VALVE INSTRUCTIONS

BRITISH BROADCASTING CORPORATION

ENGINEERING DIVISION

VALVE INSTRUCTIONS

INCORPORATING

TRANSMITTING VALVES · TELEVISION TUBES · SEMI-CONDUCTORS AND ASSOCIATED ELECTRONIC DEVICES

ISSUED BY THE ENGINEERING TRAINING DEPARTMENT
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PART I GENERAL INSTRUCTIONS

PART I

GENERAL INSTRUCTIONS

1. Valve Section

Valve Section is responsible for the whole of the organisation concerned in the ordering and supplying of valves and electronic devices throughout the Corporation. It follows, therefore, that all negotiations with the manufacturers of electronic devices are conducted by Valve Section, with the exception that the orders are placed by Buying Department on the suppliers after price negotiations.

Valve Section is based at The White House, Motspur Park, New Malden, Surrey, and all communications on the subject of valves should be addressed there (Telephone: MALden 0051).

2. Nomenclature

The word " Valve " as used throughout this Instruction applies to all gas-filled, vacuum devices and semi-conductors.

3. Stocks of Valves

It is the responsibility of Valve Section to obtain and hold stocks of valves for the needs of Transmitters, studio centres and mobile units. These needs are arrived at from information supplied by R.E.s, E.i.C.s and A.E.i.C.s in the form of the yearly return which is detailed in subsequent paragraphs.

Certain electronic devices, notably television camera tubes, are not carried in stock but are hired from the suppliers, and Valve Section is responsible only for co-ordinating the supply and return. These devices are dealt with under paragraph 24.

4. Requisitioning of Valves. Valve Requisition ES/700/P

(*a*) *General Procedure*

It is the responsibility of the E.i.C. of any particular station to keep his valve stocks to the stock level approved for his station by Valve Section. Stocks should on no account be allowed to fall to less than half the approved level.

To obtain goods from Valve Section, requisition Form ES/700/P should be used. The instructions given inside the cover should be strictly followed. Note that only valves and other goods stocked by Valve Section should be shown on these requisitions.

The details asked for should be given in full in the appropriate places. The A, B and C copies of the requisition form should be sent direct to Valve Section, The White House, Motspur Park, New Malden, Surrey.

When submitting requisitions individual items should be arranged, as far as possible, in alphabetical and numerical order of Types as Stocked by Valve Section.

The entries on the requisitions should give the quantity and type only. Additional descriptions, e.g. manufacturer's name, the words " Valve ", " C.R.T.", " Neon ", etc. are unnecessary and should be omitted.

Should it be necessary to obtain valves urgently for service equipment, this can be done by applying by telephone or telegram to Valve Section, MALden 0051. Provided station stocks are properly maintained, it should not be necessary to resort to this procedure except in emergencies.

(*b*) *Valves for New Apparatus*

In the case of new equipment, all working and spare guaranteed valves will be supplied by Valve Section against a scheme number. Information concerning the quantities of valves required, etc., will be forthcoming well in advance of the actual installation, and the appropriate requisitions will be placed by Valve Section.

Other non-guaranteed socket valves will be supplied by the department installing the apparatus, and it will be the responsibility of the E.i.C. in such cases to requisition spare valves according to the approved stock levels.

The equipment for which they are required should be briefly stated in the space under " Reasons for Requisition " headed " Other Purposes ", as this information assists in the stock control of first issue valves.

(*c*) *Specialist Departments*

Specialist departments, such as D.D., P. & I.D., Equipment, Lines, Research, etc., should notify Valve Section and E.i.C.s of requirements of valves for new apparatus they are supplying as soon as it is possible for them to do so. Working valves for new apparatus (with the exception of guaranteed valves), if not supplied with the equipment, should be requisitioned on Valve Section by the installing departments. Valve Section will then supply all necessary spare valves in accordance with requisitions from the E.i.C. concerned (see 4(*b*) above).

5. Credit System

(*a*) *General*

A comprehensive credit system has been agreed between valve manufacturers and the Corporation concerning certain valves. These valves are guaranteed for certain periods, according to the type and depending upon certain conditions being adhered to. The operation of this credit system is the sole responsibility of Valve Section, and no correspondence with outside firms should be entered into by any other department or station. A list of guarantees is given in 26. If a valve is guaranteed for 300/1,800 hours the first figure represents the life up to which the valve will be credited in full. If the valve fails between 300/1,800 hours it will be credited on a straight-line sliding scale, and over 1,800 hours scrap credit, if any, will be allowed.

It should be noted that valves are only guaranteed as above for a limited number of years, and it therefore follows that valves should be put into circuit in order of date of receipt, to ensure that the older valves are used first. The guaranteed life has little relation to the actual life which should be obtained. It is effectively an insurance against early failures. A valve, for example, having a guaranteed life of 500 hours may have an actual working life of between three and ten times this figure, depending on conditions of use.

(*b*) *Receiving Valves, Cathode Ray Tubes, Monoscope Tubes, Photomultipliers, Klystrons and Camera Tubes other than those hired*

As a general rule, valve manufacturers do not guarantee receiving valves individually, and, as the administration of a credit system for such a large quantity of valves as is used in the Corporation would be out of all proportion to the advantages obtained, it has been decided that receiving valves shall be scrapped on failure, since the elements cannot be recovered satisfactorily. If there is any doubt as to whether a receiving valve is actually faulty or not it can be returned to Valve Section who will report on it.

Cathode Ray Tubes, Monoscope Tubes, Photomultipliers, Klystrons and Camera Tubes other than those hired are guaranteed under various agreements with the manufacturers. Such devices should be returned to Valve Section only if qualifying for credit. Unless otherwise specified, the qualification for credit is failure under 1,000 hours or 12 months in circuit, whichever occurs first. Certain types, as indicated in paragraph 7, also qualify for scrap credit, and should be returned to Valve Section. All other valves should be scrapped on site.

All valves returned to Valve Section should be advised on an ordinary advice note quoting the type, serial number, hours of life or period in circuit, and reason for rejection. They should be sent in the appropriate crate or carton as supplied by the

manufacturer. It should be noted that all wooden crates and moulded packings are returnable.

6. Valves in Transit

It is the responsibility of the E.i.C. to see that the valve or valves received from Valve Section are in good condition and have not been damaged in transit. Should the valves be in good condition, the white copy of the advice note sent with the valves should be signed and returned at once to Valve Section. Should some or all of the valves be faulty, the white copy of the advice note should be so marked and returned with the valves and an explanatory memorandum to Valve Section.

Guaranteed valves are insured during transit from Valve Section to stations and from stations to Valve Section, and should be dealt with as follows. Immediately upon receipt at a station, examination should be made for physical damage, and the advice note should not be signed and returned to Valve Section until the valve has been tested. Large valves must be Pirani tested and, if satisfactory, should subsequently be tested in circuit (see 16). For smaller valves, one of the other methods of test detailed in these instructions should be used. The receipt of the signed advice note by Valve Section will be taken to indicate that the valves have been tested satisfactorily by the E.i.C. and the insurance will be cleared. If the results of the tests are unsatisfactory or if it appears possible that the valve has sustained damage in transit, Valve Section should be notified at once by memorandum. No other action on the part of the E.i.C. is necessary. Any complaints regarding damage in transit will be dealt with by Valve Section who will contact the carriers if necessary. Valves broken in transit will be replaced by Valve Section who will recover from the insurers. A further requisition from the station concerned will not be necessary in such cases.

7. Expended Guaranteed Valves

Guaranteed valves which have completed their guaranteed life and which are eligible for scrap credit should be returned to Valve Section on a BBC Advice Note (ES/99/P).

The following valves come into this category:—

ACT.14	BW.194	CAT.29		
BR.155	BY.189	PCA.21		
BR.161	BR.1151	R6010		
BR.189	BY.1151	R6015		
BR.194	BY.1144	R9516		
BR.1106	CAM.2	C103		
BR.1122	CAM.3	C106		
BR.1132	CAT.6	PMT57		
BW.189	CAT.9	10MW/4A		

All other valves failing outside the guarantee period should be broken up on site and scrap copper sold for the best price obtainable. Where valves develop peculiar faults, Valve Section should be informed and will make arrangements for special reports to be obtained. E.i.C.s will be notified of the action to be taken.

8. Return of Guaranteed Valves

When a valve becomes available for return under guarantee it should be carefully packed in a valve travelling crate specifically designed for that particular type of valve. Should any breakage have occurred in the glasswork, this should be secured as far as possible from further damage by means of adhesive tape or paper. All types of guaranteed valves may be returned by passenger train.

Valves failing within the guaranteed period should be returned to Valve Section, Motspur Park. BBC Advice Notes (ES/99/P) should be prepared showing the type and serial number of the valve, its life and the alleged cause of failure. A copy is not required by the manufacturer.

9. Accidental Breakage

Accidental breakage of all types of electronic devices should be immediately reported in writing with full details of the accident to the appropriate Superintendent Engineer concerned, with a copy to Valve Section and Insurance Manager. In the case of valves or cathode ray tubes, they should be dealt with as expended valves as outlined in paragraph 7. In the case of hired television camera tubes, the damaged tube should be returned immediately

to the Works. The words "Accidentally Broken" must be entered on the advice note.

10. Valve Crates

E.i.C.s should keep the number of empty crates on site to a minimum, and any crates required for exceptional valve movements should be requested by memorandum or telephone from Valve Section and not directly from the manufacturer.

In the case of E.E.V. and M.O.V. valves supplied by M.W.T. the crate serial number is prefixed by the letter "V" and these crates should be returned direct to M.W.T. by goods train. All other crates should be returned to the manufacturer by the same means. In all cases a copy of the advice note should be sent to Valve Section.

The addresses to which the crates should be sent are as follows:—

Marconi

M.W.T. Co. Ltd.,
Valve Division,
Marconi House,
Chelmsford,
Essex.

S.T. & C.

S.T. & C. Ltd.,
Valve Division,
Brixham Road,
Paignton,
Devon.

M.O. Valve Co.

M.O. Valve Co. Ltd.,
Brook Green,
Hammersmith,
London, W.6.

E.E.V. Co. Ltd.

English Electric Valve Co. Ltd.,
Waterhouse Lane,
Chelmsford,
Essex.

11. Returns required by Valve Section

(*a*) *Monthly return*

Valve Casualty return on Form ES/112/P must include *all guaranteed* valves that have failed during the month, whether they have failed within the guarantee or not.

(*b*) *Annual return*

To be submitted not later than 6th August on the current stock list provided by Valve Section. The information contained in this return is used for several purposes, and the return should be compiled as accurately as possible from information up to the end of the preceding month. All valves, both guaranteed and receiving, including rectifiers, contact and indicating thermometers, crystal connection tubes, neons, vacuum capacitors, cathode ray tubes, semiconductors, camera tubes (other than hired) must be shown.

(*c*) *Small valves*

While there is no need to keep separate valve life sheets for every small receiving type valve in use, the date of entry and removal from circuit may be recorded and an approximate life computed from the known operational schedule or the equipment in which the valve is used. Stick-on labels E/57 are available from Stationery Stores for this purpose.

The information so obtained is not immediately required by Valve Section, but should be periodically analysed at stations, and where there is evidence of a type or batch failing with short lives, the matter should be brought to the attention of Head of Valve Section with all relevant details.

12. Testing of Stock Valves

Valves which have been in stock for a long time should be tested to ascertain that they have not deteriorated.

13. Filament Voltages of Cooled-anode Guaranteed Valves with Tungsten Filaments

(*a*) *General Instructions*

The overall distortion produced by high-power equipment is largely influenced by the filament voltage at which the final amplifier is run. On the other hand, the higher the filament voltage, the less will be the life of the valve. Furthermore. tungsten filaments decrease in diameter due to evaporation, which decrease takes place throughout life, and the filament usually fails when the diameter has been reduced at any one point by 10% of its normal cross-section. It follows, therefore, that the filament voltage of the large cooled-anode valves should be reduced below the marked volts as much as possible consistent with the maintenance of overall distortion below the specific figure ruling for each transmitter. It will also be necessary progressively to increase the filament voltage with life, to ensure that distortion does not increase above this specified figure.

It should here be stated that, in general, filament voltages should not be more than 2·5 volts below marked volts, and in no circumstances must the coupling be increased in order to obtain the same drive as was obtained when the valve was originally set up and the filament run at marked volts. Should this be done there is very grave risk of overheating the grid by putting in more power than the grid can handle. If conditions are such that more drive is required, this automatically indicates that the filament is being under-run too much.

(*b*) *Types of Filament*

The following information applies only to valves fitted with bright tungsten filaments. VALVES FITTED WITH THORIATED TUNGSTEN OR OXIDE-COATED FILAMENTS MUST BE OPERATED AT THE SPECIFIED FILAMENT VOLTAGE.

(*c*) *Accuracy of Voltmeter and Ammeter Readings*

It is assumed throughout this instruction that the instruments have been calibrated to substandard accuracy and that they are checked frequently to ensure that the accuracy of the readings is maintained. All the figures quoted are D.C. readings, and the voltage readings refer to filament voltages read directly across the valve terminals. Where possible the correct voltage should be read by connecting a substandard dynamometer voltmeter directly across the valve terminals.

(*d*) *Form Factor*

This is defined as the peak-to-average ratio of the anode and grid currents and can be an approximation only. The angle of flow of the anode current and grid current varies between wide limits, due to the mode of operation of the valve. Strictly, the peak-to-average ratio of the anode current will differ from that of the peak-to-average ratio of the grid current. In the majority of cases, however, a near approximation will be obtained by taking the sum of the average anode and grid currents (i.e. the average space current) and multiplying by one of the typical form factors given below to obtain the peak space current.

Typical Form Factors:

Class C	Anode modulated R.F. amplifier	9·3
Class B	Linear R.F. amplifier	7
Class B	Modulator	4
Class A	A.F. Amplifier	2
Class C	Non-modulated R.F. amplifier ..	4·6
Class C	F.M./R.F. amplifier	4·6

(*e*) *Marked Voltage of Tungsten Filaments*

Most large valves are marked with a filament voltage which corresponds to that filament temperature which will give 90% saturation of space current, and this is known as " marked volts." Below this voltage the emission falls off, depending on the individual valve type. The table on page 1.6 gives the emission in amperes at " marked volts " and at other voltages for a number of valves in more general use.

(*f*) *Lives exceeding* 5,000 *hours*

Where the life of a valve exceeds 5,000 hours, the indicated running voltage must be increased by 2% of the operating filament voltage and also for every additional 5,000 hours of life above 5,000 hours.

Total Emission in Amperes for Various Filament Voltages

Valve	*Above Marked Volts*		*Marked Volts*	*Below Marked Volts*				
	+1·0	+0·5	**0**	−0·5	−1·0	−1·5	−2·0	−2·5
ACT.16	18	15	**12**	9·5	7·2	5·5	—	—
ACT.14	14·4	12·2	**10**	8	6·2	4·5	—	—
CAT.6	14·8	12·2	**10**	8·0	6·4	5·0	—	—
CAT.17C	127	112	**100**	88	78	68	61	54
CAT.14C	127	112	**100**	88	78	68	61	54
CAT.20C	45	38	**35**	31	27	23	20	17·5
CAT.9/PCA.21 ..	18	14·8	**12**	9·2	7·2	5·6	4·3	3·0
CAM.2	3·0	2·45	**2·0**	1·6	1·25	0·95	0·75	0·6
CAM.3	5·0	3·9	**3**	2·3	1·7	—	—	—
3Q/331E	133	116	**100**	87	75	64·5	55	47·5
4Q/230A	14·7	12	**10**	8·3	6·85	5·6	4·6	3·75
3Q/200A	11·75	9·75	**8·0**	6·6	5·4	4·35	3·52	2·8
4081A	11·75	9·75	**8·0**	6·6	5·4	4·35	3·52	2·8
4030D or 4030C ..	61·5	53	**45**	38·6	32·8	27·6	23·4	19·8
BR.128	45	34·5	**25**	18	13	9·25	6·25	—
BR.175	12·0	10·2	**8·5**	7	6	4·9	4	3
BR.155	22	17·9	**14**	11·2	8·7	6·7	5·2	3·9

(*g*) *Method of Use*

The following procedure should be used to ascertain the correct running filament voltage.

(1) Note the average anode and grid current as shown on the meters (it is assumed that these have been calibrated to substandard accuracy). Add these together to obtain the average space current.

(2) Note the correct form factor to be used.

(3) Obtain the peak space current by multiplying the average space current by the form factor.

(4) From the marked filament voltage table select two figures of emission between which the peak space current lies. The figures in the table are given in half-volt steps only, but changes in emission due to a change in voltage of 1/10 volt can easily be obtained from these by averaging. The correct running voltage relative to "marked volts" can thus be obtained.

(5) Make any necessary correction for lives exceeding 5,000 hours.

(*h*) *Examples*

(1) A CAT.20C valve at Burghead. In this transmitter the valve is used as a Class B linear R.F. amplifier. The form factor is therefore 7.

The average anode current in the particular valve is 4·5 amps and the grid current negligible. The average space current is therefore 4·5 amps and the peak space current is 31·5 amps. This figure lies between 31 and 35 amps, and the correct running voltage is 0·4 volt below marked volts for a valve with less than 5,000 hours' life.

(2) A 4030C or D valve at Brookmans Park, Start Point or Stagshaw in the final amplifier. The valve is used as a Class C anode-modulated R.F. amplifier and the form factor is 9·3.

The average anode current is 3·7 amps and the average grid current is 0·3 amp. The average space current is 4 amps and the peak space current is 37·2 amps. This lies between 32·8 and 38·6 amps, corresponding to 1·0 and 0·5 volt below marked volts respectively, and correct running voltage is therefore 0·6 volt below marked volts for a valve with less than 5,000 hours' life.

14. Valve Cooling Water

E.i.C.s of transmitters using water-cooled valves must pay particular attention to the distilled water used in the valve cooling system to ensure that the purity of the water is maintained. It should be noted that distilled water is a very ready solvent, and therefore impurities are very quickly absorbed without being readily detected. The object of using distilled water in the valve cooling system is to ensure, firstly, that there is as little deposit on the anodes of the valve as possible and, secondly, that the electrolysis caused by the conductivity of the water is as low as possible.

It naturally follows that any loss of distilled water from the valve cooling system must be made up by the addition of pure distilled water from an approved supplier. E.i.C.s are warned that distilled water sold as such is very often impure, by virtue of the fact that insufficient care has been taken to make quite certain that the carboys in which the water is sent have been thoroughly purified beforehand. Only in cases of emergency may the valve cooling system be topped up with tap water, since the addition of only a small quantity of the latter will be sufficient to increase many times the conductivity of the valve cooling water as a whole. Samples of valve cooling water should be sent to Valve Section for test every six months, on 1st May and 1st November. Samples are required from each of the valve cooling systems and one from the station distiller. They should consist of at least 1 pint, and where possible quart Winchester or similar glass-stoppered bottles should be used. The glass stoppers should be slightly smeared with clean petroleum jelly or silicone grease MS4 to prevent seizure and subsequent breakage of the neck when removing the stopper. Great care should be taken to see that the bottles are thoroughly clean. This can best be ensured by filling the bottles right up to the top with distilled water, allowing them to stand overnight, tipping the water out in the

morning, and then washing them out again with distilled water before finally filling with the sample for test. Should any E.i.C. have suspicions about the quality of the valve cooling water at any other time he should forward a sample to Valve Section for test. Distilled water carboys should be stored away and used for no other purpose, and they should be fitted with moulded rubber caps to prevent absorption of acid fumes during storage. Carboys containing acid or having contained acid should be clearly marked and safely stowed away so that they cannot be mistaken for distilled water carboys. Carboys that have contained acid must on no account be used for storage of distilled water.

It should also be realised that it is possible for station distillers to have a leak and give bad quality of water. All distillers should therefore be inspected frequently, and leaks from the cooler to the catchment area should be looked for and immediate action taken if any be found. The conductivity of good-quality distilled water should be better than 10 recip. megohms/cm^3, and water in circulation in a valve cooling system should be better than 100 recip. megohms/cm^3 at 20°C, except in the case of the new closed circuit systems, where the conductivity should be better than 20 recip. megohms/cm^3 at 20°C.

Deionized water may be considered equivalent in every way to distilled water, provided the deionizing chemicals are renewed at the correct specified intervals.

15. Water-cooled Valves : Switching Schedule

(a) Filament Switching

The resistance of a tungsten filament when cold is about ten times less than when hot. It is therefore necessary to apply a low filament voltage and slowly increase the voltage to the full value. During the first ten seconds of application, immediately after switching on, the voltage applied is such that the current shall not exceed 70% of the working current, the applied or initial striking voltage being only between 5 and 7% of the normal. In the case of CAT.17C or CAT.14C type valves the striking voltage is about 1·8 volts. After the initial period of 10 seconds the voltage may be increased fairly rapidly, but the current must not rise much above normal. The whole operation should take not less than 30 seconds. In modern transmitters automatic gear is employed, but in older types employing smaller valves, where the operation is carried out manually, care must be exercised to see that this procedure is followed correctly.

(b) High-tension Switching and Conditioning

In the case of new valves or of a valve that has been out of service for a period of more than seven days it is necessary to condition the valve by a gradual application of the high-tension voltage, and the conditioning should be carried out as follows.

An anode voltage of 5,000 volts and normal drive for that voltage but without modulation should first be applied, and left thus for 10 minutes. After this period the voltage may gradually be increased up to the full value in easy stages, and the whole operation should be completed in not less than 30 minutes. In the case, however, of valves which have been out of operation for a period of less than seven days this procedure may be accelerated, the first application of high-tension voltage being at 10,000 volts; after 30 seconds it may be increased in one step to the full value.

During the ordinary operation of a transmitter, if the H.T. is interrupted, either deliberately or accidentally, for any reason (for example due to the arc-back from a mercury-vapour rectifier) the anode voltage may be reapplied immediately at a value not exceeding 70% of the normal, and two seconds thereafter may be increased to the full value.

Circumstances may arise when it becomes necessary, due to emergency, to reduce as far as possible the running-up period detailed above, and a concession may be made in the case of a valve which has completed a life of 1,000 hours, so that the running-up period may be reduced from 30 to 5 minutes, although the valve has not been in commission within the seven day period mentioned above. It should be noted that this concession should not be used except in the most urgent cases.

It is intended that the above procedure should apply to valves type BR.128, BR.161, BW.165, CAT.14C, CAT.17C, CAT.20C, CAT.27, CAT.29, CAT.30, PCA.21, 4030C and D, 3Q/294E, 3Q/331E, 4Q/230A.

16. Pirani Test for Large Cooled-anode Valves

To ensure that any damage to the filaments or impairments of the vacuum of large valves is detected prior to the valve being power tested, Pirani tests will be applied to all valves shown in the list on page 1.10.

(1) By the manufacturer. (*Note:* If the manufacturer is the supplier, the manufacturer's test figures will be omitted.)
(2) By the supplier.
(3) Valve Section after delivery to Valve Stores.
(4) By station staff after delivery to transmitting stations.

To ensure that these tests are correctly recorded and tabulated, valve label E/463/P must be used; it consists of three detachable portions, each portion being overprinted with a coloured diagonal line, the procedure being as follows:

(*a*) Labels in their cellophane covers will be issued to valve suppliers. Valve suppliers, prior to despatch of valves, will enter on each of the three sections (red, green and yellow) the supplier's name, valve serial number, Pirani figures, and the date of test.

If the supplier is not the manufacturer, the manufacturer's and the supplier's figures will be shown. If the supplier is the manufacturer, the manufacturer's figures will be omitted.

(*b*) A label, all sections duly completed, will be attached by the supplier to each valve prior to its despatch to Valve Section.

(*c*) Each valve, on receipt at Valve Stores, will be Pirani tested and appropriate entries made on all three sections of the label. The red section will be returned to the supplier, the green and yellow sections being attached to the valve.

(*d*) If Valve Section moves valves from one store to another, Pirani tests and the date will be recorded on the green and yellow sections.

(*e*) Valves in Valve Stores may, at the discretion of H.V.S., be Pirani tested at any time, and in all such cases the results of the tests will be recorded on the yellow and green sections.

(*f*) Each valve on receipt at stations will be Pirani tested as soon as possible and the results of the tests recorded on the green and yellow sections with the name of the station. The completed green section will then be detached and forwarded to Valve Section, the yellow section being replaced in the cellophane cover and re-attached to the valve. When the valve is placed in the transmitter the yellow section in its cellophane cover will be detached and filed. It will be re-attached when the valve is removed from the transmitter.

