RESTRICTED

MODEL OQ-2

VACUUM TUBE TESTING EQUIPMENT

INSTRUCTIONS

Manufactured for

NAVY DEPARTMENT BUREAU OF SHIPS

by

WESTON ELECTRICAL INSTRUMENT CORP.
Newark, N.J.

Contract NXss/a-13581 Contract Dated September 30, 1942

MODEL OQ EQUIPMENT

GUARANTEE

ON

MODEL OQ VACUUM TUBE TESTING EQUIPMENT

This Model OQ Vacuum Tube Testing Set is guaranteed to be free from defects in workmanship and material for a period of one year of service, this period to be considered as actual service covering the time the device is installed and in use. In the event that the device has not seen a full year's service at the end of a two year period from the date of this contract, this guarantee shall be considered as terminated. This guarantee does not cover vacuum tubes as used in the device itself, lights, or fuses, all of which are purchased on the open market from one or more commercial companies, and carry the usual guarantee of the manufacturer.

In the event that defects are found, other than the parts mentioned in the previous paragraph, this guarantee shall cover the satisfactory repair or replacement of the defective part, at the contractor's plant, Newark, N. J., within the two year period mentioned above. Should such defects occur, report of failure of any part of this equipment during its service life, shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and give the date of installation of the equipment. Refer to latest revision of Bureau of Engineering Circular Letter No. 40 for instructions concerning Reports of Failures, etc.

Contract NXss/a-13581 Contract Dated September 30, 1942

Serial number of equipment.....

Date of acceptance by the Navy.....

Date of delivery to contract destination.....

Date of completion of installation.....

Date placed in service.....

WESTON ELECTRICAL INSTRUMENT CORPORATION

Newark, N. J., U. S. A.

RESTRICTED

INSTRUCTIONS

on

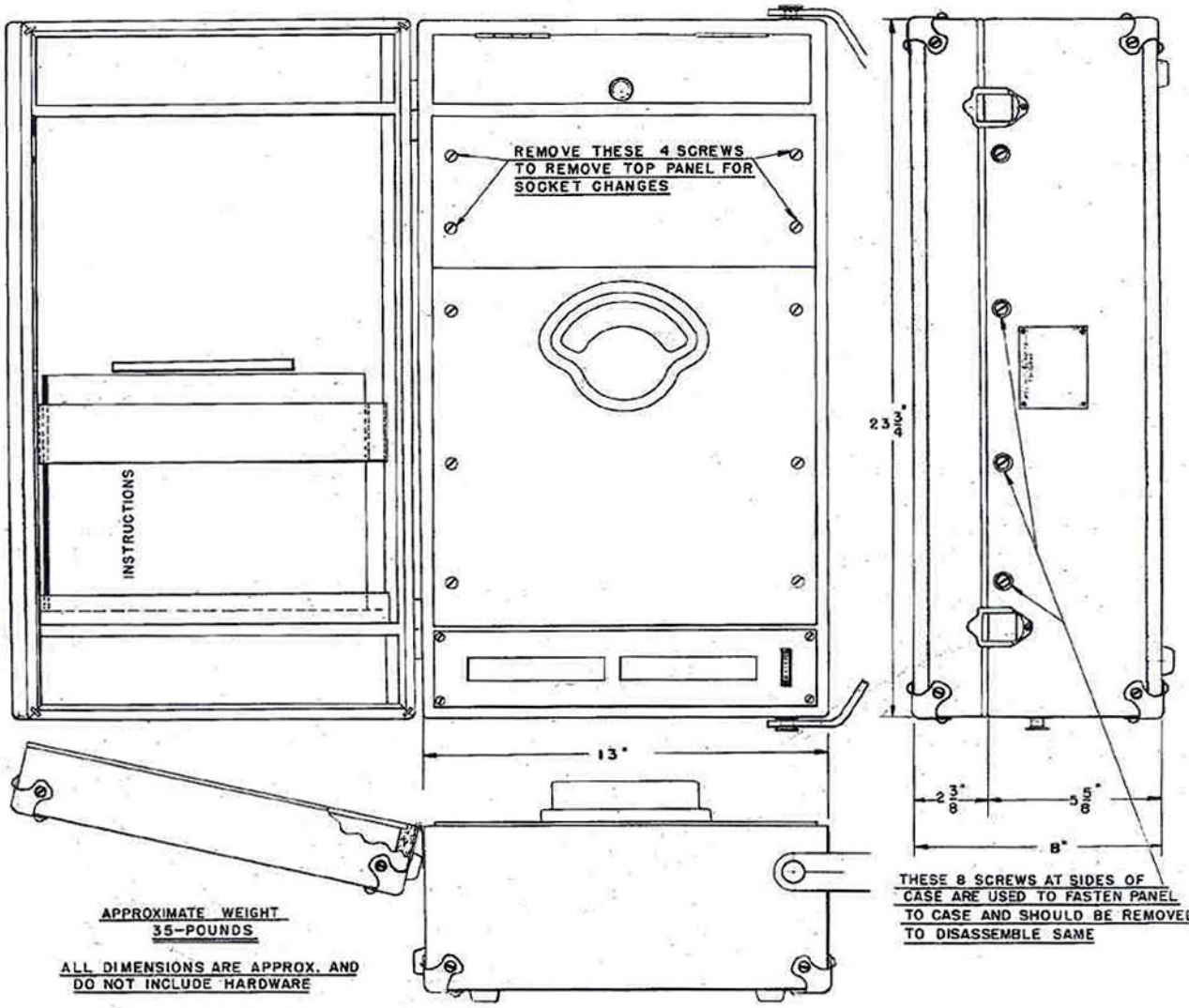
THEORY AND USE

of

MODEL OQ
VACUUM TUBE TESTING EQUIPMENT

Supply: 115 Volts—60 Cycles
35 Watts

This instruction book is furnished for the information of commissioned, warrant, enlisted and civilian personnel of the Navy whose duties involve design, instruction, operation and installation of radio and sound equipment. The word "RESTRICTED" as applied to this instruction book signifies that this instruction book is to be read only by the above personnel, and that the contents of it should not be made known to persons not connected with the Navy.



Dimensional Diagram of OQ Equipment
Approximate Weight: 35 Lbs.

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I.

INTRODUCTION

A. TESTING VACUUM TUBES

Each vacuum tube purchased by the Navy is subjected to more than fifteen electrical and mechanical tests which are designed to insure that vacuum tubes supplied to the Service are satisfactory in every respect.

It is seldom that tubes, during shipment or handling, are subjected to mechanical shocks of sufficient magnitude to dislocate or dismember the electrodes; however, it is desirable to have available a means for quickly and easily testing vacuum tubes prior to placing them in service.

The end of useful life of vacuum tubes is usually occasioned by a reduction of electron emissivity of the cathode which reduces the amplifying ability or conductivity of the tube. In receiving equipment this decadence of a tube results in loss of sensitivity and, in the case of rectifier tubes, with a reduction of the rectified output voltage. Whenever receiving equipment operates subnormally, it is desirable to have available a means for testing each vacuum tube so that the defective one may be replaced, if the fault lies in the tubes, and so that the remainder may be retained to deliver additional useful life.

To fulfill the need for a portable tube testing device, the Service has been provided with the Model OQ Vacuum Tube Testing Equipment.

This tube tester was designed to provide a portable device, with the best possible accuracy, consistent with size and weight. With the large number of tubes in use by the Service and available on the commercial market, flexibility was also an important object so that facilities would be available in all types of emergencies for obtaining reasonably accurate measurements on vacuum tubes in all types of communication receiving equipment. The accuracy of measurement obtainable is partly a function of the skill of the operator in adjusting the applied voltages and instruments to the correct values and in reading the instrument indications. The indications of the potential and current instruments used with this equipment are guaranteed to be accurate to only 2% of their full scale readings. Should all instrument errors happen to be cumulative, errors of 6 to 8% or even 10% are possible. Care should therefore be exercised in setting the instruments correctly for best accuracy.

B. APPARATUS AND DATA

The Model OQ equipment includes the following apparatus:

A group of vacuum tube sockets engraved with the R.M.A. standard pin numbering, consisting of a 4 pin, 5 pin, 6 pin, combination large and small 7 pin, an 8 pin loktal, an 8 pin octal, a miniature, an acorn socket and a separate socket for testing the Western Electric 215A peanut tubes; a transformer supplying suitable heater voltage in accord with a selector switch setting, to any of the above mentioned sockets; patch cords for making connections to any of the socket pins; a second and separately controlled power transformer for supplying potentials for all other electrodes including plate, grid, screen and suppressor voltages; individual 3½" a.c. instruments for indicating the correct transformer potentials; a plurality of controls for selecting the correct proportional voltages to be supplied to the patch cord jacks; a self-contained d.c. supply including a rectifier tube and suitable transformer windings for supplying the energy for short testing; a neon lamp operating with a short test switch for indicating short circuited tube elements and a large fan shaped meter with 4" scale length for reading the proportional mutual conductance and emission readings on the various vacuum tubes. A block diagram of the equipment is shown on page 3.

The four master controls are lettered A through D, and are in line on the bottom of the panel. Settings for controls "A", "C", and "D" for each tube, and the cut-off or end point reading on the main indicating instrument, are tabulated on a roller type indexing chart mounted in the oak case, directly below the panel. This roller chart provides all the data necessary for tube testing, providing the operator is familiar with the tube base connections for the tube to be tested. A complete

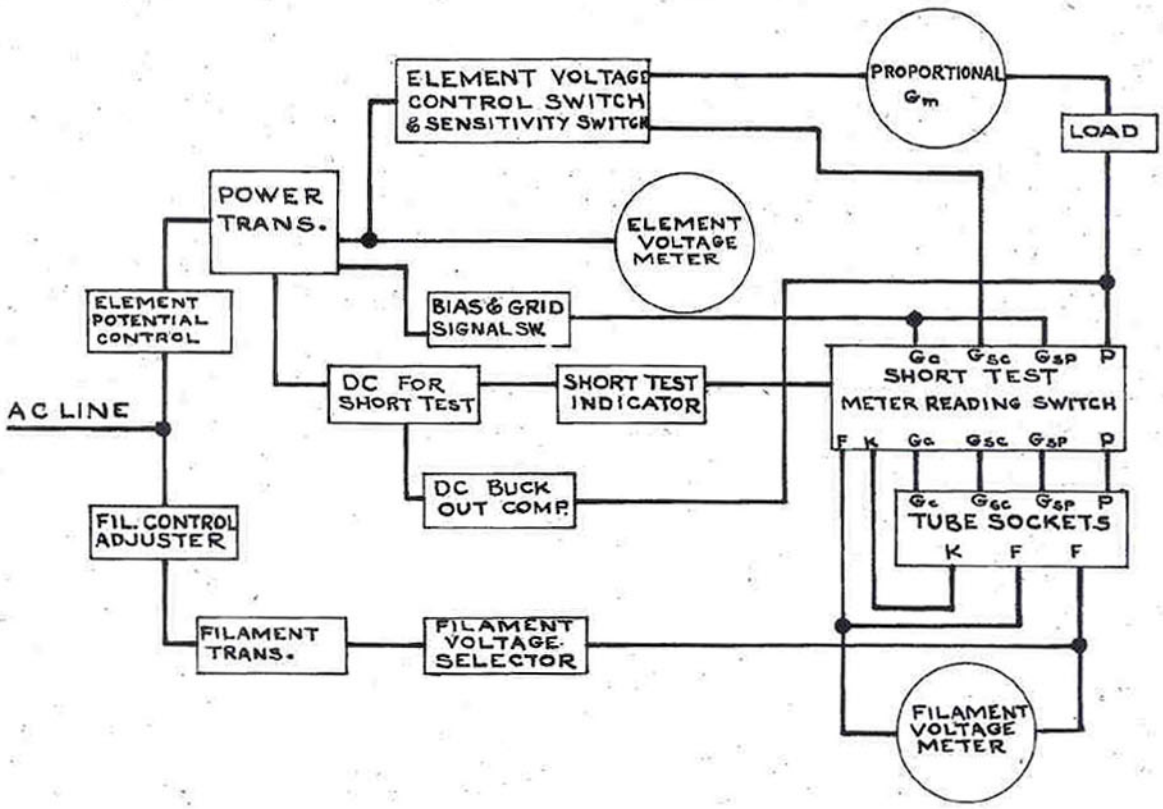
set of tube base charts is available elsewhere in this book for locating the pin numbers for each tube electrode. In addition, complete data including all pin numbers, voltages required and end point readings are listed in a large table in this book. If the tube to be tested is listed on the roller chart, but the base data is not known, this table will be far more rapid in use for making the various patch cord connections and setting the controls, than the tube base charts.

