

DYNAMIC CONDUCTANCE TUBE & TRANSISTOR TESTER

MODEL

**666**



ELECTRONIC INSTRUMENT CO. INC.  
3300 NORTHERN BLVD., L. I. CITY 1, N. Y.



## GENERAL DESCRIPTION

The EICO Model 666 Dynamic Conductance Tube & Transistor Tester is one of the first thoroughly practical service instruments able to test both tubes and transistors. Among its advantages are rapid and simple operation, close simulation of actual tube operating conditions, and unexcelled thoroughness and accuracy of test. The outstanding mechanical design and layout, coupled with components carefully selected for ruggedness, makes the Model 666 extremely well-suited for the hard usage of daily service work.

All components of the Model 666 tube tester are assembled to the heavy-gauge aluminum front panel, which is in turn top-mounted by 14 screws to flanges on all four sides of the steel case. A detachable steel cover is mounted to the back of the case with separable hinges so that the cover may easily be removed for use of the instrument as a counter-top model or replaced to convert it back to a portable instrument.

There are ten different tube sockets on the panel to accommodate any receiving tube, old or new, and whether it be standard size, miniature, or sub-miniature. In addition, pilot and Christmas tree lamps can be checked rapidly using the center of the large 7-pin socket. A special transistor socket accommodates both n-p-n and p-n-p transistors. To protect against damage due to current overload, a type 3AG 1 ampere fuse is connected in series with the primary of the power transformer.

## SPECIFICATIONS

LINE VOLTAGE & FREQUENCY: 105-130v, 60 cycles.

Note: Do not connect to a dc line.

POWER CONSUMPTION: 10 watts with no tube/transistor under test; 50 watts at maximum load.

TUBE TYPES TESTED: Nearly all 4, 5, 6, and 7 pin, actual, octal, miniature 7 and 9 pin, sub-miniature 5, 6, and 7 pin (in line base) and 8 pin (circular base) receiving tubes, many small transmitting and special-purpose tubes, voltage regulators, cold cathode rectifiers, electron-ray indicators, and ballast tubes. Tests color and monochrome tv picture tubes with accessory adaptor.

TUBE TESTS: a) Direct-reading of inter-element and cathode heater leakage in ohms on a 0 to 20 meg-ohms scale. DC test voltage always applied in correct polarity to eliminate emission effects from readings. b) Merit test, which is an emission reading for diodes and rectifiers and a dynamic conductance (combined

plate conductance, mutual conductance, and emission) reading for triodes, tetrodes, and pentodes.

TRANSISTORS TESTED: Nearly all n-p-n and p-n-p types.

TRANSISTOR TESTS: a) Leakage measurement of collector current with emitter grounded and no base signal. b) Direct reading of current amplification factor or Beta (change in collector current caused by change in base current).

ACCURACY OF LINE VOLTAGE INDICATION:  $\pm 3\%$

SIZE: 12" X 15" X 6".

WEIGHT: 20 lbs.

## FUNCTIONS OF CONTROLS

A necessary supplement to the operating instructions is the following description of control functions. Several controls, for example, have unusual secondary functions which must be understood in making settings.

FILAMENT SELECTOR— The dial of this control indicates rms a-c volts tapped from the power transformer and applied to the tube filament at each position. Do not take the setting for granted; check the roll chart and set it to the value shown for the particular tube type. The last position, marked "Z", is used when checking cold cathode tubes such as the 0Z4 for which the plate voltage of the Model 666 is insufficient to initiate conduction in the tube. The 117 volts available from the FILAMENT switch is thrown in series with the plate voltage of 180 volts at the "Z" position to provide a total voltage sufficient to initiate tube conduction. A 3K resistor, placed in series with this circuit, provides current limiting to protect the tube after the start of conduction.

LINE ADJ. — This control is a continuously variable potentiometer connected across a portion of the primary winding. It permits adjustment of transformer secondary voltages to the standard test values despite line voltage and filament load variations. The LINE push-button serves to insert a standard resistance in the leakage test circuit which will result in exactly half-scale deflection (LINE mark) when the LINE ADJ. control has been set properly in relation to the actual line voltage and filament load. The actual line voltage may be read off the dial of the LINE ADJ. control with an accuracy of  $\pm 3\%$  when line adjustment is made under no-load conditions (no tube inserted for testing).

GRID control — A continuously variable potentiometer which taps the desired grid voltage up to a maximum of 5, 15, or 45 volts, depending on the setting of the V lever. A snap switch, which takes up the first few divisions on the dial, is actuated in the most counter-clockwise position and inserts a 400 $\Omega$  current-limiting resistor in series

with the plate supply (for high-current rectifiers). At settings of 7 and above, the resistor is shorted.

**PLATE control** — A continuously variable rheostat in series with the meter which acts as a "fine" adjustment of meter sensitivity in conjunction with the "coarse" adjustment provided by the "S" lever switch.

**LEVER switches 1 through 9 & C** — These are single section six-position switches which connect the similarly numbered tube socket terminals (lever C is for the cap lead) to the proper voltage sources for the tube which is to be tested. At the 1 position, each switch contacts ground; at the 2 position, each switch contacts the filament voltage; at the 3 position, each switch contacts the screen voltage; at the 4 position, each switch contacts plate voltage; in the 5 position, each switch contacts grid voltage; in the 6 position, each switch furnishes an open circuit.

**LEVER V** — This is a three section switch with four positions (1 through 4). 5, 15, 45, 90, and 180 volt taps on a separate secondary winding on the transformer are so connected to these switch sections as to provide selection from four combinations of plate, screen, and grid voltages. The plate and screen voltages selected are applied through the MERIT switch to the corresponding position contacts on lever switches 1 through C. The grid voltage selected is applied to the GRID potentiometer so that the desired portion of the total available voltage can be accurately tapped off by means of the dial calibration and applied to the grid position contacts on lever switches 1 through C, also through the MERIT switch. The plate, screen, and grid voltages selected at each position of the V switch are as follows:

Pos'n	Plate	Screen	Grid
1	45 v	15 v	0-5 v
2	90	45	0-15
3	180	90	0-15
4	180	90	0-45

**LEVER S** — This is a single section six-position switch which selects the value of shunt resistance placed across the meter and PLATE control potentiometer. As such, lever S is a "coarse" meter sensitivity control which is used in conjunction with the "fine" control provided by the PLATE potentiometer. Position 1 provides the least meter sensitivity for high current tubes and position 5 the highest sensitivity for low current tubes; intermediate positions provide a variety of sensitivities necessary for testing the many tube types encountered. At position 6 of the S switch, the grid voltage from the V switch is connected through the 24,000 ohm current-limiting resistor in testing light-duty diodes.

**PUSH-SWITCHES 1 through 9 & C** — Each of these switches serves as a transfer switch for the tube element connected to the corresponding base pin number. The #1 switch controls all connections to the #1 socket terminals; the #2 switch controls all connections to the #2 socket terminals; and so forth, in order, through to the #9 switch for the #9 terminal of the noval socket.

The C switch controls the connections to the cap lead. These push switches serve the following functions:

With the MERIT and LINE switches at their normal position, depressing one of these switches transfers the corresponding tube element to one side of the ohmmeter circuit (with the remaining tube elements all grounded together with the other side of the ohmmeter circuit) as required for the inter-element leakage tests. These push-switches are also primarily responsible for two of the outstanding features of this tube tester; one feature being that in the majority of cases all sections of multi-section tubes draw their normal current when any one section is tested; the second being the rapid testing afforded multi-section tubes due to the saving in set-up time. These advantages are obtained because the push switches permit selection of the tube base pin which will be connected to the transformer power supply through the meter circuit when the MERIT switch is pulled down, in order that the current through the corresponding tube element (normally the plate of a tube or a tube section) be measured for MERIT testing. The remaining tube base pins (connected to the push switches which are not depressed for the particular MERIT test) are connected either directly to the transformer power supply or indirectly through a potentiometer.

**RESET push button** — This button is a convenience intended to permit restoring of a depressed push-switch to the normal position.

**H-K LEAKage push switch** — This is a momentary switch which is used for heater-cathode leakage testing. When the push switch for an indirectly heated cathode (underlined in the LEAK column of the roll chart) is depressed to transfer the cathode to one side of the ohmmeter circuit, the H-K LEAK button is depressed also to break the ground connection of the remaining "lumped" elements in order that cathode emission current to these elements will be excluded from the cathode heater leakage measurement.

**TRANSISTOR TEST selector** — This is a special five-position multi-circuit switch performing the following functions: a) At the TUBE position the transistor test socket is de-energized and the meter connected so as to render it available for line adjustment, leakage testing, and merit testing; b) At the transistor test positions, it applies a dc bias voltage between the collector and emitter socket terminals, of polarity depending on whether the n-p-n or p-n-p positions are used.

At the 1 position for either transistor type, the meter is inserted in the collector circuit in series with a 1K current-limiting resistor to measure the current ( $I_{CEO}$ ) under these conditions. At either 2 position, a 200K resistor is connected between the collector side of the power supply and the base to put a small current into the base. The current gain, Beta, is then read on the meter, which remains in the collector circuit.

**WARNING:** Be certain as to the type of transistor (n-p-n or p-n-p) you are testing. Testing a transistor using the positions designated for the opposite type may damage the tester meter or the transistor. Note that shorted transistors may cause the meter to read past full scale at the

"N-P-N 1" or P-N-P 1" position. Should this occur, turn the switch back to the "TUBE" position immediately and discard the defective transistor, after you have first checked to see that the correct test position was used for the particular type.

**SPECIAL SOCKET CONNECTIONS.**— Several socket terminal connections are not standard and should be noted. The pilot light socket in the center of the 7-pin socket is connected across the selected filament voltage (shell to ground, center post to filament switch arm). The center of the loktal socket is connected to ground. The sub-miniature in-line socket has no numbers assigned to its seven terminals. In the Model 666, these terminals are connected to the push-switches as if they were numbered 1 to 7 beginning at the index dot on the panel. However, a consistent connection procedure has been established (the roll chart settings are given accordingly), which is as follows: With tube base and socket indexes matched (dot or spur on tube base to dot at right of socket on the panel), the tube leads are inserted in order so as not to skip any socket terminals starting from the extreme right.

## OPERATING INSTRUCTIONS

### PRELIMINARY STEPS FOR TUBE OR TRANSISTOR TESTING.

1. Insert the power plug in a 105-125 volts AC, 50/60 cps line outlet. Do not use a DC line outlet or any AC line outlet other than specified above.
2. Turn the tester on by rotating the LINE ADJ. control clock-wise from AC-OFF.
3. Set the TRANSISTOR TEST selector to TUBE, regardless of whether it is a tube or transistor that is to be tested.
4. Make a preliminary line adjust by holding down the LINE button while turning the LINE ADJ. control until the meter pointer is over the LINE ADJ. mark on the meter (center scale). Release the LINE button at the conclusion of the adjustment.

### TUBE TESTING CONTINUED

5. Press the RESET button to release any button which may be down from a previous setting. Make sure the TRANSISTOR TEST selector is set at "TUBE".
6. Move all 12 lever switches down to the "1" position.
7. Rotate one or both roll chart wheels until the tube type you wish to test appears in one of the windows. Obsolete types will be found in a supplement to this manual.
8. Note the number of lines of settings devoted to the tube on the chart. Each line of settings corresponds to a section of the tube (1 line for a single diode, triode, or pentode; 2 lines for a double diode or triode or pentagrid converter; 3 lines for a duodiode-triode, etc.) Each section of the tube is tested by making the settings indicated on a single line of the chart and then depressing the MERIT lever. All inter-element short and leakage testing must be performed before any of the MERIT tests is performed as

a safeguard to the tube tester. The push-buttons which must be pressed down to complete the leakage and short testing are all given in the first line of settings. Specific instructions for making settings and performing the required tests follow.

9. The first 3 settings following the tube type are for the FIL. selector, GRID control and PLATE control, in that order. Set these controls accordingly.

10. The next 12 settings are for lever switches 1, 2, 3, 4, 5, 6, 7, 8, 9, C, V, and S in that order. Set these levers accordingly.

11. Check all settings to make sure that no mistake has been made.

12. Insert the tube into the socket which matches its base. (The socket just above the TRANSISTOR TEST selector is for transistors only. All other sockets are for tubes only). If the rectangular sub-miniature socket is used, turn the tube so that its index (red dot, black dot, glass spur) matches the dot on the panel; then insert each lead into a socket terminal in order, not skipping any socket terminals starting from the right. If there is a top cap on the tube, connect to it with the cap clip lead.

13. Allow sufficient warm-up time before proceeding. For battery-operated tubes and h.v. rectifiers (1B3 type) warm up is almost instantaneous; for most receiving tubes 10 to 20 seconds; for high power pentodes, triodes, and rectifiers 20-40 seconds. Note that the MERIT test (step 17) should not be performed until the stated warm-up time has elapsed.

14. Press the LINE button and note the meter reading. Depending on the filament drain of the tube under test, the meter will read more or less to the left of the LINE ADJ. mark (center scale). Holding the LINE button down turn the LINE ADJ. control until the meter pointer is again over the LINE ADJ. mark. Release the LINE button at the conclusion of this adjustment.

15. Refer to the first (or only) line of settings for the tube and note the buttons listed in the LEAK. column. Press down each of the buttons listed one at a time (in order), observing the meter each time. (See next paragraph for evaluation of leakage readings.) The underlined leakage buttons are for indirectly heated cathodes; when these buttons are depressed, the resulting meter reading will be valid only when the H-K LEAK button is also depressed. Failure to do so will not normally cause damage to the tube, but will give too low a leakage reading due to emission to other elements. Thus, the underlined leakage tests are of heater to cathode leakage only.

On cathode leakage test of light duty diodes in multi-section tubes, meter will not swing across the scale as for other type of tubes if tube under test is good, and there is no need to depress the H-K LEAK button. Underlining of pin #2 in case of 6AQ7 merely indicates cathode. The above also applies to other tubes of similar types such as 6R8, 6S8, and 6T8.

Standard for acceptance or rejection on Inter-Element Leakage (excluding cathode-heater leakage): No less than 5 megs on any test. A stricter standard for high re-

liability applications would be no less than 10 megs on any test.

Standard for Acceptance or Rejection on Cathode-heater Leakage: Not less than 1 meg for non-power types; not less than 500K for power types. Half these values may be acceptable for tubes approaching end of life, with the exception of tubes used in audio preamplifiers which may not read less than 1 meg at any time.

In general, tubes failing to meet these standards should be discarded. In any case, do not perform a MERIT test on any tube having an inter-element leakage resistance less than 100K ohms, as this may damage the tube tester. Note that all required inter-element and cathode-heater leakage tests for the entire tube have been completed with the tester set up for the first (or only) MERIT test and before the first (or only) MERIT test is made. No further leakage testing is performed thereafter.

Note: Depressing the buttons listed in the MERIT column actually tests that element for leakage until the MERIT lever is depressed. A tube giving too low an ohms reading in this condition should not be tested for MERIT.

16. Perform the first (or only) MERIT test on tubes which have been found satisfactory as to leakage and shorts by first pressing down the button listed in the MERIT column and then pulling down the MERIT lever switch. With the MERIT lever held down, read the merit (quality) indication on the DIODES GOOD scale for diodes and rectifiers, or the colored areas and percent markings for all other tubes. Note that although 100% represents normal conductance for a new tube, some tubes will read higher and some lower because of the tolerances allowed in tube manufacturing. Note also that the limits of the GOOD, ? (doubtful), and REPLACE areas are obtained by striking an average for all tube types and so should not be interpreted in an absolute manner.

17. If there is more than one line of settings for the tube, leave the tube in the socket and proceed as follows for each line: a) Reset the lever switches and GRID and PLATE controls accordingly; b) Depress the button listed in the MERIT column; c) Pull down the MERIT lever switch to read the quality on the meter of the particular tube section under test.

18. After testing the last section of a tube, remove the tube from the socket of the tube tester. Push reset button and return all lever switches to "1". Failure to do this can result in damage to the meter when you proceed to test the next tube.

19. Proceed with testing another tube by beginning with Step 5. If there are no more tubes or transistors to be tested, turn the LINE ADJ. control counter-clockwise to its AC-OFF position. A slide switch at the end of the potentiometer winding opens the primary circuit of the power transformer and turns the tester off. If there is a transistor to be tested, proceed directly to step 5 of TRANSISTOR TESTING after completing step 18 of TUBE TESTING.

CONTINUED PROCEDURE FOR TRANSISTOR TESTING

5. Locate the type number of the transistor to be tested on the transistor chart. Note whether the transistor is a n-p-n or a p-n-p type and the specified allowable range of Beta. Make sure that the TRANSISTOR TEST selector is set at "TUBE".