Method of Test

A substandard voltmeter is connected directly across the filament terminals (in the case of the largest valves, across the special filament terminals provided). An ammeter, battery and resistance are then connected in series with the filament, and the current passed is maintained at a constant value by continuous adjustment of the variable resistance. The voltage drop across the filament is measured every five minutes from cold until a steady voltage drop is obtained for three successive readings. The approximate time required for this is shown in the final column. The steady filament current and the final stabilised voltage applicable to each type of valve are also shown in the table.

Certain precautions should be taken with this test: heavy leads capable of carrying the current without excessive drop should be used, and the voltmeter should be connected directly across the filament pins or the special terminals provided. Several valves of the same type can be tested in series if necessary, using an additional 6-volt battery if the voltage drop is too large for a single one.

Calibration of Meters

All stations using large valves are now equipped with Pirani test apparatus. Both the voltmeter and ammeter can be calibrated against laboratory standards held by Valve Section. Should station meters be sent to Valve Section for check, they should be carefully packed and sent by valve lorry or other reliable road transport, and not by public transport or postal services.

Batteries

Any suitable type of battery may be used provided it has sufficient capacity. Particulars of the standard batteries normally issued are given in T.M.I.225.

Interpretation of Results

It is intended that the Pirani records provided by these cards shall be evidence of safe transit or damage to the valve when transported from one destination to another. As an indication of safe transit, the difference between readings taken at successive stages of movement of any valve should not exceed 5%. If a difference greater than 5% is obtained, damage in transit should be suspected, and the valve should not be moved or submitted to further tests until Valve Section has given disposal instructions.

It is anticipated that stations may have difficulty in setting ammeters to allow for calibration errors owing to the limitations of the scale, and if so it is permissible to use a system of averaging, e.g. if it is required to measure the voltage drop at a current of 12 amps and the meter correction requires a reading of 11·85 amps —a figure which would be difficult to set on the scale—a final steady reading may be taken at 12 amps and a further reading taken with the current reduced to 11·5 amps. The correct reading for 11·85 amps will then be a fraction—probably of the order of some thousandths of a volt—above the mean of the two readings.

17. Pirani Test Data

See accompanying table.

18. Technical Information

Valve data folders are issued to stations covering the valve types as listed on the Annual Insurance Return. Fuller and more specialised data is available on request, and all applications for valve data should be addressed to Valve Section and not to valve manufacturers.

Valve	*Current (amps)*	*Voltage (approx.)*	*Approximate Duration of Test (minutes)*
ACS.5	12·5	0·250	
ACT.14	7·5	0·345	60
ACT.16	12·0	0·500	45
ACT.26	20·0	0·355	50
BR.128	40·0	0·365	60
BR.155	15·0	0·455	50
BR.161	15·0	0·096	35
BR.175	7·5	0·550	55
BR.189	30·0	0·195	45
BR.191B	3·0	0·170	25
BR.195	12·0	0·190	30
BR.1122	20·0	0·235	50
BR.1131	2·5	0·145	40
BR.1151	40·0	0·800	55
BW.165	40·0	0·495	50
BY.189	30·0	0·210	45
BY.1122	20·0	0·235	50
BY.1144	50·0	0·112	50
BY.1151	40·0	0·800	55
CAM.4	7·5	0·365	45
CAT.6	7·5	0·340	60
CAT.9	12·0	0·500	45
CAT.14C	40·0	0·550	50
CAT.17C	40·0	0·550	50

Valve	*Current (amps)*	*Voltage (approx.)*	*Approximate Duration of Test (minutes)*
CAT.20C	20·0	0·550	45
CAT.27	35·0	0·560	55
CAT.29	8·0	0·425	45
CAT.30	20·0	0·450	45
CR.192	15·0	0·010	30
PCA.21	12·0	0·480	50
TY7/6000A	5·0	0·385	45
3J/192E	8·0	0·075	30
3J/210E	17·5	0·100	60
3J/252EW	12·0	0·100	60
3J/260E	12·0	0·250	80
3J/261	12·0	0·310	80
3Q/200A	7·0	0·380	80
3Q/260E	12·0	0·250	80
3Q/294E	20·0	0·190	85
3Q/331E	40·0	0·280	80
3Z/222EW	12·0		
4Q/230A	8·0	0·570	55
5J/180E	4·0	0·200	45
827R	2·5	0·10	25
4030D	20·0	0·310	85
4058B	7·0	0·49	50
4081A	7·0	0·395	80

19. Air-cooled Filament Seals

Valves of CAT.14C, CAT.17C, CAT.20C, CAT.27, CAT.30 and PCA.21 are fitted with air-cooled filament seals. Great care is required to see that the correct volume of air is passing in the seal. In particular the filament leads must be fitted so that they go right home on the filament stub, or a serious air leak will result. There must be a pressure of air at the end of the pipe before it enters the filament of at least 5 in. of water. This pressure of air will give a pressure at the orifice gauge of at least 0·5 in. In the case of valve type PCA.21 a pressure drop of 0·25 in. is satisfactory. This valve has a filter which can be inspected and cleaned by unscrewing the knurled nut on the air inlet pipe. This filter should be inspected every 2,000 hours and cleaned as required.

Care is required to prevent twisting action being imparted to filament leads or stubs when connecting tubing on filament connectors.

20. Thermometers and Connection Tubes

All necessary information concerning the supply of the above is given in T.M.I.210.

21. Anode Sealing Washers

Anode sealing washers of all types are stocked by Valve Section and are to be requisitioned in the same way as valves, but washers for any other purpose, such as jacket-to-chair washers, etc., are considered to be part of the transmitter and must be obtained through Engineering Buyer.

Samples of washers ordered directly through Engineering Buyer should be sent to Valve Section for acceptance test.

22. Rubber Hose for Valve Cooling

All necessary information concerning the supply of the above is given in T.M.I.207, Issue 1, 25th May 1948. Requisitions for hose should be submitted to S.E.T. and not to Valve Section.

23. Rubber Tubing for Supply of Air and Water*

The following sizes of tubing have been agreed, and the sizes have been called, for the sake of simplicity, BBC Patterns 1 to 5. The standardised sizes and their use are given in the following table.

*BBC Pattern No.**	*Nominal Bore (in.)*	*Nominal Outside Diameter (in.)*	*Main Use*
1	$\frac{1}{4}$	$\frac{1}{2}$	May be used for conveying air to the filament well of CAT.9 and CAT.29 type valves
2	$\frac{1}{2}$	$\frac{3}{4}$	To convey air to the top and middle corona rings of CAT.27 and CAT.17C and the corona rings of CAT.20C, CAT.30, PCA.21, CAT.9 and CAM.4 valves
3	$\frac{23}{32}$	1	To convey air to the filament seals of CAT.14C, CAT.17C, CAT.20C, CAT.30, CAT.27 and to the bottom corona rings of CAT.27, CAT.17C and CAT.14C valves
4	$\frac{7}{8}$	$1\frac{1}{8}$	To supply air to the top seal of PCA.21
5	$\frac{7}{16}$	$\frac{5}{8}$	

*This tubing is of pure rubber and is the only tube to be used for this purpose. All requisitions for rubber tubing should be submitted direct to Valve Section.

24. Television Camera Tubes—Hired

E.i.C.s of television studios and mobile units are required to operate in their cameras, camera tubes which are hired from the makers and must follow certain specific procedure for each make of device. It is intended here to indicate only the general principles to be followed. Specific instructions will be issued from time to time for each particular device.

(*a*) *Studio camera tubes*

The following camera tubes are used in London Studios:

C.P.S. Emitrons (E.M.I. Electronics Ltd.)
Image Orthicons (E.E.V. Co. Ltd. and E.M.I. Electronics Ltd.)

The maximum holding of hired tubes is defined for each studio and must not be exceeded. The suppliers are responsible for delivery in good condition to BBC Stores at the Studios. All tubes must be tested within fourteen days of delivery. In the case of Image Orthicons the BBC has undertaken an agreement with E.E.V. whereby no tube will remain unused for a period exceeding one month from date of delivery and that from then on each tube will be used for a period of not less than five hours per month. Delivery notes in duplicate will be made out by the suppliers for each delivery. One copy will accompany the tube and be handed over with it, and the other copy will be sent by post to Valve Section, Motspur Park. The suppliers will also be responsible for the collection of tubes which are to be returned to them. The E.i.C. will use Advice Notes specially printed for this purpose and will follow the instructions printed thereon. Form Nos. are as follows. (Obtainable on demand from Valve Section.)

E/995/P (E.E.V.) Image orthicons
E/995/P (E.M.I.) Image orthicons
E/336/P C.P.S. Emitrons

The E.i.C. will maintain a bonded store in which all tubes not in use will be kept. This store will be regarded as a bona fide bonded store by the suppliers and the BBC. Contact between the supplier and the E.i.C. will be established and direct arrangements for despatch and collection will be made except where special transport facilities are required, in which case arrangements should be made through Head of Valve Section. The E.i.C. will, at regular monthly intervals, send to Head of Valve Section, Motspur Park a return showing the number of hours of use logged against each tube, and particulars of each tube which has failed during the month.

(*b*) *Mobile O.B. Units Camera Tubes*

In the case of mobile television O.B. units the Image Orthicon

camera tube is the only type used. Despatch and return of these tubes is carried out in special containers and the cost of carriage in both directions is borne by the manufacturer.

The maximum holding of hired tubes is defined for each Region and must not be exceeded. The suppliers are responsible for delivery in good condition. All tubes must be tested within fourteen days of delivery.

Tubes must not remain unused for a period exceeding one month from date of delivery and from then on each tube will be used for a period of not less than five hours per month.

Delivery notes in duplicate will be made out by the suppliers for each delivery. One copy will accompany the tube and the other copy will be sent by post to Valve Section, Motspur Park.

E.i.C.s will be responsible for the return of rejected tubes to the supplier. The special containers supplied by the manufacturer only must be used. Supplies of Advice Notes (Form E/995/P) and pads of railway consignment notes for this purpose may be obtained from Valve Section on demand.

E.i.C.s will, at regular monthly intervals, send a return to Head of Valve Section, Motspur Park, showing the number of hours of use logged against each tube and particulars of each tube which has failed during the month.

N.B.: The burning hour shall mean any hour during which the heater of a tube is energised until the time the heater is de-energised, including all testing periods prior to the camera being brought into service and subsequent testing periods. To complete a burning hour, operation need not be continuous.

25. Television Camera Tubes—Bought

Staticon and Vidicon tubes are purchased outright by the BBC. The various types of tubes are as follows:

Staticons type C.933, C.935, C.936 Cathodeon Ltd.
Vidicons type P.820 English Electric Valve Co. Ltd.
Vidicons type 10667S E.M.I. Electronics Ltd.

No stocks are held at Valve Section. Each station has an approved holding of tubes, and it is the responsibility of the E.i.C. to see that it is maintained at the approved level. The tubes are delivered direct to stations as and when required. The procedure for ordering tubes is briefly as follows. Valve Section is responsible for placing bulk orders with the respective manufacturers. Stocks of tubes are then held at the factories. E.i.C.s wishing replacements should make a request to Valve Section either by telephone or memo. Valve Section will then contact the manufacturer and arrange delivery direct to the station concerned. No other paper-work is required of the E.i.C. All tubes must be tested within fourteen days of delivery, and Valve Section should be notified by memo if tube is acceptable. All tubes are covered by a guarantee of 50/500 hours and 18 months from date of delivery.

Tubes failing within this guarantee should be returned direct to the manufacturer concerned. Advice Notes (Form E/1199/P) have been specially printed for this purpose. The cost of carriage on the return journey is borne by the BBC.

The E.i.C. will, at regular monthly intervals, send to Head of Valve Section, Motspur Park, a return showing the number of hours of use logged against each tube and particulars of each tube which has failed during the month.

26. Guaranteed Valves, Cathode-Ray Tubes, Klystrons and Camera Tubes

Valves which exceed their guaranteed life should be scrapped on site except those marked with an asterisk which are eligible for scrap credit.

(*a*) *Transmitting Valves*

Type	*Guarantee*	*Type*	*Guarantee*
E.E.V.		*E.E.V.* (*continued*)	
A.207	100/2000	*BR.155	100/2000
B.142	100/1500	*BR.161	100/2000
		BR.175	100/1500
BR.128/ BR.128B	100/1500	*BR.189	100/2000

*Valves marked with an asterisk are eligible for scrap credit at end of guaranteed life.

Type	*Guarantee*	*Type*	*Guarantee*	*Type*	*Guarantee*	*Type*	*Guarantee*
E.E.V. (continued)		*S.T. and C.*		*S.T. and C. (continued)*		*M.O. Valve Co. (continued)*	
BR.191B	100/1500	2V/561E/ 4079A	100/3000	4007A	100/2000	ACS.2	100/1500
BR.195	100/2000	2V/561E 4079A	100/3000	4013C	100/2000	ACS.4	100/1000
*BR.1122	100/1500	3H/151J	100/1000	4014A	100/1250	ACS.5	100/1000
BR.1129	100/2000	3J/161J	100/2000	4030D	100/1750	ACT.6	100/1000
*BR.1131	100/1000	3J/162J	100/2000	4058B	100/2000	ACT.9	100/2000
*BR.1132	100/1000	3J/192E	100/2000	4064B	100/3000	ACT.10	100/500
*BR.1151	100/2000	3J/210E	100/2000	4069A	100/2000	*ACT.14	100/1000
BW.165	100/2000	3J/252EW	200/2000	4077A	100/3000	ACT.15	100/1500
*BY.189	100/2000	3J/261E	100/2000	4078A	100/3000	ACT.22	100/800
*BY.1122	100/1500	3Q/200A	100/2000	4081A	100/4500	ACT.25	100/2000
*BY.1144	100/2000	3Q/260E	300/500	4212E	100/1250	ACT.26	100/1000
*BY.1151	100/2000	3Q/294E	300/2000	4220C	100/2000	ACT.27	100/1000
C.1108	100/1500	3Q/331E	300/2000	4242A	100/2000	ACT.29	100/2000
C.1112	100/1500	3V/531E	100/3000	4270A	100/3000	*CAM.2	300/1500
*CR.192	100/1500	3Z/222EW	200/2000	4278A	100/3000	*CAM.3	300/2000
*4KM 50,000 LA3	100/3000	4CX/250B	100/1000	4282B	100/2000	CAM.4	300/1500
4CX 5000A	2000.	4H/180E	100/1000	4357A	100/1000	*CAT.6	300/2000
		4H/181E	100/2000			*CAT.9	300/2000
		4Q/230A	100/2000			CAT.14C	300/2000
		5C/450A	100/2000	*M.O. Valve Co.*		CAT.17C	300/2000
		5D/100A	100/2000	A.207	100/1000	CAT.20C	300/2000
		5J/180E	100/1000	ACM.3	100/2000	CAT.27	300/2000
		828 SS.1971	100/1500. 100/1000	ACPT.9	100/1000	*CAT.29	300/2000

*Valves marked with an asterisk are eligible for scrap credit at end of guaranteed life.

Type	*Guarantee*	*Type*	*Guarantee*
M.O. Valve Co. (continued)		*M.O. Valve Co. (continued)*	
CAT.30	300/2000	QA.2405	100/1000
DA.100	100/1000	TT.10	50/1000
DET.2	100/2000	TT.12	100/500
DET.3	100/2000	TT.15	100/1000
DET.16	100/500	TT.16	100/1000
DET.17	100/500	TT.21	100/1000
DET.21	100/500	CV.2318	100/1000
E.2939	100/2000	CV.4071	100/1000
E.2954	100/2000	*Mullard*	
E.2998	100/2000	MZ2/200	100/2000
E.3004	100/2000	QQV06/40A	100/1500
GU.7	100/2000	QQV07/50	100/1500
GU.8	100/2000	QY3/125	100/1500
GU.20/21	100/1500	QY4/250	100/1500
GXU.2	100/1000	QY4/400	100/1500
GXU.3	100/1000	QY5/3000A	100/1500
GXU.5	100/1500	RR3/250 (3B28)	100/1000
MR.4	100/1000	RR3/1250 (4B32)	100/1000
MR.10	100/2000	TD04/20	100/1000
MT.9L	100/2000	TY4/350	100/1000
MT.14	100/1000	TY7/6000A	100/1500
*PCA.21	300/1000		

*Valves marked with an asterisk are eligible for scrap credit at end of guaranteed life.

Type	*Guarantee*	*Type*	*Guarantee*
Mullard (continued)		*A.E.I.*	
		BD.340A	100/2500
TD1/100A	100/1000	BT.5	100/2500
TD2/300A	100/1000	BT.17	100/2500
XR1/1600A	100/1000	BT.19	100/2500
XR1/3200A	100/1000	BT.89	100/2500
XR1/6400A	100/1000	BT.113	100/2500

(*b*) *Instrument Tubes*

Type	*Guarantee*	*Type*	*Guarantee*
A.E.I.		*Electronic Tubes*	
3OC3/T1	6M or 1000 h	3AZP31	6M or 1000 h
		5BKP1	6M or 1000 h
Cintel			
3EG1	100/1000 h/2 yr	*G.E.C.*	
6EG5	100/1000 h/2 yr	401A (E4103/B/4)	6M or 1000 h
Cossor		701A (E4205/B/7)	6M or 1000 h
1CP1	6M or 1000 h		
88D	6M or 1000 h	901A (E4412/B/9)	6M or 1000 h
89D	6M or 1000 h	E4504/B/16	6M or 1000 h

Type	*Guarantee*	*Type*	*Guarantee from date of purchase*
Mullard		*Tektronix*	
DG7-5	6M or 1000 h	T51/P2	1 year
DG7-32	6M or 1000 h	T52/P1	1 year
DG7-36	6M or 1000 h	T54/P2	1 year
DG13-34	6M or 1000 h	T55/P2	1 year
DG13-2	6M or 1000 h	T581/P2	1 year
DG16-22	6M or 1000 h	*Sylvania*	
DH7-91	6M or 1000 h	SE3A1	1 year
DH10-94	6M or 1000 h	SE5A1	1 year
DH13-97	6M or 1000 h	SE5D2	1 year
DHM10-93	6M or 1000 h	ST515/P2	1 year
20th Century		ST533/P2	1 year
S6G	500/1000 h		

Note; Where the guarantee is given as 6M or 1000 hours, in the tables under (b) and (c), this means that the C.R.T. is guaranteed for full credit or free replacement if failing within six months or 1000 hours of placing in circuit, which ever occurs first, and it is important that the label attached to the C.R.T. should be filled in when the C.R.T. is placed in circuit and completed when the C.R.T. is withdrawn at the end of life.

(c) *Scanning, Inlay and Special Tubes*

Type	*Guarantee*	*Type*	*Guarantee*
Cathodeon		*Ferranti (continued)*	
C912 'T.C.C.'	25/800/18 months	6/22Q3M	Under negotiation. Return V/S up to 350 h
C912 'Apology'	25/800/18 months		
C912 'Symbol'	25/800/18 months	6/44PM	Under negotiation. Return V/S up to 350 h
Cintel			
C106J2F	100/500 h/2 yr	9/22PM	Under negotiation. Return V/S up to 350 h
C212PIF	100/350 h/2 yr		
C212QIF	100/350 h/2 yr	9/24DM	Under negotiation. Return V/S up to 350 h
C219QIF	100/350 h/2 yr		
E.M.I.		*Mullard*	
MX29 (R5161)	10/250 h	4MK13	6M 1000 h
		31CDD 53/3	3M
Ferranti			
6/22 PM	Under negotiation. Return V/S up to 350 h	36CDD 16/3	3M
		53CDD 24/2	3M
6/22QAM	Under negotiation. Return V/S up to 350 h	MC13-16	6M 1000 h
		MK13-16	6M 1000 h

(d) *Monitor, Viewfinder Tubes and Photomultipliers*

Type	*Guarantee*
All Types	6M or 1000 h

The following tubes are available for scrap credit at end of guaranteed life: PMT, 10MW4A.

(*e*) *Klystrons*

Type	*Guarantee*	*Type*	*Guarantee*
C.F.T.H.		*E.E.V.*	
TH2220B	Nil	K366	100/1000, 2 yr
		Mullard	
E.M.I.		KS7-85	100/1000, 1 yr
*R6010	50/250	KS7-1000	100/1000, 1 yr
*R6015	50/250	*S.T. and C.*	
*R9516	50/500	V247C/1K	100/1000, 5 yr
R9537	50/1000	V271C/1M	100/1000, 5 yr
*R9630	50/500	V271C/3M	100/1000, 5 yr

*Valves marked with an asterisk are eligible for scrap credit at end of guaranteed life.

(*f*) *Camera Tubes*

Type	*Guarantee*	*Type*	*Guarantee*
Cathodeon		*E.M.I.*	
C933 Staticons	50/500 h	10667S Vidicons	50/500 h
C935 Staticons	50/500 h	*E.E.V.*	
C936 Staticons	50/500 h	P820 Vidicons	50/500 h

27. Redundant Valves

Equipment becoming redundant and including small valves should be returned to H.E.D. Redundant Plant with the valves, quoting the appropriate financial approval.

Stocks of spare small valves for redundant equipment should also be returned to H.E.D. Redundant Plant.

Stocks of redundant guaranteed valves should be notified to Head of Valve Section, giving type, serial numbers and life if any. Head of Valve Section will then decide whether the valves should be returned to Valve Section for credit or to Redundant Plant.

28. Summary of Valve Returns

The following is a summary of valve returns to be submitted by E.i.C.s to Valve Section as detailed in 11.

Title	*Form*	*When submitted*
Casualty return	E/112	Monthly—to reach Valve Section during the first week following month or as soon as possible after quarter day. See 11 (*a*) (4).
Television camera tube returns	Memo	Monthly—to reach Valve Section during the first week following month or as soon as possible after quarter day. See 24.
Valve insurance return	E/673	Not later than 6th August in any year.

IMPORTANT NOTE

All these returns must be submitted promptly by all E.i.C.s on the proper forms.

29. Return of Expended or Faulty Valves : Labels

Each valve crate or carton containing expended or faulty valves, including cathode-ray tubes and klystrons, should have

affixed to the exterior a label ES/142/P (obtainable in quantity from Stationery Stores) duly filled up describing the type of valve and the station or office of origin. All old labels should be removed to avoid confusion in stores.

30. Receiving Valves and Semi-conductors

For information on characteristics, connections and equivalents for the above, reference should be made to " Radio Valve Data " issued by the Wireless World. Each holder of BBC Valve Instructions will automatically be issued with the current edition of the Wireless World " Radio Valve Data ".

PART 2. RECEIVING VALVES

(THIRD ISSUE, JULY 1955)

The mutual conductance figures given in this edition are the averages obtained by Valve Section on a large number of valves using a VT/4 Bridge. The figures taken on the VT/5 Bridge should not vary from the average figures given by more than $\pm$ 5 per cent.

Unless otherwise stated the test voltages are as follows:

Diodes and Power Rectifiers: $V_a = 100$

Triodes: $V_a = 100$, $V_{g1} = 0$

Tetrodes and Pentodes: $V_a = 110$, $V_{g2} = 100$, $V_{g1} = 0$

Normally a valve should be rejected when its mutual conductance has fallen to 50 per cent. of the average value, although in special circuits a valve may cease to function satisfactorily before this limit has been reached. In such cases the user must fix his own limits, depending on design considerations.

The emission of low-voltage power rectifiers and signal diodes is not listed, but should be approximately 50 mA per anode for power rectifiers and 0·8 mA per anode for signal diodes, measured on the VT/4 Bridge. The corresponding reading for both types of rectifiers measured on the VT/5 Bridge should be approximately 3·5. This is an arbitrary figure (see Technical Instructions S.4, Section 12).

High-voltage rectifiers, due to the large variation of cathode/anode impedance between one valve type and another, give widely different readings. These are listed for individual valve types and represent the average emission obtainable on the VT/4 Bridge.

Where valves are listed with centre-tapped filaments, the heater pins and ratings are listed for the series connection of the filament. For parallel connection the I_f should be doubled and the V_f halved.

The VT/4 and VT/5 Bridges as originally supplied are not fitted with valve holders to accommodate all the valve types listed in this publication. A sub-panel for the VT/4 Bridge is, however, obtainable from Equipment Department, and drawings for modifications to the VT/5 Bridge have been published covering the addition of B7G, B8A, and B9A valve holders and provision for grid bias.

Faulty vibration galvanometers ex VT/4 Bridges should be sent to Equipment Department for repair or replacement and not to Valve Section.