C. THE METHOD

Of the many measurable characteristics of a vacuum tube, the transconductance is the one most closely associated with operating performance. For this reason, the factor which determines the end of useful life of vacuum tubes is generally taken to be the transconductance except in the case of diodes which have no grids and except in the case of certain other tubes, the transconductance of which is not conveniently measured. The factor which determines the end of useful life of these last mentioned tubes is generally taken to be the cathode emission current measured under specified conditions.

The Model OQ equipment measures proportional mutual conductance in terms of percent above or below the normal listed or so-called bogie value, as specified by the various tube manufacturers. This measurement is made by reading the change in plate current with simultaneous change in grid voltage. Various grid signal values are used in accord with the type tube under measurement, and suitable potentials are applied to the various electrodes through the switching controls A through D. A.C. potentials are used in all cases, the tube under test acting as its own rectifier and the main indicating instrument showing the rectified current in the plate circuit. Under controlled conditions a change in the grid voltage will cause a proportionate change in the plate current, and this reading if taken on the proper section of the tube characteristic, will be proportional to the mutual conductance of the vacuum tube as measured under standard conditions, such as those used in the Model OD equipments.

BLOCK DIAGRAM



II.

DETAILED DESCRIPTION OF THE EQUIPMENT

A. GENERAL

The complete tube checker is housed in a heavy quartered oak case supplied with suitable protective corners and a full length carrying strap. The tube testing panel in itself consists of two sections. The first, or lower section, containing all of the instruments, controls, short test lamp, pilot light and the energized patch cord jacks, and the upper or smaller section containing only the tube sockets and connections to the corresponding set of patch cord jacks numbered in accord with the R.M.A. basing system. The two panels are held together by heavy brass angle pieces, and this whole section of the tester may be removed in one unit by taking out the four large oval head screws in line on the handle and hinged sides of the oak case. The panel screws only mount the two panel sections together on the brass angle pieces, and these should not be disturbed when removing the equipment from the case. The large screws that go through the oak case into the angle brackets, are the ones that should be removed when it is necessary to take the test set out of the case. The socket panel is kept separate and this CAN BE removed separately by taking out the four corner screws holding this section to the brass angle pieces. However, this should only be necessary for actual socket replacement or repair as required. This panel has been manufactured as an individual section so that should tube bases change radically, requiring new socket designs, this section could be replaced at a relatively small cost.

The tube indexer of the roller chart type, mounts in a separate section at the bottom of the case, and this can be taken out by removing the four corner wood screws. This indexer is equipped with a printed chart approximately three feet long, which can be removed and replaced if necessary. Three metal clamps of the snap-on type hold the paper in position on each end of the rollers, and a new chart may be set in position by removing these clamps and snapping them on individually over the new paper chart on the roller. Space is available at the lower section of the roller chart for adding extra tubes. This can be done by removing the indexer and writing in pencil or ink on the line near the bottom of the page.

A lead compartment is available at the top section of the case and this houses the twelve individual patch cords and a ten foot line cord equipped with a fuse plug. A hinge cover is provided so that the cords can be kept in this compartment when not in use. The cover has a notch in one corner for the line cord so that the set can be operated with this compartment door closed. Spare fuses are provided in a small envelope which should be kept in this compartment, and should the device fail to function, the fuses in the plug itself can be examined and replacements made if necessary. Note that each side of the line is fused and that both fuses should be tested if failure occurs.

B. SHORT TEST SYSTEM

The short testing circuit of this device has been worked out so that the tube is tested for all inter-electrode shorts after it has been brought up to temperature, for mutual conductance or emission testing. This circuit operates through the master control switch B and a six position short testing switch. A single neon lamp is used, this lamp being connected into each of the electrode circuits consecutively by operation of the six position switch. This short testing is done after the patch cords are in position, but just before the emission or mutual conductance readings are taken. Energy for the short test is supplied through one of the two internal transformers and a rectifier tube. The voltage of this circuit is automatically adjusted when the right hand or element voltage instrument is set to the correct reading. No other rectifier tubes are used in this device.

C. HEATER VOLTAGE SUPPLY

Heater voltages are available in steps all the way from 1 volt to 120 volts. These potentials are selected by the rotary switch control marked A and are available in values used on the greater proportion of receiver vacuum

tubes. The switch selects the approximate voltage and final adjustment of the potential is made by using the HEATER VOLTAGE ADJUSTER and setting the reading to the correct value on the heater voltage instrument directly above this control. An interlocking circuit is used on the heater voltage switch marked A, to automatically select the correct potential range on the heater voltage instrument. This avoids damage to the meter from overloading when rotating the switch rapidly from one potential to another. A separate transformer is used for all heater potentials and, therefore, adjustments of this voltage do not in any way affect the potentials used on the other electrodes. The readings on the heater voltage instrument should always be checked after the tube is placed in the socket to be sure to correct for any drop in potential caused by loading the filament transformer.

D. ELEMENT VOLTAGE CIRCUIT

All other electrode potentials as differentiated from heater potentials are supplied by a second, separately controlled transformer. The actual values of these potentials are selected by a 22 position control marked D. These voltages are then supplied to the patch cord jacks on the top of the panel in accord with the heading on the marked plate directly above the jacks. An element voltage instrument is mounted above this control D and is used for setting the line potential on this transformer to the correct value. A control directly below the instrument marked PLATE VOLTAGE ADJUSTER is used to set the instrument pointer to the 100 volt mark as indicated by an arrow on the scale of this instrument.

Control C is used for setting up the proper values of shunt resistance network for the instrument and meter reset circuits. All the controls, A through D, should be set to the proper positions before placing the tube in the socket. Switch B should always be in the left hand or SHORT TEST position, until the tube has come up to temperature and a short test made by operating the six position switch marked ROTATE WATCHING NEON LAMP. Any flash or indication on the neon lamp will show a short between two or more of the electrodes, and the tube should be rejected as unfit for service at this point. Further testing of the tube under severe shorted conditions may cause damage to the test set.

E. PROPORTIONAL MUTUAL CONDUCTANCE READINGS

The fan shaped instrument in the center of the panel is equipped with a scale marked 0 to 130. This instrument will indicate readings in percent of normal mutual conductance or emission on all tubes except in a few cases where the tubes are listed with a notation in the remark column to the effect that the normal reading is less than 100. The test set is calibrated on each tube type so that where the tube is normal with a manufacturer's rated mutual conductance, it will read 100 on this instrument. If the tube happens to have a mutual conductance higher than the rated value, it will show indications above the 100 value up to 130%. If the tubes read higher or show an indication off scale on the instrument, it is doubtful if they should be used for normal service. End point values are listed in the book and examples will be given on subsequent pages showing the minimum readings acceptable for Naval service.

When testing each amplifier tube, that is, all tubes calling for mutual conductance readings, the normal plate current of the tube must be cancelled out or bucked out on the large fan shaped instrument. When a tube has been brought up to temperature and control B set in the METER READINGS position, this meter will indicate normal plate current. The control to the lower right of the fan shaped instrument should be rotated in a clock-wise direction INCREASING THE REVERSE OR BUCK-OUT CURRENT THROUGH THE METER bringing the pointer back to the zero value. The mutual conductance test switch marked G_m TEST should then be depressed and the percent indication noted. If this reading is above the rejection point as listed on the roller chart or in the instruction book tables, the tube can be used for further service.

F. THE CONTROLS

Heater Volts—A. This is the selector switch for the approximate filament voltage. It should be set first of all to the correct reading as listed on the roller chart for Control A.

Switch B. This is the master control switch to separate short test and mutual conductance

or emission readings. It should always be set first to the SHORT TEST position until this part of the test is completed.

Control C. This is a double potentiometer controlling two separate instrument circuits and should be set to the correct value as noted on the roller chart under the column headed Control C.

Control D. This is the master control for selecting the series of electrode potentials required for proper testing of the particular vacuum tube in question. This should be set in accord with column D on the roller chart.

Heater Voltage Adjuster. This is the vernier control for accurately setting the heater voltage to the correct value as read on the HEATER VOLTAGE instrument. It is used after Control A is set to the correct position.

Short Test Switch Marked "Rotate Watching Neon Lamp". This is a six position switch connecting all electrode circuits in turn into the short test circuit and should be rotated while watching the neon lamp.

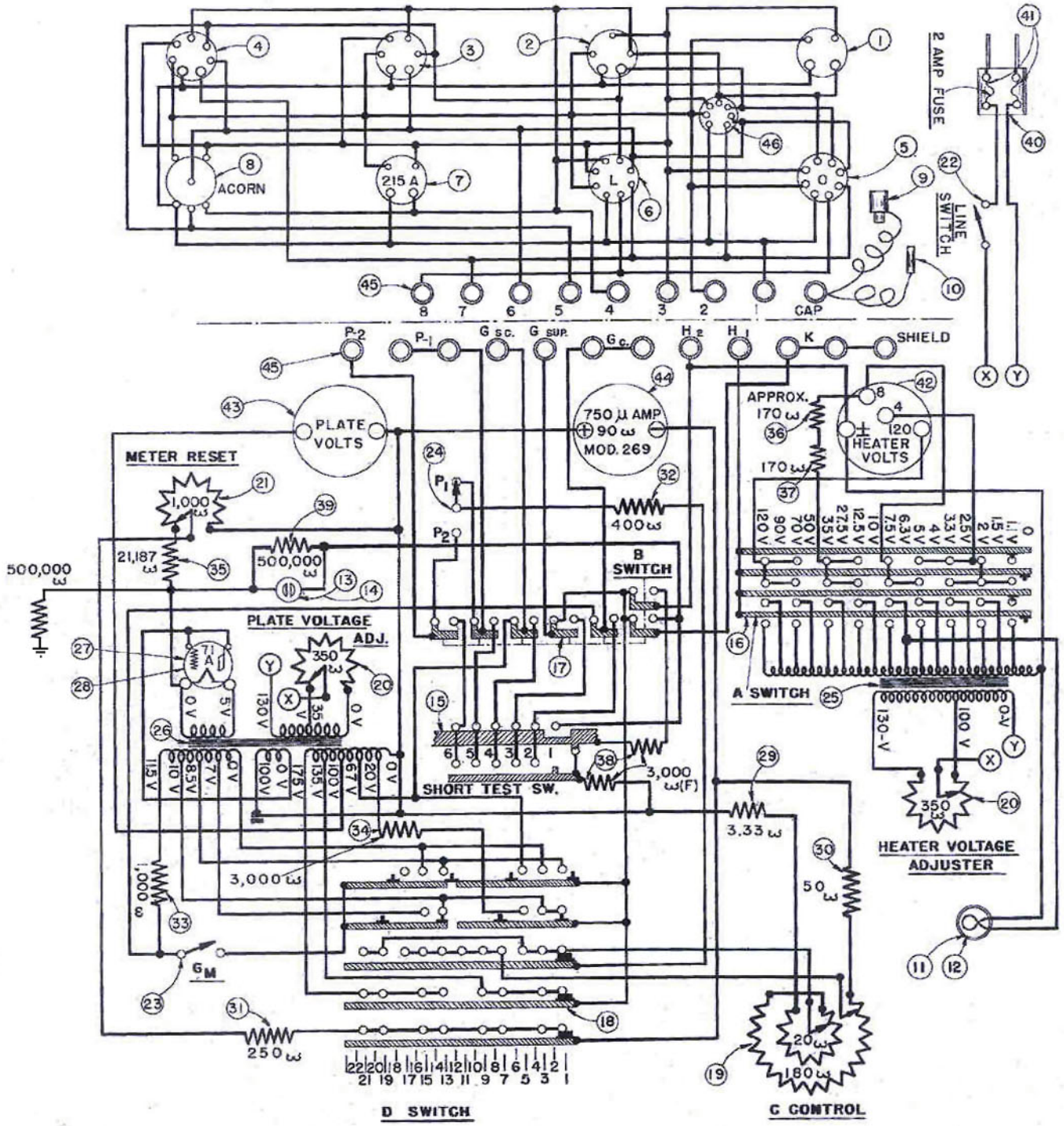
Meter Reset. This is a potentiometer controlling the reverse current through the proportional mutual conductance indicating instrument. It is only used for measuring G_m percentage values and is not required and can be ignored when testing rectifiers and diodes for emission values. It is automatically disconnected from the circuit when the four main controls A through D are properly set for emission readings.

Plate Voltage Adjuster. This is used to set all other voltages other than the heater voltage to the correct values. This should be used to set the ELEMENT VOLTAGE instrument to the 100 volt position as indicated by the arrow.