6. Insert the emitter (E), base (B), and collector (C) lead of the transistor in the corresponding terminals of the transistor socket located immediately above the TRANSISTOR TEST selector.

7. Turn the TRANSISTOR TEST selector from "TUBE" to position 1 on the p-n-p or n-p-n side depending on the type of transistor under test. The indication on the meter will be proportional to the collector current with emitter grounded and no base signal. On this test, transistors in good condition should read in the " $I_{ceo}$  GOOD" area (between 0 and 40 on the 0 to 140 scale); reject transistors that read outside the " $I_{ceo}$  GOOD" area (higher than 40 on the 0 to 140 scale), unless note has been made on the chart that a higher reading is acceptable.

8. Turn the TRANSISTOR TEST selector to position 2 and read the current amplification factor or Beta (change in collector current caused by a change in base current) on the 0 to 140 Beta Scale. A good transistor will read within the allowable range of Beta as given on the chart for the particular transistor type. Transistors which do not give a reading within the specified allowable range of Beta may still be useable; see data sheet.

9. Turn the TRANSISTOR TEST selector back to "TUBE" and then remove the transistor from the transistor socket.

10. Proceed with testing another transistor by beginning with step 5. If there are no more transistors or tubes to be tested, turn the tester off by turning the LINE ADJ. control to its AC-OFF position. If there is a tube to be tested, proceed directly to step 5 of TUBE TESTING after completing step 9 of TRANSISTOR TESTING.

NOTE: The only controls having any effect in transistor testing are the TRANSISTOR TEST selector, the LINE ADJ. control, and the LINE push-button. Provided that a tube has not been left inserted in any of the tube sockets, the settings of any other lever switches, push-buttons or potentiometers on the panel have no effect and are immaterial.

## CIRCUIT DESCRIPTION

It may be of assistance in understanding the functioning of the instrument to examine the following typical partial schematics, each of which indicates the voltages applied and the placement of the meter circuit when performing the tests provided (in accordance with the detailed operating instructions) for tubes and transistors.

Note:  $R_s$  denotes the meter shunt resistance selected by S23 (Lever S).  $\Phi 1$ ,  $\Phi 2$ , and  $\Phi 3$  denote various a-c voltages taken from taps on the high voltage secondary winding of the power transformer and selected by S22 (Lever V). An asterisk denotes the function of current-limiting.

The functioning of the Model 666 in each of the various tests furnished is as follows:

**INTER-ELEMENT LEAKAGE:** A filtered dc test voltage of -70 volts is obtained by rectifying and filtering (CR1 and C1) the 50 volts ac obtained from filament winding tap. This voltage is applied between the tube element isolated by its transfer switch and the remaining tube elements whose lever switches are set at the plate, screen, and grid voltage busses which are grounded through the MERIT and H-K switches at their normal positions. The current through this circuit is read in ohms on the meter. Note that the polarity of the test voltage is evidently such as to eliminate cathode emission from the reading and that resistor R8 and LEAK CAL. rheostat R7 restrict the total current to 200  $\mu$ a (full scale) even with a dead short. For heater-to-cathode leakage testing, the connection of the "remaining" elements to ground is broken by depressing the H-K push-switch to remove them from the circuit and leave in the test circuit the cathode and heater only. This is necessary because the cathode is placed at a negative voltage with respect to the "remaining" elements when it is selected by its transfer switch and the consequent cathode emission current would also register on the meter to give a false low reading of cathode-heater leakage.

**LINE ADJ:** For line adjustment, resistor R19 and LINE CAL rheostat R18 (identical to R8 and R7 respectively) are inserted in the leakage test circuit by depressing the LINE push-switch to exactly double the total resistance in the circuit and reduce the meter indication to exactly half scale. The condition for full-scale and half-scale reading, set in initial calibration with the LEAK CAL. and LINE CAL. rheostat R7 and R18, is that the LINE ADJUST potentiometer be set to give 130 volts across the full transformer primary (or 105 volts across the low end of the primary and the primary tap). The LINE ADJUST potentiometer permits duplication of this condition over a  $\pm 10\%$  variation of the actual line voltage from the nominal value (117 volts).

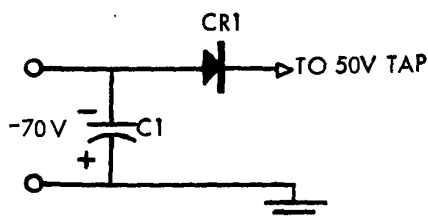
**MERIT TEST:** Several of the many configurations that occur in MERIT testing are shown above. In general, each

test furnish a composite indication of cathode emission capability and the ability of each grid to control the plate current in accordance with the design of the tube, plus the ability of the plate to receive the regulated current. For diodes and rectifiers, the measurement is simply an emission test. To properly test a great variety of tube types, several plate, screen and ranges of grid voltage are available from taps on the plate secondary winding of the transformer for selection by switch S22 (lever V). These voltages are applied through switch S28 (MERIT) to the plate, screen, and grid bus bars inter-connecting corresponding terminals on switches S12 through 21 (lever switches 1 through 9 & C). The grid voltage is variable by R16 (GRID potentiometer) from zero to maximum of the range selected. Note that the plate, screen, and grid voltage contacts on switches S12 through 21 are grounded at the normal position of S28 and that plate, screen, and grid voltages are only applied when S28 is pulled down.

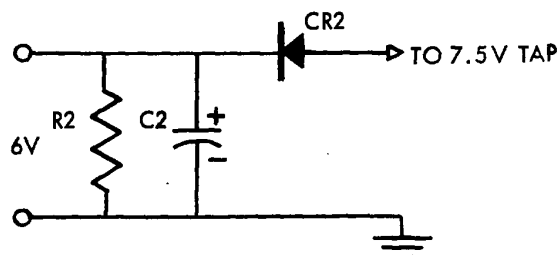
**TRANSISTOR TESTS:** At the P-N-P 1 or N-P-N 1 test positions of the TRANSISTOR TEST selector, a measurement is made of the collector current that flows when the emitter is grounded and no signal is applied to the base. This current is a function of the temperature, the resistivity of the germanium and, most important, becomes quite large if there is contamination of the surface of the germanium or if the transistor has been damaged by a short circuit. At the P-N-P 2 or N-P-N 2 positions, a small current is put into the base via the 200K $\Omega$  resistor R3 to permit measurement of the collector-to-base amplification factor Beta, sometimes call Alpha cb. In some cases the range of Beta given in the chart has been taken directly from the transistor manufacturer's specification; in other cases Beta has been calculated from the grounded-base Alpha, Alpha ce, according to the relationship:

$$\text{Beta} = \frac{\text{Alpha ce}}{1 - \text{Alpha ce}}$$

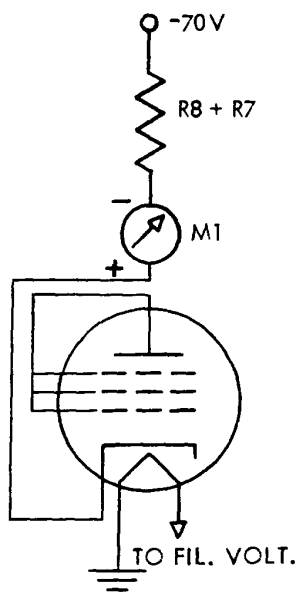
These simple tests will determine if the transistor is good or bad, but will not, of course, duplicate the factory tests of frequency response, input resistance, output resistance, collector capacitance and other electrical characteristics that are necessary for a specific grade of transistor.



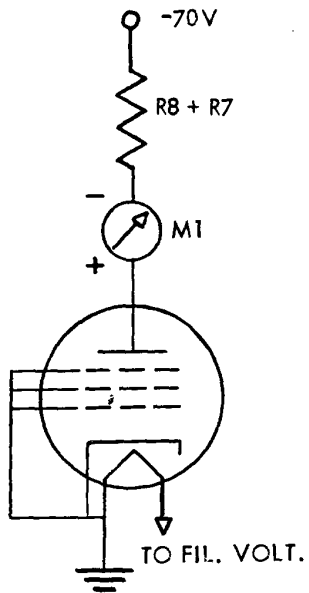
LEAKAGE TEST POWER SUPPLY — Also used for Line Adjust.



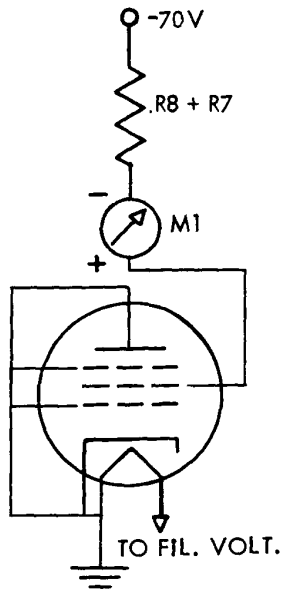
TRANSISTOR TEST POWER SUPPLY



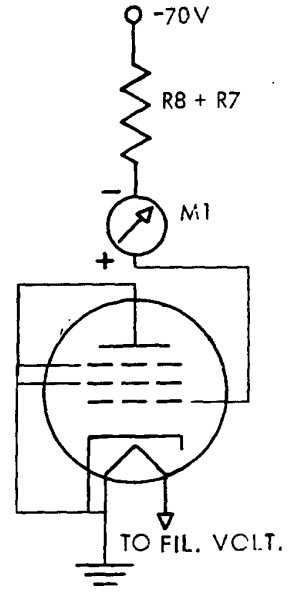
a) CATHODE-TO-HEATER  
LEAKAGE TEST



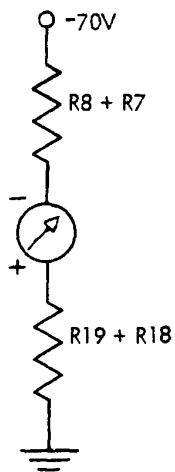
b) PLATE-TO-ALL  
LEAKAGE TEST



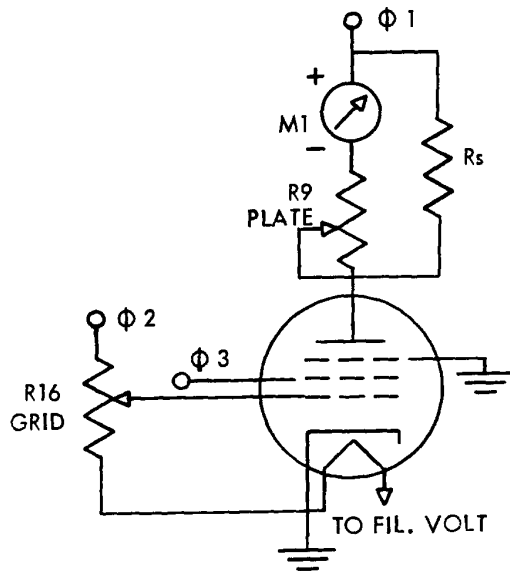
c) SCREEN-TO-ALL  
LEAKAGE TEST



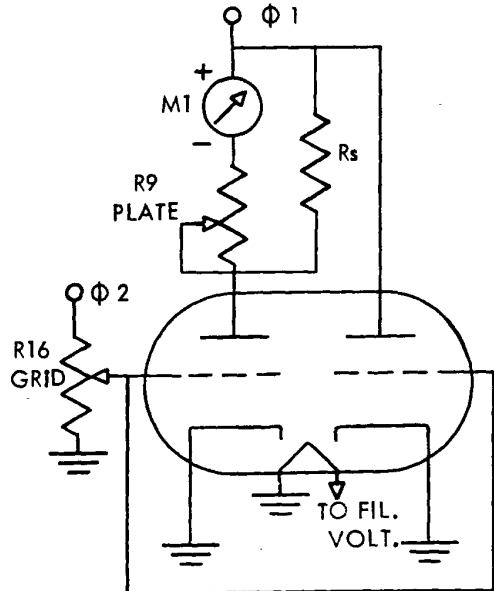
d) GRID-TO-ALL  
LEAKAGE TEST



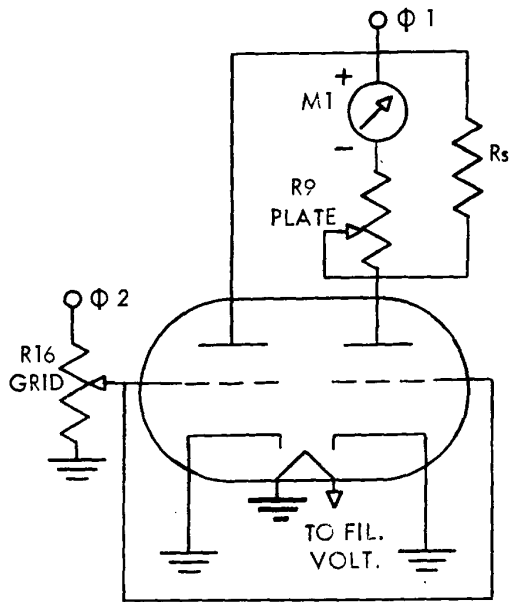
e) LINE ADJUST



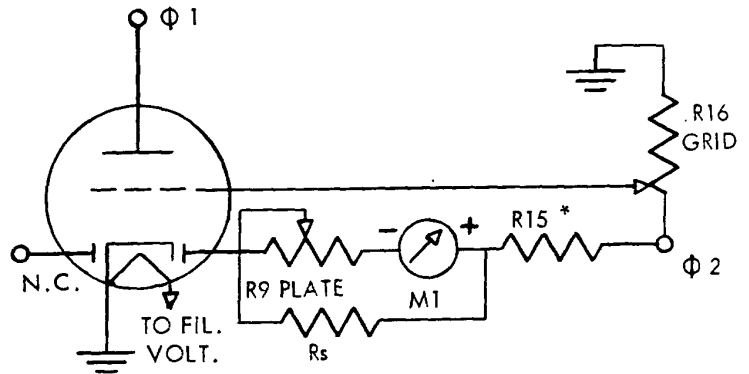
f) MERIT TEST of  
TYPICAL PENTODE



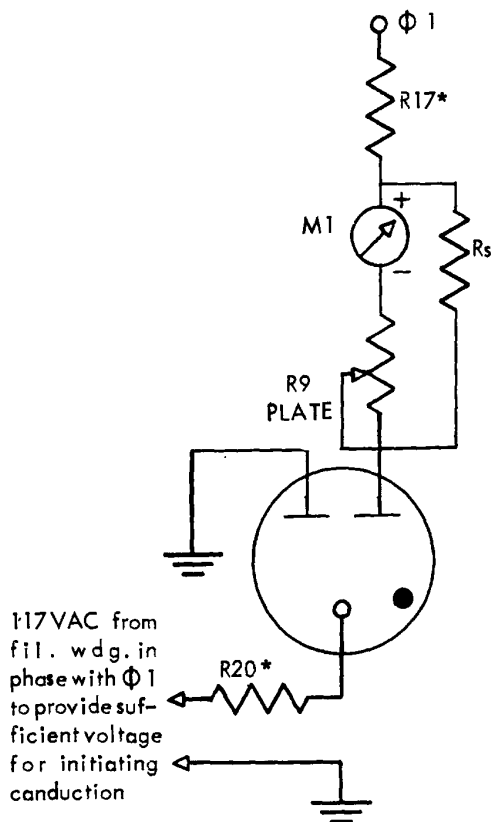
g) MERIT TEST OF TRIODE  
1 of A DUO-TRIODE



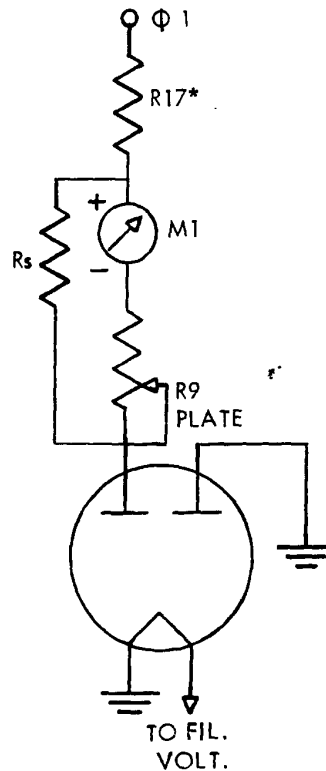
h) MERIT TEST OF TRIODE  
2 of a DUO-TRIODE



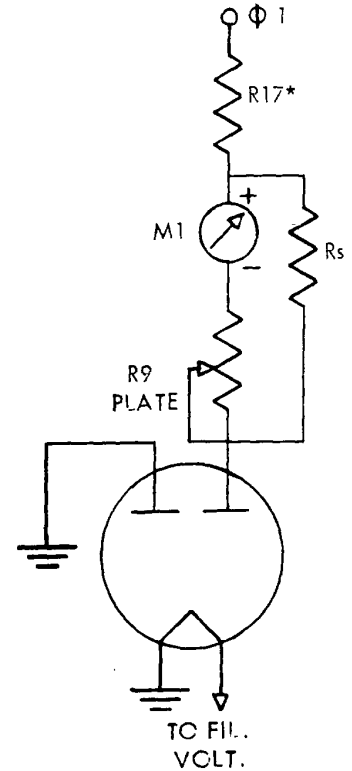
i) MERIT TEST of light-duty diodes, (showing  
one diode section of a triode duo-diode, such  
as a 12SQ7).



j) MERIT TESTING of OZ4, OY4 cold-cathode  
gas rectifiers (test of one section of OZ4 shown).