The following abbreviations are used in the text:

BC	Bottom Cap
CT	Centre Tap
FW	Full Wave
HW	Half Wave
MV	Mercury Vapour
ST	Side Terminal
TC	Top Cap

Note

Valve parameters are no longer measured by Valve Section using VT/4 and VT/5 Bridges, and it is therefore not intended to issue additions to the valve types at present listed under Part 2, Receiving Valves.

Individual valve data, however, can be supplied on request.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
A.638	Triode	B4	2.0	0.2	1	2	—	—	—	3 & 4	2.2	V_a = 50 V
A.792	Triode	B7	13.0	0.3	7	TC	—	—	6	4 & 5	4.7	
A.800	Power Rectifier	B4	4.0	2.0	1	—	—	—	TC	3 & 4		
A.863	H.F. Pentode	1.0	6.3	0.3	3	TC	4	—	8	2 & 7	1.2	
A.864	H.F. Pentode	B7	13.0	0.6	TC	2	7	3	6	4 & 5	13.0	
A.869	Triode	1.0	6.3	0.3	3	5	—	—	8	2 & 7	2.5	
A.943	H.F. Pentode	1.0	6.3	0.3	3	TC	4	5	8	2 & 7	1.3	
A.950	H.F. Tetrode	B7	13.0	0.45	2	TC	7	—	6	4 & 5	7.5	
A.1468	Diode	B9G	6.0	1.0	2, 3, 7, 8	—	—	—	—	1 & 9		
A.1714	Triode	B7G	6.3	0.55	7	1	—	—	2	3 & 4	7.0	
A.1820	Output Pentode	B8G	6.3	0.95	2	6	3	4, 5	7	1 & 8	10.0	
A.1834	Double Triode	1.0	6.3	2.5	5	4	—	—	6	7 & 8	5.2 at 35_{mA}	
					2	1	—	—	3			
A.1841	Hexode	B8G	6.3	0.3	2	6	3	4	7	1 & 8	1.2	
ABC.1	Double Diode Triode	SC8	4.0	0.65	8	TC	—	—	4	2 & 3	3.0	
					5, 6	—	—	—	4			
AC/DD ...	Double Diode	B5	4.0	1.0	1, 2	—	—	—	5	3 & 4		
AC/HL	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	3.0	
AC/HLDD ...	Double Diode Triode	B7	4.0	1.0	7	TC	—	—	6	4 & 5	2.6	
					1, 3	—	—	—	6			
AC/P	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	3.8	
AC/P1	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	3.8	
AC/P4	Triode	B5	4.0	1.0	TC	2	—	—	5	3 & 4	7.0	
AC/PEN 5-pin	Output Pentode	B5	4.0	1.0	1	2	ST	—	5	3 & 4	2.5	
AC/PEN 7-pin	Output Pentode	B7	4.0	1.0	7	2	3	—	6	4 & 5	2.5	
AC/S2	H.F. Tetrode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	3.5	
AC/S2 PEN ...	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	3.5	
AC/SG ...	H.F. Tetrode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	3.0	
AC/SGVM ...	Var. Mu Tetrode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	1.5	
AC/SP1 ...	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	2.0	
AC/SP3RH ...	H.F. Pentode	B7	4.0	1.0	2	TC	7	3	6	4 & 5	8.0	
AC/TH1 ...	Triode Heptode	B7	4.0	1.3	1	2	—	—	6	4 & 5	4.0	
					7	TC	3	—	6		3.2	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
AC/VP1 ...	Var. Mu Pentode	B7	4.0	0.65	TC	2	7	3	6	4 & 5	2.0	
AC/VP2 ...	Var. Mu Pentode	B7	4.0	0.65	2	TC	7	3	6	4 & 5	2.0	
AC2	Triode	SC8	4.0	0.65	8	TC	—	—	4	2 & 3	3.0	
AC/2HL ...	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	6.5	
AC2/PEN ...	Output Pentode	B7	4.0	1.75	7	2	3	—	6	4 & 5	8.0	
AC2/PEN DD ...	Double Diode Pentode	B7	4.0	2.0	2	TC	7	—	6	4 & 5	8.0	
					1, 3	—	—	—	6			
AC4/PEN ...	Output Pentode	B7	4.0	1.75	7	2	3	—	6	4 & 5	11.0	
AC5/PEN ...	Output Pentode	B7	4.0	1.75	7	2	3	—	6	4 & 5	9.0	
AD1	Triode	SC8	4.0	0.95	8	6	—	—	—	2 & 3	6.0	
AF7	H.F. Pentode	SC8	4.0	0.65	8	TC	7	5	4	2 & 3	2.4	
AL2	Output Pentode	SC8	4.0	1.0	8	TC	7	—	4	2 & 3	3.0	
AL4	Output Pentode	SC8	4.0	1.75	8	6	7	—	4	2 & 3	9.0	
AL60	Output Pentode	B7	4.0	2.1	TC	2	7	3	6	4 & 5	14.0	
AZ1	F.W. Power Rectifier	SC8	4.0	1.1	5, 8	—	—	—	—	2 & 3		
AZ31	F.W. Power Rectifier	1.O	4.0	1.1	4, 6	—	—	—	—	2 & 8		
B21	Double Triode	B7	2.0	0.2	7	1	—	—	—	4 & 5	2.0	
					3	2	—	—	—		2.0	
B30	Double Triode	B7	13.0	0.3	7	1	—	—	6	4 & 5	1.3	
					3	2	—	—	6	4 & 5	1.3	
B.36	Double Triode	1.O	12.6	0.3	2	1	—	—	3	7 & 8	3.0	
					5	4	—	—	6		3.0	
B65	Double Triode	1.O	6.3	0.6	2	1	—	—	3	7 & 8	3.0	
					5	4	—	—	6		3.0	
CBL1	Double Diode Pentode	SC8	44.0	0.2	8	TC	7	—	4	2 & 3	8.0	
					5, 6	—	—	—	4			
CCH35	Triode Hexode	1.O	7.0	0.2	6	5	—	—	8	2 & 7	2.8	
					3	TC	4	—	8		2.5	
CL4	Output Pentode	SC8	33.0	0.2	8	TC	7	—	4	2 & 3	8.0	
CL33	Output Pentode	1.O	33.0	0.2	3	5	4	—	8	2 & 7	8.0	
CV131	Var. Mu Pentode	B7G	6.3	0.2	5	1	7	6	2	3 & 4	2.1	
CV132	Hexode	B7G	6.3	0.2	5	1	7	6	2	3 & 4	2.2	
CV133	Triode	B7G	6.3	0.15	1, 5	6	—	—	7	3 & 4	2.2	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT.4
CV135	H.W. Power Rectifier	B7G	6.3	0.42	1, 5	—	—	—	2	3 & 4		
CV136	H.F. Pentode	B7G	6.3	0.2	5	1	7	—	2	3 & 4	2.6	
CV137	Diode Triode	B7G	6.3	0.3	7	6	—	—	5	3 & 4	2.5	
					1	—	—	—	2			
CV138	H.F. Pentode	B7G	6.3	0.3	5	1	7	6	2	3 & 4	6.5	
CV139	H.F. Triode	B7G	6.3	0.3	7	1, 6	—	—	2, 5	3 & 4	7.0	
CV140	Double Diode	B7G	6.3	0.3	7	—	—	—	1	3 & 4		
					2	—	—	—	5			
CV172	Diode	B9G	6.0	1.0	2,3,7,8	—	—	—	—	1 & 9		
CV173	H.F. Pentode	B9G	6.3	0.95	3	7	2	4	6	1 & 9	10.0	
CV261	H.W. Rectifier	B7G	4.0	0.5	TC	—	—	—	1,2,5,6,7	3 & 4	I_a = 15mA	
CV329	H.F. Pentode	B7G	6.3	0.35	5	1	7	6	2	3 & 4	1.9	
CV785	H.F. Pentode	B7G	1.4	0.05	2	6	3	5	—	1 & 7	1.0	
CV807	Pentode	B7G	2.8	0.1	2, 6	4	3	—	—	1 & 7 5 CT	2.0	
CY1	H.W. Power Rectifier	SC8	20.0	0.2	8	—	—	—	4	2 & 3		
CY31	H.W. Power Rectifier	I.O	20.0	0.2	5	—	—	—	8	2 & 7		
D1	Diode	B3G	4.0	0.2	TC	—	—	—	2	1 & 3		
D41	Double Diode	B5	4.0	0.3	1, 2	—	—	—	5	3 & 4		
D42	Diode	B4	4.0	0.6	1	—	—	—	2	3 & 4		
D63	Double Diode	I.O	6.3	0.3	3	—	—	—	4	2 & 7		
					5	—	—	—	8			
D77	Double Diode	B7G	6.3	0.3	2	—	—	—	5	3 & 4		
					7	—	—	—	1			
DA30	Triode	B4	4.0	2.0	1	2	—	—	—	3 & 4	5.0	V_a = 50
DAC32	Diode Triode	I.O	1.4	0.05	3	TC	—	—	—	2 & 7	0.6	
					5	—	—	—	—			
DAF91	Diode Pentode	B7G	1.4	0.05	5	6	4	—	—	1 & 7	0.8	
					3	—	—	—	—			
DC/HL	Triode	B5	6.0	0.5	1	2	—	—	5	3 & 4	2.7	
DC/SG	H.F. Tetrode	B5	6.0	0.5	TC	2	1	—	5	3 & 4	2.5	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
DCC90	Double Triode	B7G	2.8	0.11	6	5	—	—	—	1 & 7	2.0	
					2	3	—	—	—	4 CT	2.0	
DD41	Double Dicde	M.O	4.0	0.5	3	—	—	—	2	1 & 8		
					5	—	—	—	7			
DD207 ...	Double Diode	B4	2.0	0.075	1, 2	—	—	—	—	3 & 4		
DD620 ...	Double Diode	B5	6.0	0.2	1, 2	—	—	—	5	3 & 4		
DDL4	Double Diode	B5	4.0	0.75	1, 2	—	—	—	5	3 & 4		
DDT	Double Diode Triode	B7	4.0	1.0	7	TC	—	—	6	4 & 5	2.4	
					1, 3	—	—	—	6			
DET19	Double Triode	USM7	6.3	0.75	TC	3	—	—	4	1 & 7	2.2	
					TC	5	—	—	4		2.2	
DF33	H.F. Pentode	1.O	1.4	0.05	3	TC	4	—	—	2 & 7	0.9	
DF91	Var. Mu H.F. Pentode	B7G	1.4	0.05	2	6	3	—	—	1 & 7	1.1	
DF92	H.F. Pentode	B7G	1.4	0.05	2	6	3	—	—	1 & 7	1.1	
												V_a = 90 V.
DH30	Double Diode Triode	B7	13.0	0.3	7	TC	—	—	6	4 & 5	4.5	V_{g2} = 80 V.
					1, 3	—	—	—	6			
DH63	Double Diode Triode	1.O	6.3	0.3	3	TC	—	—	8	2 & 7	1.2	
					4, 5	—	—	—	8			
DH76	Double Diode Triode	1.O	13.0	0.16	3	TC	—	—	8	2 & 7	1.2	
					4, 5	—	—	—	8			
DH77	Double Diode Triode	B7G	6.3	0.3	7	1	—	—	2	3 & 4	1.8	
					6, 5	—	—	—	2			
DH81	Double Diode Triode	B8G	6.3	0.3	2	3	—	—	4, 7	1 & 8	1.4	
					5, 6	—	—	—	4, 7			
DK32	Heptode	1.O	1.4	0.05	6	5	4	—	—	2 & 7	0.7	
					3	TC	4	—	—		0.8	V_{g2} = 60 V.
DK91	Heptode	B7G	1.4	0.05	2	6	3	—	—	1 & 7	0.5	
					3	4	—	—	—		1.7	
DL33	Output Pentode	1.O	2.8	0.05	3	5	4	—	—	2 & 7 8 CT	3.0	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
DL35	Output Pentode	1.O	1.4	0.1	3	5	4	—	—	2 & 7	2.0	V_a = 80 V. V_{g2} = 80 V. V_{g1} = −4.5 V.
DL63	Double Diode Tríode	1.O	6.3	0.3	3	TC	—	—	8	2 & 7	1.6	
					4, 5	—	—	—	8			
DL82	Double Diode Triode	B8G	6.3	0.3	2	3	—	—	7	1 & 8	1.5	
					5, 6	—	—	—	7			
DL91	Output Pentode	B7G	1.4	0.1	2	3	4	—	—	1 & 7	1.2	
DL92	Output Pentode	B7G	2.8	0.05	2, 6	3	4	—	—	1 & 7 5 CT	2.5	
DL93	Output Pentode	B7G	2.8	0.1	2, 6	4	3	—	—	1 & 7 5 CT	2.3	V_a = 90 V. V_{g2} = 70 V. V_{g1} = −4.5 V.
DL94	Output Pentode	B7G	2.8	0.05	2	6	3	—	—	1 & 7 5 CT	2.5	V_a = 90 V. V_{g2} = 90 V.
DO24	Triode	B4	4.0	2.0	1	2	—	—	—	3 & 4	6.5	
DO26	Triode	B4	4.0	2.0	1	2	—	—	—	3 & 4	3.7	V_a = 50 V.
DW4/350 ...	F.W. Power Rectifier	B4	4.0	2.0	1, 2	—	—	—	—	3 & 4		
E2004	H.W. Rectifier	1.O	1.25	0.2	TC	—	—	—	—	2 & 7	I_a = 6mA	
EA40	Diode	B8A	6.3	0.2	4	—	—	—	7	1 & 8		
EA50	Diode	B3G	6.3	0.15	TC	—	—	—	2	1 & 3		
EAC91	Diode Triode	B7G	6.3	0.3	7	6	—	—	5	3 & 4	3.2	
					1	—	—	—	2			
EAF42	Diode Pentode	B8A	6.3	0.2	2	6	5	4	7	1 & 8	2.8	
					3	—	—	—	7			
EB4	Double Diode	SC8	6.3	0.2	5	—	—	—	4	2 & 3		
					7	—	—	—	8			
EB34	Double Diode	1.O	6.3	0.2	3	—	—	—	4	2 & 7		
					5	—	—	—	8			
EB41	Double Diode	B8A	6.3	0.3	4	—	—	—	3	1 & 8		
					6	—	—	—	7			
EB91	Double Diode	B7G	6.3	0.3	7	—	—	—	1	3 & 4		
					2	—	—	—	5			

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
EBC3	Double Diode Triode	SC8	6.3	0.2	8	TC	—	—	4	2 & 3	2.0	
					5, 6	—	—	—	4			
EBC33	Double Diode Triode	I.O	6.3	0.2	3	TC	—	—	8	2 & 7	2.0	
					4, 5	—	—	—	8			
EBC41	Double Diode Triode	B8A	6.3	0.23	2	3	—	—	7	1 & 8	1.75	
					5, 6	—	—	—	7			
EBL1	Double Diode Pentode	SC8	6.3	1.5	8	TC	7	—	4	2 & 3	9.4	
					6, 5	—	—	—	4			
EBL21	Double Diode Pentode	B8G	6.3	0.8	2	3	4	—	7	1 & 8	7.4	
					5, 6	—	—	—	7			
EBL31	Double Diode Pentode	I.O	6.3	1.5	3	TC	6	—	8	2 & 7	9.0	
					4, 5	—	—	—	8			
EC52	Triode	B9G	6.3	0.43	4	2	—	—	3	1 & 9	5.4	
EC53	Triode	B3G	6.3	0.25	TC	TC	—	—	2	1 & 3	3.4	
EC91	H.F. Triode	B7G	6.3	0.3	7	1, 6	—	—	2, 5	3 & 4	7.0	
ECC31	Double Triode	I.O	6.3	0.95	6	5	—	—	8	2 & 7	2.3	
					3	4	—	—	8		2.3	
ECC32	Double Triode	I.O	6.3	0.95	2	1	—	—	3	7 & 8	3.6	
					5	4	—	—	6		3.6	
ECC33	Double Triode	I.O	6.3	0.4	2	1	—	—	3	7 & 8	3.6	
					5	4	—	—	6		3.6	
ECC34	Double Triode	I.O	6.3	0.95	2	1	—	—	3	7 & 8	3.6	
					5	4	—	—	6		3.6	
ECC35	Double Triode	I.O	6.3	0.4	2	1	—	—	3	7 & 8	2.4	
					5	4	—	—	6		2.4	
ECC40	Double Triode	B8A	6.3	0.6	5	6	—	—	7	1 & 8	3.2	
					2	3	—	—	4		3.2	
ECC81	Double Triode	B9A	12.6	0.15	1	2	—	—	3	4 & 5	6.0	
					6	7	—	—	8	9 CT	6.0	
ECC91	Double Triode	B7G	6.3	0.45	1	6	—	—	7		6.0	$V_{g1} = -1.0$ V.
					2	5	—	—	7	3 & 4	6.0	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
ECH3	Triode Hexode	SC8	6.3	0.2	5	6	—	—	4	2 & 3	2.8	
					8	TC	7	—	4		2.5	
ECH21	Triode Heptode	B8G	6.3	0.33	2	6	5	7	Spigot	1 & 8	3.0	N.B.—Connect
					3	4	5	—	Spigot		3.2	spigot to frame.
ECH33 ...	Triode Hexode	1.O	6.3	0.2	6	5	—	—	8	2 & 7	2.8	
					3	TC	4	—	8		2.5	
ECH35 ...	Triode Hexode	1.O	6.3	0.3	3	TC	4	—	8	2 & 7	2.5	
					6	5	—	—	8		2.8	
ECL80	Triode Pentode	B9A	6.3	0.3	6	9	8	7	3	4 & 5	5.5	
					1	2	—	—	3		2.0	
EF5	Var. Mu Pentode	SC8	6.3	0.2	8	TC	7	5	4	2 & 3	3.3	
EF6	H.F. Pentode	SC8	6.3	0.2	8	TC	7	5	4	2 & 3	1.6	
EF8	H.F. Pentode	SC8	6.3	0.2	8	TC	7	5	4	2 & 3	1.6	
EF9	H.F. Pentode	SC8	6.3	0.2	8	TC	7	5	4	2 & 3	2.0	
EF22	H.F. Pentode	B8G	6.3	0.2	2	6	3	—	7	1 & 8	2.8	
EF36	H.F. Pentode	1.O	6.3	0.2	3	TC	4	5	8	2 & 7	1.6	
EF37 (EF37A) ...	H.F. Pentode	1.O	6.3	0.2	3	TC	4	5	8	2 & 7	2.5	
EF38	H.F. Pentode	1.O	6.3	0.2	3	TC	4	5	8	2 & 7	1.6	
EF39	H.F. Pentode	1.O	6.3	0.2	3	TC	4	5	8	2 & 7	2.0	
EF40	Pentode	B8A	6.3	0.2	2	5	6	4	7	1 & 8	2.0	
EF41	Var. Mu H.F. Pentode	B8A	6.3	0.2	2	6	5	—	3, 4, 7	1 & 8	3.4	
EF42	H.F. Pentode	B8A	6.3	0.33	2	6	5	4	7	1 & 8	7.0	
EF50	H.F. Pentode	B9G	6.3	0.3	3	7	2	4	6	1 & 9	5.6	
EF54	Pentode	B9G	6.3	0.3	2	6	3	—	4, 5, 7, 8	1 & 9	6.6	
EF55	H.F. Pentode	B9G	6.3	0.95	3	7	2	4	6	1 & 9	10.0	
EF80	H.F. Pentode	B9A	6.3	0.3	7	2	8	9, 6	3, 1	4 & 5	8.0	
EF91	H.F. Pentode	B7G	6.3	0.3	5	1	7	6	2	3 & 4	6.5	
EF92	Var. Mu Pentode	B7G	6.3	0.2	5	1	7	6	2	3 & 4	2.4	
EF95	H.F. Pentode	B7G	6.3	0.175	5	1	6	—	2, 7	3 & 4	6.0	
EK2	Octode	SC8	6.3	0.2	5	6	—	—	4	2 & 3	0.7	
					8	TC	7	—	4		0.4	
EL3	Output Pentode	SC8	6.3	0.9	8	6	7	—	4	2 & 3	8.0	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
EL32	Output Pentode	I.O	6.3	0.2	3	TC	4	—	8	2 & 7	4.0	
EL33	Output Pentode	I.O	6.3	0.9	3	5	4	—	8	2 & 7	8.0	
EL37	Output Pentode	I.O	6.3	1.4	3	5	4	—	8	2 & 7	11.0	V_{g2} = 60 V.
EL38	Output Pentode	I.O	6.3	1.4	TC	5	4	1	8	2 & 7	12.9	
EL41	Output Pentode	B8A	6.3	0.7	2	6	5	—	3, 7	1 & 8	11.0	
EL42	Output Pentode	B8A	6.3	0.2	2	6	5	—	3, 7	1 & 8	3.4	
EL50	Output Pentode	SC8	6.3	1.35	TC	6	7	5	4	2 & 3	10.4	V_{g2} = 90 V.
EL81	Output Pentode	B9A	6.3	1.0	TC	2	8	9	3	4 & 5	7.6	V_{g2} = 60 V. V_{g1} = — 5 V.
EL91	Output Pentode	B7G	6.3	0.2	5	1	7	—	2	3 & 4	3.3	
EQ80	Nonode	B9A	6.3	0.2	6	7	1	—	3, 8	4 & 5	1.0	V_a = 100 V. V_{g2} = 40 V. V_{g1} = — 0.5 V. Pins 2 & 9 connected to cathode.
EY51	H.W. Rectifier	Loose Leads	6.3	0.08	TC	—	—	—	—		10.0 mA	
EY91	H.W. Power Rectifier	B7G	6.3	0.42	1, 5	—	—	—	2	3 & 4		
EZ3	F.W. Power Rectifier	SC8	6.3	0.65	5, 8	—	—	—	4	2 & 3		
EZ35	F.W. Power Rectifier	I.O	6.3	0.6	3, 5	—	—	—	8	2 & 7		
EZ40	F.W. Power Rectifier	B8A	6.3	0.6	2, 6	—	—	—	7	1 & 8		
EZ41	F.W. Power Rectifier	B8A	6.3	0.4	2, 6	—	—	—	7	1 & 8		
FC2A	Octode	B7	2.0	0.14	1	2	—	—	—	4 & 5	0.6	
					7	TC	3	—	—		1.0	
FC4	Octode	B7	4.0	0.65	1	2	—	—	6	4 & 5	2.4	
					7	TC	3	—	6		1.8	
FC13	Octode	SC8	13.0	0.2	8	TC	7	—	4	2 & 3	1.8	
					5	6	—	—	4		2.4	
FC13C	Octode	B7	13.0	0.2	7	TC	3	—	6	4 & 5	1.8	
					1	2	—	—	6		2.4	
GU1	H.W. M.V. Power Rectifier	B4	4.0	3.0	1	—	—	—	—	3 & 4		