On-Off Switch. This is mounted on the left hand side of the panel below the heater voltage instrument. This controls energy flow to all circuits. The red jewel light indicates at all times whether or not this switch is turned on.

Normal Plate—Second Plate Switch. This is used when testing double plate rectifiers, diodes and two section triodes and pentodes, etc. It actually connects the two patch cord jacks marked Plate No. 1 into the circuit when the switch is in the NORMAL PLATE position, and the patch cord jack marked Plate No. 2 when this switch is in the SECOND PLATE position. This control should always be kept in the NORMAL PLATE position except when taking actual readings on the second sections of double tubes.

G_m Test Switch. This is a spring return switch and should only be depressed for proportional mutual conductance readings on the large fan shaped instrument, after the pointer has been set to the zero position by means of the meter reset control.



Wiring Diagram

III.

OPERATION

THE TESTING OF VACUUM TUBES

A. UNPACKING AND SETTING UP

Remove the Model OQ equipment from the shipping carton by means of the leather carrying strap, and set the device in the horizontal position on the table or bench for operation. Open the cover by releasing the two snap catches on the handle side and, if desirable, remove the cover entirely by means of the slip hinges. The instruction book is held in the cover of the set, and may be removed by sliding it towards the top of the cover.

Open the hinged compartment at the top of the instrument, and unpack the twelve patch cords, and line cord assembly. The patch cords can be left temporarily in the compartment and the line cord inserted in a 60 cycle, 115 volt outlet.

Turn on the test set by means of the left hand toggle switch. The pilot light and right hand instrument should indicate immediately. The left hand instrument will also show a reading if the A control is indexed to one of the voltage positions. Index switch B to the SHORT TEST position and connect a patch cord from one of the jacks marked CATHODE to one of the jacks marked CONTROL GRID. With the short test switch marked ROTATE WATCHING NEON LAMP in either the 1 or 2 position, the neon lamp should indicate.

If no meter or pilot light indications are obtained at first, check the fuses in the plug making sure these are not open circuited, and also be sure that there is energy at the a.c. outlet. If the neon lamp shows no indication, be sure this is indexed correctly in the socket. This is a bayonet type of socket and the lamp must be pushed down and rotated to remove it or insert it in the socket.

Remove the patch cord used for checking the short test lamp and replace this in the top compartment.

B. TESTING AN AMPLIFIER TUBE

Select a tube to be tested. It is recommended that one of the simpler types be tried first, such as the type 01A, the first tube listed on the roller chart. Set controls A, C and D to the 5.0, 10 and 10 positions respectively. Set control B to the SHORT TEST position. This tube has a conventional four prong base, and therefore, patch cords should be connected from the two heater jacks to socket panel jacks 1 and 4 respectively. The control grid is on No. 3 and therefore, this jack should be connected with one of the control grid jacks. The plate is on pin No. 2 and this should be connected to one of the two jacks marked PLATE 1. *The "PLATE 1" jacks should always be used on tubes having a single plate electrode.* The "PLATE 2" jack is only used on double tubes.

Be sure that the test set is turned on. The heater voltmeter should read approximately 5 volts and the PLATE VOLTAGE ADJUSTER should be rotated to bring the element voltmeter to the 100 mark. Place the tube in the four prong socket and correct the heater voltage reading if necessary, by means of the HEATER VOLTAGE ADJUSTER. Rotate the short test switch from positions 1 through 6 watching the neon lamp. If the tube is free from shorts; index the B control to the METER READINGS position. A plate current indication should be noted on the large fan shaped meter. Be sure that the NORMAL PLATE-SECOND PLATE switch is in the NORMAL PLATE position. Starting from the counter-clockwise extreme position, rotate the METER RESET control until the pointer of the large fan shaped meter reads zero. This control covers a wide range of reverse currents, and some care may be required in accurately setting the pointer to the zero mark. After this is done, depress the G_m TEST switch. The condition of the tube in terms of percent normal mutual conductance will be noted on the large fan shaped meter. Refer to the roller chart, and this will show that this tube has a rejection point (Rej. Pt.) value of 65. If the reading is above 65 on this instrument, the tube should be retained as having sufficient mutual conductance for normal purposes. After completion

of the test, it is advisable to reset Control B to the short test position before proceeding with the testing of another tube. If other tubes of this type are to be checked, they should all be done at once to avoid having to reconnect the patch cord jacks.

Other amplifier tubes are tested in similar fashion. In each case set the controls A through D to the correct positions as listed, always starting with the B control in the SHORT TEST position. Keep the NORMAL PLATE-SECOND PLATE switch in the NORMAL PLATE position and always start with the METER RESET control in the extreme counter-clockwise position. If desirable, the heater connections can be made first using the patch cords, and the tube placed in its socket and allowed to come up to temperature while the balance of the patch cords are being connected. *This should only be done with the B control in the SHORT TEST position so as to avoid any damage to the tube or test set during the patching process.*

If the tube base connections are known, all information necessary for testing the tube is listed on the roller chart. There are a few tubes such as converters wherein special patch cord instructions are necessary, and on these tubes the roller chart lists a notation "See Instruction Book". On tubes of this type there are several ways of measuring the mutual conductance, and to obtain correct test readings the patching instructions in the tube data tables listed further on in this book, should be referred to. On twin triodes, twin tetrodes, and pentodes as well as double plate rectifiers and diodes, a single patching operation can be used for testing both sections of the tube. If mutual conductance readings are desired, the two grid circuits can be patched simultaneously to the grid jacks, with one plate circuit connected to one of the jacks marked "PLATE 1", and the second plate connected to the separate jack marked "PLATE 2". In this case the normal procedure for testing a single amplifier tube should be followed and after this is complete, the NORMAL PLATE-SECOND PLATE switch should be changed to the SECOND PLATE position, the large fan shaped instrument again balanced to the zero value, and the proportional G_m reading taken on the second section of the tube.

Where a glass tube (G or GT) has equivalent characteristics to the metal tube, only one type is listed and values given apply to all.

C. TESTING RECTIFIERS AND DIODES

On rectifier tubes and diodes, emission readings are used to measure the condition of the tube. This means that the meter reset control and the G_m test switch are not used for any measurements on either rectifier or diodes types. The first indication on the large fan shaped meter is, therefore, the measurement of the tube condition.

To test a rectifier tube, proceed in the same way in setting up the correct switch positions A through D. Make the patch cord connections as listed under the complete tube data in the instruction book, or, in accord with the tube base diagram. If the tube is a double plate rectifier, connect one plate to the "PLATE 1" jack and the second plate to the jack marked "PLATE 2".

Test the tube for shorts and then change the control B to the METER READINGS position. Note the large fan shaped instrument reading in percent of normal and compare this with the cut-off value on the chart in the book. If the tube is a double plate rectifier type, shift the NORMAL PLATE-SECOND PLATE switch to the SECOND PLATE position and note the condition of the second section of the tube. If the tube has only one plate, use the jacks marked P1 and leave this switch in the NORMAL PLATE position. It is only necessary to use this switch when double section tubes are involved.

In testing diodes such as the 6H6 or other equivalent types, proceed exactly as in the case of rectifier tubes. Note when testing all diodes, that the meter indications of normal tubes are considerably below the 100 value on the instrument scale. This is due to the limited current in tubes of this type, where the cathode and plate areas are quite small. Normal readings for these tubes, as well as some other types, are listed separately preceding the rejection point value. Diode currents in these tubes may vary considerably, and in some cases may be 2 or 3 times the minimum deflection or rejection point value listed in the chart. Such tubes are perfectly all right so long as they will show emission readings above the rejection point value.

Where diode plates are encountered in tubes with other sections, such as duo-diode-pentodes, and diode-triode combinations, the

amplifier section should first be tested in accord with instructions under amplifier tubes, and then each diode plate checked afterwards to be sure that the diode sections of these tubes are in good condition.

D. EXPLANATION OF TUBE DATA CHARTS AND TABLES

Roller Chart. This lists all of the tubes encountered in normal Navy service work and also a very large group of commercial types. This roller chart is divided into two sections or columns, one for each rectangular window. The tubes are listed in the left hand column of each window section in numerical order, all types in the number series from 0 to 6 inclusive appear in the left hand section as the indexer is rotated. All other types with numbers starting with the digit 7 up through the 117 volt types and letter types such as the Western Electric tubes, appear in the right hand section. No patch cord connections or tube base data are given on this roller chart, as such information would require entirely too much space to include in a roller chart design. If the tube base is known, all other information necessary is listed on the roller chart. The settings for Controls A, C and D are shown opposite each tube type, and in addition, any notes that are required, as well as the rejection point values are listed. Where glass tube (G or GT) has equivalent characteristics to the metal tube, only one type is listed and values given apply to all. If data on the tube basing are required, the complete tube data listings can be referred to, wherein this same list of tubes is repeated with the settings for the various controls, and also the patch cord connections for each electrode.

Tube Base Charts. Complete tube base charts are given in this book for general information only. These charts include all of the R.M.A. tube base assignments, as well as some additional base diagrams required for special types.

Navy Type Numbers. Where the old Navy type numbers are encountered the cross-index of old and new type numbers for vacuum tubes, listed on page 18, may be referred to.

Table of Abbreviations. Certain abbreviations have been used in listing the tube data to conserve on space, especially on the roller chart. These are given below and the operator should become familiar with these in order to make the best use of the tables and roller chart listing:

Cap	This refers to the tube top cap.
Di.	Diode.
G_m	Mutual conductance.
Hex. Conv.	Hexode converter.
Norm.	Normal. This is the normal value for good tubes. Where this value is other than 100, the normal value is listed.
Pe.	Pentode.
Pent. Conv.	Pentagrid converter.
Rect.	Rectifier.
Rej. Pt.	Rejection point, or cut-off point. Tubes showing readings below this value should be rejected as unfit for service.
Tr.	Triode.
Tw. Pe.	Twin pentode.
Tw. Tr.	Twin triode.

E. CONDENSED STEP BY STEP PROCEDURE

This condensed procedure is listed for rapid reference whereby the operator can check quickly to be sure that he is going through the proper sequence in completely testing a vacuum tube.

1. Locate the tube type number on the roller chart or in the complete tube data tables in the book.
2. Set the panel controls A, C and D to the listed values, and set Control B to the SHORT TEST position.
3. Make the patch cord connections for each of the tube electrodes, referring to the complete tube data in the book if the base connections are not known.
4. Turn on the tube tester and set the heater voltmeter to the correct reading and the element voltmeter to the indicating arrow.
5. Place the tube in the socket and allow it to come up to normal operating temperature. If the tube has a top cap connection, be sure to connect the grid lead.
6. Rotate the SHORT TEST switch through the 6 indicated positions watching the neon lamp. It is often advisable to tap

the tube with a pencil when looking for intermittent shorts. If the lamp indicates on any of the 6 positions, the tube should be rejected as shorted.

7. Be sure the NORMAL PLATE-SECOND PLATE switch is in the NORMAL PLATE position and the METER RESET control in the extreme counterclockwise position.

8. Index B control to the METER READINGS position. On most tubes a plate current indication will be noted on the mutual conductance meter. On all tubes such as rectifiers and diodes, where emission readings are used, this will show the tube condition.

9. On amplifier types, rotate the METER RESET control in a clockwise direction, resetting the instrument pointer to the zero position.

10. Depress the G_m TEST switch and note the proportional mutual conductance reading. Compare this reading with the rejection point value on the roller chart.

11. If the tube has two identical sections, and the patch cords have been set up for the testing of both sections at once, manipulate the NORMAL PLATE-SECOND PLATE switch, set the pointer again to the zero position value and depress the G_m TEST switch for the reading on the second section of the tube.