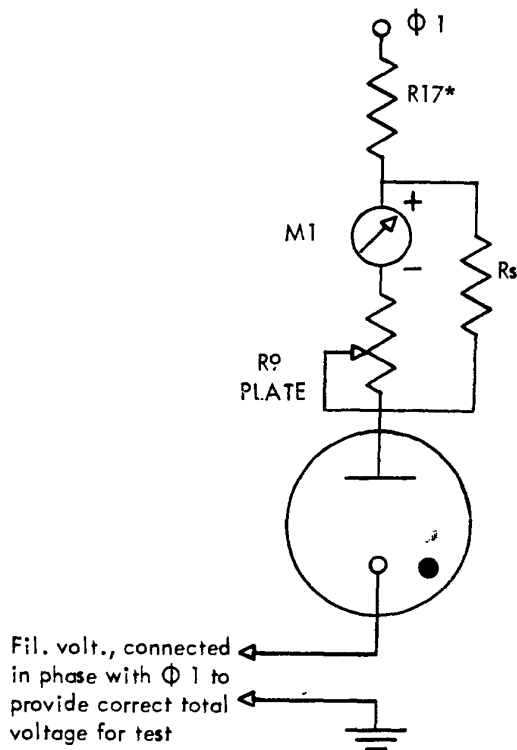


k) MERIT TEST for power rectifier  
section A of full-wave type.



l) MERIT TEST for power rectifier  
section B of full-wave type.





m) MERIT TESTING of OB2, OB3, OC3, & OD3 VR tubes.

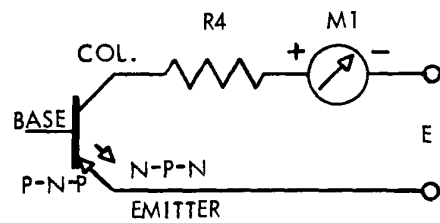
## MAINTENANCE

**GENERAL:** Included in this section are instructions for internal adjustments, trouble-shooting, and part replacement. All internal adjustments must be performed in the order given on completed kit instruments before they can be placed in use. The same procedures will serve for periodic readjustments in both kit and factory-wired instruments when required by component aging or replacement.

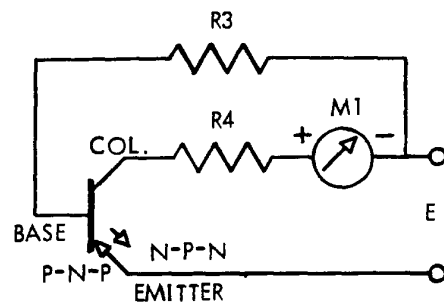
**REMOVAL FROM CABINET:** To remove the instrument from the cabinet, first disconnect it from the power line and remove the 14 screws around the edges of the panel which fasten it to the flanges of the cabinet. As all components are assembled to the panel, removal consists simply of lifting the panel out of the cabinet.

**WARNING:** The operator is exposed to voltages as high as 300 volts A-C when the instrument is being operated outside of its cabinet. Take caution to avoid personal contact with these voltages.

**INTERNAL ADJUSTMENTS:** a) Disassemble the panel from the cabinet and lift the instrument out. b) With the instrument in its normal operating position and no power applied, adjust the reading of the meter pointer to zero by turning the mechanical adjustment screw on the meter face. c) Connect an a-c voltmeter of any type across the 0-130 v. taps of the power transformer and insert the line plug into a 105-130 volts AC, 50/60 cps line outlet. With no tube or transistor inserted in the test socket, and



n) TRANSISTOR TEST 1 ( $I_{ceo}$ )



o) TRANSISTOR TEST 2 (Beta)

the TRANSISTOR TEST selector set at "TUBE", rotate the LINE ADJ. control R1 until the voltmeter reads 130 volts AC. d) Depress push-switch "C" so that it latches, and hold the metal clip on the cap lead against the panel so that it makes good electrical contact. Adjust the internal LEAK CAL. control, R7, for full-scale deflection on the meter (zero ohms on the leakage scale). e) Release the "C" push-switch by depressing the RESET push-button. Now depress the LINE push-switch and hold it down (this switch does not latch) while adjusting the LINE CAL. control, R18, for half-scale deflection (the short vertical "Line Adjust" on the meter scale). This completes the calibration of the instrument.

**Note:** The LEAK CAL. control, R7, is located on the underside of the chassis near the FILAMENT selector switch, the LINE CAL. control, R18, is also on the underside of the chassis, near the LINE ADJ. control.

**CLEANING TUBE & TRANSISTOR SOCKET TERMINALS:** After a long period of time, a film of dirt may form on the inside contact surfaces of the socket terminals which will prevent good contact with the inserted tube and transistor pins or leads. Spray or pour a little contact cleaner through the socket terminals, if this condition occurs, to remove the dirt film and restore good contact surfaces.

**Fuse Replacement:** A fuse in series with the primary winding of the power transformer protects the tube tester against damage due to overloading. Do not replace a blown fuse until you have located and corrected the cause of the failure, which can be any one of the following:





# Tube Chart Supplement Model 666-05



## Dynamic Conductance Tube & Transistor Tester

TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	
01A	5.0	7	91	23511	11111	2	3	23	2	1LC6	1.4	7	7	24353	21111	2	4	3
0A2/6073/150C2	117	0	10	21616	66111	1	3	1	1	1LD5	1.4	27	36	24361	51111	1	5	2346
0A3/VR-75	0	0	92	11113	11111	4	2	5	5	1LD5	1.4	7	25	24361	51111	4	6	4
0A4/PL1267	Z	0	50	11113	15111	4	2	57	5	1LE3	1.4	13	73	23116	51111	4	3	26
0A4/PL1267	Z	0	50	11113	12111	4	2	5	5	1LG5	1.4	7	83	23316	51111	3	3	246
0B2/6074/108C1	0	0	67	41666	66111	2	3	1	1	1LH4	1.4	13	86	23161	51111	2	5	246
0B3/VR-90	6.3	0	90	12113	11111	4	2	5	5	1LH4	1.4	7	23	23161	51111	4	6	4
0C2	35	0	85	32666	66111	2	2	1	1	1LN5	1.4	7	65	23316	51111	4	4	246
0C3/VR105	12.6	0	0	12113	11111	4	3	5	5	1N3/DM70/1M3	1.4	100	70	56112	11411	1	5	1
0D3/VR150	70	0	73	12113	11111	4	2	5	5	1N3/DM70/1M3	1.4	0	70	56112	11411	1	5	1
0G3/5TV85-10	25	0	50	42666	66111	1	3	13	1	1N5	1.4	7	79	12331	11115	4	4	34C
0Z4	Z	0	60	11113	11211	4	2	35	5	1N6	1.4	34	92	12335	61111	2	3	3456
0Z4	Z	0	60	11311	11211	4	2	3	3	1N6	1.4	7	25	12335	61111	4	6	6
1A3/DA90/1D13	1.4	7	21	26116	61111	4	6	23	2	1P5	1.4	7	51	12331	11115	4	4	34C
1A4P	2.0	7	38	24311	11115	2	4	3C	2	1P39	0	0	100	11141	11111	2	6	4
1A4T	2.0	7	51	24311	11115	2	4	23C	2	(Shine light on cathode. Needle indication must be greater than when light not on cathode)								
1A5	1.4	39	84	12335	11111	2	3	345	3	1P40	0	0	100	11141	11111	2	6	4
1A6	Mix.	2.0	30	62	24453	11112	2	4	2345	(Shine light on cathode. Needle indication must be greater than when light not on cathode)								
1A6	Osc.	2.0	30	35	24453	11112	2	4	3	1Q5	1.4	30	21	12335	11111	2	3	345
1A7	Mix.	1.4	70	20	12351	31111	4	5	3456	1Q6	1.25	30	67	15112	63311	2	4	2678
1A7	Osc.	1.4	80	95	12351	31111	4	4	6	1Q6	1.25	7	28	15112	63311	4	6	6
1AB6/DK96	1.4	40	20	14353	52111	1	5	23456	2	1R4/1294	1.4	7	17	21161	11111	4	6	47
1AC5	1.25	7	25	15112	13311	2	4	27	7	1R5/DK91/X17	1.4	7	70	13316	12111	2	4	234
1AD4/DF62	1.25	7	5	33152	11111	2	4	24	7	1R5/DK91/X17	1.4	7	24	13316	12111	2	4	3
1AD5	1.25	20	62	15112	13311	2	4	27	7	1S2/DY87/DY86	1.4	0	31	12616	16613	2	4	C
1AE4	1.25	7	95	13311	52111	4	3	236	2	1S4	1.4	7	44	13531	62111	2	3	234
1AF4	1.4	7	50	13311	52111	4	4	236	2	1S5/DAF91/6AU	1.4	20	65	11633	52111	2	4	3456
1AF5	1.4	7	74	11633	52111	4	4	3456	5	1S5/DAF91/6AU	1.4	7	29	11633	52111	4	6	3
1AF5	1.4	7	74	11633	52111	4	6	3	3	1S6	1.25	20	70	31512	61311	2	4	1368
1AG4	1.25	70	8	43251	11111	1	4	124	1	1S6	1.25	7	20	31512	61311	4	6	6
1AH4	1.25	7	86	33152	11111	2	4	124	1	1SA6	1.4	7	77	12151	31311	2	4	34
1AJ5	1.25	7	84	33615	21111	2	4	1235	1	1SB6	1.4	20	69	12436	11511	2	4	34
1AJ5	1.25	7	25	33615	21111	4	6	3	3	1SB6	1.4	7	25	12436	11511	4	6	5
1AK4	1.25	7	0	33152	11111	2	5	124	1	1T4/DF91/W17	1.4	7	85	13311	52111	4	3	236
1AN5	1.4	7	75	14311	52111	2	4	346	2	1T5	1.4	39	54	12335	11111	2	3	345
1AX2	1.4	0	88	12666	66663	4	4	C	C	1T6	1.25	25	67	31512	61311	2	4	1368
1AX4	1.4	0	86	21166	61663	4	4	C	C	1T6	1.25	7	98	31512	61311	3	6	6
1B3/8016	1.25	0	85	62616	11613	2	4	C	C	1U4	1.4	7	60	13311	52111	4	4	236
1B4P/951	2.0	7	49	24311	11115	2	4	23C	2	1U5/DAF92	1.4	25	50	13361	52111	2	4	2346
1B5/25S	2.0	7	10	23665	11111	2	5	234	2	1U6	1.4	7	96	14413	22111	2	4	45
1B5/25S	2.0	7	10	23665	11111	4	6	34	34	1U6	1.4	7	88	14413	22111	2	4	3
1B7	Mix.	1.4	70	81	12351	31111	4	4	3456	1V/KR1	6.3	0	29	23111	11111	2	2	23
1B7	Osc.	1.4	70	78	12351	31111	4	4	6	1V2	6.25	0	85	66621	66631	2	4	9
1B8	1.4	42	59	12335	31615	2	3	34568C	3	1V5	1.25	45	85	15112	13311	1	4	278
1B8	1.4	13	94	12335	31615	2	5	4	4	1V6	1.25	14	79	33511	32111	1	5	1235
1B8	1.4	7	10	12335	31615	4	6	5	5	1W4	1.4	33	71	13311	52111	2	3	236
1C3/DK96/	1.4	7	84	23151	51111	4	3	24	-2	1W5	1.25	25	53	15112	13311	2	4	278
1C5/DL35/	1.4	29	41	12335	11111	2	3	35	3	1X2	1.25	0	20	12116	11613	1	5	C
1C6	2.0	40	65	24453	11112	2	4	245	2	1Z2	1.4	0	3	21661	61113	2	4	C
1C6	2.0	40	90	24453	11112	2	3	3	3	2A3/5930	2.5	17	82	23511	11111	4	1	23
1C7	2.0	50	77	12435	41112	2	4	345	3	2A4	2.5	20	78	12511	11111	4	2	35
1C7	2.0	50	75	12435	41112	2	3	6	6	2A4	2.5	85	78	12511	11111	4	2	3
1C8	1.25	35	72	65112	33511	1	5	267	7	2A5/KR25	2.5	7	44	24451	11111	4	2	2345
1C8	1.25	35	29	65112	33511	1	5	6	6	2A6	2.5	7	20	24661	11115	2	5	2345C
1D5	2.0	7	29	12431	11115	2	4	3C	3	2A6	2.5	7	20	24661	11115	4	6	34
1D7	2.0	35	72	12435	31112	2	4	345	3	2A7	2.5	7	87	23341	11111	4	3	2356
1D7	2.0	35	20	12435	31112	2	4	6	6	2A7	2.5	7	0	23341	11111	4	4	4
1D8	1.4	26	75	12335	31615	2	3	34568	3	2AF4	2.5	10	57	35211	66111	4	2	25
1D8	1.4	7	82	12335	31615	3	4	6	6	2B3	1.4	0	56	62111	11613	2	4	C
1D8	1.4	7	22	12335	31615	4	6	8	8	2B7	2.5	78	12	24366	11115	3	3	23456C
1DN5	1.4	7	95	24311	51111	2	4	2346	2	2B7	2.5	7	20	24366	11115	4	6	45
1DN5	1.4	0	45	21141	11111	2	4	4	4	2BN4	2.0	28	70	15213	66111	4	2	12
1E4	1.4	7	85	12315	11111	4	3	35	3	2C21/1642	6.3	23	26	21353	11115	3	3	2356
1E5	2.0	7	53	12331	11115	2	4	34C	3	2C21/1642	6.3	23	26	21353	11115	3	3	3
1E7	2.0	7	65	12455	41311	4	3	34568	36	2C52	12.6	7	82	53153	12111	4	4	2356
1E8	1.25	95	92	65112	33511	1	4	267	6	2CY5	2.5	7	75	51				

TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	
3B2	2.8	0	10	12111	61614	1	5	C	C	5BT8	4.7	0	5	66121	11111	4	6	12
3B4/DL9B	2.5	80	83	36521	63111	2	3	137	7	5BW8	4.7	60	36	31321	51341	1	4	9
3B7/1291	2.8	45	34	23561	53111	3	3	36	27	5BW8	4.7	0	56	31321	51341	1	3	13
3BA6	2.8	40	5	51214	31111	3	3	127	5	5C08	4.7	53	5	53621	43151	3	3	6
3BC5	2.8	15	37	56214	31111	3	3	1567	5	5C08	4.7	63	5	53621	43151	3	3	2
3BE6	2.8	7	75	51214	31111	4	3	1257	5	5C18	5.0	7	20	53121	33151	3	3	2
3BE6	2.8	7	25	51214	31111	4	3		6	5C18	5.0	7	50	53121	33151	3	3	6
3BN4	2.8	18	69	15213	66111	4	2	127	5	5CM8	4.7	7	80	45121	43151	4	3	6
3BN6	2.8	7	35	15213	13111	3	4	126	7	5CM8	4.7	7	25	45121	43151	4	3	1
3BU8	2.8	25	34	13421	55451	2	4	1679	38	5CQ8	4.7	7	84	45321	41151	3	2	1
3BY6	2.8	7	56	51214	31111	3	3	1257	5	5CQ8	4.7	7	45	45321	41151	3	3	6
3BY6	2.8	7	26	11214	35111	3	3		6	5CR8	4.7	7	100	45121	43151	2	3	6
3BZ6	2.8	46	92	51214	31111	3	2	127	5	5CR8	4.7	7	35	45121	43151	2	3	1
3C2	2.8	0	16	12166	61614	1	4	C	C	5CU4	5.0	0	15	12141	61111	4	1	4
3C4	1.4	60	99	14312	51111	1	3	236	2	5CU4	5.0	0	15	12161	41111	4	1	6
3C6	2.8	7	90	21115	31111	4	3	45	6	5CZ5	4.7	20	30	31521	61641	4	2	9
3C6	2.8	7	90	21151	11111	4	3		3	5DH8	5.0	7	30	54121	43151	3	3	2
3C86	2.8	55	90	51214	31111	3	2	127	5	5DH8	5.0	7	45	54121	43151	3	3	6
3CE5	2.8	16	5	56214	31111	3	3	1567	5	5EA8	5.0	7	75	45321	41151	1	3	1
3CF6	2.8	13	10	51214	31111	3	3	127	5	5EA8	5.0	7	88	45321	41151	2	3	6
3CS6	2.8	7	70	51214	31111	2	4	1257	5	5EH8	4.7	7	17	15421	65341	2	3	3
3CS6	2.8	7	70	11214	35111	2	4		5	5EH8	4.7	7	100	15421	65341	2	3	9
3CY5	2.8	7	75	51214	36111	2	3	1256	5	5EU8	5.0	7	100	45421	15131	2	3	1
3D6	2.8	29	5	24311	56111	2	3	236	2	5EU8	5.0	7	28	45421	15131	2	3	3
3DE6	2.8	7	28	51214	31111	3	3	127	5	5EW6	5	14	12	51214	31111	3	3	5
3DG4	2.8	0	100	26114	14111	2	1	57	5	5FG7	4.7	35	25	54621	43151	3	3	6
3DG4	2.8	0	95	26114	14111	2	1		7	5FG7	4.7	35	70	54621	43151	3	2	2
3DK6	2.8	7	35	51214	36111	3	3	1267	5	5FV8	4.7	40	70	54121	43151	3	2	2
3DT6	2.8	10	25	51214	35111	3	4	127	5	5FV8	4.7	7	20	54121	43151	3	3	6
3E5	2.8	7	71	13316	52111	2	3	236	2	5GH8	4.7	7	90	45321	41151	2	3	1
3E6	2.8	20	89	13316	51111	2	3	46	2	5GH8	4.7	7	38	45321	41151	2	3	6
3EA5	2.8	25	50	51214	31111	2	3	156	5	5GM6	5.0	15	80	51214	36111	4	2	5
3ER5	2.8	30	75	15124	16111	3	2	125	5	5J6	4.7	25	35	33215	51111	3	3	12
3FH5	2.8	15	15	65214	11111	2	3	267	5	5R4	5.0	0	43	12111	41111	4	1	6
3FQ5	2.8	50	70	15214	66111	2	2	125	5	5R4	5.0	0	43	12141	11111	4	1	4
3FY5	2.8	7	80	15214	66111	3	2	124	5	5T4	5.0	0	30	12111	41111	4	1	6
3GS8	2.8	30	85	13421	15411	4	3	1236789	38	5T4	5.0	0	30	12141	11111	4	1	9
3LF4	2.8	23	29	24311	56111	2	3	236	2	5T8	4.7	7	84	66121	61531	3	4	126
3Q4/DL95/N18	2.8	35	29	13536	62111	2	3	234	2	5T8	4.7	7	0	66121	61531	4	6	6
3Q5	2.8	25	27	12335	11611	2	3	345	3	5U4/5931	5.0	0	41	12111	41111	4	1	4
3S4/DL92/N17	2.8	7	40	13536	62111	2	3	234	2	5U4/5931	5.0	0	41	12141	11111	4	1	4
3V4/DL94/1P11	2.8	30	34	13316	52111	2	3	236	2	5U8	4.7	71	5	35321	41151	3	3	6
4A6	3.8	7	77	12355	31611	1	4	3456	36	5U8	4.7	71	88	35321	41151	3	2	1
4AU6	4.2	7	80	51213	31111	3	3	127	5	5V3	5.0	0	25	12111	41111	3	1	6
4AV6	4.2	25	85	51216	64111	3	3	12567	7	5V3	5.0	0	25	12141	11111	3	1	4
4AV6	4.2	0	5	51216	64111	4	6		56	5V4/GZ32	5.0	0	76	12131	11111	4	1	6
4BC5	4.2	15	37	56214	31111	3	3	1567	5	5V4/GZ32	5.0	0	76	12131	11111	4	1	4
4BC8	4.2	10	70	35121	35111	2	3	2378	16	5V6	4.7	21	98	12445	11111	4	1	3
4BN6	4.2	7	65	15213	13111	4	4	126	7	5W4	5.0	0	46	12111	41111	4	1	6
4BQ7	4.2	7	23	35121	35111	4	3	2378	16	5W4	5.0	0	46	12141	11111	4	1	4
4B88	4.2	40	85	35121	35111	3	2	2378	16	5X3	5.0	0	60	21411	11111	4	1	3
4B88	4.2	25	34	13421	55451	2	4	12679	38	5X3	5.0	0	60	24111	11111	4	1	2
4BX8	4.2	23	15	35121	35111	2	3	2378	16	5X4	5.0	0	40	11114	12111	4	1	5
4BZ6	4.2	46	85	51214	31111	3	2	127	5	5X4	5.0	0	40	11411	12111	4	1	3
4BZ7	4.2	7	27	35121	35111	4	3	2378	16	5X8	4.7	25	52	15321	15341	3	3	9
4BZ8	4.2	7	75	45121	45111	3	2	2378	16	5X8	4.7	25	18	15321	15341	3	3	3
4CB6	4.2	40	90	51214	31111	3	2	127	5	5Y3/6087/6106	5.0	0	55	12141	11111	4	1	6
4CS6	4.2	7	55	51214	31111	2	4	1257	5	5Y3/6087/6106	5.0	0	55	12141	11111	4	1	4
4CS6	4.2	7	55	11214	35111	2	4		5	5Y4	5.0	0	57	11114	12111	4	1	5
4CX7	4.2	7	43	35121	35161	4	3	2378	16	5Y4	5.0	0	57	11411	12111	4	1	3
4CY5	4.2	7	65	51214	36111	2	3	1256	5	5Z3	5.0	0	35	21411	11111	4	1	3
4DE6	4.2	7	9	51214	31111	3	3	127	5	5Z3	5.0	0	35	24111	11111	4	1	2
4DK6	4.2	15	75	51214	31111	2	3	12567	5	5Z4/GZ30	5.0	0	76	12111	31111	4	1	6
4DT6	4.2	7	80	51214	33111	3	3	127	5	5Z4/GZ30	5.0	0	76	12131	11111	4	1	4
4ES8	4.2	7	75	45121	45111	2	2	23789	16	6A3	6.3	7	65	23511	11111	4	2	2
4EW6	4.2	7	35	51214	31111	3	3	127	5	6A4/LA	6.3	7	73	24531	11111	4	2	3
4GS8	4.2	30	85	13421	15411	4	3	1236789	38	6A5	6.3	7	79	12315	11611	4	1	3
5A6	5.0	7	30	31112	35661	4	2	37	1	6A6	6.3	17	94	23515	31111	3	3	26
5AM8	4.7	42	100	15321	31611	3	2	1239	6	6A7	6.3	7	78	23345	11111	4	3	2
5AM8	4.7	0	5	15321	31611	4	6		8	6A7	6.3	7	98	24345	11111	4	3	4
5AN8	4.7	50	93	35121	43511	3	2	23689	6	6A8	6.3	7	30	12435	41111	2	4	3
5AN8	4.7	15	94	35121	43511	4	2		1	6A8	6.3	15	35	12435	41111	2	4	6
5A05	4.7	67	97	51214	36111	4	1	1256	5	6AB4/EC92	6.3	7	21	41211	51111	4	3	1
5AS4	5.0	0	41	12111	41111	4	1	46	6	6AB5/6N5	6.3	7	87	24141	11111	4	3	2
5AS4	5.0	0	41	12141	11111	4	1		4	6AB5/6N5	6.3	7	87	21141	11111	4	3	8
5AS8	4.7	30	35	35121	61141	2	3	23678	9	6AB7/1853	6.3	40	94	12151	31411	3	2	3
5AS8	4.7	7	5	35121	61141	4	6		6	6AC5	6.3	75	20	12415	11111	4	2	3
5AT8	4.7	7	30	53121	43151	3	3	13789	2	6AC6	6.3	7	65	12445	11111	4	2	3
5AT8	4.7	40	40	53121	43151	3	3		6	6AC7/1852/6134	6.3	13	87	12151	31411	4	2	8
5AU4	5.0	0	82	12141	41111	4	1	46	46	6AD4	6.3	20	70	51211	11411	1	4	3
5AV8	4.7	50	93	15321	51341	3	2	126789	9	6AD7	6.3	7	92	52435	41111	3	2	8
5AV8	4.7	15	93	15321	51341	4	2											

TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT		
6AJ8/ECH81	6.3	45	43	35121	43111	2	3	126789	6	6BH6/6661/6265	6.3	45	42	51214	31111	3	3	12567	5
6AJ8/ECH81	6.3	7	10	35121	43451	1	4		8	6BH8	6.3	15	55	15321	15341	2	3	12678	39
6AK4	6.3	70	15	51211	11411	1	3	15	8	6BJ6/6662	6.3	25	95	51214	31111	3	2	12567	5
6AK5/5654/EF95	6.3	15	60	51213	36111	2	3	1256	5	6BJ7	6.3	0	32	14121	41411	2	2	126789	8
6AK6	6.3	50	89	51214	31111	3	2	127	9	6BJ8	6.3	0	32	14121	41411	1	2	26	
6AK8/EABC80	6.3	10	77	66121	61531	2	4	123678	9	6BJ8	6.3	7	41	61121	63511	4	3	123689	7
6AK8/EABC80	6.3	7	95	66121	61531	2	6		126	6BJ8	6.3	7	0	61121	63511	4	6	16	
6AL5/5726/6663	6.3	0	60	13211	13111	1	3	1257	7	6BK4	6.3	20	70	12665	61614	4	5	15	C
6AL5/5726/6663	6.3	0	48	13211	13111	1	3		2	6BK5	6.3	44	30	41521	16311	4	2	1368	1
6AL7	6.3	15	90	52455	51111	4	5	34568	3	6BK6	6.3	7	90	51216	63111	4	4	1256	7
6AL7	6.3	7	90	52455	51111	4	5		3	6BK6	6.3	7	20	51216	63111	4	6	56	
6AM4	6.3	35	33	51663	62161	3	3	12	5	6BK7	6.3	30	80	35121	35111	4	2	2378	16
6AM8	6.3	15	65	15321	41611	2	3	1279	6	6BL4	6.3	0	10	66164	62111	4	1	15	5
6AM8	6.3	7	0	15321	41611	4	6		8	6BL7	6.3	7	10	54154	12111	4	2	1346	25
6AN4	6.3	7	93	45211	66111	4	2	25	1	6BL8/ECF80	6.3	7	58	45321	41151	3	3	1236789	6
6AN5	6.3	7	95	51213	36111	2	2	1256	5	6BL8/ECF80	6.3	7	50	45321	41151	3	2	1	
6AN6	6.3	0	66	26663	11111	1	3	23456	5	6BM8/ECL82	6.3	7	0	51521	43141	3	2	126789	1
6AN6	6.3	0	66	26631	11111	1	3		4	6BM8/ECL82	6.3	7	96	51521	43141	3	3		9
6AN6	6.3	0	66	26311	11111	1	3		3	6BN4	6.3	18	69	15213	66111	4	2	12	5
6AN6	6.3	0	66	23111	11111	1	3		2	6BN6	6.3	7	25	15213	13111	4	4	126	7
6AN7	6.3	7	93	35121	63351	4	3	2379	7	6BN7	6.3	7	85	35121	15311	2	2	2367	19
6AN7	6.3	7	64	35121	63351	4	3		8	6BN8	6.3	7	90	31121	33511	2	4	2389	7
6AN8	6.3	50	93	35121	43511	3	2	23689	6	6BN8	6.3	7	30	31121	33511	1	2	16	
6AN8	6.3	15	94	35121	43511	4	2		1	6BQ5/EL84/6267	6.3	45	95	65121	14131	4	1	2379	7
6AQ5/6669/6005	6.3	67	97	51214	36111	4	1	1256	5	6BQ6/6CU6	6.3	7	78	12135	11114	4	1	4580	C
6AQ6	6.3	7	90	51216	63111	4	4	1456	7	6BQ7	6.3	7	23	35121	35111	4	3	2376	16
6AQ6	6.3	7	12	51216	63111	4	6		6	6BR8	6.3	22	98	53121	43151	4	2	126789	6
6AQ6	6.3	7	30	51216	63111	4	6		5	6BR8	6.3	22	89	53121	43151	4	2	2	
6AQ7	6.3	7	25	61654	12111	4	4	12346	5	6BS8	6.3	40	81	35121	35111	3	2	2378	16
6AQ7	6.3	7	20	61654	12111	4	6		13	6BT6	6.3	7	80	51216	63111	4	4	1256	7
6AQ8/ECC85	6.3	46	16	45121	45111	2	3	2378	16	6BT6	6.3	7	20	51216	63111	4	6	56	
6AR5	6.3	65	33	51213	31111	4	2	1256	5	6BU4	6.3	75	95	12665	61614	4	4	150	C
6AR6/6098	6.3	7	73	11424	25111	4	1	1357	3	6BU5	6.3	20	15	11351	62114	3	5	245	C
6AR8	6.3	7	75	11421	51441	4	3	1236789	89	6BU6	6.3	7	0	51216	64111	4	3	1256	7
6AS5	6.3	7	25	15216	33111	4	2	1267	7	6BU6	6.3	7	25	51216	64111	4	6	56	
6AS6/5725	6.3	22	67	51213	35111	3	3	1257	5	6BU8	6.3	25	34	13421	55451	2	4	12679	38
6AS7	6.3	7	82	53153	12111	2	1	1346	25	6BV8	6.3	11	95	15421	61161	2	2	126769	3
6AS8	6.3	7	0	35121	31141	1	4	23678	9	6BV8	6.3	7	95	15421	61161	2	6	69	
6AS8	6.3	7	5	35121	61141	4	6		6	6BW4	6.3	0	84	41121	14111	3	1	179	17
6AT6/EBC90	6.3	7	78	51216	63111	4	4	1256	7	6BW8	6.3	60	60	31321	51341	1	4	1236789	9
6AT6/EBC90	6.3	7	25	51216	63111	4	6		56	6BW8	6.3	0	60	31321	51341	1	3	13	
6AT8	6.3	27	35	53121	43151	3	3	1389	2	6BX7	6.3	35	98	53153	12111	3	1	1346	25
6AT8	6.3	10	40	53121	43151	3	3		6	6BX8	6.3	23	15	35121	35111	2	3	2376	16
6AU4	6.3	0	10	11113	12111	2	2	35	5	6BY5	6.3	0	80	12133	11111	2	2	1458	45
6AU5	6.3	25	90	52113	11311	3	1	1358	5	6BY6/5915/7036	6.3	7	56	51214	35111	3	3	1257	5
6AU6/6136/EF94	6.3	50	5	51213	31111	3	3	127	5	6BY6/5915/7036	6.3	7	95	51214	35111	3	2	6	
6AU7	6.3	40	18	45121	45161	2	3	2378	16	6BY7/EF85	6.3	10	90	15621	14311	4	2	12689	7
6AU8	6.3	12	88	15321	15331	4	2	12678	9	6BY8	6.3	7	85	51121	53311	3	3	12389	7
6AU8	6.3	15	25	15321	15331	4	3		3	6BY8	6.3	0	0	11121	31111	1	3	6	
6AV5	6.3	7	82	52113	11311	4	1	1358	5	6BZ6	6.3	46	85	51214	31111	3	2	127	5
6AV6/EBC91	6.3	60	55	51216	63111	3	3	1256	7	6BZ7	6.3	7	27	35121	35111	4	3	2378	16
6AV6/EBC91	6.3	0	5	51216	63111	4	6		56	6BZ8	6.3	7	25	35121	35116	2	4	2378	1
6AW6	6.3	19	39	51214	31111	3	3	127	5	6BZ8	6.3	7	95	35121	35116	2	3	6	
6AW8	6.3	10	85	15321	15331	3	2	126789	9	6CA/6135/EC90	6.3	40	98	36216	51111	3	2	67	1
6AW8	6.3	20	80	15321	15331	3	3		3	6C5	6.3	45	27	12315	11111	3	3	58	3
6AX4	6.3	0	78	11113	12111	4	1	35	5	6C6	6.3	15	40	24311	11115	2	4	2350	2
6AX5	6.3	0	90	12513	11111	4	1	358	5	6C7	6.3	20	77	23166	11115	3	3	24560	2
6AX5	6.3	0	90	12311	11111	4	1		3	6C7	6.3	7	28	23166	11115	4	6	45	
6AX7	6.3	7	93	45121	45161	2	4	2378	16	6C8	6.3	24	94	12315	31115	3	3	345680	36
6AX8	6.3	20	94	35321	41151	4	2	236789	6	6CA4/EZ81	6.3	0	65	46121	64661	1	2	137	17
6AX8	6.3	20	76	35321	41151	4	2		1	6CA5	6.3	19	5	16215	33111	4	2	1576	7
6AZ5	6.3	7	99	61211	11611	2	6	1278	18	6CA7/EL34	6.3	15	95	12435	61111	4	1	158	3
6AZ8	6.3	53	5	43121	55551	2	3	123679	1	6CB5	6.3	10	50	32156	61614	3	1	340	C
6AZ8	6.3	23	85	11121	11351	3	2		8	6CB6/6676	6.3	35	90	51214	31111	3	2	127	5
6B4	6.3	7	75	12315	11111	4	1	35	3	6CB6	6.3	90	90	12115	11314	2	1	350	C
6B6	6.3	7	41	12466	11115	2	5	23580	3	6CE5/6BC5	6.3	16	2	56214	31111	3	3	1567	5
6B6	6.3	7	25	12466	11115	4	6		45	6CF6	6.3	11	10	51214	31111	3	3	127	5
6B7	6.3	78	12	24366	11115	3	3	234560	2	6CG7	6.3	45	15	35121	35111	3	3	2378	16
6B7	6.3	7	20	24366	11115	4	6		45	6CG8	6.3	63	5	53621	43151	3	3	16789	6
6B8	6.3	26	12	12466	31115	4	3	34580	3	6CG8	6.3	53	5	53621	43151	3	3	2	
6B8	6.3	7	23	12466	31115	4	6		45	6CH7	6.3	20	50	35121	35161	2	3	2378	1
6BA5	6.3	20	62	51213	13111	3	3	1578	5	6CH7	6.3	30	50	35121	35161	2	3	6	
6BA6/5749/6660	6.3	40	90	51214	31111	3	2	156	5	6CH8	6.3	28	90	54321	15551	3	2	12678	2
6BA7	6.3	7	80	45121	15141	2	3	2367	9	6CH8	6.3	35	15	11121	11531	2	3	9	
6BA7	6.3	7	98	45121	15141	2	2		1	6CJ6/EL81	6.3	12	3	65121	66314	2	2	239	C
6BA8	6.3	7	36	15321	15341	2	3	126789	9	6CK4	6.3	7	80	52614	11111	2	1	1358	5
6BA8	6.3	7	96	15321	15341	2	3		3	6CL5	6.3	95	35	32156	61614	2	1		