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
GU50	H.W. Power Rectifier M.V.	B4	4.0	3.0	TC	—	—	—	—	3 & 4		
GZ32	F.W. Power Rectifier	I.O	5.0	2.3	4, 6	—	—	—	—	2 & 8		
H30	Triode	B7	13.0	0.3	7	TC	—	—	6	4 & 5	6.0	
H63	Triode	I.O	6.3	0.3	4	TC	—	—	8	2 & 7	1.5	
HA1	Triode	Acorn	4.0	0.25	1	5	—	—	3	2 & 4	3.3	
HA2	Triode	Acorn	6.3	0.15	2	3	—	—	5	1 & 4	3.3	
HD14	Diode Triode	I.O	1.4	0.05	3	TC	—	—	—	2 & 7	0.5	
					5	—	—	—	—			
HD22	Double Diode Triode	B5	2.0	0.2	1	TC	—	—	—	3 & 4	1.5	
					2, 5	—	—	—	—			
HD23	Double Diode Triode	B5	2.0	0.15	1	TC	—	—	—	3 & 4	1.4	
					2, 5	—	—	—	—			
HD24	Double Diode Triode	B5	2.0	0.1	1	TC	—	—	—	3 & 4	1.4	
					2, 5	—	—	—	—			
HL2	Triode	B5	2.0	0.1	1	2	—	—	—	3 & 4	1.5	
HL2K	Triode	B5	2.0	0.1	1	2	—	—	—	3 & 4	1.5	
HL13	Triode	SC8	13.0	0.2	8	TC	—	—	4	2 & 3	3.2	
HL13C	Triode	B7	13.0	0.2	7	TC	—	—	6	4 & 5	3.2	
HL21DD ...	Double Diode Triode	B5	2.0	0.15	1	TC	—	—	—	3 & 4	1.5	
					2, 5	—	—	—	—			
HL23	Triode	M.O.	2.0	0.05	3	5	—	—	—	1 & 8	2.0	
HL23DD ...	Double Diode Triode	M.O.	2.0	0.05	3	TC	—	—	—	1 & 8	1.4	
					5, 7	—	—	—	—			
HL41	Triode	M.O.	4.0	0.65	3	5	—	—	2	1 & 8	3.5	
HL41DD ...	Double Diode Triode	M.O.	4.0	0.65	3	TC	—	—	2	1 & 8	2.5	
					5, 7	—	—	—	2			
HL42DD ...	Double Diode Triode	M.O.	4.0	0.65	3	TC	—	—	2	1 & 8	3.0	
					5, 7	—	—	—	2			
HL133DD ...	Double Diode Triode	M.O.	13.0	0.2	3	TC	—	—	2	1 & 8	2.5	
					5, 7	—	—	—	2			
HL210	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	0.8	
HL1320 ...	Triode	B7	13.0	0.2	7	TC	—	—	6	4 & 5	3.0	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
HVR2	H.W. Rectifier	B4	4.0	0.65	TC	—	—	—	—	3 & 4	I_a = 12 mA.	
HVR2A ...	H.W. Rectifier	B4	2.0	1.7	TC	—	—	—	—	3 & 4	I_a = 12 mA.	
IW3	F.W. Power Rectifier	B4	4.0	2.4	1, 2	—	—	—	—	3 & 4		
IW4/350 ...	F.W. Power Rectifier	B4	4.0	2.0	1, 2	—	—	—	—	3 & 4		
KT2	Output Tetrode	B5	2.0	0.2	1	2	5	—	—	3 & 4	2.5	
KT8	Output Tetrode	B5	6.3	1.27	TC	2	1	—	5	3 & 4	6.4	
KT8C	Tetrode	B5	6.3	1.27	TC	2	1	—	5	3 & 4	6.4	
KT8E	Output Tetrode	B5	6.3	0.9	TC	2	1	—	5	3 & 4	6.0	
KT24	Output Tetrode	B5	2.0	0.2	1	2	5	—	—	3 & 4	3.5	
KT30	Output Tetrode	B7	13.0	0.3	7	2	3	—	6	4 & 5	3.9	
KT31	Output Tetrode	B7	26.0	0.3	7	TC	3	—	6	4 & 5	10.0	
KT32	Output Tetrode	1.O	26.0	0.3	3	5	4	—	8	2 & 7	12.0	V_a = 80 V. V_{g2} = 80 V.
KT33C ...	Output Tetrode	1.O	26.0	0.3	3	5	4	—	8	2 & 7	12.0	V_a = 80 V. V_{g2} = 80 V.
KT41	Output Tetrode	B7	4.0	2.0	7	2	3	—	6	4 & 5	9.0	
KT42	Output Tetrode	B7	4.0	1.0	7	2	3	—	6	4 & 5	2.3	
KT44 (KT45) ...	Output Tetrode	B7	4.0	2.0	TC	2	7	3	6	4 & 5	8.8	
KT61	Output Tetrode	1.O	6.3	0.95	3	5	4	—	8	2 & 7	10.0	
KT63	Output Tetrode	1.O	6.3	0.7	3	5	4	—	8	2 & 7	2.5	
KT66	Output Tetrode	1.O	6.3	1.27	3	5	4	—	8	2 & 7	6.0	
KT67 (KT67B)	Output Tetrode	B9G	6.3	1.5	3	7	2	5	6	1 & 9	12.4	V_a = 60 V. V_{g2} = 50 V. V_{g1} = — 5.0 V.
KT71	Output Tetrode	1.O	48.0	0.16	3	5	4	—	8	2 & 7	8.0	
KT81	Output Tetrode	B8G	6.3	0.95	2	6	3	—	7	1 & 8	10.0	
KTW61* ...	H.F. Pentode	1.O	6.3	0.3	3	TC	4	5	8	2 & 7	5.1	V_a = 120 V. V_{g2} = 60 V.
KTW63 ...	Var Mu Pentode	1.O	6.3	0.3	3	TC	4	—	8	2 & 7	1.5	
KTZ41 ...	H.F. Pentode	B7	4.0	1.5	2	TC	7	—	6	4 & 5	8.0	
KTZ63 ...	H.F. Pentode	1.O	6.3	0.3	3	TC	4	—	8	2 & 7	1.2	
L2	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	1.9	
L21	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	1.8	

* Cannot be tested on VT/5 as V_{g2} = 60 V. unobtainable.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
L21DD ...	Double Diode Triode	B5	2.0	0.15	1	TC	—	—	—	3 & 4	1.9	
					2, 5	—	—	—	—			
L22DD ...	Double Diode Triode	M.O	2.0	0.1	3	TC	—	—	—	1 & 8	1.9	
					5, 7	—	—	—	—			
L30	Triode	B7	13.0	0.3	7	2	—	—	6	4 & 5	4.0	
L63	Triode	1.O	6.3	0.3	3	5	—	—	8	2 & 7	2.5	
L77	Triode	B7G	6.3	0.15	1, 5	6	—	—	7	3 & 4	2.8	
LP2	Triode	B4	2.0	0.2	1	2	—	—	—	3 & 4	3.8	
LS5	Triode	B4	4.5	0.8	1	2	—	—	—	3 & 4	0.9	
LS5A	Triode	B4	4.5	0.8	1	2	—	—	—	3 & 4	0.9	
LS5B	Triode	B4	4.5	0.8	1	2	—	—	—	3 & 4	0.9	
LS7	Triode	B4	4.0	0.15	1	2	—	—	—	3 & 4	2.4	
MH4	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	3.6	
MH40	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	2.4	
MH41	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	6.0	
MHD4	Double Diode Triode	B7	4.0	1.0	7	TC	—	—	6	4 & 5	2.2	
					1, 3	—	—	—	6			
MHL4	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	2.5	
MKT4 (5-Pin) ...	Output Tetrode	B5	4.0	1.0	1	2	ST	—	5	3 & 4	3.0	
MKT4 (7-Pin) ...	Output Tetrode	B7	4.0	1.0	7	2	3	—	6	4 & 5	3.0	
ML4	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	4.0	
ML6	Triode	B5	6.0	0.7	1	2	—	—	5	3 & 4	4.5	
MPT4 (5-Pin) ...	Output Pentode	B5	4.0	1.0	1	2	ST	—	5	3 & 4	3.0	
MPT4 (7-Pin) ...	Output Pentode	B7	4.0	1.0	7	2	3	—	6	4 & 5	3.0	
MPT42 (5-Pin) ...	Output Pentode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	3.0	
MPT42 (7 Pin) ...	Output Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	3.0	
MS4	H.F. Pentode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	1.1	
MS4B	H.F. Pentode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	2.2	
MSP4 5 Pin ...	H.F. Pentode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	4.0	
MSP4 7 Pin ...	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	4.0	
MSP41	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	3.4	
MSPEN	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	2.5	
MU2	H.W. M.V. Rectifier	B4	2.0	3.1	TC	—	—	—	—	3 & 4		

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
MU12	F.W. Power Rectifier	B4	4.0	2.4	1, 2	—	—	—	—	3 & 4		
MU12/14 ...	F.W. Power Rectifier	B4	4.0	2.4	1, 2	—	—	—	—	3 & 4		
MVSG	H.F. Tetrode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	3.0	
MVSPEN ...	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	2.0	
MVSPENB ...	H.F. Pentode	B7	4.0	1.0	2	TC	7	3	6	4 & 5	2.0	
MX40	Heptode	B7	4.0	1.0	1	2	—	—	6	4 & 5	0.6	
					7	TC	3	—	6		0.6	
N14	Output Pentode	1.O	1.4	0.1	3	5	4	—	—	2 & 7	2.0	V_a = 80 V. V_{g2} = 80 V. V_{g1} = — 4.5 V.
N16	Output Pentode	1.O	2.8	0.05	3	5	4	—	—	2 & 7, 8 CT	3.0	
N17	Pentode	B7G	2.8	0.05	2, 6	3	4	—	—	1 & 7, 5 CT	1.7	
N18	Output Pentode	B7G	2.8	0.05	2, 6	3	4	—	—	1 & 7, 5 CT	2.0	V_a = 90 V. V_{g2} = 90 V. V_{g1} = — 4.5 V.
N19	Output Pentode	B7G	2.8	0.05	2	6	3	—	—	1 & 7, 5 CT	2.5	V_a = 90 V. V_{g2} = 90 V.
N34	Output Pentode	B7	13.0	0.6	7	TC	3	2	6	4 & 5	10.0	
N43	Output Pentode	B7	4.0	2.0	7	TC	3	—	6	4 & 5	10.0	
N77	Output Pentode	B7G	6.3	0.2	5	1	7	—	2	3 & 4	3.3	
N78	Output Pentode	B7G	6.3	0.64	5	1	7	—	2	3 & 4	11.0	
NR16A	Triode	B4	4.0	0.2	1	2	—	—	—	3 & 4	2.2	
OM4	Double Diode Triode	1.O	6.3	0.2	3	TC	—	—	8	2 & 7	4.0	
					4, 5	—	—	—	8			
OM6	Var. Mu Pentode	1.O	6.3	0.2	3	TC	4	5	8	2 & 7	2.9	
OM7	H.F. Pentode	1.O	6.3	0.2	3	TC	4	5	8	2 & 7	2.8	
P2	Triode	B4	2.0	0.2	1	2	—	—	—	3 & 4	3.5	
P41	Triode	M.O	4.0	0.95	3	5	—	—	2	1 & 8	8.0	
P61	Triode	M.O	6.3	0.6	3	5	—	—	2	1 & 8	9.8	
P215	Triode	B4	2.0	0.15	1	2	—	—	—	3 & 4	1.4	
P625	Triode	B4	6.0	0.25	1	2	—	—	—	3 & 4	2.5	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
P650	Triode	B4	6.0	0.5	1	2	—	—	—	3 & 4	2.7	
PD220A ...	Double Triode	B7	2.0	0.2	7	1	—	—	—	4 & 5	1.6	
					3	2	—	—	—		1.6	
PEN4DD ...	Double Diode	B7	4.0	2.25	6	TC	7	—	2	4 & 5	8.0	
	Output Pentode				1, 3	—	—	—	2			
PEN4VA ...	Output Pentode	B7	4.0	1.35	7	2	3	—	6	4 & 5	3.5	
PEN4VB ...	Output Pentode	B7	4.0	1.95	7	2	3	—	6	4 & 5	10.0	
PEN25	Output Pentode	M.O	2.0	0.15	3	5	4	—	—	1 & 8	4.4	
PEN36C ...	Output Pentode	B7	33.0	0.2	7	2	3	—	6	4 & 5	8.0	
PEN44	Output Pentode	M.O	4.0	2.1	3	5	4	—	2	1 & 8	11.0	
PEN45	Output Pentode	M.O	4.0	1.75	3	5	4	—	2	1 & 8	9.0	
PEN45DD ...	Double Diode	M.O	4.0	2.0	3	TC	4	—	2	1 & 8	9.0	
	Output Pentode				5, 7	—	—	—	2			
PEN46	Output Pentode	M.O	4.0	1.75	TC	5	4	—	2	1 & 8	9.0	
PEN141 ...	Output Pentode	M.O	2.0	0.1	3	5	4	—	—	1 & 8	1.0	
PEN220 ...	Output Pentode	B5	2.0	0.2	1	2	5	—	—	3 & 4	2.5	
PEN220A ...	Output Pentode	B5	2.0	0.2	1	2	5	—	—	3 & 4	2.5	
PEN383 ...	Output Pentode	M.O	38.0	0.2	3	5	4	—	2	1 & 8	10.0	V_a = 80 V. V_{g2} = 80 V.
PEN1340 ...	Output Pentode	B7	13.0	0.4	7	2	3	—	6	4 & 5	5.0	
PEN3520 ...	Output Pentode	B7	35.0	0.2	7	2	3	—	6	4 & 5	7.0	
PEN3820 ...	Output Pentode	B7	38.0	0.2	7	2	3	—	6	4 & 5	10.0	V_a = 80 V. V_{g2} = 80 V.
PENA4	Output Pentode	B7	4.0	1.95	7	2	3	—	6	4 & 5	9.6	
PENB4	Output Pentode	B7	4.0	2.1	7	2	3	—	6	4 & 5	8.4	
PENDD1360 ...	Double Diode	B7	13.0	0.6	2	TC	7	—	6	4 & 5	8.0	
	Output Pentode				1, 3	—	—	—	6			
PENDD4020 ...	Double Diode	B7	40.0	0.2	2	TC	7	—	6	4 & 5	7.0	
	Output Pentode				1, 3	—	—	—	6			
PL33	Output Pentode	1.O	19.0	0.3	3	5	4	—	8	2 & 7	10.0	
PL38	Output Pentode	1.O	30.0	0.3	TC	5	4	1	8	2 & 7	13.0	
PL81	Output Pentode	B9A	21.5	0.3	TC	2	8	9	3	4 & 5	8.0	V_a = 100 V. V_{g1} = — 5.0 V. V_{g2} = 60 V.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
PL83	Output Pentode	B9A	15.0	0.3	7	2	1	6, 8	3	4 & 5	12.0	V_{g1} = — 1.0 V.
PM1HL	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	1.4	
PM2A	Triode	B4	2.0	0.2	1	2	—	—	—	3 & 4	3.5	
PM2B	Double Triode	B7	2.0	0.2	7	1	—	—	—	4 & 5	1.7	
					3	2	—	—	—		1.7	
PM2BA	Double Triode	B7	2.0	0.2	7	1	—	—	—	4 & 5	1.3	
					3	2	—	—	—		1.3	
PM2DL	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	1.5	
PM2DX ...	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	1.7	
PM2HL	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	1.3	
PM6D	Triode	B4	6.0	0.1	1	2	—	—	—	3 & 4	2.0	
PM12	H.F. Tetrode	B4	2.0	0.15	TC	2	1	—	—	3 & 4	1.0	
PM12A ...	H.F. Tetrode	B4	2.0	0.18	TC	2	1	—	—	3 & 4	1.0	
PM22A ...	Output Pentode	B5	2.0	0.15	1	2	5	—	—	3 & 4	2.5	
PM22D	Output Pentode	B5	2.0	0.3	1	2	5	—	—	3 & 4	2.5	
PM24	Output Pentode	B5	4.0	0.15	1	2	5,ST	—	—	3 & 4	2.0	
PM24A ...	Output Pentode	B5	4.0	0.275	1	2	5	—	—	3 & 4	2.0	
PM24B	Output Pentode	B5	4.0	1.0	1	2	5	—	—	3 & 4	2.2	
PM24C ...	Output Pentode	B5	4.0	1.0	1	2	5	—	—	3 & 4	3.0	
PM24D	Output Pentode	B5	4.0	2.0	1	2	5	—	—	3 & 4	4.0	
PM24E	Output Pentode	B5	4.0	2.0	1	2	5	—	—	3 & 4	4.0	
PM24M	Output Pentode	B5	4.0	1.0	1	2	5	—	—	3 & 4	3.2	
PM26	Output Pentode	B5	6.0	0.17	1	2	5,ST	—	—	3 & 4	2.0	
PP3 250... ...	Triode	B4	4.0	1.0	1	2	—	—	—	3 & 4	6.5	
PP5/400... ...	Triode	B4	4.0	2.0	1	2	—	—	—	3 & 4	6.0	
PP3521 ...	Triode	B7	35.0	0.2	7	2	—	—	6	4 & 5	10.0	
PT15	Power Pentode	B5	6.0	1.3	TC	2	1	5	—	3 & 4	2.8	
PVO5/15 ...	Pentode	SC8	12.0	0.4	TC	6	7	5	4	2 & 3	3.8	
PX4	Triode	B4	4.0	1.0	1	2	—	—	—	3 & 4	6.0	
PX25	Triode	B4	4.0	2.0	1	2	—	—	—	3 & 4	5.6	V_a = 50 V.
PX25A ...	Triode	B4	4.0	2.0	1	2	—	—	—	3 & 4	5.0	V_a = 50 V.
PY31	H.W. Power Rectifier	I.O	17.0	0.3	5	—	—	—	8	2 & 7		
PY80	H.W. Power Rectifier	B9A	19.0	0.3	9	—	—	—	3	4 & 5		

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
PZ30	F.W. Power Rectifier	I.O	52.0	0.3	3	—	—	—	4	2 & 7		
					5	—	—	—	8			
QP22B*... ...	Double Tetrode	B7	2.0	0.3	7	1	6	—	—	4 & 5	3.0	
					3	2	6	—	—		3.0	
QP25	Double Tetrode	M.O	2.0	0.2	3	5	4	—	—	1 & 8	2.6	
					7	6	4	—	—		2.6	
QP230* ...	Double Tetrode	B7	2.0	0.3	7	1	6	—	—	4 & 5	3.0	
					3	2	6	—	—		3.0	
QVO4/7 ...	Tetrode	B9G	6.3	0.6	2	7	3 & 4	—	6	1 & 9	4.0	
R3	F.W. Power Rectifier	B4	4.0	2.5	1, 2	—	—	—	—	3 & 4		
R10	H.W Rectifier	B7G	4.0	0.5	TC	—	—	—	1,2,5,6,7	3 & 4	I_a = 15 mA	
RG1/240A ...	H.W. M.V. Power Rectifier	B4	4.0	2.7	TC	—	—	—	—	3 & 4		
RG3/250A ...	H.W. M.V. Rectifier	USM4	2.5	5.0	TC	—	—	—	—	1 & 4		
RL7	H.F. Pentode	B9G	6.3	0.3	2	6	3	—	4,5,7,8	1 & 9	6.6	
RL16	Triode	B9G	6.3	0.5	4	2	—	—	3	1 & 9	5.4	
RL18	Triode	B3G	6.3	0.25	TC	TC	—	—	2	1 & 3	3.4	
S4VB	Var. Mu Pentode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	3.0	
S23	H.F. Tetrode	B4	2.0	0.1	TC	2	1	—	—	3 & 4	0.8	
S24	H.F. Tetrode	B4	2.0	0.15	TC	2	1	—	—	3 & 4	1.2	
S215VM... ...	Var. Mu H.F. Tetrode	B4	2.0	0.15	TC	2	1	—	—	3 & 4	2.0	
S610	H.F. Tetrode	B4	6.0	0.1	TC	2	1	—	—	3 & 4	1.0	
SD6	Diode	B7G	6.3	0.15	2	—	—	—	5	3 & 4		
SG215	H.F. Tetrode	B4	2.0	0.15	TC	2	1	—	—	3 & 4	1.5	
SP2	H.F. Pentode	B7	2.0	0.18	TC	2	7	3	—	4 & 5	1.3	
SP4 (5 Pin) ...	H.F. Pentode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	3.0	
SP4 (7 Pin) ...	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	3.0	
SP4B	H.F. Pentode	B7	4.0	0.65	2	TC	7	3	6	4 & 5	3.0	
SP13C	H.F. Pentode	B7	13.0	0.2	2	TC	7	3	6	4 & 5	2.5	
SP41	H.F. Pentode	M.O	4.0	0.95	3	TC	4	5	2	1 & 8	8.0	
SP42	H.F. Pentode	M.O	4.0	0.95	3	TC	4	5	2	1 & 8	9.2	
SP61	H.F. Pentode	M.O	6.3	0.6	3	TC	4	5	2	1 & 8	8.0	
SP141	H.F. Pentode	M.O	1.4	0.05	3	TC	4	—	—	1 & 8	0.8	V_{g2} = 90 V.

* N.B.—Cannot be tested on a VT/4 due to pin 6 being permanently connected to cathode.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
SP181	H.F. Pentode	M.O	18.0	0.2	3	TC	4	5	2	1 & 8	8.0	
SU25	H.W. Rectifier	1.O	2.0	0.5	TC	—	—	—	—	2 & 7	I_a = 13 mA	
SU2130	H.W. Rectifier	B4	2.0	1.0	TC	—	—	—	—	3 & 4	I_a = 18 mA	
SU2150	H.W. Rectifier	B4	2.0	1.15	TC	—	—	—	—	3 & 4	I_a = 13 mA	
SU2150A ...	H.W. Rectifier	B4	2.0	1.5	TC	—	—	—	—	3 & 4	I_a = 15 mA	
TDD2A ...	Double Diode Triode	B5	2.0	0.12	1	TC	—	—	—	3 & 4	1.4	
					2, 5	—	—	—	—			
TDD4	Double Diode Triode	B7	4.0	0.65	7	TC	—	—	6	4 & 5	2.0	
					1, 3	—	—	—	6			
TDD13C ...	Double Diode Triode	B7	13.0	0.2	7	TC	—	—	6	4 & 5	2.9	
					1, 3	—	—	—	6			
TH4 (TH4A) ...	Triode Heptode	B7	4.0	1.0	1	2	—	—	6	4 & 5	2.9	
					7	TC	3	—	6		1.8	
TH4B	Triode Heptode	B7	4.0	1.45	1	2	—	—	6	4 & 5	4.9	
					7	TC	3	—	6		2.1	
TH30C ...	Triode Heptode	B7	29.0	0.2	1	2	—	—	6	4 & 5	5.6	
					7	TC	3	—	6		3.0	
TH41	Triode Heptode	M.O	4.0	1.3	4	5	—	—	2	1 & 8	4.1	
					3	TC	7	—	2		3.1	
TH233	Triode Heptode	M.O	23.0	0.2	4	5	—	—	2	1 & 8	4.0	
					3	TC	7	—	2		3.4	
TH2320 ...	Triode Heptode	B7	23.0	0.2	1	2	—	—	6	4 & 5	4.1	
					7	TC	3	—	6		3.1	
TH2321 ...	Triode Heptode	B7	23.0	0.2	1	2	—	—	6	4 & 5	4.1	
					7	TC	3	—	6		3.4	
TP23	Triode Pentode	B7	2.0	0.25	1	2	—	—	—	4 & 5	2.7	
					7	TC	3	—	—		1.5	
TP25	Triode Pentode	M.O	2.0	0.2	4	5	—	—	—	1 & 8	2.7	
					3	TC	7	—	—		1.5	
TP26	Triode Pentode	M.O	2.0	0.2	4	5	—	—	—	1 & 8	1.8	
					3	TC	7	—	—		0.9	
TSP4	H.F. Pentode	B7	4.0	1.3	2	TC	7	3	6	4 & 5	4.0	
TT4	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	5.0	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
U8	F.W. Power Rectifier	B4	7.5	2.4	1, 2	—	—	—	—	3 & 4		
U10	F.W. Power Rectifier	B4	4.0	1.0	1, 2	—	—	—	—	3 & 4		
U12/14	F.W. Power Rectifier	B4	4.0	2.5	1, 2	—	—	—	—	3 & 4		
U16	H.W. Rectifier	B4	2.0	0.25	TC	—	—	—	—	3 & 4	I_a = 10 mA	
U16	H.W. Rectifier	B4	2.0	1.0	TC	—	—	—	—	3 & 4	I_a = 20 mA	
U17	H.W. Rectifier	B4	4.0	1.0	TC	—	—	—	—	3 & 4	I_a = 40 mA	
U18/20	F.W. Power Rectifier	B4	4.0	3.75	1, 2	—	—	—	—	3 & 4		
U22	H.W. Rectifier	M.O	2.0	2.0	TC	—	—	—	—	1 & 8	I_a = 8 mA	
U24	H.W. Rectifier	I.O	2.0	0.15	TC	—	—	—	—	2 & 7	I_a = 5 mA	
U27	H.W. Rectifier	B4	4.0	1.0	TC	—	—	—	—	3 & 4	I_a = 40 mA	
U29	H.W. Rectifier	B4	2.0	2.75	TC	—	—	—	—	3 & 4	I_a = 20 mA	
U30	F.W. Power Rectifier	B7	26.0	0.3	7	—	—	—	6	4 & 5		
					2	—	—	—	3	1 CT		
U31	H.W. Power Rectifier	I.O	26.0	0.3	5	—	—	—	8	2 & 7		
U33	H.W. Rectifier	B4	2.0	0.15	TC	—	—	—	—	3 & 4	I_a = 5 mA	
U37	H.W. Rectifier	Loose Leads	1.4	0.14	TC	—	—	—	—		I_a = 15 mA	
U50	F.W. Power Rectifier	I.O	5.0	2.0	4, 6	—	—	—	—	2 & 8		
U52	F.W. Power Rectifier	I.O	5.0	3.0	4, 6	—	—	—	—	2 & 8		
U76	H.W. Power Rectifier	I.O	30.0	0.16	5	—	—	—	8	2 & 7		
U78	F.W. Power Rectifier	B7G	6.3	0.6	1, 6	—	—	—	7	3 & 4		
U81	F.W. Power Rectifier	B8G	6.3	1.6	3, 6	—	—	—	7	1 & 8		
U82	F.W. Power Rectifier	B8G	6.3	0.6	3, 6	—	—	—	7	1 & 8		
U403	H.W. Power Rectifier	M.O	40.0	0.2	5	—	—	—	3	1 & 8		
U404	H.W Power Rectifier	B8A	40.0	0.1	2	—	—	—	7	1 & 8		
U4020	H.W. Power Rectifier	B5	40.0	0.2	1	—	—	—	5	3 & 4		
UR1C	H.W. Power Rectifier	B5	20.0	0.2	1	—	—	—	5	3 & 4		
UR3C	F.W. Power Rectifier	B7	30.0	0.2	2	—	—	—	3	4 & 5		
					7	—	—	—	6			
UU4	F.W. Power Rectifier	B4	4.0	2.2	1, 2	—	—	—	—	3 & 4		
UU5	F.W. Power Rectifier	B4	4.0	2.3	1, 2	—	—	—	—	3 & 4		
UU6	F.W. Power Rectifier	M.O	4.0	1.4	3, 5	—	—	—	—	1 & 8		