COMPLETE TUBE DATA FOR MODEL OQ

Tube Type	Heater	Cathode	Control Grid	Normal Plate	Second Plate	Screen	Suppressor	Panel Controls A	C	D	Rej. Point	Remarks	Tube Type
01A	1-4	....	3	2	.....	....	.....	5.0	10	10	65		01A
1A3	1-7	3	.....	2	6	....	.....	1.4	13	11	20	Diode	1A3
1A4	1-4	....	Cap	2	.....	3	.....	2.0	27	9	65		1A4
1A5-G	2-7	....	5	3	.....	4	.....	1.4	50	8	50		1A5-G
1A6	1-6	....	4 & Cap	2 & 3	.....	5	.....	2.0	46	8	50	Pent. Cover	1A6
1A7-G	2-7	....	5 & Cap	3 & 6	.....	4	.....	1.4	39	8	50	Pent. Cover	1A7-G
1B4-P	1-4	....	Cap	2	.....	3	.....	2.0	34	9	65		1B4-P
1B5/25S	1-6	....	5	2	.....	....	.....	2.0	50	8	52	Tr; Norm-79	1B5/25S
1B5/25S	1-6	....	.....	3	4	....	.....	2.0	13	11	25	Di.	1B5/25S
1C5-G	2-7	....	5	3	.....	4	.....	1.4	10	9	50		1C5-G
1C6	1-6	....	4 & Cap	2 & 3	.....	5	.....	2.0	28	8	50	Pent. Conv.	1C6
1C7-G	2-7	....	5 & Cap	3 & 6	.....	4	.....	2.0	28	8	50	Pent. Conv.	1C7-G
1D5-GP	2-7	....	Cap	3	.....	4	.....	2.0	33	9	65		1D5-GP
1D7-G	2-7	....	5 & Cap	3 & 6	.....	4	.....	2.0	46	8	50	Pent. Conv.	1D7-G
1D8-GT	2-7	....	5	3	.....	4	.....	1.4	33	8	50	Pe.	1D8-GT
1D8-GT	2-7	....	Cap	6	.....	....	.....	1.4	47	9	65	Tr.	1D8-GT
1D8-GT	2-7	....	.....	8	.....	....	.....	1.4	13	11	20	Di.	1D8-GT
1E5-GP	2-7	....	Cap	3	.....	4	.....	2.0	35	9	65		1E5-GP
1E7-G	2-7	....	4 & 5	3	6	8	.....	2.0	41	8	50	Tw. Pe.	1E7-G
1F4	1-5	....	3	2	.....	4	.....	2.0	32	8	50		1F4
1F5-G	2-7	....	5	3	.....	4	.....	2.0	32	8	50		1F5-G
1F6	1-6	....	Cap	2	.....	3	.....	2.0	41	9	65	Pe.	1F6
1F6	1-6	....	.....	4	5	....	.....	2.0	13	11	20	Di.	1F6
1F7-GV	2-7	....	Cap	3	.....	6	.....	2.0	41	9	65	Pe.	1F7-GV
1F7-GV	2-7	....	.....	4	5	....	.....	2.0	13	11	20	Di.	1F7-GV
1G4-G	2-7	....	5	3	.....	....	.....	1.4	5	10	65		1G4-G
1G5-G	2-7	....	5	3	.....	4	.....	2.0	21	8	50		1G5-G
1G6-G	2-7	....	4 & 5	3	6	....	.....	1.4	27	9	50	Tw. Tr.	1G6-G
1H4-G	2-7	....	5	3	.....	....	.....	2.0	19	9	65		1H4-G
1H5-G	2-7	....	Cap	3	.....	....	.....	1.4	50	9	55	Tr; Norm-84	1H5-G
1H5-G	2-7	....	.....	5	.....	....	.....	1.4	13	11	20	Di.	1H5-G
1H6-GT	2-7	....	6	3	.....	....	.....	2.0	50	8	52	Tr; Norm-80	1H6-GT
1H6-GT	2-7	....	.....	4	5	....	.....	2.0	13	11	20	Di.	1H6-GT
1J5	2-7	....	5	3	.....	4	.....	2.0	10	10	50		1J5
1J6-G	2-7	....	4 & 5	3	6	....	.....	2.0	18	9	50	Tw. Tr.	1J6-G
1LA4	1-8	....	6	2	.....	3	.....	1.4	50	8	50		1LA4
1LA6	1-8	....	4 & 6	2 & 3	.....	5	.....	1.4	45	8	50	Pent. Conv.	1LA6
1LB4	1-8	....	6	2	.....	3	.....	1.4	33	8	50		1LB4
1LC6	1-8	....	4 & 6	2 & 3	.....	5	.....	1.4	40	8	50	Pent. Conv.	1LC6
1LH4	1-8	....	6	2	.....	....	.....	1.4	50	9	55	Tr; Norm-84	1LH4

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Tube Type	Heater	Cathode	Control Grid	Normal Plate	Second Plate	Screen	Sup-pressor	Panel Controls A	C	D	Rej. Point	Remarks	Tube Type
1LH4	1-8	....	.....	.....	4	....	.....	1.4	13	11	20	Di.	1LH4
1LN5	1-8	....	6	2	.....	3	4	1.4	50	9	65		1LN5
1N5-G	2-7	....	Cap	3	.....	4	.....	1.4	50	9	62	Norm-95	1N5-G
1N6	2-7	....	5	3	.....	4	.....	1.4	50	8	50	Pe.	1N6
1N6	2-7	....	.....	6	.....	....	.....	1.4	13	11	20	Di.	1N6
1P5	2-7	....	Cap	3	.....	4	.....	1.4	47	9	65		1P5
1Q5-GT	2-7	....	5	3	.....	4	.....	1.4	15	8	50		1Q5-GT
1R5	1-7	....	4 & 6	2	.....	3	.....	1.4	25	9	50		1R5
1S4	1-7	....	3	2	.....	4	.....	1.4	50	4	38	Normal-76	1S4
1S5	1-7	....	6	5	.....	4	.....	1.4	46	9	50	Pe.	1S5
1S5	1-7	....	.....	3	.....	....	.....	1.4	13	11	20	Di.	1S5
1T4	1-7	....	6	2	.....	3	.....	1.4	24	9	65		1T4
1T5-G	2-7	....	5	3	.....	4	.....	1.4	31	8	50		1T5-G
1-V	1-4	3	.....	2	.....	....	.....	6.3	1	6	60	Rect.	1-V
2A3	1-4	....	3	2	.....	....	.....	2.5	21	4	50		2A3
2A5	1-6	5	4	2	.....	3	.....	2.5	3	10	50		2A5
2A6	1-6	5	Cap	2	.....	....	.....	2.5	17	9	65	Tr.	2A6
2A6	1-6	5	.....	3	4	....	.....	2.5	13	11	25	Di.	2A6
2A7	1-7	6	5 & Cap	2 & 4	.....	3	.....	2.5	20	8	50	Pent. Conv.	2A7
2B7	1-7	6	Cap	2	.....	3	.....	2.5	24	9	65	Pe.	2B7
2B7	1-7	6	.....	4	5	....	.....	2.5	13	11	25	Di.	2B7
3A8-GT	2-7	....	Cap	3	.....	4	.....	2.8	50	9	38	Pe. Norm-59	3A8-GT
3A8-GT	2-7	....	5	6	.....	....	.....	2.8	50	9	56	Tr. Norm-86	3A8-GT
3A8-GT	2-7	....	.....	8	.....	....	.....	2.8	13	11	20	Di.	3A8-GT
3Q4	1-7	....	3	2	.....	4	.....	2.8	17	8	50		3Q4
3Q5-GT	2-7	....	5	3	.....	4	.....	2.8	20	8	50		3Q5-GT
3S4	1-7	....	3	2	.....	4	.....	2.8	8	9	50		3S4
5T4	2-8	....	.....	4	6	....	.....	5.0	2	6	60	Rect.	5T4
5U4-G	2-8	....	.....	4	6	....	.....	5.0	3	6	60	Rect.	5U4-G
5V4-G	2-8	....	.....	4	6	....	.....	5.0	0	6	60	Rect.	5V4-G
5W4	2-8	....	.....	4	6	....	.....	5.0	8	6	60	Rect.	5W4
5X4-G	7-8	....	.....	3	5	....	.....	5.0	3	6	60	Rect.	5X4-G
5Y3-G	2-8	....	.....	4	6	....	.....	5.0	7	6	60	Rect.	5Y3-G
5Y4-G	7-8	....	.....	3	5	....	.....	5.0	7	6	60	Rect.	5Y4-G
5Z3	1-4	....	.....	2	3	....	.....	5.0	3	6	60	Rect.	5Z3
5Z4	2-8	....	.....	4	6	....	.....	5.0	0	6	60	Rect.	5Z4
6A3	1-4	....	3	2	.....	....	.....	6.3	21	4	50		6A3
6A4	1-5	....	3	2	.....	4	.....	6.3	23	8	50		6A4
6A6	1-7	4	3 & 5	2	6	....	.....	6.3	25	8	50	Tw. Tr.	6A6
6A7	1-7	6	5 & Cap	2 & 4	.....	3	.....	6.3	20	8	50	Pent. Conv.	6A7
6A8	2-7	8	5 & Cap	3 & 6	.....	4	.....	6.3	18	8	50	Pent. Conv.	6A8
6AB5/6N5	1-6	5	3	2	4	....	.....	6.3	29	15	65	Pull 2nd Plate Toggle Sw. & Visually Inspect Target.	6AB5/6N5
6AB6-G	2-7	8	5	3	.....	4	.....	6.3	45	8	50	Dir. Coup. Amp.	6AB6-G
6AB7/1853	2-7	5	4	8	.....	6	3	6.3	25	7	65		6AB7/1853
6AC5-G	2-7	8	5	3	.....	....	.....	6.3	17	9	50		6AC5-G
6AC7/1852	2-7	5	4 & 6	8	.....	....	3	6.3	10	15	65		6AC7/1852
6AD7-G	2-7	8	5	3	.....	4	.....	6.3	17	8	50	Pe.	6AD7-G
6AD7-G	2-7	8	1	6	.....	....	.....	6.3	28	10	65	Tr.	6AD7-G
6AE5-GT	2-7	8	5	3	.....	....	.....	6.3	40	4	65		6AE5-GT
6AE6-G	2-7	8	5	3	4	....	.....	6.3	35	9	50	Tw. Plate Control Tube	6AE6-G
6AE7-GT	2-7	5 & 8	4 & 6	3	.....	....	.....	6.3	2	8	65		6AE7-GT
6AF6-G	2-7	8	.....	3 & 5	.....	4	.....	6.3	27	16	60	Meter Reset Cont. to be set completely counter-clockwise. No G_m measurements.	6AF6-G

