7258 8077

BROADCASTING AND CATV EQUIPMENT

OA2 OB2 OB3 OC3 OD3	GB-OA2WA GB-OB2WA — — —	— — OB3 OC3 OD3	6AL5; EB91 6AN4 6AN5 6AN8 6AQ5	GB-5726 — — — GB-6005	5726/6AL5W 6AN4 6AN5WA 6AN8A 6005/6AQ5W/6095
1B3/1G3GT 1X2B 2C51 2D21 2X2A	— — GB-5670 GB-5727 —	1B3/1G3GT 1X2B 5670WA 5727/2D21W 2X2A	6AS5 6AS6 6AS7G 6AS8 6AT6; EBC90	— GB-5725 GB-6080 — —	6AS5 5725/6AS6W 6080 6AS8 6AT6
5R4 5U4 5V4 5Y3GT	— GB-5931 — GB-5Y3WGTA	5R4GYB 5U4GB 5V4GA 5Y3WGTA	6AU4 6AU6; EF94 6AU6; EF94 6AU8 6AV6; EBC91	— GB-6136 7543 ⑦ — —	6AU4GTA 6AU6A 6AU6A 6AU8A 6AV6
6AF4 6AG5 6AG7 6AK5; EL90	— GB-6186 — GB-5654	6AF4 6186/6AG5WA 6AG7 5654/6AK5W	6AW8 6AX4 6AX5GT	— — —	6AW8 6AX4GTB 6AX5GT

FOOTNOTES

1. GB prefix—Sylvania GB Gold Brand Type—(Spring 1965 issue Technical Section) designed and manufactured for critical industrial and commercial applications.
2. Recommended where Gm at low heater voltage is critical.
3. Ferrite Isolator—to prevent parasitic oscillation in critical applications.
4. Envelope size and style sometimes different from original tube type.
5. Heater current of suggested replacement approximately 15% higher than that of original tube type.
6. Features special heater controls for mobile service.
7. Especially controlled for low hum.

BROADCASTING AND CATV EQUIPMENT (cont'd)