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
UU8	F.W Power Rectifier	M.O	4.0	2.8	3, 5	—	—	—	—	1 & 8		
UU8	F.W. Power Rectifier	M.O	4.0	3.4	3, 5	—	—	—	—	1 & 8		
UU9	F.W. Power Rectifier	B8A	6.3	0.63	2, 6	—	—	—	7	1 & 8		
UF41	Var. Mu Pentode	B8A	12.6	0.1	2	6	5	—	3,4,7	1 & 8	3.0	$V_{g1} = -1.5$ V.
UL41	Output Pentode	B8A	45.0	0.1	2	6	5	—	7	1 & 8	10.0	$V_{g1} = -4.0$ V.
UY31	H.W. Power Rectifier	I.O	50.0	0.1	5	—	—	—	8	2 & 7		
UY41	H.W. Power Rectifier	B8A	31.0	0.1	2	—	—	—	7	1 & 8		
V872	H.F. Pentode	M.O	6.3	0.63	3	TC	4	5	2	1 & 8	1.8	
V914	Double Diode	B5	4.0	0.3	1, 2	—	—	—	5	3 & 4		
VMP4G ...	Var. Mu Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	3.5	
VMS4	Var. Mu Tetrode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	1.0	
VMS4B ...	Var. Mu Tetrode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	2.5	
VP2	Var. Mu Pentode	B7	2.0	0.18	TC	2	7	3	—	4 & 5	1.7	
VP2B	Var. Mu Pentode	B7	2.0	0.135	2	TC	7, 6	3	—	4 & 5	2.4	
VP4 (5-Pin) ...	Var. Mu Pentode	B5	4.0	1.0	TC	2	1	—	5	3 & 4	2.0	
VP4 (7-Pin) ...	Var. Mu Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	2.0	
VP4B	Var. Mu Pentode	B7	4.0	0.65	2	TC	7	3	6	4 & 5	2.5	
VP13A	Var. Mu Pentode	SC8	13.0	0.2	8	TC	7	5	4	2 & 3	2.5	
VP13C	Var. Mu Pentode	B7	13.0	0.2	2	TC	7	3	6	4 & 5	2.5	
VP21	Var. Mu H.F. Pentode	B7	2.0	0.1	TC	2	7	3	6	4 & 5	1.1	
VP22	Var. Mu H.F. Pentode	M.O	2.0	0.1	3	TC	4	5	—	1 & 8	1.8	
VP23	Var. Mu H.F. Pentode	M.O	2.0	0.05	3	TC	4	5	—	1 & 8	1.3	$V_{g2} = 60$ V.
VP41	Var. Mu H.F. Pentode	M.O	4.0	0.65	3	TC	4	5	2	1 & 8	2.0	
VP133	Var. Mu Pentode	M.O	13.0	0.2	3	TC	4	5	2	1 & 8	2.0	
VP215	Var. Mu Pentode	B7	2.0	0.15	TC	2	7	3	—	4 & 5	1.8	
VP1321	Var. Mu Pentode	B7	13.0	0.2	TC	2	7	3	6	4 & 5	2.0	
VP1322	Var. Mu Pentode	B7	13.0	0.2	2	TC	7	3	6	4 & 5	2.0	
VR65	H.F. Pentode	M.O	6.3	0.63	3	TC	4	5	2	1 & 8	8.0	
VR78	Diode	B3G	4.0	0.2	TC	—	—	—	2	1 & 3		
VR92	Diode	B3G	6.3	0.15	TC	—	—	—	2	1 & 3		
W17	Var. Mu Pentode	B7G	1.4	0.05	2	6	3	—	—	1 & 7	1.0	
W21 (4-Pin) ...	Var. Mu Pentode	B4	2.0	0.1	TC	2	1	—	—	3 & 4	1.5	
W21 (7-Pin) ...	Var. Mu Pentode	B7	2.0	0.1	TC	2	7	—	—	4 & 5	1.5	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
W31	Var. Mu Pentode	B7	13.0	0.3	TC	2	7	3	6	4 & 5	3.0	
W42	Var. Mu Pentode	B7	4.0	0.6	2	TC	7	3	6	4 & 5	2.4	
W76	Var. Mu Pentode	1.O	13.0	0.16	3	TC	4	5	8	2 & 7	1.8	
W77	Var. Mu Pentode	B7G	6.3	0.2	5	1	7	6	2	3 & 4	2.5	
W.81	Var. Mu Pentode	B8G	6.3	0.3	2	6	3	4	7	1 & 8	5.0	
X14	Heptode	1.O	1.4	0.05	6	5	4	—	—	2 & 7	0.7	V_{g2} = 60 V.
					3	TC	4	—	—		0.8	
X17	Heptode	B7G	1.4	0.05	2	6	3	—	—	1 & 7	0.5	
					3	4	—	—	—		1.7	
X21	Heptode	B7	2.0	0.1	1	2	3	—	—	4 & 5	0.4	
					7	TC	3	—	—		0.2	
X22	Heptode	B7	2.0	0.15	1	2	3	—	—	4 & 5	0.5	
					7	TC	3	—	—		0.2	
X23	Heptode	B7	2.0	0.3	1	2	3	—	—	4 & 5	1.8	
					7	TC	3	—	—		1.0	
X24	Triode Hexode	B7	2.0	0.2	1	2	—	—	—	4 & 5	2.0	
					7	TC	3	—	—		1.0	
X31	Triode Hexode	B7	13.0	0.3	1	2	—	—	6	4 & 5	2.5	
					7	TC	3	—	6		1.8	
X34	Triode Hexode	B7	13.0	0.3	1	2	—	—	6	4 & 5	2.5	
					7	TC	3	—	6		1.8	
X41	Triode Hexode	B7	4.0	1.2	1	2	—	—	6	4 & 5	2.1	
					7	TC	3	—	6		2.6	
X61	Heptode	1.O	6.3	0.3	3	TC	4	—	8	2 & 7	2.0	
					6	5	—	—	8		1.4	
X63	Heptode	1.O	6.3	0.3	3	TC	4	—	8	2 & 7	1.1	
					6	5	—	—	8		0.5	
X64	Heptode	1.O	6.3	0.3	3	TC	4	—	8	2 & 7	1.2	
					6	5	—	—	8		0.6	
X65 X66 ...	Triode Hexode	1.O	6.3	0.3	3	TC	4	—	8	2 & 7	0.6	
					6	5	—	—	8		1.2	
X76	Triode Hexode	1.O	13.0	0.16	3	TC	4	—	8	2 & 7	2.8	
					6	5	—	—	8		3.4	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
X78	Triode Hexode	B7G	6.3	0.3	5	2	1	—	3	3 & 4	2.4	
					6	7	—	—	3		2.8	
X79	Triode Hexode	B9A	6.3	0.3	6	2	1	—	3	4 & 5	2.65	
					8	7	—	—	3		3.0	
X81	Triode Hexode	B8G	6.3	0.3	2	6	5	—	7	1 & 8	3.0	
					3	4	—	—	7		2.6	
Z14	H.F. Pentode	1.O	1.4	0.05	3	TC	4	—	—	2 & 7	0.9	
Z21 (4-Pin) ...	H.F. Pentode	B4	2.0	0.1	TC	2	1	—	—	3 & 4	1.6	
Z21 (7-Pin) ...	H.F. Pentode	B7	2.0	0.1	TC	2	7	—	—	4 & 5	1.6	
Z31	H.F. Pentode	B7	13.0	0.3	TC	2	7	3	6	4 & 5	2.5	
Z62	H.F. Pentode	1.O	6.3	0.45	3	TC	4	5	8	2 & 7	9.8	
Z66	H.F. Pentode	1.O	6.3	0.63	3	TC	4	5	8	2 & 7	7.6	
Z77	H.F. Pentode	B7G	6.3	0.3	5	1	7	6	2	3 & 4	6.5	
ZA1	H.F. Pentode	Acorn	4.0	0.25	TC	BC	1	5	3	2 & 4	1.8	
ZA2	H.F. Pentode	Acorn	6.3	0.15	TC	BC	2	3	5	1 & 4	1.8	
ZD17	Diode Pentode	B7G	1.4	0.05	5	6	4	—	—	1 & 7	0.8	
					3	—	—	—	—			
1A5	Output Pentode	1.O	1.4	0.05	3	5	4	—	—	2 & 7	0.6	
1A7	Heptode	1.O	1.4	0.05	6	5	4	—	—	2 & 7	0.7	V_{g2} = 60 V.
					3	TC	4	—	—		0.8	
1B3	H.W. Rectifier	1.O	1.25	0.2	TC	—	—	—	—	2 & 7	I_a = 6 mA	
1C5	Output Pentode	1.O	1.4	0.1	3	5	4	—	—	2 & 7	1.6	V_a = 80 V. V_{g2} = 80 V.
1D5 (Brimar) ...	H.W. Power Rectifier	B5	40.0	0.2	1	—	—	—	5	3 & 4		
1D6 (Brimar) ...	H.W. Power Rectifier	USS6	25.0	0.3	5	—	—	—	4	1 & 6		
1H5	Diode Triode	1.O	1.4	0.05	3	TC	—	—	—	2 & 7	0.5	
					5	—	—	—	—			
1N5	H.F. Pentode	1.O	1.4	0.05	3	TC	4	—	—	2 & 7	0.9	
1P5	Var. Mu Pentode	1.O	1.4	0.05	3	TC	4	—	—	2 & 7	1.0	V_a = 90 V. V_{g2} = 90 V.
1R5	Heptode	B7G	1.4	0.05	2	6	3	—	—	1 & 7	0.5	
					3	4	—	—	—		1.7	
1S4	Output Pentode	B7G	1.4	0.1	2	3	4	—	—	1 & 7	1.2	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
1S5	Diode Pentode	B7G	1.4	0.05	5	6	4	—	—	1 & 7	0.8	
					3	—	—	—	—			
1T4	Var. Mu Pentode	B7G	1.4	0.05	2	6	3	—	—	1 & 7	1.1	
1V	H.W. Power Rectifier	USS4	6.3	0.3	2	—	—	—	3	1 & 4		
2A3	Triode	USM4	2.5	2.5	2	3	—	—	—	1 & 4	5.0	
2A5	Output Pentode	USM6	2.5	1.75	2	4	3	—	5	1 & 6	2.5	
2A7	Heptode	USS7	2.5	0.8	4	5	3	—	6	1 & 7	0.8	
					2	TC	3	—	6		0.7	
2B7	Double Diode Var. Mu Pentode	USS7	2.5	0.8	2	TC	3	—	6	1 & 7	1.0	
					4, 5	—	—	—	6			
2D2	Double Diode	B5	2.0	0.09	1, 2	—	—	—	5	3 & 4		
2D4A	Double Diode	B5	4.0	0.65	1, 2	—	—	—	5	3 & 4		
2D4B	Double Diode	B7	4.0	0.35	7	—	—	—	6	4 & 5		
					2	—	—	—	3			
2P	Triode	B4	2.0	2.0	1	2	—	—	—	3 & 4	6.4	
2T/270K ...	H.W. Rectifier	B7G	4.0	0.5	TC	—	—	—	1,2,5,6,7	3 & 4	I_a = 15 mA	
2V/400A ...	H.W. M.V. Power Rectifier	USM4	2.5	5.0	TC	—	—	—	—	1 & 4		
2X2/2X2A ...	H.W Rectifier	USS4	2.5	1.75	TC	—	—	—	—	1 & 4	I_a = 11 mA	
2XP	Triode	B4	2.0	2.0	1	2	—	—	—	3 & 4	6.4	
3A4 ...	Pentode	B7G	2.8	0.1	2, 6	4	3	—	—	1 & 7 5 CT	3.6	
3B7/1291 ...	Double Triode	B8G	2.8	0.11	7	6	—	—	—	1 & 8	1.85	V_a = 90 V.
					2	3	—	—	—	4 CT	1.85	
3B240M ...	H.F. Triode	B8G	6.3	1.1	TC	3,4,5,6	—	—	2,7	1 & 8	16.0	
3D6	Output Pentode	B8G	2.8	0.11	2	6	3	—	—	1 & 8 7 CT	3.2	
3Q4	Output Pentode	B7G	2.8	0.05	2, 6	3	4	—	—	1 & 7 5 CT	2.0	V_a = 90 V. V_{g2} = 90 V. V_{g1} = — 4.5 V.
3Q5	Pentode	1.O	2.8	0.05	3	5	4	—	—	2 & 7 8 CT	2.8	V_a = 80 V.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
3S4	Output Pentode	B7G	2.8	0.05	2, 6	3	4	—	—	1 & 7 5 CT	2.5	
3V4	Output Pentode	B7G	2.8	0.05	2	6	3	—	—	1 & 7 5 CT	2.5	$V_a = 90$ V. $V_{g2} = 90$ V.
4THA	Triode Hexode	B7	4.0	1.5	1	2	—	—	6	4 & 5	4.8	
					7	TC	3	—	6		2.2	
4TPB	H.F. Pentode	B7	4.0	1.0	2	TC	7	3	6	4 & 5	6.3	
4TSA	Split Anode Pentode	B7	4.0	1.0	7 or TC	2	3	—	6	4 & 5	1.6 ea. anode	
4TSP	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	6.3	
4XP	Triode	B4	4.0	1.0	1	2	—	—	—	3 & 4	6.4	
5B/250A ...	H.F. Power Pentode	USM5	6.3	0.9	TC	3	2	—	4	1 & 5	6.5	
5R4	F.W. Power Rectifier	I.O	5.0	2.0	4, 6	—	—	—	—	2 & 8		
5T4	F.W. Power Rectifier	I.O	5.0	2.0	4, 6	—	—	—	—	2 & 8		
5U4	F.W. Power Rectifier	I.O	5.0	3.0	4, 6	—	—	—	—	2 & 8		
5V4	F.W. Power Rectifier	I.O	5.0	2.0	4, 6	—	—	—	—	2 & 8		
5Y3	F.W. Power Rectifier	I.O	5.0	2.0	4, 6	—	—	—	—	2 & 8		
5Z3	F.W. Power Rectifier	USM4	5.0	3.0	2, 3	—	—	—	—	1 & 4		
5Z4	F.W. Power Rectifier	I.O	5.0	2.0	4, 6	—	—	—	—	2 & 8		
6A3	Triode	USM4	6.3	1.0	2	3	—	—	—	1 & 4	5.3	
6A6	Double Triode	USM7	6.3	0.8	2	3	—	—	4	1 & 7	1.7	
					6	5	—	—	4		1.7	
6A7	Heptode	USS7	6.3	0.3	4	5	3	—	6	1 & 7	0.8	
					2	TC	3	—	6		0.7	
6AB7/1853 ...	H.F. Pentode	I.O	6.3	0.45	8	4	6	3	5	2 & 7	4.6	
6AC7/1852 ...	H.F. Pentode	I.O	6.3	0.45	8	4	6	3	5	2 & 7	11.0	
6AG5	H.F. Pentode	B7G	6.3	0.3	5	1	6	—	2, 7	3 & 4	4.2	
6AG7	H.F. Pentode	I.O	6.3	0.65	8	4	6	—	5	2 & 7	10.6	
6AK5	H.F. Pentode	B7G	6.3	0.175	5	1	6	—	2 & 7	3 & 4	6.0	
6AM6	H.F. Pentode	B7G	6.3	0.3	5	1	7	6	2	3 & 4	6.5	
6AQ5	Output Tetrode	B7G	6.3	0.45	5	1, 7	6	—	2	3 & 4	4.5	
6AS7G	Double Triode	I.O	6.3	2.5	5	4	—	—	6	7 & 8	5.2 at I_a = 35 mA	
					2	1	—	—	3			
6AU6	H.F. Pentode	B7G	6.3	0.3	5	1	6	2	7	3 & 4	5.5	$V_{g1} = -0.5$ V.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
6B7	Double Diode	USS7	6.3	0.3	2	TC	3	—	6	1 & 7	1.0	
	Var. Mu Pentode				4, 5	—	—	—	6			
6B8	Double Diode	1.O	6.3	0.3	3	TC	6	—	8	2 & 7	1.0	
	Var. Mu Pentode				4, 5	—	—	—	8			
6BA6	H.F. Pentode	B7G	6.3	0.5	5	1	6	2	7	3 & 4	5.6	
6BE6	Heptode	B7G	6.3	0.3	5	1	6	7	2	3 & 4	3.2	
6BG6G	Output Tetrode	1.O	6.3	0.9	TC	5	8	—	3	2 & 7	7.2	
6C4	Triode	B7G	6.3	0.15	1, 5	6	—	—	7	3 & 4	3.0	
6C5	Triode	1.O	6.3	0.3	3	5	—	—	8	2 & 7	2.0	
6C6	H.F. Pentode	USS6	6.3	0.3	2	TC	3	4	5	1 & 6	1.5	
6C8	Double Triode	1.O	6.3	0.3	3	TC	—	—	4	2 & 7	2.0	
					6	5	—	—	8		2.0	
6C9	Triode Hexode	B8A	6.3	0.45	2	6	5	4	7	1 & 8	3.0	
					3	4	—	—	7		3.4	
6CH6	Output Pentode	B9A	6.3	0.75	7	2	8	9	3	4 & 5	12.4	
6D1	Diode	B3G	6.3	0.15	TC	—	—	—	2	1 & 3		
6D2	Double Diode	B7G	6.3	0.3	2	—	—	—	5	3 & 4		
					7	—	—	—	1			
6D6	Var. Mu Pentode	USS6	6.3	0.3	2	TC	3	4	5	1 & 6	1.6	
6F1	H.F. Pentode	B8A	6.3	0.35	2	6	4	3	5, 7	1 & 8	9.0	
6F5	Triode	1.O	6.3	0.3	4	TC	—	—	8	2 & 7	2.0	
6F6	Output Pentode	1.O	6.3	0.7	3	5	4	—	8	2 & 7	2.5	
6F7	Triode Pentode	USS7	6.3	0.3	4	5	—	—	6	1 & 7	0.5	
					2	TC	3	—	6		1.3	
6F8	Double Triode	1.O	6.3	0.6	3	TC	—	—	4	2 & 7	3.0	
					6	5	—	—	8		3.0	
6F11	H.F. Pentode	B8A	6.3	0.2	2	6	5	4	7	1 & 8	2.8	
6F12	H.F. Pentode	B7G	6.3	0.3	5	1	7	6	2	3 & 4	6.5	
6F13	H.F. Pentode	B8A	6.3	0.35	2	6	5	4	7	1 & 8	11.0	
6F14	H.F. Pentode	B8A	6.3	0.35	2	6	5	4	7	1 & 8	9.8	
6F15	Var. Mu Pentode	B8A	6.3	0.2	2	6	5	4	7	1 & 8	2.8	
6F32	H.F. Pentode	M.O	6.3	0.63	3	TC	4	5	2	1 & 8	1.8	
6F33	H.F. Pentode	B7G	6.3	0.35	5	1	7	6	2	3 & 4	1.9	$V_{g1} = -1.5$ V.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
6H6	Double Diode	I.O	6.3	0.3	3	—	—	—	4	2 & 7		
					5	—	—	—	8			
6J5	Triode	I.O	6.3	0.3	3	5	—	—	8	2 & 7	3.0	
6J7	H.F. Pentode	I.O	6.3	0.3	3	TC	4	5	8	2 & 7	1.5	
6K6	Output Pentode	I.O	6.3	0.4	3	5	4	—	8	2 & 7	3.0	
6K7	Var. Mu Pentode	I.O	6.3	0.3	3	TC	4	5	8	2 & 7	1.4	
6K8	Triode Hexode	I.O	6.3	0.3	6	5	—	—	8	2 & 7	2.0	
					3	TC	4	—	8		0.4	
6L6	Output Pentode	I.O	6.3	0.9	3	5	4	—	8	2 & 7	5.7	
6L7	Heptode	I.O	6.3	0.3	3	TC	4	5	8	2 & 7	1.7	
6L18	Triode	B8A	6.3	0.3	2	6	—	—	7	1 & 8	10.6	
6L19	Double Triode	B8A	6.3	0.4	5	6	—	—	7	1 & 8	3.2	
					2	3	—	—	4		3.2	
6LD20	Double Diode Triode	B8A	6.3	0.25	2	3	—	—	7	1 & 8	3.4	
					5, 6	—	—	—	7			
6N7	Double Triode	I.O	6.3	0.8	3	4	—	—	8	2 & 7	1.7	
					6	5	—	—	8			
6P7	Triode Pentode	I.O	6.3	0.3	6	7	—	—	8	2 & 3	0.5	
					4	TC	5	—	8		1.3	
6P25	Output Tetrode	I.O	6.3	1.1	3	5	4	—	8	2 & 7	8.4	
6P28	Output Tetrode	I.O	6.3	1.1	TC	5	4	—	8	2 & 7	10.0	
6Q7	Double Diode Triode	I.O	6.3	0.3	3	TC	—	—	8	2 & 7	1.4	
					4, 5	—	—	—	8			
6R7	Double Diode Triode	I.O	6.3	0.3	3	TC	—	—	8	2 & 7	2.0	
					4, 5	—	—	—	8			
6S7	Var. Mu Pentode	I.O	6.3	0.15	3	TC	4	5	8	2 & 7	1.7	
6SA7	Heptode	I.O	6.3	0.3	3	5	4	8	6	2 & 7	1.4	
6SC7	Double Triode	I.O	6.3	0.3	2	3	—	—	6	7 & 8	1.3	
					5	4	—	—	6		1.3	
6SF5	Triode	I.O	6.3	0.3	5	3	—	—	2	7 & 8	2.0	
6SG7	Var. Mu Pentode	I.O	6.3	0.3	8	4	6	—	5	2 & 7	4.4	
6SH7	H.F. Pentode	I.O	6.3	0.3	8	4	6	—	3 & 5	2 & 7	4.4	
6SJ7	H.F. Pentode	I.O	6.3	0.3	8	4	6	3	5	2 & 7	2.2	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
6SK7	Var. Mu Pentode	1.O	6.3	0.3	8	4	6	3	5	2 & 7	2.2	
6SL7	Double Triode	1.O	6.3	0.3	5	4	—	—	6	7 & 8	1.5	
					2	1	—	—	3		1.5	
6SN7	Double Triode	1.O	6.3	0.3	5	4	—	—	6	7 & 8	3.1	
					2	1	—	—	3		3.1	
6SQ7	Double Diode Triode	1.O	6.3	0.3	6	2	—	—	3	7 & 8	1.2	
					4, 5	—	—	—	3			
6T8	Triple Diode Triode	B9A	6.3	0.45	9	8	—	—	7	4 & 5	1.4	
					6	—	—	—	7			
					2	—	—	—	3			
					1	—	—	—	7			
6U7	Var. Mu Pentode	1.O	6.3	0.3	3	TC	4	5	8	2 & 7	1.7	
6V6	Output Pentode	1.O	6.3	0.45	3	5	4	—	8	2 & 7	4.2	
6X4	F.W. Power Rectifier	B.7G	6.3	0.6	1,6	—	—	—	7	3 & 4		
6X5	F.W. Power Rectifier	1.O	6.3	0.6	3, 5	—	—	—	8	2 & 7		
6Y6	Output Pentode	1.O	6.3	1.25	3	5	4	—	8	2 & 7	12.0	
6Z7	Double Triode	1.O	6.3	0.3	3	4	—	—	8	2 & 7	1.5	
					6	5	—	—	8		1.5	
7A4	Triode	B8G	6.3	0.3	2	6	—	—	7	1 & 8	3.0	
7B6	Double Diode Triode	B 8G	6.3	0.3	2	3	—	—	4, 7	1 & 8	1.0	
					5, 6	—	—	—	4, 7			
7C5	Output Pentode	B8G	6.3	0.45	2	6	3	—	7	1 & 8	4.6	
7D10	Output Pentode	B9A	6.3	0.75	7	2	8	9	3	4 & 5	12.4	
7F7	Double Triode	B8G	6.3	0.3	3	4	—	—	2	1 & 8	1.6	
					6	5	—	—	7		1.6	
7H7	Var. Mu H.F. Pentode	B8G	6.3	0.3	2	6	3	4	7	1 & 8	4.0	
8D3	H.F. Pentode	B7G	6.3	0.3	5	1	7	6	2	3 & 4	6.5	
8D5	Pentode	B9A	6.3	0.15	7	2	8	9	3	4 & 5	2.6	
8D7	Pentode	B9A	6.3	0.15	7	TC	8	9	3	4 & 5	2.6	
9D2	Var. Mu Pentode	B7	13.0	0.2	2	TC	7	3	6	4 & 5	2.0	
9D6	Var. Mu Pentode	B7G	6.3	0.2	5	1	7	6	2	3 & 4	2.1	
10C1	Triode Heptode	B8A	28.0	0.1	3	4	—	—	7	1 & 8	3.5	
					2	6	5	—	7		2.7	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
10D1	Double Diode	B5	13.0	0.2	1, 2	—	—	—	5	3 & 4		
10F1	H.F. Pentode	B8A	22.0	0.1	2	6	4	3	5, 7	1 & 8	9.0	
10F9	Var. Mu Pentode	B8A	13.0	0.1	2	6	5	4	7	1 & 8	2.5	
10LD11 ...	Double Diode Triode	B8A	15.0	0.1	2	3	—	—	7	1 & 8	3.0	
					6, 5	—	—	—	7			
10P13	Output Tetrode	B8A	40.0	0.1	2	6	5	—	7	1 & 8	12.2	
10P14	Output Pentode	1.O	40.0	0.1	3	5	4	—	8	2 & 7	11.4	
11E2	Output Tetrode	1.O	6.3	0.9	Side Cap	5	4	—	8	2 & 7	8.5	
11E3	Output Tetrode	B7	4.2	2.5	TC	2	7	—	6	4 & 5	No figures available	
12A6	Output Tetrode	1.O	12.6	0.15	3	5	4	—	8	2 & 7	3.4	
12A7	Output Pentode and H.W. Power Rectifier	USS7	12.6	0.3	2	TC	3	—	6	1 & 7	1.0	
					5	—	—	—	4			
12AT7	Double Triode	B9A	12.6	0.15	6	7	—	—	8	4 & 5	7.0	
					1	2	—	—	3	9 CT	7.0	
12AU6	Pentode	B7G	12.6	0.15	5	1	6	2	7	3 & 4	3.8	
12AU7	Double Triode	B9A	12.6	0.15	6	7	—	—	8	4 & 5	3.0	
					1	2	—	—	3	9 CT	3.0	
12AX7	Double Triode	B9A	12.6	0.15	6	7	—	—	8	4 & 5	2.2	
					1	2	—	—	3	9 CT	2.2	
12BA6	Var. Mu Pentode	B7G	12.6	0.15	5	1	6	2	7	3 & 4	5.6	
12BE6	Heptode	B7G	12.6	0.15	5	1	6	7	2	3 & 4	3.2	
12C8	Double Diode Pentode	1.O	12.6	0.15	3	TC	6	—	8	2 & 7	1.0	
					4, 5	—	—	—	8			
12E1	Output Tetrode	1.O	6.3	1.6	TC	5	4	—	8	2 & 7	5.0	$V_a = 80$ V. $V_{g2} = 30$ V.
12H6	Double Diode	1.O	12.6	0.15	3	—	—	—	4	2 & 7		
					5	—	—	—	8			
12J5	Triode	1.O	12.6	0.15	3	5	—	—	8	2 & 7	3.0	
12J7	H.F. Pentode	1.O	12.6	0.15	3	TC	4	5	8	2 & 7	1.5	
12K7	Var. Mu Pentode	1.O	12.6	0.15	3	TC	4	5	8	2 & 7	1.4	
12K8	Triode Hexode	1.O	12.6	0.15	6	5	—	—	8	2 & 7	2.0	
					3	TC	4	—	8		0.4	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
12Q7	Double Diode Triode	1.O	12.6	0.15	3	TC	—	—	8	2 & 7	1.4	
					4, 5	—	—	—	8			
12SA7	Heptode	1.O	12.6	0.15	3	5	4	8	6	2 & 7	1.4	
12SC7	Double Triode	1.O	12.6	0.15	2	3	—	—	6	7 & 8	1.3	
					5	4	—	—	6		1.3	
12SF5	Triode	1.O	12.6	0.15	5	3	—	—	2	7 & 8	2.0	
12SG7	Var. Mu Pentode	1.O	12.6	0.15	8	4	6	—	5	2 & 7	4.4	
12SH7	H.F. Pentode	1.O	12.6	0.15	8	4	6	—	5	2 & 7	4.0	
12SJ7	H.F. Pentode	1.O	12.6	0.15	8	4	6	3	5	2 & 7	2.2	
12SR7	Double Diode Triode	1.O	12.6	0.15	6	2	—	—	3	7 & 8	1.9	
					4, 5	—	—	—	3			
15D1	Heptode	B7	13.0	0.2	1	2	3	—	6	4 & 5	0.9	
					7	TC	3	—	6		0.5	
18	Output Pentode	USS6	14.0	0.3	2	4	3	—	5	1 & 6	2.6	
19G6	H.W. Rectifier	B7G	4.0	0.5	TC	—	—	—	1,2,5,6,7	3 & 4	I_a = 30 mA	V_a = 80 V.
19H1	H.W. Rectifier	B4	4.0	2.0	TC	—	—	—	—	3 & 4		
19T8	Triple Diode Triode	B9A	19.0	0.15	9	8	—	—	7	4 & 5	1.4	
					1, 6	—	—	—	7			
					2	—	—	—	3			
22V/310A ...	F.W. M.V. Power Rectifier	USM4	5.0	3.0	2, 3	—	—	—	—	1 & 4		
25L6	Output Pentode	1.O	25.0	0.3	3	5	4	—	8	2 & 7	11.0	V_a = 80 V. V_{g2} = 80 V.
25RE	F.W. Power Rectifier	USS6	25.0	0.3	2	—	—	—	3	1 & 6		
					5	—	—	—	4			
25Y5	F.W. Power Rectifier	USS6	25.0	0.3	5	—	—	—	4	1 & 6		
					2	—	—	—	3			
25Z4	H.W. Power Rectifier	1.O	25.0	0.3	3, 5	—	—	—	8	2 & 7		
25Z5	F.W. Power Rectifier	USS6	25.0	0.3	2	—	—	—	3	1 & 6		
					5	—	—	—	4			
25Z6	F.W. Power Rectifier	1.O	25.0	0.3	3	—	—	—	4	2 & 7		
					5	—	—	—	8			