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Tube Type	Heater	Cathode	Control Grid	Normal Plate	Second Plate	Screen	Sup-pressor	Panel Controls A	C	D	Rej. Point	Remarks	Tube Type
6AG7	2-7	5	4	8	.....	6	1	6.3	27	3	65		6AG7
6B4	2-7	....	5	3	.....	....	.....	6.3	21	4	50		6B4
6B5	1-6	5	4	2	.....	3	.....	6.3	34	8	50	Dir. Coup. Amp.	6B5
6B6-G	2-7	8	Cap	3	.....	....	.....	6.3	24	9	65	Tr.	6B6-G
6B6-G	2-7	8	.....	4	5	....	.....	6.3	13	11	25	Di.	6B6-G
6B7	1-7	6	Cap	2	.....	3	.....	6.3	24	9	65	Pe.	6B7
6B7	1-7	6	.....	4	5	....	.....	6.3	13	11	25	Di.	6B7
6B8	2-7	8	Cap	3	.....	6	.....	6.3	24	9	65	Pe.	6B8
6B8	2-7	8	.....	4	5	....	.....	6.3	13	11	25	Di.	6B8
6C5	2-7	8	5	3	.....	....	.....	6.3	16	8	65		6C5
6C6	1-6	4 & 5	Cap	2	.....	3	.....	6.3	40	8	65		6C6
6C8-G	2-7	4-8	Cap & 5	3	6	....	.....	6.3	29	8	65	Tw. Tr.	6C8-G
6D6	1-6	5	Cap	2	.....	3	4	6.3	28	8	65		6D6
6D8-G	2-7	8	5 & Cap	3 & 6	.....	4	.....	6.3	21	8	50	Pent. Conv.	6D8-G
6E5	1-6	5	3	2	4	....	.....	6.3	24	15	65	Pull 2nd Pl. toggle switch & visually inspect target.	6E5
6E6	1-7	4	3 & 5	2	6	....	.....	6.3	50	22	50		6E6
6F5	2-7	8	Cap	4	.....	....	.....	6.3	9	9	65		6F5
6F6	2-7	8	5	3	.....	4	.....	6.3	3	10	50		6F6
6F7	1-7	6	Cap	2	.....	3	.....	6.3	47	8	65	Pe.	6F7
6F7	1-7	6	5	4	.....	....	.....	6.3	20	10	65	Tr.	6F7
6F8-G	2-7	4-8	Cap & 5	3	6	....	.....	6.3	10	8	65	Tw. Tr.	6F8-G
6G6-G	2-7	8	5	3	.....	4	.....	6.3	19	8	50		6G6-G
6H6	2-7	4-8	.....	3	5	....	.....	6.3	13	11	40	Di.	6H6
6J5	2-7	8	5	3	.....	....	.....	6.3	9	8	65		6J5
6J6	3-4	7	5 & 6	1	2	....	.....	6.3	12	7	65		6J6
6J7	2-7	8	Cap	3	.....	4	5	6.3	40	8	65		6J7
6K5-G	2-7	8	Cap	3	.....	....	.....	6.3	38	8	65		6K5-G
6K6-G	2-7	8	5	3	.....	4	.....	6.3	14	8	50		6K6-G
6K7	2-7	8	Cap	3	.....	4	5	6.3	33	8	65		6K7
6K8	2-7	8	5 & Cap	3 & 6	.....	4	.....	6.3	14	7	50	Hex. Conv.	6K8
6L5-G	2-7	8	5	3	.....	....	.....	6.3	18	8	65		6L5-G
6L6	2-7	8	5	3	.....	4	.....	6.3	34	4	50		6L6
6L7	2-7	8	5 & Cap	3	.....	4	.....	6.3	29	8	50	Pent. Mixer	6L7
6N6	2-7	8	5	3	.....	4	.....	6.3	34	8	50	Dir. Coup. Amp.	6N6
6N7	2-7	8	4 & 5	3	6	....	.....	6.3	25	8	50	Tw. Tr.	6N7
6P5-G	2-7	8	5	3	.....	....	.....	6.3	19	8	65		6P5-G
6P7-G	2-3	8	Cap	4	.....	5	.....	6.3	47	8	65	Pe.	6P7-G
6P7-G	2-3	8	7	6	.....	....	.....	6.3	20	10	65	Tr.	6P7-G
6Q7	2-7	8	Cap	3	.....	....	.....	6.3	10	9	65	Tr.	6Q7
6Q7	2-7	8	.....	4	5	....	.....	6.3	13	11	25	Di.	6Q7
6R7	2-7	8	Cap	3	.....	....	.....	6.3	17	8	65	Tr.	6R7
6R7	2-7	8	.....	4	5	....	.....	6.3	13	11	25	Di.	6R7
6S7	2-7	8	Cap	3	.....	4	5	6.3	27	8	65		6S7
6SA7	2-7	6	5 & 8	3	.....	4	1	6.3	25	8	50	Pent. Conv.	6SA7
6SC7	7-8	6	3 & 4	2	5	....	.....	6.3	19	9	65	Tw. Tr.	6SC7
6SF5	7-8	2	3	5	.....	....	.....	6.3	9	9	65		6SF5
6SG7	2-7	3	4	8	.....	6	.....	6.3	20	7	65		6SG7
6SH7	2-7	3	4	8	.....	6	.....	6.3	19	8	65		6SH7
6SJ7	2-7	5	4	8	.....	6	3	6.3	26	8	65		6SJ7
6SK7	2-7	5	4	8	.....	6	3	6.3	22	8	65		6SK7
6SL7	7-8	3 & 6	1 & 4	2	5	....	.....	6.3	48	13	65	Tw. Tr.	6SL7
6SN7	7-8	3 & 6	1 & 4	2	5	....	.....	6.3	9	8	65		6SN7
6SQ7	7-8	3	2	6	.....	....	.....	6.3	20	9	65	Tr.	6SQ7
6SQ7	7-8	3	.....	4	5	....	.....	6.3	13	11	25	Di.	6SQ7
6SR7	7-8	3	2	6	.....	....	.....	6.3	17	8	65	Tr.	6SR7

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Tube Type	Heater	Cathode	Control Grid	Normal Plate	Second Plate	Screen	Sup-pressor	Panel Controls A	C	D	Rej. Point	Remarks	Tube Type
6SR7	7-8	3	.....	4	5	....	.....	6.3	13	11	25	Di.	6SR7
6SS7	2-7	5	4	8	.....	6	3	6.3	24	8	65		6SS7
6T7-G	2-7	8	Cap	3	.....	....	.....	6.3	23	9	65	Tr.	6T7-G
6T7-G	2-7	8	.....	4	5	....	.....	6.3	13	11	25	Di.	6T7-G
6U5/6G5	1-6	5	3	2	4	....	.....	6.3	22	15	65	Pull 2nd plate toggle sw. & visually inspect target.	6U5/6G5
6U7-G	2-7	8	Cap	3	.....	4	5	6.3	28	8	65		6U7-G
6V6	2-7	8	5	3	.....	4	.....	6.3	8	8	50		6V6
6V7-G	2-7	8	Cap	3	.....	....	.....	6.3	4	10	65	Tr.	6V7-G
6V7	2-7	8	.....	4	5	....	.....	6.3	13	11	25	Di.	6V7
6W7-G	2-7	8	Cap	3	.....	4	5	6.3	39	8	65		6W7-G
6X5	2-7	8	.....	3	5	....	.....	6.3	2	6	60	Rect.	6X5
6Y5	1-6	4	.....	3	5	....	.....	6.3	1	6	60		6Y5
6Y6-G	2-7	8	5	3	.....	4	.....	6.3	13	4	50		6Y6-G
6Z7-G	2-7	8	4 & 5	3	6	....	.....	6.3	14	9	50	Tw. Tr.	6Z7-G
6ZY5-G	2-7	8	.....	3	5	....	.....	6.3	3	6	60	Rect.	6ZY5-G
7A4	1-8	7	6	2	.....	....	.....	6.3	12	8	65		7A4
7A5	1-8	7	6	2	.....	3	.....	6.3	28	3	50		7A5
7A6	1-8	2-7	.....	3	6	....	.....	6.3	13	11	40	Di.	7A6
7A7	1-8	7	6	2	.....	3	4	6.3	20	8	65		7A7
7A7-LM	1-8	7	6	2	.....	3	4	6.3	20	8	65		7A7-LM
7A8	1-8	7	4 & 6	2 & 3	.....	5	.....	6.3	22	8	50	Octode Conv.	7A8
7B4	1-8	7	6	2	.....	....	.....	6.3	10	9	65		7B4
7B5	1-8	7	6	2	.....	3	.....	6.3	14	8	50		7B5
7B5-LT	1-8	7	6	2	.....	3	.....	6.3	14	8	50		7B5-LT
7B6	1-8	7	3	2	.....	....	.....	6.3	20	9	65	Tr.	7B6
7B6	1-8	7	.....	5	6	....	.....	6.3	13	11	25	Di.	7B6
7B6-LM	1-8	7	3	2	.....	....	.....	6.3	20	9	65	Tr.	7B6-LM
7B6-LM	1-8	7	.....	5	6	....	.....	6.3	13	11	25	Di.	7B6-LM
7B7	1-8	7	6	2	.....	3	4	6.3	27	8	65		7B7
7B8	1-8	7	4 & 6	2 & 3	.....	5	.....	6.3	19	8	50	Pent. Conv.	7B8
7B8-LM	1-8	7	4 & 6	2 & 3	.....	5	.....	6.3	19	8	50	Pent. Conv.	7B8-LM
7C5	1-8	7	6	2	.....	3	.....	6.3	6	8	50		7C5
7C5-LT	1-8	7	6	2	.....	3	.....	6.3	6	8	50		7C5-LT
7C6	1-8	7	3	2	.....	....	.....	6.3	30	9	65	Tr.	7C6
7C6	1-8	7	.....	5	6	....	.....	6.3	13	11	25	Di.	7C6
7C7	1-8	7	6	2	.....	3	4	6.3	15	9	65		7C7
7E6	1-8	7	3	2	.....	....	.....	6.3	17	8	65	Tr.	7E6
7E6	1-8	7	.....	5	6	....	.....	6.3	13	11	25	Di.	7E6
7E7	1-8	7	6	2	.....	5	.....	6.3	37	8	65	Pe.	7E7
7E7	1-8	7	.....	3	4	....	.....	6.3	13	11	25	Di.	7E7
7F7	1-8	2-7	4 & 5	3	6	....	.....	6.3	15	9	65	Tw. Tr.	7F7
7G7/1232	1-8	7	6	2	.....	3	4	6.3	9	8	65		7G7/1232
7H7	1-8	7	6	2	.....	3	4	6.3	15	8	65		7H7
7J7	1-8	7	4 & 6	2 & 3	.....	5	.....	6.3	11	8	50	Tr. Hex. Conv.	7J7
7L7	1-8	7	6	2	.....	3	4	6.3	28	7	65		7L7
7N7	1-8	2-7	4 & 5	3	6	....	.....	6.3	10	8	65	Tw. Tr.	7N7
7Q7	1-8	7	4 & 6	2	.....	3	5	6.3	38	7	50	Pent. Conv.	7Q7
7Y4	1-8	7	.....	3	6	....	.....	6.3	2	6	60	Rect.	7Y4
10	1-4	....	3	2	.....	....	.....	7.5	11	9	50		10
12A5	1-7	5	4	2	.....	3	.....	12.6	31	22	50		12A5
12A6	2-7	8	5	3	.....	4	.....	12.6	14	8	50		12A6
12A7	1-7	6	Cap	2	.....	3	.....	12.6	9	10	50	Pe.	12A7
12A7	1-7	4	.....	5	.....	....	.....	12.6	1	6	60	Rect.	12A7
12A8-GT	2-7	8	5 & Cap	3 & 6	.....	4	.....	12.6	18	8	50	Pent. Conv.	12A8-GT
12B8	2-7	1	Cap	3	.....	4	.....	12.6	35	7	65	Pe.	12B8

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Tube Type	Heater	Cathode	Control Grid	Normal Plate	Second Plate	Screen	Sup-pressor	Panel Controls A	C	D	Rej. Point	Remarks	Tube Type
12B8-GT	2-7	6	8	5	.....	....	.....	12.6	35	7	65	Tr.	12B8-GT
12C8	2-7	8	Cap	3	.....	6	.....	12.6	24	9	65	Pe.	12C8
12C8	2-7	8	.....	4	5	....	.....	12.6	13	11	25	Di.	12C8
12F5-GT	2-7	8	Cap	4	.....	....	.....	12.6	9	9	65		12F5-GT
12H6	2-7	4 & 8	.....	3	5	....	.....	12.6	13	11	40		12H6
12J5-GT	2-7	8	5	3	.....	....	.....	12.6	12	8	65		12J5-GT
12J7-GT	2-7	8	Cap	3	.....	4	5	12.6	40	8	65		12J7-GT
12K7-GT	2-7	8	Cap	3	.....	4	5	12.6	38	8	65		12K7-GT
12K8	2-7	8	5 & Cap	3 & 6	.....	4	.....	12.6	14	7	50	Hexode Conv.	12K8
12Q7	2-7	8	Cap	3	.....	....	.....	12.6	10	9	65	Tr.	12Q7
12Q7	2-7	8	.....	4	5	....	.....	12.6	13	11	25	Di.	12Q7
12SA7	2-7	6	5 & 8	3	.....	4	1	12.6	25	8	50	Pent. Conv.	12SA7
12SC7	7-8	6	3 & 4	2	5	....	.....	12.6	19	9	65	Tw. Tr.	12SC7
12SF5	7-8	2	3	5	.....	....	.....	12.6	9	9	65		12SF5
12SF7	7-8	3	2	6	.....	4	.....	12.6	24	8	65	Pe.	12SF7
12SF7	7-8	3	.....	5	.....	....	.....	12.6	13	11	25	Di.	12SF7
12SG7	2-7	3	4	8	.....	6	.....	12.6	20	7	65		12SG7
12SH7	2-7	3	4	8	.....	6	.....	12.6	19	8	65		12SH7
12SJ7	2-7	5	4	8	.....	6	3	12.6	26	8	65		12SJ7
12SK7	2-7	5	4	8	.....	6	3	12.6	22	8	65		12SK7
12SL7-GT	7-8	3 & 6	1 & 4	2	5	....	.....	12.6	43	13	65	Tw. Tr.	12SL7-GT
12SN7-GT	7-8	3 & 6	1 & 4	2	5	....	.....	12.6	9	8	65		12SN7-GT
12SQ7	7-8	3	2	6	.....	....	.....	12.6	20	9	65	Tr.	12SQ7
12SQ7	7-8	3	.....	4	5	....	.....	12.6	13	11	25	Di.	12SQ7
12SR7	7-8	3	2	6	.....	....	.....	12.6	17	8	65	Tr.	12SR7
12SR7	7-8	3	.....	4	5	....	.....	12.6	13	11	25	Di.	12SR7
12Z3	1-4	3	.....	2	.....	....	.....	12.6	0	6	60	Rect.	12Z3
14B6	1-8	7	3	2	.....	....	.....	12.6	20	9	65	Tr.	14B6
14B6	1-8	7	.....	5	6	....	.....	12.6	13	11	25	Di.	14B6
14H7	1-8	7	6	2	.....	3	4	12.6	15	8	65		14H7
14J7	1-8	7	4 & 6	2 & 3	.....	5	.....	12.6	11	8	50	Tr. Hex. Conv.	14J7
14Q7	1-8	7	4 & 6	2	.....	3	5	12.6	38	7	50	Hept. Pent. Conv.	14Q7
15	1-5	4	Cap	2	.....	3	.....	2.0	32	9	65		15
19	1-6	....	3 & 4	2	5	....	.....	2.0	18	9	50		19
20	1-4	....	3	2	.....	....	.....	3.3	14	10	33	Norm-65	20
22	1-4	....	Cap	2	.....	3	.....	3.3	50	9	52	Norm-80	22
24A	1-5	4	Cap	2	.....	3	.....	2.5	29	14	65		24A
25A6	2-7	8	5	3	.....	4	.....	25	39	4	50		25A6
25A7	2-7	8	5	3	.....	4	.....	25	50	4	50	Pe.	25A7
25A7	2-7	1	.....	6	.....	....	.....	25	0	6	60	Rect.	25A7
25AC5-G	2-7	8	5	3	.....	....	.....	25	10	9	50		25AC5-G
25B5	1-6	5	4	2	3	....	.....	25	43	22	50	Dir. Coup. Amp.	25B5
25B6-G	2-7	8	5	3	.....	4	.....	25	4	12	50		25B6-G
25B8	2-7	1	Cap	3	.....	4	.....	25	30	7	65	Pe.	25B8
25B8	2-7	6	8	5	.....	....	.....	25	35	7	65	Tr.	25B8
25C6	2-7	8	5	3	.....	4	.....	25	13	4	50		25C6
25L6	2-7	8	5	3	.....	4	.....	25	38	2	50		25L6
25N6	2-7	8	5	3	.....	4	.....	25	43	22	50	Dir. Coup. Amp.	25N6
25Z5	1-6	3-4	.....	2	5	....	.....	25	0	6	60	Rect.	25Z5
25Z6	2-7	4-8	.....	3	5	....	.....	25	0	6	60	Rect.	25Z6
26	1-4	....	3	2	.....	....	.....	1.5	4	10	65		26
27	1-5	4	3	2	.....	....	.....	2.5	4	10	65		27
30	1-4	....	3	2	.....	....	.....	2.0	19	9	65		30
31	1-4	....	3	2	.....	....	.....	2.0	3	10	50		31
32	1-4	....	Cap	2	.....	3	.....	2.0	36	9	65		32
34	1-4	....	Cap	2	.....	3	.....	2.0	41	9	65		34
35	1-5	4	Cap	2	.....	3	.....	2.5	22	10	65		35
35A5	1-8	7	6	2	.....	3	.....	35	24	4	50		35A5
35L6-GT	2-7	8	5	3	.....	4	.....	35	24	4	50		35L6-GT
35Z3	1-8	7	.....	2	.....	....	.....	35	0	6	64	Rect. Norm-107	35Z3