Original Tube Type	Sylvania Industrial Replacements		Original Tube Type	Sylvania Industrial Replacements	
	Premium ①	Standard		Premium ①	Standard
6BA6 6BC5 6BC7 6BE6; EK90 6BG6G	GB-5749 — — GB-5750 —	5749/6BA6W 6BC5 6BC7 5750/6BE6W 6BG6A	6L6 6SL7GT 6SN7GT 6T8 6U8, A	GB-5932 GB-6SL7WGT GB-6SN7WGT — GB-1252/6U8A	6L6GC 6SL7WGT 6SN7WGT 6T8 6U8A
6BH6 6BJ6 6BJ7 6BK7A 6BL7GT	6661/6BH6 ⑥ 6662/6BJ6 ⑥ — — —	6BH6 6BJ6 6BJ7 6BK7A 6BL7GTA	6V6 6W6GT 6X4 6X5GT 6X8	— — GB-6X4WA GB-6X5WGT —	6V6GTA 6W6GT 6X4WA 6X5WGT 6X8
6BL8; ECF80 6BN4 6BQ5; EL84 6BQ6 6BQ7A	— — — — GB-6BQ7A	6BL8/ECF80 6BN4A 6BQ5 6BQ6GTB/6CU6 6BQ7A	6Y6G 12AT7; ECC81 12AU7; ECC82 12AV6; HBC91 12AX7; ECC83	— GB-6201 GB-5814A — GB-5751	6Y6GA 12AT7WB 6189/12AU7WA 12AV6 5751WA
6BS8 6BZ6 6BZ7 6C4; EC90 6CB6	— — — GB-6135 6676/6CB6 ⑥	6BS8 6BZ6 6BZ7 6135 6CB6	12BH7 12BY7 407A 408A 807	— — GB-407A GB-408A GB-5933	12BH7A 12BY7A — — 807
6CD6G 6CG7 6CG8 6CL6 6CS6	— — — 6677/6CL6 ⑥ —	6CD6GA 6CG7 6CG8 6CL6 6CS6	1218 5651 5654 5670 5687	— — GB-5654 GB-5670 GB-5687	1218A 5651WA 5654/6AK5W 5670WA —
6CU8 6CX8 6CY5 6DJ8 6DQ6	— — GB-6CY5 GB-6DJ8 —	6CU8 6CX8 6CY5 — 6DQ6GB	5693 5725 5726 5749 5763	— GB-5725 GB-5726 GB-5749 —	5693 5725/6AS6W 5726/6AL5W 5749/6BA6W 5763
6EA8 6EH7; EF183 6EJ7; EF184 6ER5; EC95 6EU7	— — — — —	6EA8 6EH7 6EJ7 6ER5 6EU7	5814A 5881 6005/6AQ5 6028 6146, A	GB-5814A — GB-6005 GB-408A —	5814A 5881 6005/6AQ5W/6095 6028 6146B/8298A
6EV5 6GK5 6HG8; ECF86 6J4 6J6; ECC91 6J7	— — — GB-6J4WA GB-6101 —	6EV5 6GK5 6HG8 6J4WA 6J6WA 6J7	6201 6883 6922; ECC88 6939 7025	GB-6201 — 7308 — —	12AT7WB 6883A 6922 6939 7025
AVIATION EQUIPMENT					
OA2 OB2 OB3 OC3 OD3	GB-OA2WA GB-OB2WA — — —	OA2WA OB2WA OB3 OC3 OD3	6AG5, W 6AJ5 6AK5, W 6AL5, W	GB-6186 — GB-5654 GB-1220/5654 ③ GB-5726	6186/6AG5WA 6AJ5 5654/6AK5W 5726/6AL5W
2C39A 2C51 2D21, W 2E26	— GB-5670 ⑤ GB-1219/5670 ①⑤ GB-5727 —	7289/3CX100A5 5670WA 5727/2D21W 2E26	6AN5 6AQ5, W 6BA6, W 6C4, W 6J6	— GB-6005 GB-5749 GB-6135 ⑤ GB-6101	6AN5WA 6005/6AQ5W 5749/6BA6W 6C4WA 6J6WA
5R4GY 5U4G 5Y3GT, WGT	— GB-5931 ④ GB-5Y3WGTA	5R4GYB 5U4GB 5Y3WGTA	6L6GA 6SL7GT, W 6SN7, GT	GB-5932 ④ GB-6SL7WGT GB-6SN7WGT	6L6GB 6SL7WGT 6SN7WGTA

AVIATION EQUIPMENT (cont'd)

Original Tube Type	Sylvania Industrial Replacements		Original Tube Type	Sylvania Industrial Replacements	
	Premium ①	Standard		Premium ①	Standard
6V6, GT 6X4, W 6X5GT, WGT 7F8, W 12AU7, A	— GB-6X4WA GB-6X5WGT — GB-6189 GB-5814A ③	6V6GTY, A 6X4WA 6X5WGT 7F8W 6189/12AU7WA 5814WA	5726 5727 5749 5750 5751 5814, A	GB-5726 GB-5727 GB-5749 GB-5750 GB-5751 GB-5814A	5726/6AL5W 5727/2D21W 5749/6BA6W 5750/6BE6W 5751WA 5814WA
12AX7 12BE6 28D7, W 807, W 5636	GB-5751 ⑤ — — GB-5933 ④ —	12AX7WA 12BE6 S-28D7 807W 5636	5840 5894 5896 5902 5987	— — — — —	5840 5894 5896 5902 5987
5644 5647 5651, WA 5654 5670	— — — GB-5654 GB-5670 GB-1219/5670 ②	5644 5647 5651WA 5654/5654W 5670WA	6005/6AQ5 6021 6080 6095 6111	GB-6005 — GB-6080 GB-6005 —	6005, 6AQ5W/6095 6021 6080 6005/6AQ5W/6095 6111
5687 5692 5702WA 5718	GB-5687 GB-6SN7WGT — —	5687WA 5692 5702WA 5718	6112 6136 6146A 6159, A 6186	— GB-6136 — — GB-6186	6112 — 6146B/8298A 6159A 6186/6AG5WA
5719 5725	— GB-5725	5719 5725/6AS6W	6201 7815	GB-6201 —	— 7815/3CPN10A5

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WINTER, 1965**

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