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
28D7	Output Double Pentode	B8G	28.0	0.4	5	7	3	—	6	1 & 8	7.0	V_a = 60 V. V_{g2} = 40 V.
					4	2	3	—	6			
30	Triode	USS4	2.0	0.06	2	3	—	—	—	1 & 4	1.2	
35DH2A ...	H.W. Rectifier	1.O	1.3	0.8	TC	—	—	—	8	2 & 7	I_a = 9 mA	
35L6	Output Pentode	1.O	35. 0	0.15	3	5	4	—	8	2 & 7	7.0	
35Z4	H.W. Power Rectifier	1.O	35.0	0.15	5	—	—	—	8	2 & 7		
35Z5	H.W. Power Rectifier	1.O	35.0	0.15	5	—	—	—	8	2 & 7		
37	Triode	USS5	6.3	0.3	2	3	—	—	4	1 & 5	1.5	
41	Output Pentode	USS6	6.3	0.4	2	4	3	—	5	1 & 6	3.0	
41MH	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	4.0	
41MP	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	7.4	
41MPG	Heptode	B7	4.0	1.0	1	2	3	—	6	4 & 5	1.6	
					7	TC	3	—	6		1.0	
41MPT	H.F. Pentode	B7	4.0	1.0	TC	2	7	3	6	4 & 5	4.8	
41MTA	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	4.0	
41MTB ...	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	2.6	
41MTL	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	3.0	
41MTS	Split Anode Pentode	B7	4.0	1.0	1	2	3	—	6	4 & 5	1.6	
					7	2	3	—	6		1.6	
41MXP	Triode	B5	4.0	1.0	1	2	—	—	5	3 & 4	7.4	
41STH	Triode Hexode	B7	4.0	1.0	1	2	—	—	6	4 & 5	4.3	
					7	TC	3	—	6		3.2	
42	Output Pentode	USM6	6.3	0.7	2	4	3	—	5	1 & 6	2.5	
42MPT	H.F. Pentode	B7	4.0	2.0	TC	2	7	3	6	4 & 5	6.0	
42SPT	H.F. Pentode	B7	4.0	2.0	TC	2	7	3	6	4 & 5	10.0	
43	Output Pentode	USM6	25.0	0.3	2	4	3	—	5	1 & 6	4.0	
43IU	F.W. Power Rectifier	B4	4.0	2.5	1, 2	—	—	—	—	3 & 4		
44IU	F.W. Power Rectifier	B4	4.0	2.5	1, 2	—	—	—	—	3 & 4		
45	Triode	USM4	2.5	1.5	2	3	—	—	—	1 & 4	2.6	
45IU	F.W. Power Rectifier	B4	4.0	3.5	2, 1	—	—	—	—	3 & 4		
50L6	Output Pentode	1.O	50.0	0.15	3	5	4	—	8	2 & 7	11.0	
53	Double Triode	USM7	2.5	2.0	2	3	—	—	4	1 & 7	1.7	
					6	5	—	—	4		1.7	

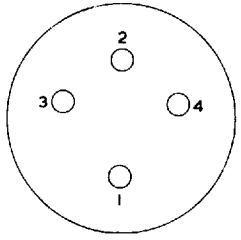
Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
53KU	F.W. Power Rectifier	I.O	5.0	2.8	4, 6	—	—	—	—	2 & 8		
56	Triode	USS5	2.5	1.0	2	3	—	—	4	1 & 5	1.8	
57	H.F. Pentode	USS6	2.5	1.0	2	TC	3	4	5	1 & 6	1.5	
58	Var. Mu Pentode	USS6	2.5	1.0	2	TC	3	4	5	1 & 6	1.7	
59	Output Pentode	USM7	2.5	2.0	2	4	3	5	6	1 & 7	2.6	
61BT	Output Pentode	I.O	6.3	0.85	TC	5	4	—	8	2 & 7	6.2	V_{g2} = 60 V.
61SPT	H.F. Pentode	I.O	6.3	1.27	TC	5	4	3	8	2 & 7	10.4	
63SPT	H.F. Pentode	B9G	6.3	0.3	3	7	2	4	6	1 & 9	8.0	
75	Double Diode Triode	USS6	6.3	0.3	2	TC	—	—	5	1 & 6	1.2	
					3, 4	—	—	—	5			
76	Triode	USS5	6.3	0.3	2	3	—	—	4	1 & 5	1.8	
77	H.F. Pentode	USS6	6.3	0.3	2	TC	3	4	5	1 & 6	1.7	
78	Var. Mu Pentode	USS6	6.3	0.3	2	TC	3	4	5	1 & 6	1.4	
79	Double Triode	USS6	6.3	0.6	5	TC	—	—	4	1 & 6	1.5	
					2	3	—	—	4		1.5	
80	F.W. Power Rectifier	USM4	5.0	2.0	2, 3	—	—	—	—	1 & 4		
80S	F.W. Power Rectifier	USM4	5.0	2.0	2, 3	—	—	—	—	1 & 4		
82	M.V. F.W. Power Rectifier	USM4	2.5	3.0	2, 3	—	—	—	—	1 & 4		
83	M.V. F.W. Power Rectifier	USM4	5.0	3.0	2, 3	—	—	—	—	1 & 4		
83V	F.W. Power Rectifier	USM4	5.0	2.0	2, 3	—	—	—	—	1 & 4		
84/6Z4 ...	F.W. Power Rectifier	USS5	6.3	0.5	2, 3	—	—	—	4	1 & 5		
85	Double Diode Triode	USS6	6.3	0.3	2	TC	—	—	5	1 & 6	1.5	
					3, 4	—	—	—	5			
89	Output Pentode	USS6	6.3	0.4	2	TC	3	4	5	1 & 6	2.0	
202DDT ...	Double Diode Triode	B7	20.0	0.2	7	TC	—	—	6	4 & 5	2.5	
					1, 3	—	—	—	6			
202STH ...	Triode Hexode	B7	20.0	0.2	7	TC	3	—	6	4 & 5	1.56	
					1	2	—	—	6		2.16	
202VP	Var. Mu Pentode	B7	20.0	0.2	TC	2	7	3	6	4 & 5	2.7	
202VPB ...	Var. Mu Pentode	B7	20.0	0.2	2	TC	7	3	6	4 & 5	2.8	

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
203THA ...	Triode Hexode	B7	20.0	0.3	7	TC	3	—	6	4 & 5	2.0	
					1	2	—	—	6		5.0	
210DDT ...	Double Diode Triode	B5	2.0	0.1	1	TC	—	—	—	3 & 4	1.0	
					2, 5	—	—	—	—			
210HL	Triode	B4	2.0	0.1	1	2	—	—	—	3 & 4	1.0	
210SPT (5-Pin)	H.F. Pentode	B5	2.0	0.1	TC	2	1	3	—	3 & 4	1.2	
210SPT (7-Pin)	H.F. Pentode	B7	2.0	0.1	TC	2	7	3	—	4 & 5	1.2	
210VPT (5-Pin)	Var. Mu Pentode	B5	2.0	0.1	TC	2	1	3	—	3 & 4	1.0	
210VPT (7-Pin)	Var. Mu Pentode	B7	2.0	0.1	TC	2	7	3	—	4 & 5	1.0	
215P	Triode	B4	2.0	0.15	1	2	—	—	—	3 & 4	2.0	
220B	Double Triode	B7	2.0	0.2	7	1	—	—	—	4 & 5	1.2	
					3	2	—	—	—		1.2	
225DU ...	F.W. Rectifier	B7	2.0	0.5	7	—	—	—	—	5 & 6		
			2.0	0.5	2	—	—	—	—	3 & 4		
240B	Double Triode	B7	2.0	0.4	7	1	—	—	—	4 & 5	1.5	
					3	2	—	—	—		1.5	
240QP* ...	Double Pentode	B7	2.0	0.4	7	1	6	—	—	4 & 5	2.5	
					3	2	6	—	—		2.5	
247A	Triode	USM5	2.0	1.6	2	3	—	—	4	1 & 5	1.0	
262B	Triode	USS4	10.0	0.3	2	TC	—	—	3	1 & 4	1.0	
301A	F.W. M.V. Power Rectifier	USS4	5.0	3.0	2, 3	—	—	—	—	1 & 4		
349A	Output Tetrode	1.O	6.3	1.0	3	5	4	—	8	2 & 7	4.6	
350A	Output Tetrode	USM5	6.3	1.6	TC	3	2	—	4	1 & 5	9.2	
351A	F.W. Power Rectifier	1.O	6.3	1.0	3, 5	—	—	—	8	2 & 7		
354V	Triode	B5	4.0	0.65	1	2	—	—	5	3 & 4	3.2	
405BU	F.W. Power Rectifier	B4	4.0	0.5	1, 2	—	—	—	—	3 & 4		
506 (506BU) ...	F.W. Power Rectifier	B4	4.0	1.0	1, 2	—	—	—	—	3 & 4		
802	H.F. Pentode	USM7	6.3	0.9	TC	4	3	5	6	1 & 7	No figures available	
807	Output Pentode	USM5	6.3	0.9	TC	3	2	—	4	1 & 5	6.5	
836	H.W. Power Rectifier	USM4	2.5	5.0	TC	—	—	—	—	1 & 4		
843	Triode	USM5	2.5	2.5	2	3	—	—	4	1 & 5	1.6	

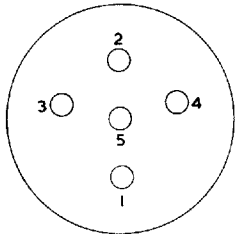
* Cannot be tested on VT/4 due to pin 6 being permanently connected to cathode.

Valve Type	Function	Base	V_f	I_f	Electrode Connections A	G1	G2	G3	C	Heaters	Average g_m or I_a (Rect)	Test Voltages VT/4
866A/866 ...	H.W. M.V. Power Rectifier	USM4	2.5	5.0	TC	—	—	—	—	1 & 4		
954	H.F. Pentode	Acorn	6.3	0.15	TC	BC	2	3	5	1 & 4	1.8	
955	Triode	Acorn	6.3	0.15	2	3	—	—	5	1 & 4	3.3	
956	Var. Mu Pentode	Acorn	6.3	0.15	TC	BC	2	3	5	1 & 4	2.2	
958	Triode	Acorn	1.25	0.1	2	3	—	—	—	1 & 4	1.5	
959	Pentode	Acorn	1.25	0.05	TC	BC	2	3	—	1 & 4	0.8	
1221	H.F. Pentode	USS6	6.3	0.3	2	TC	3	4	5	1 & 6	1.5	
1561	F.W. Power Rectifier	B4	4.0	2.0	1, 2	—	—	—	—	3 & 4		
1603	H.F. Pentode	USS6	6.3	0.3	2	TC	3	4	5	1 & 6	1.5	
1612	Heptode	1.O	6.3	0.3	3	TC	4	5	8	2 & 7	1.7	
1620	H.F. Pentode	1.O	6.3	0.3	3	TC	4	5	8	2 & 7	1.5	
1621	Output Pentode	1.O	6.3	0.7	3	5	4	—	8	2 & 7	2.5	
1622	Output Pentode	1.O	6.3	0.9	3	5	4	—	8	2 & 7	5.7	
1807	F.W. Power Rectifier	B4	4.0	2.0	1, 2	—	—	—	—	3 & 4		
1815	F.W. Power Rectifier	B4	4.0	2.3	1, 2	—	—	—	—	3 & 4		
1821	F.W. Power Rectifier	B4	4.0	1.0	1, 2	—	—	—	—	3 & 4		
1831	F.W. Power Rectifier	B4	4.0	1.0	1, 2	—	—	—	—	3 & 4		
1851	H.F. Pentode	1.O	6.3	0.45	3	TC	4	5	8	2 & 7	11.0	
4019A	Triode	USM4	4.0	0.25	2	3	—	—	—	1 & 4	1.7	
4020A	Triode	USM4	4.0	0.25	2	3	—	—	—	1 & 4	0.7	
4021A	Triode	USM4	4.0	0.25	2	3	—	—	—	1 & 4	3.7	
4024B	Triode	B5	4.0	1.1	1	2	—	—	5	3 & 4	12.0	
4033A	Triode	B5	6.0	1.4	1	2	—	—	5	3 & 4	8.4	
4043C	Triode	USM4	7.5	1.2	2	3	—	—	—	1 & 4	1.3	
4046A	H.F. Pentode	B5	4.0	0.95	TC	2	1	—	5	3 & 4	3.0	
4048A	H.W. Rectifier	B5	1.8	5.0	1	—	—	—	—	3 & 4		
4061A	H.F. Pentode	USM7	6.3	0.8	TC	4	3	5	6	1 & 7	2.2	
4074A	Double Triode	USM7	6.3	0.8	TC	3	—	—	4	1 & 7	2.3	
					TC	5	—	—	4		2.3	
4673	H.F. Pentode	SC8	4.0	1.35	8	TC	7	5	4	2 & 3	5.2	
4683	Triode	SC8	4.0	0.95	8	6	—	—	—	2 & 3	6.2	
5763	Output Pentode	B9A	6.0	0.75	1	8, 9	6	3	7	4 & 5	7.0	

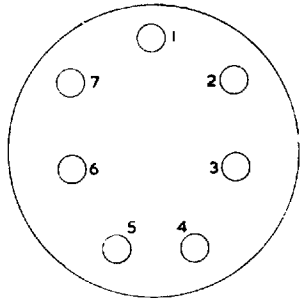
PART 3. VALVE BASES



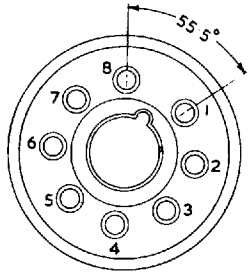
British 4-pin
B4



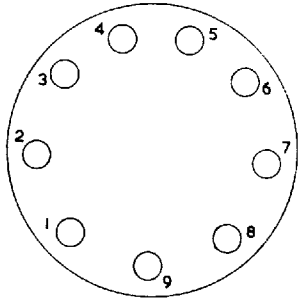
British 5-pin
B5



British 7-pin
B7

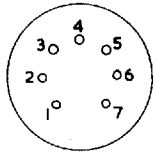


British Octal
Mazda Octal
M.O.

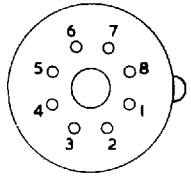


British 9-pin
B9

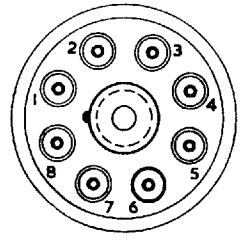
British 3-pin
B3G



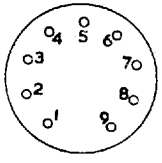
Button Miniature
7-pin Glass
B7G



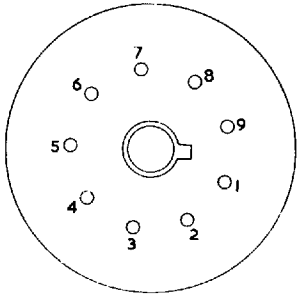
8-pin Glass
B8A



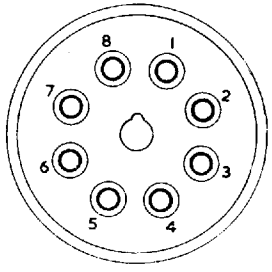
Loctal
B8G



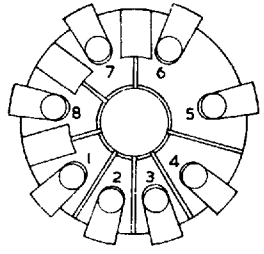
Noval
B9A



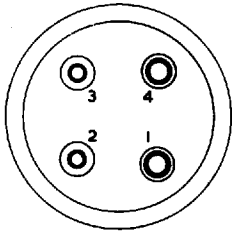
9-pin Glass
B9G



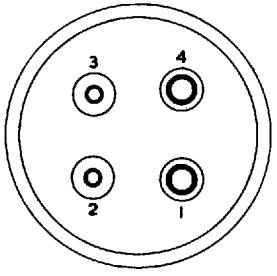
International Octal
I.O.



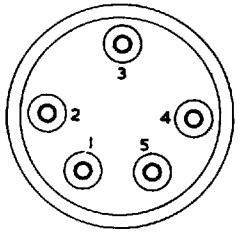
Side Contact
SC8



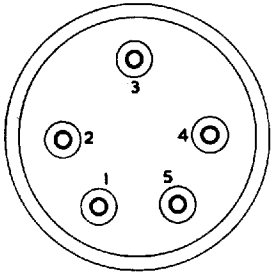
American Small 4-pin
USS4



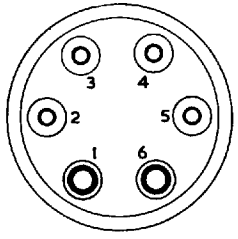
American Medium 4-pin
USM4



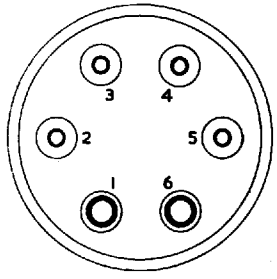
American Small 5-pin
USS5



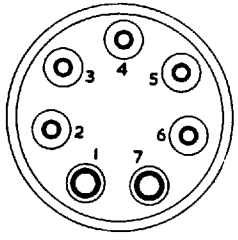
American Medium 5-pin
USM5



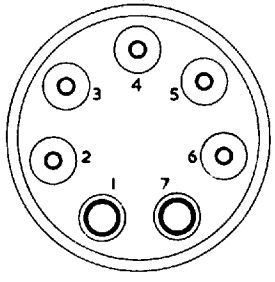
American Small 6-pin
USS6



American Medium 6-pin
USM6



American Small 7-pin
USS7



American Medium 7-pin
USM7

PART 4

VALVE EQUIVALENTS

Many types of valves required for service use are not held in stock by Valve Section and the following lists indicate the equivalents that are issued. In all cases, the equivalents are direct plug-in replacements and no modifications are necessary either to the circuit or to the Valve-holder.