COMPLETE TUBE DATA FOR MODEL OQ

Tube Type	Heater	Cathode	Control Grid	Normal Plate	Second Plate	Screen	Sup-pressor	Panel Controls A	C	D	Rej. Point	Remarks	Tube Type
35Z3-LT	1-8	7	.....	2	.....	....	.....	35	0	6	64	Rect. Norm-107	35Z3-LT
35Z5-GT	2-7	8	.....	5	.....	....	.....	35	0	6	66	Rect. Norm-110	35Z5-GT
36	1-5	4	Cap	2	.....	3	.....	6.3	46	8	65		36
37	1-5	4	3	2	.....	....	.....	6.3	3	10	65		37
38	1-5	4	Cap	2	.....	3	.....	6.3	10	10	50		38
39/44	1-5	4	Cap	2	.....	3	.....	6.3	41	8	65		39/44
40	1-4	....	3	2	.....	....	.....	5.0	41	9	65		40
41	1-6	5	4	2	.....	3	.....	6.3	14	8	50		41
42	1-6	5	4	2	.....	3	.....	6.3	3	10	50		42
43	1-6	5	4	2	.....	3	.....	25	39	4	50		43
45	1-4	....	3	2	.....	....	.....	2.5	40	4	50		45
45Z3	1-7	4	.....	2	.....	....	.....	45	0	6	60	Rect.	45Z3
45Z5-GT	2-7	8	.....	5	.....	....	.....	45	0	6	70	Rect. Norm-117	45Z5-GT
46	1-5	....	3	2 & 4	.....	....	.....	2.5	37	4	50		46
47	1-5	....	3	2	.....	4	.....	2.5	18	8	50		47
48	1-6	5	4	2	.....	3	.....	30	18	4	50		48
49	1-5	....	3	2 & 4	.....	....	.....	2.0	0	10	55	Norm-110	49
50	1-4	....	3	2	.....	....	.....	7.5	48	22	50		50
50L6-GT	2-7	8	5	3	.....	4	.....	50	16	4	50		50L6-GT
50Y6-GT	2-7	4 & 8	.....	3	5	....	.....	50	0	6	60		50Y6-GT
50Z7	2-7	4 & 8	.....	3	5	....	.....	50	0	6	65		50Z7
53	1-7	4	3 & 5	2	6	....	.....	2.5	25	8	50	Tw. Tr.	53
55	1-6	5	Cap	2	.....	....	.....	2.5	4	10	65	Tr.	55
55	1-6	5	.....	3	4	....	.....	2.5	13	11	25	Di.	55
56	1-5	4	3	2	.....	....	.....	2.5	19	8	65		56
57	1-6	5	Cap	2	.....	3	4	2.5	40	8	65		57
58	1-6	5	Cap	2	.....	3	4	2.5	28	8	65		58
59	1-7	6	4	2	.....	3	5	2.5	18	8	50		59
70L7-GT	2-7	6	5	3	.....	4	.....	70	9	4	50	Beam Power	70L7-GT
70L7-GT	2-7	1	.....	8	.....	....	.....	70	0	6	60	Rect.	70L7-GT
71A	1-4	....	3	2	.....	....	.....	5.0	47	4	50		71A
75	1-6	5	Cap	2	.....	....	.....	6.3	20	9	65	Tr.	75
75	1-6	5	.....	3	4	....	.....	6.3	13	11	25	Di.	75
76	1-6	4	3	2	.....	....	.....	6.3	19	8	65		76
77	1-6	5	Cap	2	.....	3	4	6.3	40	8	65		77
78	1-6	5	Cap	2	.....	3	4	6.3	33	8	65		78
79	1-6	4	Cap & 3	5	2	....	.....	6.3	14	9	65	Tw. Tr.	79
80	1-4	....	.....	2	3	....	.....	5.0	7	6	60	Rect.	80
81	1-4	....	.....	2	.....	....	.....	7.5	12	6	60	Rect.	81
82	1-4	....	.....	2	3	....	.....	2.5	0	6	60	Rect.	82
83	1-4	....	.....	2	3	....	.....	5.0	0	6	66	Rect. Norm-110	83
84/6Z4	1-5	4	.....	2	3	....	.....	6.3	1	6	60	Rect.	84/6Z4
85	1-6	5	Cap	2	.....	....	.....	6.3	4	10	65	Tr.	85
85	1-6	5	.....	3	4	....	.....	6.3	13	11	25	Di.	85
89	1-6	5	Cap	2	.....	3	4	6.3	3	10	50		89
117L7-GT	2-7	8	4	3	.....	5	.....	117	0	8	50		117L7-GT
117L7-GT	2-7	1	.....	6	.....	....	.....	117	15	11	60	Rect.	117L7-GT
117N7-GT	2-7	6	4	3	.....	5	.....	117	15	4	50		117N7-GT
117P7-GT	2-7	6	4	3	.....	5	.....	117	0	8	50		117P7-GT
117Z6-GT	2-7	4-8	.....	3	5	....	.....	117	0	6	60	Rect.	117Z6-GT
801	1-4	....	3	2	.....	....	.....	7.5	3	10	65		801
807	1-5	4	3	Cap	.....	2	.....	6.3	42	4	50		807
837	1-7	6	4	Cap	.....	3	5	12.6	30	22	65		837
864	1-4	....	3	2	.....	....	.....	1.1	22	9	57	Norm-88	864
954	1-4	5	6	Cap	.....	2	3	6.3	26	8	65		954
955	1-4	5	3	2	.....	....	.....	6.3	12	8	65		955
956	1-4	5	6	Cap	.....	2	3	6.3	23	8	65		956
957	1-4	....	3	2	.....	....	.....	1.25	50	8	61	Norm-93	957
958	1-4	....	3	2	.....	....	.....	1.25	23	8	65		958
959	1-4	....	6	Cap	.....	2	3	1.25	50	8	42	Norm-65	959

COMPLETE TUBE DATA FOR MODEL OQ

Tube Type	Heater	Cathode	Control Grid	Normal Plate	Second Plate	Screen	Sup-pressor	Panel Controls A	C	D	Rej. Point	Remarks	Tube Type
1201	2-8	4	1	3	.....	....	.....	6.3	7	8	65		1201
HY-114	2-7	....	Left Cap	Right Cap	.....	....	.....	1.4	36	8	65		HY-114
HY-615	2-7	8	Left Cap	Right Cap	.....	....	.....	6.3	17	8	65		HY-615
RK-33	1-7	6-2	4 & Cap	5	3	....	.....	6.3	9	9	65		RK-33
WE-215A	1-4	....	3	2	.....	....	.....	1.1	14	10	65		WE-215A
WE-231D	1-4	....	3	2	.....	....	.....	3.1	38	9	65		WE-231D
WE-244A	1-5	4	3	2	.....	....	.....	2	4	16	65		WE-244A
WE-257A	1-4	....	Cap	2	.....	....	.....	3.1	38	9	65		WE-257A
WE-262A	1-4	3	Cap	2	.....	....	.....	10	35	8	65		WE-262A
WE-262B	1-4	3	Cap	2	.....	....	.....	10	35	8	65		WE-262B
WE-271A	1-5	4	3	2	.....	....	.....	5	46	4	50		WE-271A
WE-274A	1-4	....	.....	2	3	....	.....	5	5	6	60		WE-274A
WE-274B	2-8	....	.....	3	6	....	.....	5	5	6	60		WE-274B
WE-300A	1-4	....	3	2	.....	....	.....	5.0	22	4	50		WE-300A
WE-300B	1-4	....	3	2	....	....	.....	5.0	22	4	50		WE-300B
WE-306A	1-5	....	Cap	2	.....	3	.....	2.75	10	8	65		WE-306A
WE-307A	1-5	....	3	Cap	.....	2	4	5.5	11	8	65		WE-307A
WE-339A	1-5	....	3	Cap	.....	2	4	5	15	12	50		WE-339A
WE-350A	1-5	4	3	Cap	.....	2	.....	6.3	28	3	50		WE-350A
9001	3-4	2	1	5	.....	6	.....	6.3	20	14	65		9001
9002	3-4	2	6	5	.....	....	.....	6.3	12	8	65		9002
9003	3-4	2	1	5	.....	6	.....	6.3	26	8	65		9003
9004	1-4	3	.....	2	.....	....	.....	6.3	13	11	20	Diode	9004
2X2	1-4	....	.....	Cap	.....	....	.....	2.5	10	18	80		2X2

TUBE BASE LIST

Tube Type	Base
00	4D
00A	4D
0A4	4V
0Z3	5N
0Z4	4R
01	4D
01A	4D
01AA	4D
01B	4D
1	4G
1A1	4A
1A3	5AP
1A4-P	4M
1A4-T	4K
1A5-G	6X
1A6-GT	6L
1A6S	6L
1A7-G	7Z
1B1	4A
1B4	4K
1B4-P	4M
1B5/25S	6M
1B7-G	7Z
1C1	4A
1C5-G	6X
1C6	6L
1C7-G	7Z
1D1	4A
1D5-GP	5Y
1D5-GT	5R
1D7-G	7Z
1D8-GT	8AJ
1E1	4A
1E4-G	5S
1E5-G	5R
1E5-GP	5Y
1E7-G	8C
1F1	4A
1F4	5K
1F5-G	6X
1F6	6W
1F7-G	7AD
1F7-GH	7AD
1F7-GV	7AD
1G1	4A
1G4-G	5S
1G5-G	6X
1G6-G	7AB
1H4-G	5S
1H5-G	5Z
1H6-G	7AA
1J1	4A
1J5-G	6X
1J6-G	7AB
1K1	4A
1L1	4T
1L4	X-39
1LA4	5AD
1LA6	7AK
1LB4	5AD
1LB6	8AX
1LC5	7AO
1LC6	7AK
1LD5	6AX
1LE3	4AA
1LH4	5AG
1LN5	7AO
1N1	4T
1N5-G	5Y
1N6-G	7AM
1P1	4T
1P5-G	5Y
1Q1	4T
1Q5-GT	6AF
1R1-G	4T
1R5	7AT
1S1-G	4T
1S4	7AV
1S5	6AU
1T1-G	4T
1T4	6AR
1T5-GT	6X
1-V	4G
1V1	4A
1Y1	4A
1Z1	4A
2	4A
2A3	4D
2A3-H	4Q
2A4-G	5S
2A5	6B
2A6	6G
2A7	7C
2B6	7J
2B7	7D
2E5	6R
2G5	6R
2S/4S	5D
2V3-G	4Y
2W3	4X
2X2/879	4AB
2Y2	4AB
2Y3	4C
2Y4	5D
2Z2	4B
3	4A
3A4	7BB
3A5	7BC
3A8-GT	8AS
3C5-GT	7AQ
3LE4	X-14
3LF4	6BB
3Q4	7BA
3Q5-GT	7AP
3S4	7BA
4	4A
4A6-G	8L
4S	5D
5	4A
5T4	5T
5U4-G	5T
5V4-G	5L
5W4	5T
5X3	4C
5X4-G	5Q
5Y3-G	5T
5Y4-G	5Q
5Z3	4C
5Z4	5L
6	4A
6A3	4D
6A4/LA	5B
6A5-G	6T
6A6	7B
6AB5	6R
6AB6	7AU
6AB7/1853	8N
6AC5-G	6Q
6AC6-G	7W
6AC7/1852	8N
6AD5-G	6Q
6AD6-G	7AG
6AD7-G	8AY
6AE5-GT	6Q
6AE6-G	7AH
6AE7-GT	7AX
6AF5-G	6Q
6AF6-G	7AG
6AF7	8AG
6AG5	X-36
6AG7	8Y
6AH5-G	6AP
6AH7-GT	8BE
6AL6-G	6AM
6A7	7C
6A7-M	8A
6A7-S	7C
6A8	8A
6B4-G	5S
6B5	6AS
6B6-G	7V
6B7	7D
6B8	8E
6C4	6BG
6C5	6Q
6C5-G	6Q
6C6	6F
6C7	7G
6C8-G	8G
6D5	6Q
6D6	6F
6D7	7H
6D8-G	8A
6E5	6R
6E6	7B
6E7	7H
6F5	5M
6F5-G	5M
6F6	7S
6F7	7E
6F7-S	7E
6F8-G	8G
6G5	6R
6G6-G	7S
6G7	7N
6G7S	7N
6H4-GT	5AF
6H5	6R
6H6	7Q
6H7	7P
6H7-S	7P
6H8	8E
6J5	6Q
6J6	7BF
6J7	7R
6J7-G	7R
6J7-GT	7R
6J8-G	8H
6K5-G	5U
6K6-G	7S
6K7	7R
6K8	8K
6L5-G	6Q
6L6	7AC
6L7	7T
6N5	6R
6N6-G	7AU
6N7	8B
6P5-G	6Q
6P7-G	7U
6Q6-G	6Y
6Q7	7V
6R6-G	6AW
6R7	7V
6S6-GT	5AK
6S7-G	7R
6SA7	8R
6SA7-GT	8AD
6SC7	8S
6SD7-GT	8N
6SE7-GT	8N
6SF5	6AB
6SF7	7AZ
6SG7	8BC
6SH7	8BK
6SJ7	8N
6SK7	8N
6SL7-GT	8BD
6SN7-GT	8BD
6SQ7	8Q
6SR7	8Q
6SS7	8N
6ST7	8Q
6T5	6R
6T7-G	7V
6U5/6G5	6R
6U6-GT	7AC
6U7-G	7R
6V6	7AC
6V7-G	7V
6W5-G	6S
6W6-GT	7AC
6W7-G	7R
6X5	6S
6Y3	4AC
6Y5	6J
6Y6-G	7AC
6Y7-G	8B
6Z3	4G
6Z4	5D
6Z5	6K
6Z6	7Q
6Z7-G	8B
6ZY5-G	6S
7	4A
7A4	5AC
7A5	6AA
7A6	7AJ
7A7-LM	8V
7A8	8U
7B4	5AC
7B5	6AE
7B6	8W
7B7	8V
7B8	8X
7C5	6AA
7C6	8W
7C7	8V
7E6	8W
7E7	8AE
7F7	8AC
7G7	8V
7H7	8V
7J7	8AR
7K7	8BF
7L7	8V
7N7	8AC
7Q7	8AL
7R7	8AE
7S7	8BL
7T7	X-29
7V7	8V
7W7	8BJ
7Y4	5AB
7Z4	5AB
8	4A
9	4A
10	4D
12A	4D
12A5	7F
12A6	7AC
12A7	7K
12A8-GT	8A
12AH7-GT	8BE
12B7	8V
12B8-GT	8T
12C8	8E
12E5-GT	6Q
12F5-GT	5M
12G7	7V
12H6	7Q
12J5-GT	6Q
12J7-GT	7R
12K7-GT	7R
12K8	8K
12Q7-GT	7V
12SA7	8R
12SA7-GT	8AD
12SC7	8S
12SF5	6AB
12SF7	7AZ
12SG7	8BC
12SH7	8BK
12SJ7	8N
12SK7	8N
12SL7-GT	8BD
12SN7-GT	8BD
12SQ7	8Q
12SR7	8Q
12Z3	4Q
12Z5	6K
14	5E
14A4	5AC
14A5	6AA
14A7	8V
14B6	8W
14B8	8X
14C5	6AA
14C7	8V
14E6	8W
14F7	8AC
14H7	8V
14J7	8AR
14N7	8AC
14Q7	8AL
14R7	8AE
14S7	8BL
14W7	8BJ
14Y4	5AB
14Z3	4G
15	5F
17	5A
18	6B
19	6C
20	4D

TUBE BASE LIST

Tube Type	Base
22	4K
24A	5E
24S	5E
25	6M
25A6	7S
25A7-G	8F
25AC5-GT	6Q
25B5	6D
25B6-G	7S
25B8-GT	8T
25C6-G	7AC
25D8-GT	8AF
25L6	7AC
25N6-G	7W
25S	6M
25X6-GT	7Q
25Y4-GT	5AA
25Y5	6E
25Z3	4G
25Z4	5AA
25Z5	6E
25Z6	7Q
26	4D
27	5A
27HM	5A
27S	5A
29	6N
30	4D
31	4D
32	4K
32L7-GT	8Z
33	5K
34	4M
35	5E
35A5-LT	6AA
35L6-GT	7AC
35Y4	5AL
35Z3-LT	4Z
35Z4-GT	5AA
35Z5-GT	6AD
35Z6-G	7Q
36	5E
37	5A
38	5F
39/44	5F
40	4D
40Z5	6AD
41	6B
41M	7S
42	6B
42A2	X-4
42B2	X-4
43	6B
43-MG	7S
44	5F
45	4D
45Z3	5AM
45Z5-GT	6AD
46	5C
46A1	X-10
46B1	X-10
47	5B
48	6A
49	5-C
49A2	X-4
49B2	X-4
50	4D
50A5	6AA
50C6-G	7AC
50L6-GT	7AC
50Y6-GT	7Q
50Z6-G	7Q
50Z7-G	8AN
51	5E
52	5C
53	7B
55	6Q
56	5A
56AS	5A
56S	5A
57	6F
57AS	6F
57S	6F
58	6F
58AS	6F
58S	6F
59	7A
59A	7A
59S	7A
64	5E
65	5E
67	5A
68	5E
69	5E
70	6N
70A7-GT	8AB
70L7-GT	8AA
71A	4D
75	6G
75M	7V
75S	6G
76	5A
77	6F
77M	7R
78	6F
78S	6F
79	6H
80	4C
81	4B
82	4C
82V	4L
83	4C
83V	4L
84/6Z4	5D
85	6G
85AS	6G
85L7	8AB
85M	7V
85S	6G
86M	6Q
87S	6F
88	4C
88S	6F
89	6F
89RS	7N
90	6N
91	6N
92	6N
95	6B
96	4G
98	5D
112A	4D
117L7-GT	8AO
117M7-GT	8AO
117N7-GT	8AV
117P7-GT	8AV
117Z6-GT	7Q
165R	4A
165R4	X-3
165R8	X-3
181	4D
182A	4D
182B	4D
183/483	4D
185R	4A
185R4	X-3
185R8	X-3
210T	4D
213	4C
213B	4C
216	4B
216B	4B
257	5B
264	4D
291	5G
293	5G
295	5G
482A	4D
482B	4D
483	4D
484	5A
485	5A
486	X-9
585	4D
586	4D
801	4D
803	5J
804	5J
807	X-11
837	X-15
840	5J
841	4D
842	4D
843	5A
864	4D
865	X-2
874	4S
878	4P
879	4AB
884	6Q
885	5A
950	5K
951	4K
954	X-5
955	X-6
956	X-5
957	X-8
958	X-8
959	X-7
985	5D
986	4C
1201	X-26
1203	X-27
1204	X-28
1221	6F
1223	7R
1231	8V
1232	8V
1284	X-29
1291	X-30
1293	X-31
1294	X-27
1299	6DB
1602	4D
1603	6F
1609	5K
1612	7T
1613	7S
1614	7AC
1620	7R
1621	7S
1622	7AC
1625	X-16
1626	6Q
1629	X-13
1631	7AC
1632	7AC
T633	8BD
1634	8S
1635	X-22
1642	X-17
1851	7R
1852	8N
1853	8N
9001	X-18
9002	X-19
9003	X-18
9004	X-23
9005	X-24
A (5)	5H
A (6)	6N
A-22	4D
A-26	4D
A-28	4D
A-30	4Q
A-32	4Q
A-40	4Q
A-48	4Q
AC-22	5E
AD	4G
AF	4C
AG	4C
AX	4Q
B	4E
BA	4J
BH	4J
BR	4H
BX	4D
CK-1005	X-32
D-½	4B
D-1	4C
DE	4D
E	4D
G	4D
GA	5B
G-2	5D
G-2S	5D
G-4	5D
G-4S	5D
G-84	5D
H	4D
HY-114B	X-33
HY-615B	X-34
K-24	5E
K-27	5A
KR-1	4G
KR-2	4G
KR-5	5B
KR-20	6N
KR-22	6N
KR-25	6B
KR-28	5D
KR-31	4G
KR-98	5D
KR-7184	X-38
LA	5B
P-861	5D
PZ	5B
PZH	5B
RA-1	4Q
RE-1	4C
RE-2	4B
RK-19	X-1
RK-21	4AB
RK-22	X-1
RK-24	4D
RK-33	X-17
RK-34	X-37
RK-47	5J
RK-62	4D
SO-1	4Q
SO-2	4D
V-99	4E
VR-50	4W
VR-75-30	X-12
VR-90-30	4W
VR-105-30	X-12
VR-150-30	X-12
WE-215A	4D
WE-231D	4D
WE-257A	X-20
WE-300A	4D
WE-300B	4D
WE-306A	X-21
WE-307A	5J
WE-350A	X-11
WE-718A	8BK
WE-717A	X-35
X-99	4D
XXD	8AC
XXL	5AC