The lists are in the following order:

Section 1. Valves Classified as Reliable.
Section 2. Valves held in stock by Valve Section.
Section 3. Equivalents for Commercial Types.
Section 4. Equivalents for C.V. Types.

In using these lists the user requiring reliable valves should first check Section 1 against Section 2 to see if the valve required is in stock. The equivalent for a valve not in stock is then obtained from Sections 3 or 4.

SECTION 1
Valves classified as reliable

CV	*Prototype Commercial*	*MWT Co. Q Type*	*M.O.V. QA Type*	*Brimar*	*Mullard*	*CV*
131	W77, EF92	QW77	QA2400	6065	M8161	4015
133	L77, EC90	QL77	QA2401	–	M8080	4058
136	N77, EL91	QN77	QA2402	6516	M8082	4063
138	Z77, EL91	QZ77	QA2403	6064	M8083	4014
140	D77, EB91	QD77	QA2404	6058	M8079	4025
415	TT15	QTT15	QA2405	–	–	4046
455	12AT7, ECC81	QB309	QA2406	6060	M8162	4024
493	U78, EZ90	QU78	QA2407	6063	–	4005
1988	B65, 6SN7GT	QB65	QA2408	6180	–	–
452	DH77, 6AT6	–	–	6066	–	–
454	6BA6, EF93	–	–	5749	–	4009
453	6BE6, EK90	–	–	5750	–	4012
2135	6BR7	–	–	6059	–	4006
2136	6BW6	–	–	6061	–	4043
2127	6CH6, EL821	–	–	6132	–	4055
491	12AU7, ECC82	–	–	6067	M8136	4003
492	12AX7, ECC83	–	–	6057	M8137	4004
2212	13D3	–	–	6158	–	–
2129	5763, QV03-12	–	–	6062	M8096	4039

CV	*Prototype Commercial*	*MWT Co. Q Type*	*M.O.V. QA Type*	*Brimar*	*Mullard*	*CV*
2218	R17	–	–	6157	–	–
2235	R18, EY84	–	–	–	M8091	4044
417	EC91	–	–	–	M8099	4070
137	EAC91	–	–	–	M8097	4059
858	ECC91, 616	–	–	–	M8081	4031
850	EF95, 6AK5	–	–	5654	M8100	4010
449	85A2	–	–	–	M8098	4048
2225	150B2	–	–	–	M8163	–
-	90C1	–	–	–	M8206	–
-	85A3	–	–	–	M8190	–
2901	EF86	–	–	–	M8195	–
2522	6AS6	–	–	–	M8196	4011
1833	108C1, OB2	–	–	–	M8224	4028
797	EN91, 2D21	–	–	–	M8204	4018
1832	150C2, O2A	–	–	–	M8223	4020
	No equivalent HF Pentode	–	–	6870	–	–
	" " Double Triode	–	–	5965	–	–
2209	6F33	–	–	–	–	4064

SECTION 2.

Stock types which are issued as listed.

C = Current Type,
M = Maintenance Type, in limited production,
O = Obsolescent, but stocks held.

A41-G4	O	ACT15	O	BR155	C
A207	C	ACT16	C	BR161	C
A864	O	ACT22	C	BR175	C
A1714	C	ACT25	C	BR189	C
A1820	C	ACT26	C	BR191B	C
A1834	C	ACT27	C	BR195	C
A2087	C	ACT29	C	BR1129	C
A2196	C	AC/VP1	M	BT5	M
A2244	C	AC/VP2	M	BT17	M
A2293	C	AL60	M	BT19	M
A2521	C	AW36/21	C	BU115/22	C
A2674	C	AW36/48	C	BU280/20	C
AC701	C	AW43/80	C	BW165	C
AC/HL	M	AW53/80	C	BW187	O
AC/2HL	M	AZ31	O		
ACH3	C	AZ41	O	C1C	O
AC/P	M			C12B	C
AC/P1	M	B142	C	C14BM	C
ACS2	M	BBCS1	M	C14HM	C
AC/SP3.RH	M	BBCS2	M	C14MM	C
ACT6	O	BBCS3	M	C17BM	C
ACT9	C	BIC/1E	C	C17HM	C
ACT10	O	BR128	C	C17FM	C
ACT14	C	BR154	O	C17MM	C

C21HM	C
C103B-2F	C
C103C-2F	C
C106J-2F	C
C144	C
C212Q-1F	C
C212P-1F	C
C213B-2F	C
C219Q-1F	C
C505B-2F	C
C912.TCC	C
C912 Apology	C
C912 Symbol	C
C1112	C
CAM2	C
CAM3	C
CAM4	0
CAM5	0
CAT6	C
CAT9	C
CAT14C	0
CAT17C	M
CAT27	C
CAT29	C
CAT30	C
CG12E	0
CL33	0
CR139	0
CR192	C
CRM92A	C
CRM93	C
CRM121B	M
CRM141	M
CRM151	M
CRM152B	M
CRM153	M
CRM171	M
CRM172	C
CRM211	M
CRM212	C
CS2A	C
CS3A	C
CT1R	M
CT2R	C
CT3	M
CT4/50	M
CT7	C
CV129	0
CV364	M
CV425	C
CV427	C
CV442	C
CV448	C
CV2001	C
CV2006	C
CV2009	C
CV2011	C
CV2016	C
CV2179	C
CV2209	C
CV2243	C
CV2400	C
CY31	0
D1	M
D41	0
D63	0
DA30	M
DA60	M
DA100	C
DAC32	M
DAF41	C
DAF96	C
DC90	C
DCC90	C
DD41	0
DET2	M
DET3	C
DET5	0
DET12	C
DET17	0
DET18	C
DET20	0
DET21	C
DET22	C
DET23	C
DET24	C
DET25	0
DF33	M
DF61	C
DF66	M
DF72	0
DF91	C
DF92	C
DF96	C
DF97	C

DG7/5	C
DG7/36	C
DG10-14	C
DG13/2	C
DG13/34	C
DH63	M
DH77	C
DH81	0
DK32	M
DK91	C
DK92	C
DK96	C
DL33	M
DL35	M
DL63	0
DL66	M
DL68	M
DL69	C
DL70	C
DL93	C
DL96	C
DLS10	C
DLS15	C
DLS16	C
DM70	C
DY86	C
E80CC	C
E80F	C
E80L	C
E81L	C
E83F	C
E88CC	C
E91H	C
E180F	C
E4103/B/4	M
E4205/B/7	M
E4412/B/9	M
E4504/B/16	M
EA50	M
EA52	C
EA76	C
EABC80	C
EAC91	C
EAF42	M
EB34	M
EB41	M
EBC33	M
EBC41	M
EBF80	M
EBF83	C
EBF89	C
EBL21	M
EBL31	M
EC52	0
EC53	0
EC70	M
EC80	C
EC81	C
EC91	C
EC92	C
ECC31	0
ECC32	M
ECC33	M
ECC34	M
ECC35	M
ECC40	M
ECC81	C
ECC84	C
ECC85	C
ECF80	C
ECH21	M
ECH42	M
ECH81	C
ECH83	C
ECL80	C
ECL82	C
ECL83	C
EF14	0
EF36	M
EF37A	M
EF39	M
EF40	M
EF41	M
EF42	M
EF50	M
EF54	M
EF55	M
EF72	M
EF80	C
EF85	C
EF86	C
EF89	C
EF91	C
EF92	C
EF97	C
EF98	C
EF800	C
EF804S	C
EL11	0
EL32	M
EL33	M
EL34	C
EL360	C
EL37	M

EL38	M
EL41	M
EL42	M
EL81	C
EL83	C
EL84	C
EL85	C
EL86	C
EL803	C
EL822	C
EM1	0
EM34	M
EM81	C
EM85	C
EN31	C
EN32	C
ESU575	C
EY51	C
EY81	C
EY83	C
EY84	C
EY86	C
EY91	M
EZ3	0
EZ11	0
EZ35	M
EZ40	M
EZ41	M
EZ80	C
FS9/50	C
FW4/800	C
G10/241E	C
G50/1G	C
G55/1K	C
G120/1B	C
G150/1A	C
G150/2D	C
G180/2M	C
G240/2D	C
G400/1K	C
GD86W	C
GET4	C
GET6	C
GEX34	C
GEX35	C
GEX36	C
GEX54/3	C
GEX56	C
GEX64	C
GEX66	C
GJ5M	C
GJ6M	C
GS16-160V	C
GS18-90V	C
GS56-110V	C
GS116A-90V	C
GS146	C
GS149	C
GT1C	C
GU7	M
GU8	M
GXU1	C
GXU2	C
GXU3	C
GXU5	C
GZ30	M
GZ32	C
GZ33	C
GZ34	C
H63	M
HL2K	0
HL23DD	0
HL41DD	0
HVR2	0
IT1	M
IT2	M
IT3	C
K12-2L	C
K25-2L	C
K50-2L	C
KT2	M
KT8	0
KT31	0
KT33C	M
KT41	M
KT45	0
KT61	M
KT66	C
KT67	C
KT67B	M
KT71	0
KT81	0
KT807	C
KTW61	0
KTW63	M
KTZ63	0
L30	0
L63	M

L77	C
L101	C
LN1	C
LS5	0
M3	C
M8079	C
M8081	C
M8083	C
M8098	C
M8099	C
M8100	C
ME41	0
ME91	0
MHD4	0
MHL4	0
MKT4	M
MPT42	0
MR4	0
MR4 (E620)	0
MR6	M
MR10	M
MSC2	C
MSP4	0
MSPEN	0
MT9L	M
MT14	0
MVSPENB	0
MW6/2	C
MW13/35	C
MW22/22	C
MW31/74	M
MW36/24	M
MW36/67	C
MW41/1	M
MW43/67	C
MW43/69	C
MW53/20	M
MW53/80	C
MWT2	C
MX2	M
MX40	0
MZ2/200	M
N17	C
N18	C
N34	0
N77	C
N78	C
N102/X1	C
NE2	C
NSP2	M
NT2	C
Neons G mcc	C
" " mes	C
" F mes	C
OA5	C
OA10	C
OA70	C
OA86	C
OA91	C
OC16	C
OC44	C
OC45	C
OC71	C
OC72	C
OC73	C
OCP71	C
OC604	C
O9D	0
O9L	0
OZ4	0
P61	0
P820	C
PCA21	0
PCC84	C
PCC89	C
PCF80	C
PCF82	C
PCL82	C
PCL83	C
PE50A	M
PENA4	M
PEN44	0
PEN45	0
PEN46	0
PENDD1360	0
PL33	M
PL36	C
PL38	M
PL81	C
PL82	M
PL83	C
PP3521	0
PX4	M
PX25	M
PY31	M
PY32	C
PY80	M
PY81	C
PY82	C
PY83	C
PZ30	M

QA2405	C
QL77	C
QN77	C
QP25	0
QQV02-6	C
QQV03/20	C
QQV06/40A	C
QS75/20	C
QS75/60	C
QS95/10	C
QS108/45	C
QS150/15	C
QS150/40	C
QS150/45	C
QU78	C
QV04-7	C
QV06-20	C
QY2-100	C
QY3-125	C
QY4-250A	C
R10	C
R17	C
R19	C
R5161	C
R5559	C
R6010	C
R6015	C
RG1/240A	M
RG3/1250	M
RR3/250	C
RR3/1250	C
RS21A	C
RT434	C
S6G	C
S130	0
S130P	C
SD6	C
SE14/70	C
SE17/70	C
SIM2	C
SP2	0
SP41	0
SP42	0
SP61	0
SS1971	M
STV70/60	0
STV280/40	C
STV280/80	C
SU2150	0
SU2150A	M
SX641	C
SX642	C
T41	0
T51/P2	C
T54/P2	C
T55/P2	C
TA10	0
TA15	0
TD1-100A	C
TH4B	0
TH41	0
TH233	0
TP25	0
TJ3	0
TS3	C
TT10	C
TT12	M
TT16	M
TY6/1000A	C
TY7/600A	C
U10	M
U15	0
U16	0
U19	C
U22	C
U24	M
U25	C
U26	C
U27	0
U31	0
U33	M
U37	C
U41	C
U50	C
U78	C
U81	0
U82	0
U191	C
U281	C
U301	C
U329	C
U403	0
U709	C
U801	C
UAF42	M
UBC41	M
UBF80	M
UCH42	M
UL41	M
UU5	M

UU6	M
UU8	M
UU9	C
UY41	M
V190C/1M	C
V245C/1K	C
V246A/1K	C
V247C/1K	C
V271C/1M	C
VA16	C
VB701	C
VB704	C
VLS465	0
VLS465A	0
VLS465B	0
VLS631	C
VP4B	M
VP23	0
VP41	0
VP133	0
VR75/30	C
VR105/30	C
VT114	0
W31	0
W61	0
W81	0
X24	0
X41M	0
X61M	M
X63	M
X65	0
X78	C
X79	C
X81M	0
XB1	C
XC18	C
XF6060	C
XFW40	C
XH1.5	M
XR1-3200	C
XR1-6400	C
XR1-6400A	C
Y61	M
Z21	0
Z66	0
Z319	C
Z359	C
Z759	C
Z803U	C
Z900T	C
ZD17	C
ZS10B	C
1A5GT	M
1CP1	C
1D8GT	0
1S004	C
1U5	C
2A3	0
2B	M
2BP1	0
2C43	C
2D21	C
2K26	0
2-01C	C
2P	0
2V/561E	C
2X2	M
3/31	M
3A3	0
3A/167M	C
3B/240M	C
3BP1A	0
3EG1	C
3H/151J	C
3J/162J	C
3J/192E	C
3J/210E	C
3J/261E	C
3KP1	0
3Q/200A	M
3Q/260E	C
3Q/294E	C
3Q/331E	C
3V4	C
3V/531E	C
4/11	M
4EP1	C
4H/180E	C
4H/181E	C
4MK13	M
4Q/230A	M
4THA	0
5/2	0
5A/152M	C
5A/163K	M

5B/254M	C	6BC7	M	6K25	M
5B/255M	C	6BD4A	C	6L1	C
5BKP1	C	6BE6	C	6L6G	C
5C/450A	C	6BG6G	M	6L6GA	M
5D/100A	M	6BH6	C	6L7	0
5J/180E	C	6BJ6	C	6L18	C
5R4GY	C	6BN6	C	6L19	C
5U4G	C	6BQ7A	C	6L34	C
5V4G	C	6BR7	C	6LD20	M
		6BS7	C	6M2	C
6/4	C	6BW6	C	6P1	C
6/22PM	C	6BW7	C	6N7GT	0
6/22QM	C	6C6	M	6P25	C
6/30L2	C	6C8G	0	6P26	C
6A8GT	M	6C9	C	6P28	C
6AC7	0	6CB5	M	6SA7	0
6AF4A	C	6CB6	C	6SG7	0
6AG7	0	6CD6G	C	6SH7	0
6AH6	C	6CH6	C	6SJ7GT	0
6AJ4	M	6CL6	C	6SK7	0
6AK6	C	6D6	0	6SL7GT	M
6AL7GT	M	6EB4F	C	6SN7GT	M
6AM4	C	6EG4	C	6SQ7	0
6AN8	C	6EG5	C	6U4GT	C
6AQ5	C	6F1	C	6U8	C
6AS5	C	6F6G	M	6V6GT	C
6AS6	C	6F8G	M	6W2	C
6AU4	M	6F11	C	6X5GT	M
6AU5	C	6F13	M	6Y6	0
6AU6	C	6F14	C		
6AV6	M	6F15	C	7C5	0
6AW8	C	6F17	C	7CP4	0
6B4G	M	6F18	C		
6B8GT	M	6F32	0	10C1	C
6BA6	C	6K8GT	M	10C2	C

10F1	C
10F9	C
10LD11	C
10MW4A	C
10P13	C
10P14	C
11E2	C
11E3	C
12AH8	C
12AL5	M
12AT6	C
12AT7	C
12AU6	C
12AU7	C
12AX7	C
12AY7	M
12B4	C
12BA6	C
12BE6	C
12BH7	C
12BY7	C
12BZ7	C
12E1	C
12SJ7GT	0
13D3	C
13E1	C
17CDD26/0	C
19BG6G	M
19G6	C
19H1	C
20CG	M
20D1	C
20F2	C
20L1	C
20P1	M
20P3	C
20P4	C
20P5	C
25L6GT	C
26D	0
26G	0
27M1	C
27M2	C
29C1	C
30C3P1	C
30FL1	C
30F5	C
30P4	C
30P12	C
30P16	C
30PL1	C
31CDD53/1	C
33A/158M	C
35C5	0
35Z4GT	0
37	0
41	0
42SPT	0
451U	C
50C5	C
52CG	C
53CDD23/1	C
53KU	C
55CG	C
61BT	M
61SPT	M
62BTA	0
75C	C
76	0
80	0
83	0
84	0
85A1	C
85A2	C
85K	0
88D	C
89D	C
89	0
90C1	C
90CV	C
90CG	C
90EY4F	C
90/350G1H	M
90/529G1E	M
108C1	C
150B2	C
150C4	C
161	C
185BT	0
225DU	0

301	C
302	C
305	C
306	C
328	C
331A	0
351A	0
723A/B	0
802	0
805	0
807	C
815	0
828	C
832	0
832A	C
843	0
845	0
954	0
955	0
956	0
991	M
1129	0
1816P4	0
3538	M
4007A	0
4013C, D	M
4014A	M
4030D	C
4033L	0
4046A	M
4058B	0
4061A	0
4065A	0
4074A	M
4077A	M
4078A	0
4081A	M
4096AB	M
4205E	0
4212E	C
4220C	M
4242A	C
4270A	M
4278A	M
4279A	0
4282B	0
4300A	M
4357A	M
4687	0
5642	C
5687	C
5750	C
5763	C
6057	C
6058	C
6059	C
6060	C
6061	C
6064	C
6067	C
6080	C
6097F	C
6146	C
7475	M
10667S	C
68506	C

SECTION 3.

Valve Equivalents issued by Valve Section.

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
A2134	CV2179	CG5C	CV442	DT436	MHD4
AC044	PX4	CG5E	CV442	DY30	U41
AC/DD	D41	CG6C	GEX34		
AC/HLDD	MHD4	CG6E	GEX34	E1148	DET20
AC/PEN	MKT4 7 pin	CJ6	XR1-6400	E1706	KT67
AC2/PEN	PENA4			E2004	U41
AW17/20	17CDD 26/0	D42	D41 (change connections)	E2133	Z319
				E2134	CV2179
B65	6SN7GT	D77	M8079 or 6058	EB91	M8079 or 6058
B109	UCC85	D152	M8079 or 6058	EBC90	DH77
B152	6060	DAF91	ZD17	EC55	DET22
B309	6060	DD4	D41	EC90	L77 or QL77
B319	PCC84	DD6	M8079 or 6058	EC94	6AF4A
B329	12AU7	DDL4	D41	* ECC81	6060
B339	12AX7	DDT	MHD4	ECC82	12AU7
B719	ECC85	DEM2	DET2	ECC83	12AX7
		DET19	4074A	ECC91	M8081
C14HM	C14MM	DH142	UBC41	ECF82	6U8
C17HM	C17MM	DH147	EBC33	ECH35	X61M
C143	TT10	DH150	EBC41	ECH41	ECH42
C178	QQV06-40A	DH719	EABC80	ECR30	E4205/B/7
C180	832A	DL92	N17	ECR35	E4412/B/9
C1111	CV427	DL94	3V4	ECR60	E4504/B/16
CC8L	8L	DL95	N18	EF22	W81
CG1C	CV425	DL145	10LD11	EF82	6CH6
CG1E	CV425	DLS19	VLS631	EF91	M8083 or 6064
CG4C	CV448	DO24	PX25	EF93	6BA6
CG4E	CV448	DP61	M8100	EF94	6AU6

* ECC81 will be supplied if requisition marked "No equivalents"

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
EF95	M8100	GZ37	53KU	MW31/16	MW31/74
EK90	6BE6			MW43/64	MW43/69
EL35	6L6G	HBC90	12AT6		
EL90	6AQ5	H4D	MHD4	N14	DL35
EL91	N77 or QN77	HD14	DAC32	N15	DL33
EL821	6CH6	HF93	12BA6	N16	DL33
EM80	EM81	HK90	12BE6	N19	3V4
EN91	2D21	HL2	H12/K	N41	PENA4
ESU872	GXU2 or RR3/1250	HL92	50C5	N77	QN77
EZ81	U709	HVR2A	SU2150A	N142	UL41
EZ90	U78 or QU78			N144	N77 or QN77
		KT8C	KT807	N145	10P13
FC4	MX40	KT32	25L6G	N147	EL33
FW4/500	FW4/800	KT44	KT45	N148	7C5
		KT63	6F6G	N150	EL41
G180/2M	QS150/45	KT81	A1820	N151	EL42
GD3	CV442			N152	PL81
GD4	GEX34	L77	QL77	N153	PL83
GD5	CV448	LN152	ECL80	N154	PL82
GEX33	GEX35	LN309	PCL83	N155	EL85
GEX44	GEX34	LP4	PX4	N308	PL36
GEX45/1	CV425	LZ319	PCF80	N309	PL83
GEX54	CV448	LS845	A2674	N329	PL82
GEX55/1	CV448			N359	PL81
GJ4M	GJ5M	M183515	GEX34	N709	EL84
GS46	GS56	ME1001	DET22	N727	6AQ5
GS50	90CG	MH4	AC/HL		
GT13	0C44	MH41	AC2/HL	OM1	CY31
GU11	GXU5	ML4	AC/P	OM3	EB34
GU20/21	GXU3	MU12/14	UU5	OM4	EBC33
GU50	RG1/240A	MVSPEN	AC/VP1	OM5	EF36
GZ30	5V4G	MVSPENB	AC/VP2	OM5A	EF37A
GZ31	5U4G	MW22/16	MW22/22	OM5B	EF37A

Type required	Equivalent issued
OM5C	EF37A
OM6	EF39
OM7	EF39
OM10	X61M
P552/1E	CV427
PEN4VA	MKT4
PEN4VB	KT41
PP3/250	PX4
PP5/400	PX25
PT4	PEN4
QA2400	EF92
QA2401	QL77
QA2402	QN77
QA2403	M8083 or 6064
QA2404	M8079 or 6058
QA2406	6060
QA2407	QU78
QA2408	6SN7GT
QQV04-20	815
QQV07-40	C144
QS83/3	85A2
QS92-10	7475
QS1205	VR75/30
QS1206	VR105/30
QS1207	150C4
QS1208	108C1
QS1209	85A2
QV03-12	5763
QV05-25	5B/250A
QV06-20	6146
QY2-100	TT10
QZ77	M8083 or 6064
R1	U10
R2	UU5
R3	UU5
R4	UU5
R11	U27
R12	EY51
R14	PZ30
R16	U37
R18	EY84
RG3-250A	RR3/1250 or GXU2
RL7	EF54
RL16	EC52
RL18	EC53
S102/1K	VLS631
SD61	EA50
SP6	M8083 or 6064
ST11	7475
SU44	R10
SU45	19G6
SU61	EY51
T4D	D1
T6D	EA50
TD03-5	DET23
TD03-10	DET22
TD04-20	DET24
TD35-12	2C43
TDD4	MHD4
TSP4	AC/SP3 RH
TT4	AC/P
TT15	QA2405
TT16	QY3/125
U17	U27
U18/20	FW4/800
U43	EY51
U52	5U4G
U54	GZ33
U70	6X5GT
U78	QU78
U142	UY41
U143	AZ31
U145	UY41
U147	6X5GT
U149	U82
U150	EZ40
U151	EY51
U152	PY80
U153	PY81
U154	PY82
U192	PY82
U251	U329
U309	PY80
U319	PY82
UF41	10F9
UU4	UU5
UU60-250	UU5
UU120-350	UU5
UU120-500	UU5
V503	DA30
V872	6F32
V888	M8083

Type required	Equivalent issued
V914	D41
V1505	4212E
V1064P1	30C3P1
V1907	U27
VCR139A	E4205/B/7
VHT4	MX40
VMP4G	AC/VP1
VP2	VP23
VP6	EF92
VR65	SP61
VR65A	SP41
VR78	D1
VR150/30	QS150/40
W17	DF91
W42	AC/VP2
W63	KTW63
W77	EF92
W143	X81
W145	10F9
W147	EF39
W150	EF41
W719	EF85
W727	6BA6
WD142	UAF42
WD150	EAF42
WD709	EBF80
WG4A	CV442
WG4B	CV442
WG5A	GEX34
WG5B	CV425
WG6A	CV448
WG7A	CV448
WG7B	CV448
X14	DK32
X17	DK91
X18	DK92
X64	6L7
X77	6BE6
X142	UCH42
X145	10C1
X147	X61M
X150	ECH42
X719	ECH81
X727	6BE6
Y62	Y61
Y63	Y61
Y64	Y61
Z14	DF33
Z63	KTZ63
Z77	M8083 or 6064
Z90	EF50
Z142	UF42
Z145	10F1
Z150	EF42
Z152	EF80
Z309	Z759
Z719	EF80
Z729	EF86
ZD152	EBF80
0A2	150C2
0A3	VR75/30
0B2	108C1
0C3	VR105/30
0D3	QS150/40
1A3	DA90
1A7	DK32
1AB6	DK96
1AC6	DK92
1AD4	DF62
1AH5	DAF96
1AJ4	DF96
1B3GT	U41
1C1	DK91
1C2	DK92
1C3	DK96
1C5	DL35
1F5	DF96
1F2	DF92
1F3	DF91
1FD1	DAF96
1FD9	ZD17
1H5	DAC32
1L4	DF92
1M1	DM70
1M3	DM70
1N5	DF33
1P1	DL96
1P5	DF33
1P10	N17
1P11	3V4

Type required	Equivalent issued
1R5	DK91
1S5	ZD17
1T2	U37
1T4	DF91
1X2B	R19
2C39A	3H/151J or TD1/100A
2S/140G	EA76
2T/270K	R10
2V/400A	RR3/250 or GXU1
2V/531E	4078A
2X/105G	CV448
2X/106G	CV425
3A4	DL93
3A5	DCC90
3B28	RR3/250 or GXU1
3C4	DL96
3Q4	N18
3Q5	DL33
3S4	N17
3WP1	DG7/36
4B32	RR3/1250 or GXU2
4G/280K	2D21
5/2	SE14/70
5/3	SE17/70
5ABP1	DG13/34
5ADP1	DG13/34
5A/157D	EF37A
5A/170K	E180F

Type required	Equivalent issued
5B/251M	5B/254M
5B/700A	828
5C/100A	TT10
5CP1A	DG13/2
5FP4A	MW13/35
5Y3GT	U50
5Z4G	5V4G
6A8	X63
6AB4	EC92
6AB7	6SG7
6AB8	ECL80
6AE8	X79
6AG5	6AU6
6AG6	EL33
6AJ8	ECH81
6AK5	M8100
6AK8	EABC80
6AL5	M8079 or 6058
6AM5	N77 or QN77
6AM6	M8083 or 6064
6AQ4	EC91
6AQ6	DH77 (diff.Heater Current)
6AQ8	ECC85
6AS7G	A1834
6AT6	DH77
6BJ5	N78
6BK7	ECC85
6BL4	6AU4
6BL8	ECF80
6BN5	EL85

Type required	Equivalent issued
6BQ5	EL84
6BR5	EM81
6BT4	EZ40
6BX4	U78 or QU78
6BX6	EF80
6BY7	EF85
6C4	L77 or QL77
6C5G	L63
6C10	ECH42
6C12	ECH81
6CA7	EL34
6CD7	EM34
6CJ5	EF41
6CJ6	EL81
6CK5	EL41
6CN6	EL38
6CQ6	EF92
6CT7	EAF42
6CU7	ECH42
6CV7	EBC41
6CW7	ECC84
6D1	EA50
6D2	M8079 or 6058
6DA6	EF89
6E5	Y61
6E8	X61M
6F5	H63
6F12	M8083 or 6064
6F13	6F1
6F16	6F15
6F19	EF85
6F21	EF92

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
6F33	CV2209	7B6	DH81	19W3	PY80
6G5G	Y61	7D9	N77 or QN77	19X3	PY80
6H1	6BE6	7D10	6CH6	19Y3	PY82
6H6	D63	7H7	W81		
6K6	KT61	7S7	X81	20A3	2D21
6K7	KTW63	7Y4	U82	20D3	12AH8
6J5GT	L63	7Z4	U82	21A6	PL81
6J6	M8081			23D	E4205/B/7
6J7GT	KTZ63	8A8	PCF80	25E5	PL36
6L12	ECC85	8D3	M8083 or 6064	25Z4	U31
6L13	12AX7	8D5	6BR7		
6L34	EC91			30C1	PCF80
6LD3	EBC41	9A8	PCF80	30L1	PCC84
6LD12	EABC80	9D6	EF92	30P16	PL82
6M1	Y61	9U8	PCF82	31A3	UY41
6M2	EM34			35DH2A	L101
6N8	EBF80	10F3	UF42		
6P15	EL84	10LD3	UBC41	41MP	AC/P
6P17	N77 or QN77			41MPG	MX40
6Q7GT	DH63 *	12AT7	6060		
6R7	DL63	12XP4A	MW31/74	50L6	KT71
6T8	EABC80			52KU	GZ32
6U5G	Y61	14L7	UBC41	54KU	GZ32
6U7	KTW63			56CG	GS146
6V4	EZ80	15A2	MX40		
6W4	6U4GT	15A6	PL83	62BT	62BTA
6X2	EY51			62TH	ECH42
6X4	U78 or QU78	16A5	PL82	63ME	Y61
6Z4	84	16A8	PCL82	63SPT	EF50
				64ME	EM34
7A3	PENA4	17Z3	PY81	65ME	EM81
7AN7	PCC84				

* 12AT7 will be supplied if requisition is marked "No equivalents"

Type required	Equivalent issued
75B1	QS75/20
77	6C6
78	6D6
90/529GIE	529/G1E
90EG4	E4412/B/9
95A1	QS95/10
121VP	UF41
141K	MW36/24
150A2	QS150/15
150B3	QS150/15
150C2	150C4
150C3	QS150/40
171K	17AXP4
172K	MW43/69
249B	RR3/250 or GXU1
267B	RR3/1250 or GXU2
357A	4357A
436A	A2674
437A	3A/167M
451	328
506BU	U10
807	5B/250A
810	DET17
813	TT10
827R	CR139
829B	C144
833A	B142
866	RR3/250 or GXU1
868	GS146
872A	RR3/1250 or GXU2
879	2X2
884	6K25
885	6K25
892R	BR175
920	GS149
931A	27M1
1603	6C6
1620	KTZ63
1621	6F6G
1622	6L6G
3533	GS16
3543	529/G1E
4064B	RR3/1250 or GXU2
4079A	2V/561E
4313C	G150/1A
5544	XR1-3200
5545	XR1-6400
5651	85A2
5685	XR1-6400
5726	M8079 or 6058
5727	2D21
5749	6BA6
5840	EF72
5852	6X5GT
5861	DET22
5931	5U4G
5932	6L6G
5992	6V6G
5993	QU78
5998	A1834
6005	6AQ5
6058	M8079
6062	5763
6063	QU78
6064	M8083
6072	12AY7
6094	6AQ5
6101	M8081
6106	U50
6132	6CH6
6135	L77 or QL77
6136	6AU6
6157	R17
6158	13D3
6201	6060
6260B	6097F (change connections)
6267	EF86
6481	RT434
6516	N77 or QN77
6520	A1834
6688	E180F
7032	E91H
33377	55CG

SECTION 4.

Equivalents for CV Types

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
CV5	GXU3	CV181	ECC32	CV345	12E1
CV6	DET20	CV187	U19	CV354	DET23
CV9	AL60	CV188	7475	CV358	EF37A
CV18	4074A	CV190	DLS10	CV366	6AG7
CV21	VP41	CV216	QS150/40	CV367	CS2A
CV25	4242A	CV228	V246A/1K	CV371	19G6
CV26	TT10	CV242	GS18-90V	CV375	EA50
CV27	4357A	CV244	4046A	CV378	53KU
CV28	ACT9	CV248	GS16-160V	CV380	EF54
CV30	4270A	CV253	CS3A	CV384	DET5
CV31	FW4/800	CV257	ACT22	CV391	5B/255M
CV32	RR3/250 or GXU1	CV260	SP61	CV394	EM34
CV34	MR10	CV261	R10	CV395	QS150/45 or G180/2M
CV45	S130P	CV273	DET22	CV397	DET24
CV73	11E3	CV276	11E2	CV399	AC/HL
CV75	G150/1A	CV278	6SN7GT	CV405	55CG
CV118	SP61	CV279	E4205/B/7	CV408	A1714
CV121	19H1	CV281	X61M	CV409	A1820
CV124	5B/250A	CV283	M8079 or 6058	CV413	G150/2D
CV131	EF92	CV284	QS75/20	CV415	QA2405
CV133	L77 or QL77	CV286	QS95/10	CV416	6F17
CV135	EY91	CV287	QS150/15	CV417	EC91
CV136	N77 or QN77	CV303	W81	CV418	MX2
CV137	EAC91	CV309	QV04-7	CV419	DET18
CV138	M8083 or 6064	CV315	DET12	CV421	BW187
CV139	6L34	CV320	E4103/B/4	CV422	QS108/45
CV140	M8079 or 6058	CV329	CV2209	CV424	QQV06-40A
CV166	GEX54/3	CV337	27M1	CV426	EY51
CV173	EF55	CV342	VLS631	CV428	5B/254M

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
CV430	29C1	CV532	GXU5	CV617	80
CV431	85A1	CV541	U41	CV618	83
CV432	EF37A	CV545	AC/SP3RH	CV619	84
CV433	B1C/1E	CV551	25L6GT	CV622	802
CV434	QS75/60	CV552	25L6GT	CV625	805
CV436	ACT25	CV553	25L6GT	CV627	DET17
CV437	KT67	CV554	D63	CV631	828
CV438	G120/1B	CV556	QP25	CV632	C144
CV445	5J/180E	CV557	D41	CV634	832
CV446	3Q/260E	CV563	DA30	CV636	RR3/250 or GXU1
CV447	4078A	CV569	6SL7GT	CV639	843
CV448 — CG 61H.					
CV449	85A2	CV571	KT71	CV642	RR3/1250 or GXU2
CV450	EL38	CV572	6X5GT	CV646	2X2
CV452	DH77	CV573	6X6GT	CV652	6C6
CV453	6BE6	CV574	6X5GT	CV660	6AC7
CV454	6BA6	CV575	5U4G	CV668	DET18
CV455	6060	CV578	X63	CV669	4279A
CV465	EF72	CV581	L63	CV685	QS150/40
CV468	EC70	CV582	L63	CV686	VR105/30
CV469	EA76	CV583	L63	CV688	2C43
CV484	N17	CV584	GS56	CV692	0Z4
CV491	12AU7	CV585	6C6	CV701	BR175
CV492	12AX7	CV586	EL37	CV708	161
CV493	U78 or QU78	CV587	DH63	CV715	H63
CV509	6V6GT	CV588	DH63	CV717	5R4GY
CV510	6V6GT	CV589	DH63	CV720	723A
CV511	6V6GT	CV590	6SJ7GT	CV728	DF33
CV515	6Y6G	CV591	6SJ7GT	CV729	5V4G
CV518	AC/VP1	CV592	6SJ7GT	CV731	6F6G
CV524	TT12	CV593	GZ32	CV735	845
CV527	DA60	CV597	2X2	CV742	1267
CV528	VA16	CV600	DG13/2	CV782	DK91
CV530	GT1C	CV616	6C6	CV784	ZD17

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
CV785	DF91	CV1050	HL2K	CV1113	U27
CV788	832A	CV1052	EL32	CV1116	6F32
CV797	2D21	CV1053	EF39	CV1118	KT2
CV807	DL93	CV1054	EB34	CV1120	SU2150A
CV808	DCC90	CV1055	EBC33	CV1121	T41
CV812	GXU1 or RR3/250	CV1056	EF36	CV1122	AC/P1
CV814	3BP1A	CV1059	955	CV1127	PEN46
CV818	N18	CV1061	4074A	CV1128	GT1C
CV819	DL33	CV1062	DET12	CV1135	DET20
CV820	N17	CV1064	UU5	CV1136	EF54
CV841	5U4G	CV1065	SP61	CV1137	EC52
CV846	6AC7	CV1066	P61	CV1138	E4412/B/9
CV848	6AU6	CV1067	L63	CV1143	GT1C
CV850	M8100	CV1068	STV280/40	CV1144	BT19
CV852	L77 or QL77	CV1069	STV280/80	CV1168	PX4
CV858	M8081	CV1070	7475	CV1169	AC/VP1
CV866	6SJ7GT	CV1071	5U4G	CV1170	D41
CV882	DH81	CV1072	RG1/240A	CV1174	MKT4.7 pin
CV885	KT81	CV1073	H63	CV1178	DA30
CV904	BR175	CV1074	KTZ63	CV1179	AC/P
CV960	E4504/B/16	CV1075	KT66	CV1181	KT41
CV967	E4103/B/4	CV1078	D1	CV1186	6F6G
CV979	DLS10	CV1079	KT807	CV1187	D41
CV982	Button Tuneon, BBCS3	CV1088	832	CV1192	Z66
CV988	Neon Type "G" MCC	CV1091	EF50	CV1193	X65
CV990	DET12	CV1092	EA50	CV1194	X41M
CV1025	DET25	CV1095	954	CV1195	KTW63
CV1034	DET3	CV1097	E4504/B/16	CV1197	EC53
CV1037	AC/HL	CV1100	KTW61	CV1206	DA60
CV1038	MHL4	CV1103	Y61	CV1219	DA100
CV1039	UU5	CV1110	S130	CV1220	4033L
CV1040	PX25	CV1111	U27	CV1222	ACT6

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
CV1223	DET5	CV1407	PEN45	CV1597	E4103/B/4
CV1235	DET12	CV1413	UU6	CV1604	SS1971
CV1250	5279A	CV1414	VP41	CV1611	MR4
CV1252	4212E	CV1420	4078A	CV1619	4212E
CV1264	FW4/800	CV1430	AC/SP3RH	CV1627	5D/100A
CV1265	U15	CV1431	ACT16	CV1628	GU8
CV1268	U50	CV1435	GXU3	CV1629	RG3/1250
CV1288	DET12	CV1438	KT61	CV1630	5C/450A
CV1290	SU2150A	CV1440	MT9L	CV1633	3V4
CV1301	D63	CV1443	U10	CV1635	5A/163K
CV1306	HL23DD	CV1444	42SPT	CV1648	4205E
CV1314	DLS10	CV1449	RR3/1250 or GXU2	CV1673	HL2K
CV1330	AC/SP3. RH	CV1460	X41M	CV1679	DA30
CV1331	VP23	CV1461	U22	CV1681	AC/SP3RH
CV1335	SP41	CV1464	EF39	CV1683	MKT47 pin
CV1336	SP42	CV1503	KT33C	CV1688	4033L
CV1340	KT45	CV1506	5C/450A	CV1692	AC/P
CV1342	QP25	CV1508	U19	CV1697	X41M
CV1347	X61M	CV1515	MX2	CV1699	SP41
CV1352	EM81	CV1522	E4103/B/4	CV1700	SP41
CV1353	CV448	CV1526	3EG1	CV1708	80
CV1356	U22	CV1535	EZ80	CV1710	6C6
CV1364	807	CV1572	807	CV1719	U22
CV1369	4061A	CV1574	SP41	CV1731	S130P
CV1374	807	CV1577	KT45	CV1732	AC/P
CV1375	EF85	CV1578	EF50	CV1737	MW6/2
CV1376	EF80	CV1581	X61M	CV1738	R5161
CV1377	GZ34	CV1582	S130	CV1741	EL34
CV1385	E4504/B/16	CV1585	T41	CV1745	62BTA
CV1401	CL33	CV1587	E4412/B/9	CV1750	4074A
CV1402	CY31	CV1588	F4205/B/7	CV1758	DF92
CV1403	DD41	CV1596	09D	CV1762	6AK6

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
CV1784	CAG7	CV1895	VR75/30	CV1959	50C5
CV1795	723A/B	CV1899	6L18	CV1961	12AU6
CV1796	UU5	CV1901	6F11	CV1962	DL63
CV1797	4081A	CV1908	H63	CV1963	DL63
CV1799	KT66	CV1909	H63	CV1964	DL63
CV1802	DK32	CV1910	H63	CV1966	6SA7
CV1803	DL35	CV1911	6F6G	CV1967	6SA7
CV1805	DL35	CV1912	6F6G	CV1977	UL41
CV1818	DAC32	CV1919	6F14	CV1978	6SG7
CV1820	DAC32	CV1920	6LD20	CV1979	61BT
CV1821	DF33	CV1921	U24	CV1980	185BT
CV1823	DF33	CV1927	B142	CV1981	6SK7
CV1825	KT45	CV1928	12BA6	CV1982	6SK7
CV1830	U41	CV1929	D63	CV1985	6SL7GT
CV1832	150C4	CV1930	D63	CV1988	6SN7GT
CV1833	108C1	CV1931	D63	CV1989	SD6
CV1835	RR3/250 or GXU1	CV1932	L63	CV1990	6SQ7
CV1839	6F13	CV1933	L63	CV1991	6SQ7
CV1850	6L19	CV1934	L63	CV2101	DF72
CV1853	6P25	CV1935	KTZ63	CV2105	DL70
CV1854	5Y3G	CV1936	KTZ63	CV2106	DL66
CV1855	UU9	CV1937	KTZ63	CV2107	DF66
CV1856	5Y3G	CV1941	KTW63	CV2115	U41
CV1862	6AQ5	CV1942	KTW63	CV2127	6CH6
CV1863	5V4G	CV1943	KTW63	CV2128	ECH81
CV1864	5V4G	CV1944	6K8GT	CV2129	5763
CV1865	EC81	CV1945	6K8GT	CV2130	QY3/125 or TT16
CV1873	6SG7	CV1946	6K8GT	CV2131	QY4/250A
CV1882	6AG7	CV1947	6L6G	CV2133	90CG
CV1883	4H/180E	CV1948	6L6G	CV2134	90CV
CV1884	33A/158M	CV1950	6L7	CV2135	6BR7
CV1888	EC81	CV1951	6L7	CV2136	6BW6

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
CV2154	S1M2	CV2321	GD86W	CV2766	4687
CV2160	A207	CV2322	BR161	CV2775	68506
CV2171	A2087	CV2353	R6010	CV2792	723A/B
CV2174	G240/2D	CV2354	R6015	CV2796	6L6G
CV2175	DG7/5	CV2370	N17	CV2797	QQV06-40A
CV2185	88D	CV2371	DF61	CV2798	QQV03-10
CV2191	DG13/2	CV2377	13E1	CV2799	QQV03-20
CV2193	89D	CV2382	EL822	CV2806	AC2/HL
CV2194	G400/1K	CV2383	BR191B	CV2807	AC2/HL
CV2208	G50/1G	CV2390	DL93	CV2811	AC/HL
CV2210	XR1-3200	CV2399	GXU3	CV2812	AC/HL
CV2212	13D3	CV2434	Z803U	CV2813	MHD4
CV2214	3B/240M	CV2466	QQV02-6	CV2815	AC/P
CV2215	XR1-6400	CV2516	3H/151J or TD1/100A	CV2817	6L6GA
CV2217	6K25	CV2518	RR3/1250 or GXU2	CV2821	ECC33
CV2218	R17	CV2521	6AH6	CV2823	AC/SP3RH
CV2223	G10/241E	CV2522	6AS6	CV2825	ACT6
CV2224	G1/371K	CV2523	A1834	CV2827	ACT10
CV2225	150B2	CV2524	6AU6	CV2832	AC/VP2
CV2235	EY84	CV2526	6AV6	CV2842	L77 or QL77
CV2253	EN32	CV2529	45IU	CV2843	M8081
CV2257	XC18	CV2573	85A2	CV2844	U78 or QU78
CV2259	DL68	CV2577	4212E	CV2862	AZ31
CV2260	DF64	CV2578	5687	CV2871	CAT6
CV2276	Z319	CV2663	815	CV2872	CAT9
CV2288	DL66	CV2666	C144	CV2876	2D21
CV2289	U37	CV2677	GXU1 or RR3/250	CV2877	M8100
CV2290	GEX66	CV2692	GS146	CV2882	M8079 or 6058
CV2296	NSP2	CV2721	EL81	CV2883	6AQ5
CV2300	DL93	CV2726	EL83	CV2884	6AS6
CV2302	1CP1	CV2729	E80F	CV2896	52CG
CV2310	GEX64	CV2748	5V4G	CV2901	EF86
CV2315	C12B	CV2751	4096AB	CV2903	150C4

Type required	Equivalent issued	Type required	Equivalent issued	Type required	Equivalent issued
CV2912	DL63	CV3747	U15	CV3920	A2196
CV2920	DET20	CV3748	2X2	CV3921	A2244
CV2938	EL33	CV3750	U22	CV3924	6AC7
CV2940	EL36	CV3753	U31	CV3940	3H/151J or TD1/100A
CV2963	TT16	CV3759	UU5	CV3946	DG7/36
CV2966	EY86	CV3760	UU5	CV3973	6AC7
CV2973	GU7	CV3761	UU7	CV3974	6SA7
CV2975	EL84	CV3792	VP23	CV3978	6AG7
CV2980	DM70	CV3798	VR75/30	CV3979	QS150/40
CV2983	3V4	CV3806	W31	CV3985	6SL7GT
CV2984	6080	CV3823	X41M	CV3995	6CB6
CV2995	HL23DD	CV3825	X63	CV3996	U709
CV2996	HL41DD	CV3826	X65	CV3998	E180F or 5A/170K
CV3520	KT31	CV3830	XH15	CV3999	MW22/22
CV3523	6146	CV3838	Z66	CV4003	6067
CV3526	EL85	CV3839	Z66	CV4004	6057
CV3535	C14HM	CV3841	6F1	CV4005	QU78 or 6063
CV3546	MHD4	CV3881	EB41	CV4006	6059
CV3554	MPT42	CV3882	EBC41	CV4007	M8079 or 6058
CV3565	ME41	CV3883	EAF42	CV4009	6BA6 or 5749
CV3582	VP4B	CV3884	ECC40	CV4010	M8100
CV3616	6BN6	CV3885	EF40	CV4011	6AS6 or M8196
CV3618	6L6GA	CV3886	EF41	CV4012	5750
CV3619	6SJ7GT	CV3887	EF42	CV4013	5670
CV3624	GS56	CV3888	ECH42	CV4014	M8083 or 6064
CV3627	6SN7GT	CV3889	EL41	CV4015	EF92 or M8161
CV3650	12AY7	CV3890	EL42	CV4018	2D21 or M8204
CV3678	2BP1	CV3891	EZ40	CV4019	6AQ5
CV3707	6AL7GT	CV3892	AZ41	CV4020	150C4 or M8223
CV3711	N78	CV3908	6BH6	CV4023	6AU6
CV3723	T41	CV3909	6BJ6	CV4024	6060
CV3733	3KP1	CV3912	1U5	CV4025	M8079 or 6058
CV3734	6X5GT	CV3919	U82	CV4026	5R4GY

Type required	Equivalent issued
CV4027	5Y3G
CV4028	108C1 or M8224
CV4031	M8081
CV4039	5763 or 6062
CV4040	6F17
CV4043	6BW6 or 6061
CV4044	EY84 or M8091
CV4046	QA2405
CV4048	M8098
CV4055	6CH6 or 6132
CV4057	19G6
CV4058	QL77 or M8080
CV4059	EAC91 or M8097
CV4061	U37
CV4062	CV2179
CV4063	QN77 or M8082
CV4064	CV2209
CV4068	13D3 or 6158
CV4070	M8099
CV4084	75C1
CV5008	6080
CV5035	DG13/34 or 5ADP1
CV5036	6AF4A
CV5037	6BA6
CV5041	6CL6
CV5042	12BH7
CV5055	EM81
CV5060	Z759
CV5065	6U8
CV5072	U709
CV5073	6AM4
CV5074	6AF4A
CV5077	PL81
CV5080	EF37A
CV5081	61SPT
CV5083	QS75/20
CV5085	27M2
CV5086	6BS7
CV5094	EL86
CV5101	GJ5M
CV5102	GJ6M
CV5110	EF39
CV5112	3A/167M
CV5115	X79