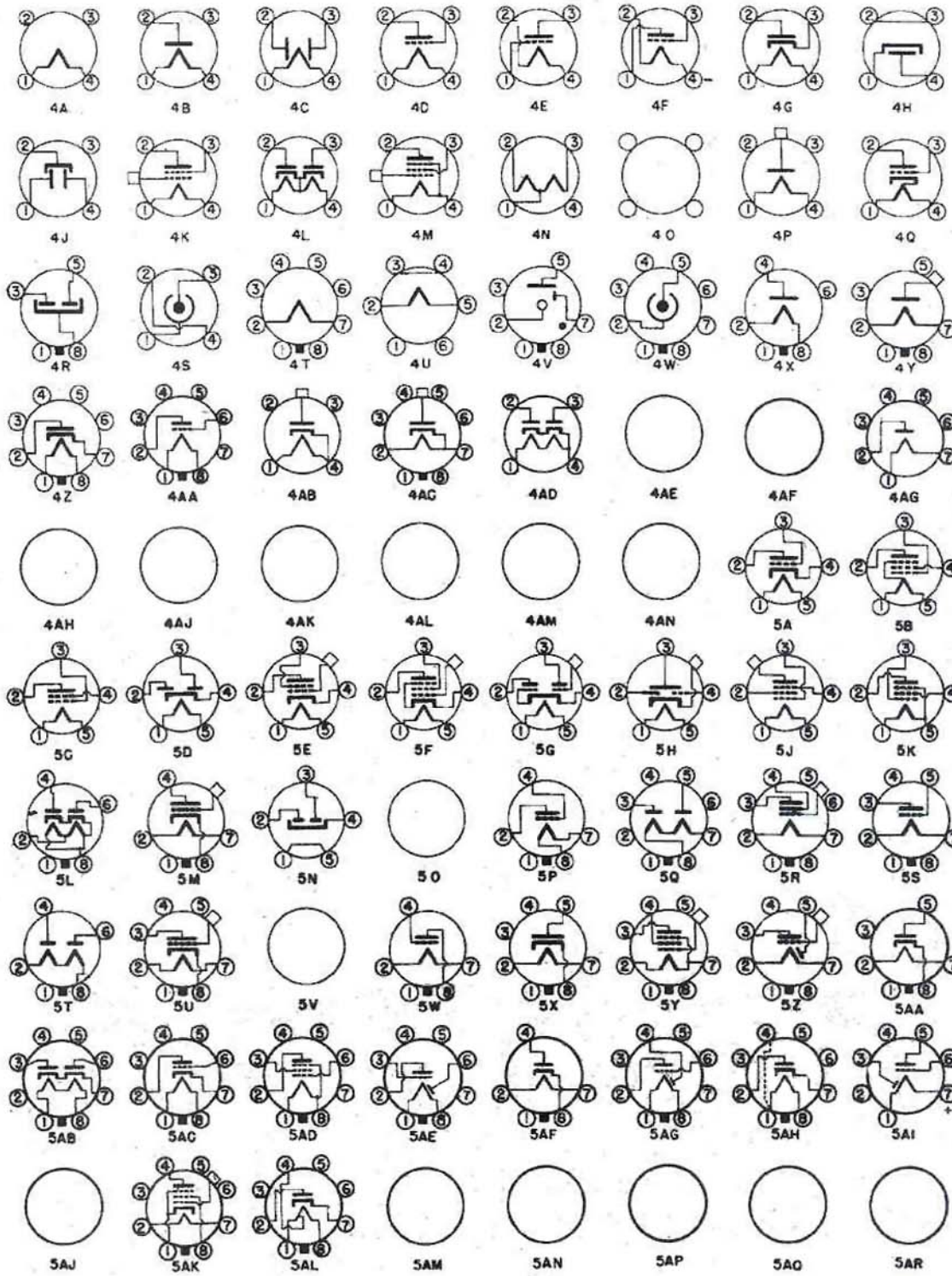
NAVY TYPE NUMBERS OF VACUUM TUBES

Cross Index of Old and New Type Numbers

Old	New
38001	01A
38012	112A
38015	38015
38019	19
38022	22
38024	24A
38027	27
38030	30
38031	31
38032	32
38032A	1B4P
38033	33
38034	34
38035	35
38036	36
38037	37
38038	38
38039	39
38040	40
38041	41
38042	42
38045	45
38047	47
38050	50
38053	53
38056	56
38057	57
38058	58
38059	59
38064	864
38071	71A
38075	75
38076	76
38077	77
38078	78
38085	85
38089	89
38101	801
38103	203A
38104	204A
38106	206
38107	207
38110	10
38111A	38111A
38112	38112
38114	214
38116	38116
38117	217C
38118	218
38119	219
38120	38120
38138	838
38142	38142
38143	843
38145	845
38146	846
38149	849
38150	850
38151	851
38152	852
38157B	857B
38158	858
38160	860
38161	861
38162	862
38165	865
38166A	866A
38169A	869A
38170	870
38171	871
38172A	872A
38180	80
38181	81
38182	82
38183	83
38184	84
38193	893
38205	38205
38211	211
38213	2A3
38215	2A5
38217	38217
38222	38222
38227	2B7
38233	38233
38236	1C6
38250	38250
38255	25Z5
38266A	836
38267	1616
38268	868
38274	874
38276	876
38278	38278
38282	38282
38286	886
38401	38401
38402	38402
38403	38403
38412	38412
38565J	6J5
38566H	6H6
38567K	6K7
38567R	6R7
38568K	6K8
38593	5Z3
38616	6A6
38617	6A7
38627	6B7
38636	6C6
38646	6D6
38655	6E5
38667	6F7
38674	38674
38674A	38674A
38717E	1E7G
38765J	6J5G
38766Y	6Y6G
38768F	6F8G
38803	803
38807	807
38808	808
38814	814
38833	833
38837	837
38842	842
38853	1853
38884	884
38897	38897
38954	954
38955	955
38956	956
38958	958
38959	959

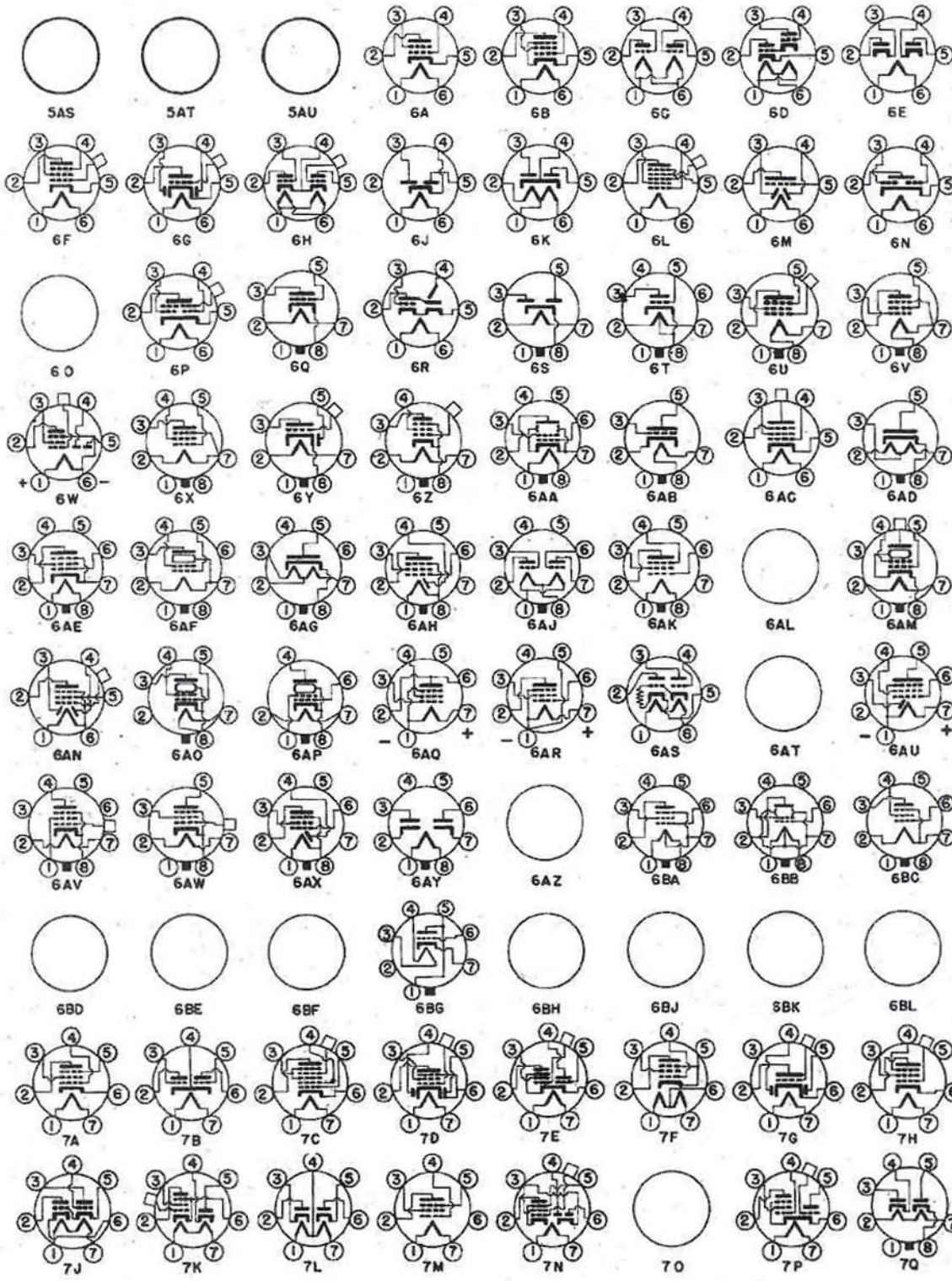
TUBE BASE CONNECTIONS

BOTTOM VIEW OF SOCKET OR BASE OF TUBE



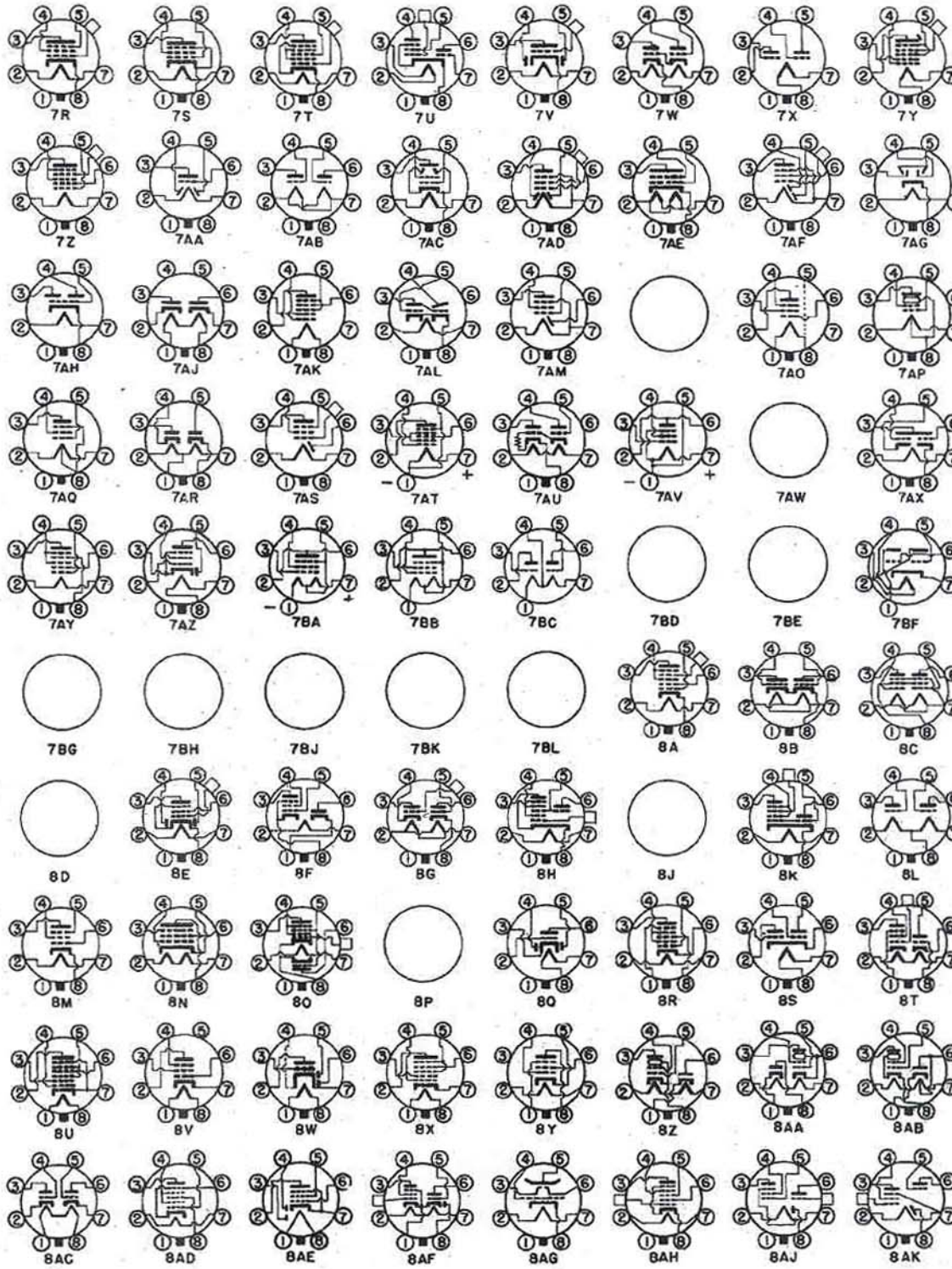
TUBE BASE CONNECTIONS

BOTTOM VIEW OF SOCKET OR BASE OF TUBE



TUBE BASE CONNECTIONS

BOTTOM VIEW OF SOCKET OR BASE OF TUBE



TUBE BASE CONNECTIONS

BOTTOM VIEW OF SOCKET OR BASE OF TUBE