TUBE TYPE	FIL	GRID PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID PLATE	LEVERS	V	S	LEAK	MERIT
6CS6/EH90	6.3	7 55	11214	35111	2 4		5	6FM8	6.3	0 48	13121	31541	1 3	1236789	26
6CS7/EH90	6.3	95 77	41521	45111	2 2	3789	6	6FM8	6.3	7 26	16121	61541	3 4		9
6CS7/EH90	6.3	90 20	41521	45111	2 2		1	6F05	6.3	50 70	15214	66111	2 2	125	5
6CU5	6.3	9 93	15216	34111	3 1	1267	7	6F07	6.3	25 85	45121	45111	3 2	123678	16
6CU6/6BQ6	6.3	7 82	12135	11114	4 1	458C	C	6F55	6.3	20 50	51214	36111	3 3	1256	5
6CU8	6.3	7 35	14321	15541	3 3	1236789	2	6FV6	6.3	15 75	51214	31111	3 2	1567	5
6CU8	6.3	7 65	14321	15541	3 2		9	6FV8	6.3	7 35	54121	43151	2 3	13789	2
6CV7/EBC41	6.3	15 75	14516	61211	4 3	3567	2	6FV8	6.3	7 90	54121	43151	2 3		6
6CV7/EBC41	6.3	15 20	14516	61211	4 6		56	6FW5	6.3	7 65	52114	11311	3 1	1358	5
6CW5/EL86	6.3	7 65	65121	64631	2 2	2379	7	6FY5/EC97	6.3	7 70	15214	66111	3 2	12	5
6CX8	6.3	7 17	15421	15341	3 3	12678	3	6G6	6.3	59 85	12335	11111	3 2	3458	3
6CX8	6.3	7 65	15421	15341	3 2		9	6GC5	6.3	7 60	31521	61641	2 2	1379	9
6CY5	6.3	7 60	51214	31111	2 3	156	5	6GE8	6.3	7 75	31521	41541	2 1	12378	6
6CY7	6.3	7 80	41521	45111	2 1	1267	1	6GE8	6.3	50 5	31521	41541	2 4		9
6CY7	6.3	7 88	41521	45111	2 4		6	6GH8	6.3	7 90	45321	41151	2 3	1236789	6
6CZ5	6.3	20 45	31521	61641	4 2	139	9	6GH8	6.3	7 38	45321	41151	2 3		1
6D4	6.3	0 78	16211	63111	1 3	7	7	6GK5	6.3	15 75	15214	16111	3 2	125	5
6D6	6.3	32 21	24311	11115	3 3	45C	2	6GK6	6.3	30 20	15121	14361	4 2	12378	7
6D7	6.3	15 45	24311	11115	2 4	238C	2	6GM6	6.3	15 80	51214	36111	4 2	126	5
6D8	6.3	7 0	12431	41111	2 4	3458	3	6GN8	6.3	7 85	15421	15341	3 3	12578	3
6D8	6.3	7 75	12431	41111	2 4		6	6GN8	6.3	7 75	15421	15341	3 2		9
6DA4	6.3	0 70	66164	62111	2 1	3	5	6GS8	6.3	30 85	13421	15411	4 3	1236789	38
6DB5	6.3	7 95	31521	66641	3 1	12368	9	6GW6	6.3	7 70	12135	11114	3 1	458C	C
6DB6	6.3	7 85	51214	31111	3 3	12567	5	6GX6	6.3	10 60	51214	31111	3 3	12567	5
6DC6	6.3	7 9	51214	31111	3 3	127	5	6GY6	6.3	7 65	51214	31111	3 3	12567	5
6DC8/EBF89	6.3	7 19	35121	46611	3 3	1239	6	6GY6	6.3	7 83	54512	41141	2 3	1236789	269
6DC8/EBF89	6.3	0 85	35121	43611	1 3		7	6H4	6.3	7 0	12161	11111	4 6	48	4
6DC8/EBF89	6.3	0 85	35121	46311	1 3		8	6H6/D63	6.3	0 77	12313	11111	1 3	3458	35
6DE4	6.3	0 73	16114	12111	2 1	35	5	6HC8	6.3	7 60	51521	43141	4 2	12378	6
6DE6	6.3	7 9	51214	31111	3 3	127	1	6HC8	6.3	7 90	51521	43141	4 3		9
6DE7	6.3	0 63	45621	45111	3 2	2789	1	6HF8	6.3	15 60	15421	15341	3 2	1236789	9
6DE7	6.3	7 95	45621	45111	3 2		6	6HF8	6.3	15 15	15421	15341	4 3		3
6DG6	6.3	7 93	12435	11111	3 1	3458	3	6HS8	6.3	10 20	13421	15411	3 4	1345	38
6DK6	6.3	15 60	51214	31111	2 3	12567	5	6J4	6.3	15 85	51216	63111	3 2	12	7
6DM4	6.3	0 35	11114	12111	4 1	35	5	6J5/L63	6.3	36 15	12315	11111	3 3	58	3
6DN6	6.3	71 9	12115	11314	4 1	358C	C	6J6/ECC91	6.3	7 50	33215	51111	3 3	567	12
6DN7	6.3	7 15	54154	12111	3 2	123456	2	6J7/Z63	6.3	7 80	12431	11115	2 4	58C	3
6DN7	6.3	7 98	54154	12111	3 2		C	6J8	6.3	60 55	12435	41111	2 3	34568C	3
6DQ5	6.3	7 47	52136	61614	3 1	134	C	6J8	6.3	60 25	12435	41111	2 3		6
6DQ6	6.3	7 70	12135	11114	4 1	458C	C	6JB8	6.3	25 60	45321	41151	3 3	1236789	61
6DR7	6.3	7 75	45521	45111	2 4	32789	6	6JC8	6.3	7 65	15321	46541	3 3	123689	6
6DR7	6.3	7 85	45521	45111	2 1		1	6JC8	6.3	30 70	15321	46541	3 2		9
6DS5	6.3	7 83	51214	36111	4 2	1256	5	6JH8	6.3	7 60	33421	51441	4 3		89
6DT5	6.3	7 55	31521	61641	3 2	1379	9	6K5	6.3	7 80	12311	11115	4 4	38C	3
6DT6	6.3	7 90	51214	35111	3 3	127	5	6K6	6.3	65 30	12435	11111	4 2	3458	3
6DT8	6.3	43 80	45121	45111	4 2	123678	16	6K7	6.3	28 30	12431	11115	3 3	348C	3
6DW5	6.3	7 33	31521	61141	2 2	1379	9	6K8	6.3	7 75	12435	31111	4 3	34568C	3
6DZ7	6.3	7 70	52435	41111	4 2	134568	36	6L5	6.3	45 25	12315	11111	3 3	358	3
6DZ8	6.3	7 90	51521	43141	2 3	278	9	6L6/5881/5932	6.3	25 76	12445	61111	4 1	3458	3
6DZ8	6.3	7 43	51521	43141	2 2		6	6L7	6.3	7 73	12435	11115	4 3	348C	3
6E5	6.3	7 80	24541	11111	4 4	2345	4	6M3	6.3	0 60	62416	16111	2 1	3C	3
6E5	6.3	7 87	21541	11111	4 4		26	6M5	6.3	25 20	35121	64611	4 2	1237	7
6E6	6.3	40 80	23515	31111	3 2	23456	2	6N3/EY82	6.3	0 27	66121	66641	4 1	1236789	9
6E7	6.3	27 27	24311	11115	3 3	236C	2	6N4	6.3	7 25	51213	66111	4 3	12	5
6EA5	6.3	25 50	51214	31111	2 3	156	5	6N6	6.3	65 0	12445	11111	4 2	3458	3
6EA7	6.3	7 94	54154	12111	1 2	123456	5	6N7	6.3	20 93	12355	31111	3 3	4568	36
6EA7	6.3	7 35	54111	12111	1 2		2	6N8/EBF80	6.3	27 72	35121	46611	2 3	123678	6
6EA8	6.3	7 85	45321	41151	1 3	1236789	1	6N8/EBF80	6.3	7 25	35121	46611	4 6		78
6EA8	6.3	7 95	45321	41151	2 3		6	6P5	6.3	7 74	12315	11111	3 3	358	3
6EB8	6.3	7 50	15421	15341	2 4	12678	3	6P7	6.3	35 52	12143	35115	3 3	45678C	4
6EB8	6.3	7 75	15421	15341	3 2		9	6P7	6.3	35 93	12143	35115	3 3		6
6EH5	6.3	15 95	16215	33111	4 1	1567	7	6Q4/EC80	6.3	7 88	56121	16641	4 2	139	9
6EH8	6.3	20 13	15421	65341	2 3	12378	3	6Q5/884	6.3	0 70	12311	11111	3 1	38	3
6EH8	6.3	7 98	15421	65341	2 3		9	6Q7/DH63/6T7	6.3	7 85	62466	11115	2 4	3458C	3
6EM5	6.3	7 50	31521	61641	3 2	1367	9	6Q7/DH63/6T7	6.3	0 25	62636	11115	1 4		4
6EM7	6.3	7 65	54154	12111	2 1	1345	2	6Q7/DH63/6T7	6.3	0 25	62636	11115	1 4		5
6EM7	6.3	7 65	54154	12111	2 4		5	6R3/EY81	6.3	0 6	66621	66641	1 2	9C	9
6ER5	6.3	40 81	15214	36111	2 2	12567	5	6R4/EC81	6.3	7 65	51121	11411	4 2	13	8
6ES8/ECC189	6.3	7 60	45121	45111	2 2	23789	61	6R6	6.3	17 42	12314	11115	4 3	358C	5
6EU7	6.3	68 65	12115	44511	1 4	456789	67	6R7	6.3	7 0	12466	11115	4 3	458C	3
6EU8	6.3	7 100	45421	15131	2 3	1236789	1	6R7	6.3	7 25	12466	11111	4 6		45
6EU8	6.3	7 28	45421	15131	2 3		3	6R8	6.3	55 16	66121	61531	3 3	123678	9
6EV5	6.3	7 90	51214	36111	3 2	1256	5	6R8	6.3	7 0	66121	61531	4 6		126
6EV7	6.3	7 35	45121	45161	4 3	2376	16	6S4	6.3	7 50	61621	56641	3 2	26	9
6EW6	6.3	7 5	51214	31111	3 3	127	5	6S7	6.3	23 25	12413	11115	3 3	348C	3
6EX6	6.3	7 60	12115	11314	4 1	358	C	6S8	6.3	7 20	61661	32115	4 5	12345C	6
6EY6	6.3	7 64	12435	11111	4 2	3458	3	6S8	6.3	7 20	61661	32115	4 6		134
6EZ5	6.3	25 100	12435	11111	4 1	3458	3	6SA7	6.3	7 78	12435	11111	4 3	1388	4
6EZ8	6.3	7 33	15421	66661	3 3	1236789	3	6SA7	6.3	7 42	12435	11111	4 3		4
6EZ8	6.3	75 80	16621	45661	2 2		6	6SB7	6.3	7 75	12335	11111	4 3	1568	3
6EZ8	6.3	75 80	16621	66451	2 2		8	6SB7	6.3	7 3	12335	11111	4 3		4
6F5/H63	6.3	7 94	12131	11115	4 2	8C	4	6SC7	6.3	7 50	14554	12111	4 4	346	25
6F6	6.3	7 58	12445	11111	4 2	3458	3	6SD7	6.3	7 55	12151	31411	4 3	345	8
6F7	6.3	15 50	24335	11115	4 3	23456C	2	6SF5	6.3	7 93	11513	12111	4 4	23	5
6F7	6.3	15 98	24335	11115	4 3		4	6SF7	6.3	61 93	15136	42111	3 2	23456	6
6F8	6.3	37 30	12315	31115	3 3	34568C	36	6SF7	6.3	7 20	15136	42111	4 6		5
6FA7															

TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT		
6SR7	6.3	7	98	15166	4	2	2345	6	7Q7	6.3	7	80	24351	4	3	3456Z	2		
6SR7	6.3	7	25	15166	4	6		45	7Q7	6.3	7	54	24351	4	3		3		
6SS7	6.3	25	19	12151	3	3	345	8	7R7	6.3	17	62	24663	3	3	23456Z	2		
6ST7	6.3	7	0	15166	4	3	2345	6	7R7	6.3	7	25	24663	3	3		34		
6ST7	6.3	7	27	15166	4	6		45	7S7	6.3	60	30	24353	5	1	23456Z	2		
6SU7/6188	6.3	7	38	54154	1	4	1346	25	7S7	6.3	60	76	24353	5	1		3		
6SV7	6.3	35	39	15136	4	3	23456	6	7T7	6.3	50	0	24316	5	1	2367	2		
6SV7	6.3	7	0	15136	4	6		5	7V7	6.3	30	10	24316	5	1	2367	2		
6SZ7	6.3	7	89	15166	3	2	2345	6	7W7	6.3	14	4	24316	5	1	2346	2		
6SZ7	6.3	7	30	15166	3	2		45	7X6	6.3	0	74	23516	3	1	236Z	6		
6T4	6.3	35	71	34211	6	6		1	7X6	6.3	0	74	21216	1	1		3		
6T7/6Q7/DH63	6.3	7	85	12466	1	15	2	458C	3	7X7	6.3	7	50	24516	5	1	23456Z	2	
6T7/6Q7/DH63	6.3	7	30	12466	1	15	4		45	7X7	6.3	7	0	24516	5	1		56	
6T8/6AK8/EABC80	6.3	7	84	66121	6	53	3	1236Z8	9	7Y4	6.3	0	84	21511	4	1	36Z	6	
6T8/6AK8/EABC80	6.3	7	0	66121	6	53	4		126	7Y4	6.3	0	84	21511	4	1		3	
6U4	6.3	0	71	11113	1	2	35	5	7Z4	6.3	0	94	21311	1	1	36Z	6		
6U5/6G5	6.3	7	87	24541	1	1	25	2	7Z4	6.3	0	94	21311	1	1		3		
6U5/6G5	6.3	7	0	21541	1	1		2	8AU8	9.0	12	75	15321	15331	4	2	12678	9	
6U6	6.3	7	94	12435	1	1	3458	3	8AU8	9.0	12	50	15321	15331	4	3		3	
6U7	6.3	27	30	12431	1	15	3	58C	3	8AU8	9.0	10	90	15321	15331	3	2	126789	9
6U8/6678/ECF82	6.3	71	5	35321	4	15	3	236789	6	8AU8	7.5	10	90	15321	15331	3	3		3
6U8/6678/ECF82	6.3	71	88	35321	4	15	3		1	8BA8	7.5	7	60	15321	15341	2	3	126789	9
6V3	6.3	0	70	13121	1	6	2C	2	8BA8	7.5	7	90	15321	15341	2	3		3	
6V4/EZ80	6.3	0	79	51121	3	1	137	7	8BA8	7.5	7	75	15321	15341	2	3	12678	39	
6V4/EZ80	6.3	0	79	31121	1	1		1	8BN8	7.5	7	18	31121	33511	2	5	2389	7	
6V5	6.3	36	90	11335	1	2	345	3	8BN8	7.5	0	50	31121	33511	1	3		16	
6V6	6.3	21	98	12445	1	1	3458	3	8BQ5	7.5	35	100	65121	14131	4	1	237	7	
6V7	6.3	22	28	12466	1	15	3	3458C	3	8C67	9.0	7	43	35121	35111	4	3	2378	16
6V7	6.3	7	22	12466	1	15	4		45	8C67	9.0	45	15	35121	35111	3	3	2378	16
6V8	6.3	7	51	46121	5	6	236789	1	8CM7	9.0	10	50	51121	45511	2	3	3789	6	
6V8	6.3	7	0	46121	5	6		279	8CM7	9.0	37	67	41121	11511	2	2		1	
6W4	6.3	0	70	11113	1	2	35	5	8CM7	9.0	7	80	66121	15361	3	4	12367	8	
6W5	6.3	0	78	12513	1	1	358	5	8CM7	9.0	7	0	66121	15361	4	6		12	
6W5	6.3	0	78	12311	1	1		3	8CS7	7.5	90	90	41521	45111	2	2	3789	6	
6W6	6.3	7	90	12335	1	1	3456	3	8CS7	7.5	90	20	41521	45111	2	2		1	
6W7	6.3	7	50	12413	1	15	2	348C	3	8CX8	7.5	7	24	15421	15341	3	3	12678	3
6X4/6202/EZ90	6.3	0	86	51211	3	1	16Z	6	8CX8	7.5	7	80	15421	15341	3	2		9	
6X4/6202/EZ90	6.3	0	86	31211	1	1		1	8EB8	7.5	20	20	15421	15341	2	4	12878	3	
6X5	6.3	0	30	12641	1	2	358	5	8EB8	7.5	7	75	15421	15341	3	2		9	
6X5	6.3	0	30	12416	1	2		3	8EM5	7.5	7	50	31521	61641	3	2	136Z	9	
6X8	6.3	2.5	20	15321	15341	3	3	1287	9	8GN8	7.5	7	80	15421	15341	4	3	126789	3
6X8	6.3	25	16	15321	15341	3	3		3	8GN8	7.5	7	65	15421	15341	4	2		9
6Y5	6.3	0	83	21513	1	1	345	5	8SN7	7.5	7	6	54154	12111	3	3	1346	25	
6Y5	6.3	0	83	21311	1	1		3	9A8/PCF80	9.0	7	95	45321	41151	2	2	1236789	1	
6Y6	6.3	7	90	12335	1	1	3458	3	9A8/PCF80	9.0	7	60	45321	41151	3	3		6	
6Z4/84	6.3	0	83	25311	1	1	234	3	9A8/PCF80	9.0	7	97	45121	45111	3	2	123678	16	
6Z4/84	6.3	0	83	23111	1	1		2	9A8/PCF80	9.0	7	18	45121	45161	2	3	2378	16	
6Z5	12.6	0	81	62513	1	1	345	5	9A8/PCF80	9.0	40	18	45121	45161	2	3	2378	16	
6Z5	12.6	0	81	62311	1	1		3	9A8/PCF80	9.0	7	15	45121	45161	4	3	23678	1	
6ZV5	6.3	0	37	12513	1	2	358	5	9A8/PCF80	9.0	7	15	45121	45161	1	2		67	
6ZV5	6.3	0	37	12311	1	2		3	9B77*	9.0	0	70	45121	44161	1	2		67	
7A4	6.3	35	17	24116	5	1	26Z	2	9DZ8	9.0	7	30	51521	43141	2	4	278	9	
7A5	6.3	66	93	23311	5	1	2367	2	9DZ8	9.0	7	50	51521	43141	2	2		6	
7A6	6.3	0	60	21316	3	1	236Z	6	9EF6	9.0	7	55	12335	1	1	3458	3		
7A6	6.3	0	60	21316	3	1		3	9U8	9.0	71	5	35321	41151	3	3	236789	6	
7A7	6.3	25	15	24316	5	1	2367	2	9U8	9.0	71	88	35321	41151	3	2		1	
7A8	6.3	7	47	24453	1	1	245Z	2	10	7.5	7	5	13511	1	1	23	2		
7A8	6.3	7	68	24453	1	1		3	10BQ5	9.0	7	80	65121	14131	4	3	2379	7	
7AB7	6.3	14	84	32415	6	1	13458	3	10C8	9.0	7	95	45121	43511	2	3	1236789	16	
7AD7	6.3	20	50	24113	5	1	236Z	2	10DE7	9.0	0	63	45621	45111	3	2	23789	1	
7AF7	6.3	35	14	21355	3	1	23456Z	36	10DE7	9.0	7	100	45621	45111	3	2		6	
7AG7	6.3	7	50	24416	5	1	236Z	2	10EG7	9.0	7	75	54154	12111	2	1	123456	2	
7AH7	6.3	7	54	24416	5	1	236Z	2	10EG7	9.0	7	40	54154	12111	4	3		5	
7AJ7	6.3	14	18	24316	5	1	236Z	2	10EM7	9.0	9	10	35	53153	12111	2	2	123456	2
7AK7/PCC84	6.3	7	65	24316	5	1	46Z	2	10EM7	9.0	9	10	30	53153	12111	4	6		5
7AN7	6.3	7	22	15421	5	1	1236Z	39	10HF8	9.0	15	60	15421	15341	3	2	123456789	9	
7AU7	6.3	45	25	35121	3	3	2378	16	10HF8	9.0	15	35	15421	15341	4	3		3	
7B4	6.3	7	90	24111	5	1	26Z	2	11CY7	9.0	7	5	41521	45111	2	2	1267	1	
7B5	6.3	7	54	24411	5	1	236Z	2	11CY7	9.0	7	98	41521	45111	2	4		6	
7B6	6.3	7	22	24566	6	1	2356Z	2	12A	5.0	17	30	23511	1	1	23	2		
7B6	6.3	7	25	24566	6	1		56	12A4*	12.6	7	65	15621	16131	4	2	12	9	
7B7	6.3	35	23	24356	5	1	236Z	2	12A5*	12.6	90	56	24351	61111	2	2	2345	3	
7B8	6.3	48	9	24453	1	1	235Z	2	12A6	12.6	7	54	12445	1	1	3458	3		
7B8	6.3	48	92	24453	1	1		3	12A7	12.6	7	30	23315	1	15	23456C	2		
7C4/1203A	6.3	0	75	21131	1	1	47	4	12A7	12.6	0	30	21113	1	1		5		
7C5	6.3	30	92	24411	5	1	236Z	2	12A8	12.6	60	0	12435	4	1	3458	3		
7C6	6.3	15	78	24566	6	1	2356Z	2	12A8	12.6	60	85	12435	4	1		6		
7C6	6.3	7	22	24566	6	1		56	12AB5	12.6	55	97	31521	61641	4	1	1379	9	
7C7	6.3	13	25	24316	5	1	236Z	2	12AC6	12.6	62	38	51213	31111	1	4	127	5	
7E5/12 01	6.3	16	60	52416	6	1	134	3	12AD6	12.6	7	79	51213	31111	1	4	1267	5	
7E6	6.3	7	25	24566	6	1	2356Z	56	12AD6	12.6	7	15	51213	31111	1	4		6	
7E6	6.3	7	0	24566	6	1		2	12AD7*	12.6	7	93	45121	45161	2	4	2378	16	
7E7	6.3	37	40	24663	5	1	23456Z	2	12AE6	12.6	15	98	51216	63111	1	4	1256	7	
7E7	6.3	7	30	24663	5	1		34	12AE6	12.6	15	100	51216	61111	2	6		56	
7EV6	7.5	7																	

TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	
12A76/HBC90	12.6	7	25	51216	63111	4	6	56	12EK6	12.6	7	55	51214	31111	1	3	1256Z	5
12A77/6679/6201	12.6	20	60	35121	35161	3	3	2378	12EL6	12.6	31	100	53126	61111	1	4	156Z	2
12A86/HF94	12.6	50	5	51214	31111	3	3	127	12EL6	12.6	0	60	11123	61111	1	4		5
12A87/6680/5814	12.6	40	18	45121	45161	2	3	2378	12EL6	12.6	0	60	11126	31111	1	4		6
12A85	12.6	7	82	52113	11311	4	1	1358	12EM6	12.6	7	30	51321	31131	1	3	12369	6
12A86/HBC91	12.6	7	87	51216	63111	4	4	1256	12EM6	12.6	0	85	51321	31131	1	4		9
12A86/HBC91	12.6	7	25	51216	63111	4	6	56	12EN6	12.6	7	94	12435	11111	4	1	3458	3
12A87/5965/6829	12.6	20	80	35121	35161	4	2	2378	12EQ7	12.6	15	40	15121	34411	3	3	123678	7
12A86	12.6	19	39	51214	31111	3	3	127	12EQ7	12.6	0	40	15121	34411	1	3		8
12AX4	12.6	0	78	11113	12111	4	1	35	12EW6	12.6	7	94	12435	11111	4	1	3458	3
12AX7/5751/6681	12.6	7	93	45121	45161	2	4	2378	12EZ6	12.6	7	100	51213	31111	1	3	127	5
12AY7/6072	12.6	16	98	35121	35161	3	3	2378	12F5	12.6	7	94	12131	11115	4	4	8C	4
12AZ7*	12.6	7	20	45121	45161	4	3	2378	12F8	12.6	11	89	63321	61511	1	4	12789	3
12B4	12.6	7	77	15621	16131	4	1	12	12F8	12.6	7	100	61121	61111	2	6		16
12BA6/HF93	12.6	40	90	51214	31111	3	2	127	12FK6	12.6	7	70	51216	63111	1	4	1256	7
12BA7	12.6	7	80	45121	15141	2	3	2367	12FK6	12.6	0	45	51216	33111	1	4		6
12BA7	12.6	7	98	45121	15141	2	2		12FK6	12.6	0	30	51213	63111	1	4		5
12BD6	12.6	22	20	51214	31111	3	3	127	12FM6	12.6	7	85	51216	63111	3	2	1256	7
12BE6/HK90	12.6	7	75	51214	31111	4	3	1257	12FM6	12.6	7	5	51216	63111	4	6		56
12BE6/HK90	12.6	7	25	51214	31111	4	3		12FQ8	12.6	7	58	45421	45411	4	4	1236789	136
12BF6	12.6	7	0	51216	64111	4	3	1256	12FR8	12.6	7	90	51521	33331	1	3	136789	7
12BF6	12.6	7	25	51216	64111	4	6	56	12FR8	12.6	7	55	51521	33331	1	4		8
12BH7	12.6	7	96	35121	35161	4	2	2378	12FR8	12.6	7	65	51521	33331	1	4		9
12BK5	12.6	44	30	41521	16511	4	2	1268	12FX8	12.6	7	75	35321	51351	1	4	1236789	3
12BK6	12.6	7	90	51216	63111	4	4	1256	12FX8	12.6	7	60	35321	51351	1	4		8
12BK6	12.6	7	20	51216	63111	4	6	56	12G4	12.6	30	20	31216	51111	3	3	67	1
12BL6	12.6	7	60	51213	31111	1	4	1267	12G8	12.6	7	95	31321	31561	1	2	2378	6
12BN6	12.6	7	59	15213	13111	4	4	126	12G8	12.6	7	54	31521	31561	1	4		1
12BO6/12CU6	12.6	7	78	12135	11114	4	1	456C	12GA6	12.6	7	85	51214	31111	1	4	1267	5
12BR7*	12.6	7	0	45121	55161	4	3	23678	12GC6	12.6	7	65	12135	11614	3	1	345C	C
12BR7*	12.6	0	60	45121	44161	1	2		12GW6	12.6	7	70	12135	11114	3	1	458C	C
12BT6	12.6	7	80	51216	63111	4	4	1256	12H4	12.6	52	16	36126	51111	3	3	67	1
12BT6	12.6	7	20	51216	63111	4	6	56	12H6	12.6	0	77	12313	11111	1	3	3456	35
12BU6	12.6	7	0	51216	64111	4	3	1256	12J5	12.6	36	15	12315	11111	3	3	56	3
12BU6	12.6	7	25	51216	64111	4	6	56	12J7	12.6	16	40	12431	11115	2	4	58C	3
12BV7	12.6	28	52	15121	64361	3	2	123	12J8	12.6	15	98	51321	31331	1	2	123789	6
12BW4	12.6	0	84	41121	14111	3	1	179	12J8	12.6	0	58	51321	31331	1	3		89
12BY7*	12.6	15	55	15121	64361	4	2	123	12K5	12.6	98	27	13216	53111	1	3	1267	7
12BZ7	12.6	25	5	35121	35161	2	4	2378	12K7	12.6	28	30	12431	11115	3	3	348C	3
12C5/12CU5	12.6	7	98	15216	33111	4	1	1267	12K8	12.6	7	81	12435	31111	4	3	468	3
12C8	12.6	26	22	12466	31115	4	3	34568C	12K8	12.6	7	64	12435	31111	4	3		6
12C8	12.6	7	25	12466	31115	4	6	45	12L6	12.6	7	94	12435	11111	4	1	3458	3
12CA5	12.6	19	6	16215	33111	4	2	1567	12L8	12.6	7	39	51543	21411	4	3	123458	4
12CM6	12.6	25	52	31521	61131	4	2	1379	12O7	12.6	7	85	12466	11115	2	4	3458C	3
12CN5*	12.6	7	75	15216	33111	1	3	126	12O7	12.6	7	25	12466	11115	4	6		45
12CR6	12.6	15	0	16214	35111	4	3	12567	12R5	12.6	7	70	15216	34111	2	2	1267	7
12CR6	12.6	0	22	16214	35111	4	6		12S8	12.6	7	20	61661	32115	4	5	123456C	6
12CS6	12.6	7	70	51214	31111	2	4	1257	12S8	12.6	7	20	61661	32115	4	6		134
12CS6	12.6	7	70	11214	35111	2	4		12SA7	12.6	7	78	12435	11111	4	3	1568	3
12CT8	12.6	7	80	45121	43511	2	3	123689	12SA7	12.6	7	42	12435	11111	4	3		4
12CT8	12.6	7	75	45121	43511	2	3		12SC7	12.6	7	50	14554	12111	4	4	346	25
12CU5/12C5	12.6	7	98	15216	33111	4	1	1267	12SF5	12.6	7	93	11513	12111	4	4	23	5
12CU6/12BQ6	12.6	7	82	12135	11114	4	1	456C	12SF7	12.6	61	93	15136	42111	3	2	23456	6
12CX6	12.6	7	84	51213	31111	1	3	1267	12SF7	12.6	7	20	15136	42111	4	6		5
12D4	12.6	0	70	66164	62111	2	1	3	12SG7	12.6	31	17	12156	31411	3	3	3468	8
12DB5	12.6	7	100	31521	66641	3	1	12368	12SH7	12.6	50	97	12156	31411	3	2	3468	8
12DE8	12.6	7	78	51321	31311	1	4	1236789	12SJ7	12.6	17	0	12151	31411	2	4	345	8
12DE8	12.6	0	94	51321	31311	1	2		12SK7	12.6	25	13	12151	31411	3	3	1456	8
12DF5*	12.6	0	27	41121	41161	2	2	38	12SL7	12.6	7	28	54154	12111	4	4	1346	25
12DF7*	12.6	11	93	45121	45161	2	4	2378	12SN7/B36	12.6	52	16	53153	12111	3	3	1346	25
12DK7	12.6	7	7	51321	33631	1	3	123679	12SO7	12.6	23	37	65133	42111	4	3	2345	6
12DK7	12.6	7	17	51321	33631	1	4		12SO7	12.6	0	65	65133	42111	1	4		45
12DK7	12.6	7	35	51321	33631	1	4		12SR7	12.6	7	98	15166	42111	4	2	2345	6
12DL8	12.6	7	45	31321	35131	1	2	2378	12SR7	12.6	7	25	15166	42111	4	6		45
12DL8	12.6	7	95	31321	35131	1	3	19	12SV6	12.6	21	98	12445	11111	4	1	3458	3
12DM4	12.6	0	95	16114	12111	1	1	3	12SV7	12.6	21	98	12445	11111	4	1	3458	3
12DM7	12.6	10	93	45121	45161	2	4	2378	12SW7	12.6	7	0	15166	42111	4	3	2345	6
12DQ6	12.6	7	77	12135	11114	4	1	456C	12SW7	12.6	7	30	15166	42111	4	6		45
12DQ7*	12.6	7	72	15121	64361	4	2	123	12SX7	12.6	52	20	53153	12111	3	3	1346	25
12DS7	12.6	7	95	36521	33131	1	4	136789	12SY7	12.6	7	72	12431	11111	4	3	1568	3
12DS7	12.6	0	75	36521	33131	1	4		12SY7	12.6	7	35	12431	11111	4	3		4
12DT5	12.6	7	55	31521	61641	3	2	1379	12U7*	12.6	14	100	35121	35161	1	4	2378	16
12DT8	12.6	25	90	45121	45111	4	2	381267	12V6	12.6	21	98	12445	11111	4	1	3458	3
12DU7	12.6			51321	33631	1		123679	12W6	12.6	7	90	12335	11111	4	1	167	6
12DU7	12.6	0		51321	33631	1			12X4	12.6	0	86	51211	31111	4	1		1
12DV7*	12.6	7	30	13321	35161	1	5	178	12X4	12.6	0	86	31211	11111	4	1		1
12DV7*	12.6	0	85	13321	35161	1	4		12Z3	12.6	0	15	23111	11111	2	2	23	2
12DV8	12.6	7	85	11321	35161	1	2	123679	13DE7	12.6	0	63	45621	45111	3	2	2789	1
12DV8	12.6	0	95	31121	11111	1	3		13DE7	12.6	7	100	45621	45111	3	2		6
12DV8	12.6	0	26	11121	11													



TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT		
14F7	12.6	7	30	21455	4	4	23456Z	36	25DN6	25	71	62	12115	4	1	358C	C		
14F8	12.6	7	50	52411	4	3	134568	36	25DQ6	25	7	70	12135	4	1	458C	C		
14GT8/7724	12.6	0	0	11121	1	2	23	2	25E5/PL36	25	7	15	62635	1114	2	2	458	C	
14GT8/7724	12.6	0	0	11121	1	2	16	6	25EC6	25	7	0	12115	1114	2	2	358	C	
14H7	12.6	7	20	11121	1154	4	4	789	9	25EH5	25	15	0	16215	3311	4	2	1567	7
14J7	12.6	30	14	24316	5111	3	3	236Z	2	25F5	25	7	26	15216	3311	4	2	1267	7
14J7	12.6	49	100	24353	5111	4	2	461	2	25L6/KT32	25	7	94	12435	1111	4	1	3458	3
14J7	12.6	40	100	24353	5111	2	3		3	25N6	25	7	5	12445	1111	4	2	458	3
14JG8	12.6	0	5	16121	6111	4	6	1236	26	25S/185	2.0	7	10	23665	1111	2	5	234	2
14JG8	12.6	80	85	11121	1154	4	6	189	9	25S/185	2.0	7	10	23665	1111	4	6	34	5
14N7	12.6	35	24	21355	3111	3	3	23456Z	36	25W4	25	0	70	11113	1211	4	1	35	5
14Q7	12.6	30	100	24351	1111	4	2	456Z	2	25W6	25	7	99	12335	1111	4	1	3458	3
14Q7	12.6	11	100	24351	1111	4	2		3	25X6	25	0	75	12513	1111	4	1	3458	5
14R7	12.6	17	62	24663	5111	3	3	23456Z	2	25X6	25	0	75	12311	1111	4	1	2345	3
14R7	12.6	7	25	24663	5111	4	6		34	25Y5	25	0	85	25113	1111	4	1	2345	2
14S7	12.6	60	30	24353	5111	2	3	2346Z	3	25Z5	25	0	71	25113	1111	4	1	2345	5
14S7	12.6	60	76	24353	5111	2	3		2	25Z5	25	0	71	23111	1111	4	1	53	5
14W7	12.6	30	10	24311	5611	3	3	2346	2	25Z6	25	0	71	12113	1111	4	1	23	2
14X7	12.6	20	60	24516	6111	4	3	23456	2	26	1.4	7	50	23511	1111	4	3	127	5
14X7	12.6	0	0	24516	6111	4	6		56	26A6	25	7	28	51214	3111	3	3	123458	48
14Y4	12.6	0	84	21511	3111	4	1	36Z	6	26A7	25	7	78	51513	2141	1	2	1256	56
14Y4	12.6	35	84	21511	3111	4	3		3	26BK6	25	7	90	51216	6311	4	4	256	7
15	2.0	25	55	24311	11115	2	4	234C	C	26BK6	25	7	20	51216	6311	4	6	234	2
15A8	12.6	7	80	12553	11313	2	2	13458	2	26C6	25	7	96	51216	6411	4	2	12567	56
15A8	12.6	7	40	12553	11313	2	4		8	26D6	25	7	84	11214	3111	4	3	256	7
15EW6	12.6	7	5	51214	3111	3	3	127	5	26D6	25	7	44	11214	3111	4	3	3458	3
17AY55GA	12.6	7	30	52113	11311	2	2	1358	5	26E6	25	25	76	12435	1111	4	1	16	6
17AX4	19	0	78	11113	1211	4	1	35	5	26Z5	25	0	25	11121	31161	2	2	234	2
17BQ6	19	56	0	12135	11114	2	2	458C	C	26Z5	25	0	25	31121	11161	2	2	23	2
17C5	12.6	7	100	15216	3311	4	1	1267	7	27	2.5	7	66	23511	1111	4	3	234	2
17CA5	12.6	19	0	16215	3111	4	2	1567	7	30	2.0	7	77	23511	1111	4	3	23	2
17D4	12.6	0	70	66164	6211	2	1	3	5	31	2.0	7	92	23511	1111	4	2	23	2
17DE4	19	0	73	16114	1211	2	1	35	5	32	2.0	7	58	24311	11115	2	4	23C	2
17DQ6	19	7	70	12135	11114	4	1	458C	C	32ET5	35	7	0	15216	4411	2	2	1256	7
17EW8/HCC85	12.6	7	20	45121	4511	3	3	2378	16	33	2.0	73	65	24531	1111	3	2	234	2
17GW6	19	0	70	12135	11119	3	1	458C	C	34	8.0	24	0	24311	11115	2	4	23C	2
17H3	19	0	70	11421	1161	2	1	13	3	34GD5	35	15	80	15216	3411	2	2	1267	7
17HC8	12.6	7	50	51521	4314	4	2	12378	6	35/51	35	28	51	24311	11115	3	3	234C	2
17HC8	12.6	15	85	51521	4314	4	3		9	35A5	35	7	80	24311	5111	2	2	2367	2
17L6	12.6	7	80	12445	6111	4	1	3458	3	35B5	35	80	38	51213	3611	2	2	1267	5
17W6	12.6	7	25	12335	1111	4	2	3458	3	35C5	35	7	22	15216	3311	4	2	1267	7
18	12.6	7	5	24421	1111	4	3	2345	2	35DZ8	35	75	100	51521	4314	2	1	12378	6
18A5	19	7	55	52113	11311	2	2	1358	5	35E5	35	45	100	51521	4314	2	3	1567	9
18DZ8	19	7	20	51521	4314	2	4	278	9	35GL6	35	7	60	15213	6411	2	2	125	7
18DZ8	19	7	50	51521	4314	2	2		6	35H88	35	15	75	51421	34151	2	2	1236789	7
18FW6	19	20	70	56214	3111	2	3	156Z	5	35H88	35	15	75	51421	34151	2	3	3458	3
18FX6	19	7	25	51214	3111	2	4	1257	5	35L6	35	7	10	12335	1111	4	2	57	5
18FX6	19	7	95	51214	3111	2	3		6	35W4/HY90	35	0	70	11213	6111	4	1	27	2
18FY6	19	20	25	51216	6311	2	4	1256	7	35Y4	35	0	71	23111	1111	4	1	27	2
18FY6	19	0	100	51216	6311	2	6		56	35Z3	35	0	71	23111	1111	4	1	27	2
(Diodes Good = 60)																			
19	2.0	50	71	23553	1111	3	3	2345	25	35Z4	35	0	71	12113	1111	4	1	58	5
19AU4	19	0	10	11113	1211	2	2	35	5	35Z5	35	0	71	12613	1111	4	1	234	2
19B66	19	85	82	12115	11314	4	1	358C	C	36	6.3	7	67	24411	11115	4	2	234C	2
19C8	19	7	40	66121	61531	2	5	1236Z8	9	37	6.3	21	64	24311	11115	3	3	234C	2
19C8	19	7	0	66121	61531	4	6		126	38	6.3	80	65	24351	1111	3	2	2345	2
19CL8	19	15	95	53121	33151	3	2	13789	2	39/44	6.3	30	65	24351	1111	4	2	2345	2
19CL8	19	15	80	53121	33151	2	3		6	42	25	20	30	23351	1111	3	2	2345	2
19EA8	19	7	85	45321	41151	1	3	1236Z89	1	43	6.3	21	64	24311	11115	3	3	234C	2
19EA8	19	7	90	45321	41151	2	3		6	44/39	2.5	7	44	23511	1111	4	2	23	2
19EZ8	19	10	30	15412	45451	3	3	1236789	368	45	50	0	78	23111	6111	4	1	24	2
19HV8	19	35	70	54121	43151	3	3	123678	2	45Z3	50	0	70	12613	1111	4	1	58	5
19HV8	19	70	80	54121	43151	3	2		6	45Z5	50	0	70	23531	1111	4	2	234	2
19J6	19	15	35	33215	5111	3	3	56Z	12	46	2.5	7	60	23531	1111	4	2	234	2
19T8	19	7	84	66121	61531	3	4	1236Z8	9	47	2.5	7	60	23531	1111	4	2	234	2
19T8	19	0	0	66121	61531	4	6		126	48	25	80	15	23551	1111	4	2	2345	2
19V8	19	7	81	46121	56161	2	4	236789	1	49	7.5	25	20	23511	1111	2	3	234	2
19V8	19	7	0	46121	56161	4	6		279	50	2.5	7	44	23511	1111	4	2	23	2
19X8	19	25	52	15321	15341	3	3	1287	9	50A5	50	7	66	24311	5111	2	2	236Z	2
19X8	19	25	18	15321	15341	3	3		3	50B5	50	7	98	51213	3611	4	1	1256	5
20	3.8	46	56	23511	1111	2	3	23	2	50C5/HL92	50	7	97	15216	3311	4	1	1267	7
20EQ7	19	7	60	15121	34661	3	3	1236	7	50C6	50	7	90	12335	1111	4	1	3458	3
20EQ7	19	0	30	15121	34661	4	6		8	50CA5	50	19	5	33111	3311	4	2	127	7
21A6/PL81	19	61	93	65121	66314	2	1	239	C	50CD4	50	7	0	16215	3311	4	2	1567	7
21EX6	19	7	65	12115	11314	4	1	358	C	50EH5	50	7	0	16215	3311	4	2	1567	7
22DE4	19	0	73	16114	1211	2	1	35	5	50F5	50	7	95	12435	1111	1	2	458	3
24A	2.5	7	85	24311	11115	4	3	234C	2	50FK5	50	7	40	15216	3411	3	2	1267	7
25A7	25	7	32	12335	1111	4	2	3458	3	50FY8	50	7	40	51521	4314	2	2	1236789	6
25A7	25	55	73	12335															

TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT		
52	6.3	7	51	24531	11111	4	2	234	2	5692/6SN7	6.3	52	16	53153	12111	3	3	1346	25
53	2.5	16	10	24515	41111	2	4	23456	26	5693/6SJ7	6.3	17	0	12151	31411	2	4	345	8
55	2.5	25	30	23661	11115	3	3	23456	2	5718	6.3	10	95	56261	16411	2	2	158	8
55	2.5	7	25	23661	11115	4	6		34	5725/6AS6	6.3	22	67	51213	35111	3	3	1257	5
56	2.5	7	74	23511	11111	4	3	234	2	5726/6AL5/6663	6.3	0	48	13211	13111	1	3	1257	57
57	25	15	45	24311	11115	2	4	235C	2	5727/2021/EN91	6.3	0	58	61213	43111	2	1	1256	6
58	2.5	34	25	24311	11115	3	3	235C	2	5749/6BA6/6660	6.3	40	90	51214	31111	3	2	127	5
59	2.5	50	35	24351	11111	4	2	2346	2	5750/6BE6/EK90	6.3	7	75	51214	31111	4	3	1257	5
60FX5	50	30	50	15216	34111	2	2	126	7	5750/6BE6/EK90	6.3	7	25	51214	31111	4	3		6
70L7	70	7	97	12335	11511	4	1	13468	3	5751/12AX7/6681	12.6	7	93	45121	45161	2	4	2378	16
70L7	70	0	70	12135	61311	4	1		8	5763	6.3	70	92	41121	31561	4	1	378	1
71A	5.0	7	38	23511	11111	4	2	23	2	5814/12AU7	12.6	45	20	45121	45161	2	3	2376	16
75	6.3	7	0	23661	11115	4	5	2345C		5823	70	0	70	46266	66111	3	1		1
75	6.3	7	25	23661	11115	4	6		34	5824	25	7	35	62435	11111	2	2	3456	3
76	6.3	7	77	23511	11111	4	3	234	2	5840	6.3	7	85	51264	13611	2	3	1257	5
77	6.3	7	98	24311	11115	4	3	235C	2	5844	6.3	7	30	44215	51111	2	3	1256Z	12
78	6.3	60	13	24311	11115	3	3	235C	2	5879	6.3	7	95	51121	13411	3	3	137	8
79	6.3	46	66	24514	11115	3	3	2345C	5	5881/6L6G	6.3	25	76	12445	11111	4	1	3456	3
79	6.3	46	66	24511	11115	3	3		2	5902	6.3	7	80	51264	13611	2	2	1257	5
80	5.0	0	85	21411	11111	2	1	23	3	5915/6BY6/7036	6.3	7	56	51214	35111	3	3	1257	5
80	5.0	0	85	24111	11111	2	1		2	5915/6BY6/7036	6.3	7	95	51214	35111	3	2		6
81	7.5	0	72	24111	11111	4	1	2	2	5963	12.6	15	20	45121	45161	2	3	123678	16
82	2.5	0	76	21311	11111	4	1	23	3	5965/12AV7	12.6	20	80	35121	35161	4	2	2378	16
82	2.5	0	76	23111	11111	4	1		2	6012	6.3	7	7	12514	11311	4	1	1358	5
83	5.0	0	60	21311	11111	4	1	23	3	6021	6.3	7	60	45211	15411	2	3	124578	1
83	5.0	0	60	23111	11111	4	1		2	6021	6.3	7	70	45211	15411	2	3		8
83V	5.0	0	80	21311	11111	4	1	234	3	6028/408A	19	7	95	51214	36111	2	3	1256	5
83V	5.0	0	80	23111	11111	4	1		2	6073/0A2/150C2	117	0	10	21616	66111	1	3		1
84/6Z4	6.3	0	83	25311	11111	4	1	234	3	6074/0B2/108C1	0	0	67	41666	66111	2	3		1
84/6Z4	6.3	0	83	23111	11111	4	1		2	6111	6.3	85	60	45211	15411	2	2	124578	18
85	6.3	35	34	23661	11115	3	3	2345C		6112	6.3	7	53	45216	16611	2	4	21	1
85	6.3	7	25	23661	11115	4	6		34	6112	6.3	7	45	66261	15411	2	4	57	8
85A2/0G3	25	0	50	42666	66111	1	3	13	1	6134/6AC7	6.3	13	87	12151	31411	4	2	345	8
89	6.3	7	85	24311	11115	4	2	235C	2	6136/6AU6/EF94	6.3	50	5	51213	31111	3	3	127	5
108C1/0B2/6074	0	0	67	41666	66111	2	3		1	6146	6.3	7	80	12365	61114	4	1	135C	C
117L7/117M7	117	30	0	12353	11111	3	2	34568	3	6159	25	7	90	12365	61114	4	1	135C	C
117L7/117M7	117	0	60	12111	31111	4	1		6	6186/6AG5	6.3	16	43	51214	36111	3	3	1256	5
117M7/117L7	117	30	0	12353	11111	3	2	34568	3	6188/6SU7	6.3	7	38	54154	12111	4	4	1346	25
117M7/117L7	117	0	60	12111	31111	4	1		6	6189/12AU7*	12.6	40	18	45121	45161	2	3	2378	16
117P7	117	50	98	12353	11111	3	1	456	3	6205	6.3	25	50	51214	13611	2	3	1257	5
117Z3	117	0	74	61213	11111	4	1	56	5	6211	12.6	7	35	45121	45161			123678	16
117Z4	117	0	75	12113	11111	4	1	56	5	6267/EF86	6.3	7	95	31121	41151	4	3	389	6
117Z6	117	0	71	12414	11111	4	1	3456	35	6350	12.6	7	92	41521	41561	2	2	23678	16
150C2/0A2/6073	117	0	10	21616	66111	1	3		1	6360	12.6	7	67	51521	43461	3	2	1237	68
150C3/0D3/VR150	70	0	73	12113	11111	4	2	5	5	6386	6.3	7	90	21531	35111	2	3	2376	46
182B/482B	5.0	7	55	23511	11111	4	2	23	2	6550	6.3	15	90	12435	11111	4	1	3458	3
183B/483	5.0	7	23	23511	11111	4	2	23	2	6626/0A2/150C2	117	0	10	21616	66111	1	3		1
407A	35	40	95	21546	45111	2	2	234678	4	6627/0B2/108C2	0	0	67	41666	66111	2	3		1
407A	35	50	95	21546	45111	2	2		6	6669/6A05/6005	6.3	67	97	51214	36111	4	1	1256	5
408A/6028	19	7	95	51214	36111	2	3	1256	5	6676/6C86	6.3	35	90	51214	31111	3	2	127	6
482B/182B	5.0	7	55	23511	11111	4	2	23	2	6677/6CL6	6.3	63	38	15321	41661	3	2	127	6
483/183B	5.0	7	23	23511	11111	4	2	23	2	6678/6U8/ECF82	6.3	71	5	35321	41151	3	3	236789	6
484/485	2.8	17	61	24511	11111	2	3	34	2	6678/6U8/ECF82	6.3	71	88	35321	41151	3	2		1
485/484	2.8	17	61	24511	11111	2	3	34	2	6679/12AT7	12.6	20	60	35121	35161	3	3	2378	16
502AX	6.3	0	70	12312	11111	4	1	356	3	6680/12AT7*	12.6	40	18	45121	45161	2	3	2378	16
502AX	6.3	0	70	12311	11111	4	1		3	6681/12AX7/5751	12.6	7	93	45121	45161	2	4	2378	16
802	6.3	25	41	26451	11114	3	2	456	C	6792	6.3	4	95	12365	31314	4	4	1368	C
807/5933/QE06140	6.3	15	91	24511	11114	4	1	234C	C	6814	6.3	30	75	51211	11411	2	2	158	8
816	25	0	66	21111	11113	4	1		C	6887	6.3	0	60	14211	14111	1	2	1657	27
864	1.25	7	90	23511	11111	4	3		2	6919	6.3	0	60	13211	13111	2	2	1257	27
866/866A	2.5	0	70	21111	11113	4	1		C	6922/E88CC	6.3	13	60	45121	45111	2	2	2378	16
884/6Q5	6.3	0	25	12412	11111	1	2	56	3	6973	6.3	7	72	31521	61641	4	2	1379	9
884/6Q5	6.3	0	25	12411	11111	1	2		3	7025/12AX7/ECC83	12.6	7	93	45121	45161	2	4	2376	16
950	2.0	50	42	24531	11111	3	3	23	2	7027	6.3	7	42	32465	61111	4	2	156	3
955	6.3	21	54	21351	11111	2	3	35	2	7036/6BY6/5915	6.3	7	56	51214	35111	3	3	1257	5
957	1.25	7	34	21311	11511	4	4	3	2	7036/6BY6/5915	6.3	7	95	51214	35111	3	2		6
958	1.25	7	5	21351	16111	2	4	3	2	7044	12.6	7	75	45121	15641	2	2	123679	1
1203A/7C4	6.3	0	75	21131	11111	1	3	47	4	7044	12.6	7	70	45121	15641	2	2		9
1229	2.0	7	42	24311	11115	2	4	2C	2	7054	12.6	15	55	15121	64361	4	2	123	7
1247	.625	7	18	11121	11116	4	6			7055	12.6	0	48	13211	13111	1	3	1257	27
1267/0A4/PL1267	Z	0	50	13114	13111	4	2	7	5	7056	12.6	13	13	51214	31111	3	3	127	5
1267/0A4/PL1267	Z	0	50	12114	13111	4	2		5	7057	12.6	10	43	35121	35111	4	3	125678	1
1273	6.3	7	50	24316	51111	2	4	467	2	7057	12.6	7	50	35121	35111	4	3		6
1280	12.6	7	50	24316	51111	2	4	467	2	7058	12.6	7	93	45121	45161	2	4	2378	16
1291/3B7*	2.8	45	34	23561	53111	3	3	36	27	7059	12.6	35	100	15321	41111	3	2	123679	6
1293	1.4	20	61	23111	51111	3	3	6	2	7059	12.6	10	15	41121	11151				

TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	TUBE TYPE	FIL	GRID	PLATE	LEVERS	V	S	LEAK	MERIT	
7699	12.6	20	67	51521	43461	3	2	1237	68	ECF82/6U8	6.3	71	88	35321	41151	3	2	
7701	12.6	20	88	15621	43661	3	2	1267	6	ECH81/6AJ8	6.3	45	42	35121	43111	2	3	126789
7716	12.6	7	80	15421	15341	3	2	12678	9	ECH81/6AJ8	6.3	7	10	35121	43451	1	4	
7716	12.6	7	50	15421	15341	2	4		3	ECH83/6DS8	6.3	7	98	35121	35351	1	4	1236789
7724/14GT8	12.6	0	0	14121	11111	1	2	23	2	ECH83/6DS8	6.3	7	95	35121	35121	1	4	
7724/14GT8	12.6	0	0	11121	41111	1	2	16	6	ECL80/6AB8	6.3	7	85	45121	41351	2	3	23789
7724/14GT8	12.6	7	20	11121	11541	4	4	789	9	ECL80/6AB8	6.3	7	72	45121	41351	2	3	
8016/1B3	1.25	0	85	62616	11613	2	4	16	C	ECL82/6BM8	6.3	7	0	51521	43141	3	2	126789
9001	6.3	7	40	51213	36111	3	4	16	5	ECL82/6BM8	6.3	7	96	51521	43141	3	3	
9002	6.3	7	66	66213	51111	3	3	567	5	EF39	6.3	7	70	12431	11115	4	3	134568
9003	6.3	7	65	56214	31111			1567	5	EF80/6BX6	6.3	7	88	15621	14311	2	3	12789
9006	6.3	0	55	41216	16111	1	2	12	1	EF85/6BY7	6.3	10	90	15621	14311	4	2	12689
B36/12SM7	12.6	52	16	53153	12111	3	3	1346	25	EF86/Z729	6.3	7	95	31121	41151	4	3	389
B65/6SN7	6.3	52	16	53153	12111	3	3	1346	25	EF89/6DA6	6.3	7	15	15121	14311	3	3	239
B152/ECC81	12.6	20	60	35121	35161	3	3	2378	16	EF93/6BA6/PM04	6.3	40	90	51214	31111	3	2	12567
B309/ECC81	12.6	20	60	35121	35161	3	3	2378	16	EF94/6AU6	6.3	50	5	51213	31111	3	3	127
CK510AX	.625	7		25313	15111	2	5		5	EF95/6AK5/5654	6.3	15	60	51213	36111	2	3	1256
CK510AX	.625	7		25313	35111	2	5		6	EF80U	6.3	50	50	11121	14351	3	3	3789
CK512AX	.625	7	100	33251	11111	2	5	12	1	EH90/6CS7	6.3	95	77	41521	45111	2	2	3789
CK526AX	1.25	40	90	43251	11111	2	3	124	1	EH90/6CS7	6.3	90	20	41521	45111	2	2	
CK533AX	1.25	7	70	33251	11111	1	5	124	1	EK90/6BE6	6.3	7	75	51214	31111	4	3	1257
CK5676AX	1.25	7	48	42511	11111	2	3	13	1	EK90/6BE6	6.3	7	25	51214	31111	4	3	
CK5744	6.3	40	55	42151	11111	2	3	145	1	EL34/6CA7	6.3	15	95	12435	61111	4	1	158
CK5875	1.25	10	25	43152	11111	2	4	124	1	EL36/6CM5	6.3	7	15	62635	11114	2	2	458
CK5886	1.25	7	20	43211	15111	2	5	127	1	EL37/5881/6L6	6.3	79	65	62435	11111	4	1	358
CK6029	1.25	40	65	41521	11111	1	3	13	1	EL38/6CN6	6.3	7	80	12145	11114	4	1	1458
D63/6H6	6.3	0	77	12313	11111	1	3	3458	35	EL81/6CJ6	6.3	12	3	65121	66314	2	2	239
D77/DO6/6AL5	6.3	0	60	13211	13111	1	3	1257	2	EL84/6B05	6.3	35	95	65121	14131	4	1	237
D77/DO6/6AL5	6.3	0	48	13211	13111	1	3		7	EL86/6CM5	6.3	7	95	65121	64631	3	2	2379
D152/6AL5/D77	6.3	0	60	13211	13111	1	3	1257	2	EL90/6A05/N727	6.3	67	97	51214	36111	4	1	1256
D152/6AL5/D77	6.3	0	48	13211	13111	1	3		7	EL95/6DL5	6.3	7	92	51214	36111	3	2	126
DA90/1A3/1D13	1.4	7	21	26116	61111	4	6	23	2	EM35	6.3	0	80	62414	41111	4	3	456
DAF91/1S5/ZD17	1.4	20	65	11633	52111	2	4	3456	5	EM35	6.3	0	80	62194	11111	4	3	
DAF91/1S5/ZD17	1.4	7	29	11633	52111	4	6		3	EM80/6BR5	6.3	0	54	11621	64641	3	3	179
DAF92/1U5	1.4	25	50	13361	52111	2	4	2346	2	EM80/6BR5	6.3	0	54	11621	61641	3	3	
DAF92/1U5	1.4	7	10	13361	52111	4	6		4	EM81/6DA5	6.3	7	25	51621	64641	4	5	1279
DAF96/1AH5	1.4	27	97	16334	52111	1	5	3456	5	EM81/6DA5	6.3	7	75	51621	61641	4	5	
DAF96/1AH5	1.4	0	65	16334	52111	1	4		3	EM84/6F06	6.3	7	75	56121	44641	4	4	13679
DC90	1.4	37	97	14615	62111	1	3	5	2	EM84/6F06	6.3	7	75	56121	44641	4	4	
DCC90/3A5*	2.8	15	84	23565	31111	2	3	35	6	EN91/2D21	6.3	0	58	61213	43111	2	1	1256
DCC90/3A5*	2.8	15	63	23565	11111	2	3		2	EQ80/6BE7	6.3	65	92	33121	45631	1	4	136
DD6/6AL5/D77	6.3	0	60	13211	13111	1	3	1257	7	EY81/6R3	6.3	0	6	66621	66641	1	2	90
DD6/6AL5/D77	6.3	0	48	13211	13111	1	3		2	EY82/6N3	6.3	0	27	66121	66641	4	1	1236789
DF62/1AD4	1.25	7	5	33152	11111	2	4	24	7	EZ80/6V4	6.3	0	79	51121	13111	4	1	137
DF91/1T4/W17	1.4	7	85	13311	52111	4	3	236	2	EZ80/6V4	6.3	0	79	31121	11111	4	1	
DF92/1L4/IF2	1.4	7	92	13311	52111	4	3	236	2	EZ81/6CA4	6.3	0	60	46121	64661	1	2	137
DF96	1.4	50	95	14366	52111	1	4	36	2	EZ90/6K4/U78	6.3	0	86	51211	31111	4	1	167
DF97	1.4	7	75	14311	52111	2	4	346	2	EZ90/6K4/U78	6.3	0	86	31211	11111	4	1	
DH63/607/6T7	6.3	7	85	62466	11115	2	4	3458	3	GZ30/5Z4	5.0	0	76	12111	31111	4	1	46
DH63/607/6T7	6.3	0	25	62636	11115	1	4		4	GZ30/5Z4	5.0	0	76	12131	11111	4	1	
DH63/607/6T7	6.3	0	25	62663	11115	1	4		5	GZ32/5V4	5.0	0	76	12111	31111	4	1	46
DH77/6AT6	6.3	7	78	51216	63111	4	4	1256	7	GZ32/5V4	5.0	0	76	12131	11111	4	1	
DH77/6AT6	6.3	7	25	51216	63111	4	6		56	GZ33	5.0	0	66	12111	41111	2	1	46
DK91/1R5/X17	1.4	7	70	13316	12111	2	4	234	2	GZ33	5.0	0	66	12141	11111	2	1	
DK91/1R5/X17	1.4	7	24	13316	12111	2	4		3	GZ34/5AR4	5.0	0	30	12111	41111	4	1	46
DK96/1AB6	1.4	40	20	14353	52111	1	5	23456	2	GZ34/5AR4	5.0	0	30	12141	11111	4	1	
DL35/N14/1C5	1.4	29	41	12335	11111	2	3	35	3	H63/6F5	6.3	7	94	12131	11115	4	4	80
DL92/354/N17	2.8	7	40	13536	62111	2	2	234	2	HBC90/12AT6	12.6	7	78	51216	63111	4	4	1256
DL93/3A4	2.8	70	90	13356	62111	2	2	234	2	HBC90/12AT6	12.6	7	25	51216	63111	4	6	
DL94/3V4	2.8	30	34	13316	52111	2	3	236	2	HBC91/12AV6	12.6	7	87	51216	63111	4	4	1256
DL95/3Q4	2.8	35	29	13536	62111	2	3	234	2	HBC91/12AV6	12.6	7	25	51216	63111	4	6	
DL96	1.4	60	99	14312	51111	1	3	236	2	HCC85/17EW8	12.6	7	20	45121	45111	3	3	2378
DL98/3B4	2.8	80	83	36521	63111	2	3	137	7	HD14/DAC32	1.4	12	98	12316	11115	2	5	350
DM70/IN3	1.4	100	70	56112	11411	2	5	1	8	HD14/DAC32	1.4	7	20	12316	11115	4	6	
DM70/IN3	1.4	0	70	56112	11411	1	5		8	HF93/12BA6	12.6	40	90	51214	31111	3	2	127
DP61/EF95/6AK5	6.3	15	60	51213	36111	2	3	1256	5	HF94/12AU6	12.6	50	5	51214	31111	3	3	127
DY86/DY87/1S2A	1.4	0	31	12616	16613	2	4	C	C	HK90/12BE6	12.6	7	75	51214	31111	4	3	1257
DY87/132/DY86	1.4	0	31	12616	16613	2	4	C	C	HK90/12BE6	12.6	7	25	51214	31111	4	3	
EBOCY/7643	6.3	10	75	45321	41151	3	3	123789	6	HL92/50C5	5.0	7	97	15216	33111	4	1	1267
EBOCF/7643	6.3	10	90	45321	41151	2	2		1	HL94/30A5	25	7	54	15216	34111	2	2	1267
E88CC/6922	.3	13	60	45121	45111	2	2	2378	16	HM04/EK90	6.3	7	75	51214	31111	4	3	1257
EAA91/6AL5	6.3	0	60	13211	13111	1	3	1257	7	HY90/35W4	35	0	70	11213	61111	4	1	57
EAA91/6AL5	6.3	0	48	13211	13111	1	3		2	KRI/1V	6.3	0	29	23111	11111	2	2	23
EABC80/6AK8	6.3	10	77	66121	61531	2	4	123678	9	KR25/2A5	2.5	7	44	24451	11111	4	2	2345
EABC80/6AK8	6.3	7	95	66121	61531	2	6		126	KT32/25L6	25	7	94	12435	11111	4	1	3458
EB91/6AL5/DD6	6.3	0	60	13211	13111	1	3	1257	27	LA/6A4	6.3	32	67	62445	11111	4	1	358
EB91/6AV6	6.3	15	75	14516	61211	4	3	3567	2	LA/6A4	6.3	7	62	12445	61111	4	1	158
EB91/6AV6	6.3	15	20	14516	61211	4	6		56	L63/6J5	6.3	7	73	24531	11111	4	2	234

## TRANSISTOR TEST DATA SHEET

The figure of merit to be measured is the common emitter current amplification ratio. Various symbols denoting this quantity include  $\beta$  (beta),  $\alpha_{cb}$  (alpha cb),  $h_{21}$ , and  $h_{fe}$ . This quantity (which we will refer to as beta) is related to the common base current amplification ratio ( $\alpha_{ce}$ ) by the following relationships:

$$\beta = \frac{\alpha_{ce}}{1 - \alpha_{ce}} \quad \alpha_{ce} = \frac{\beta}{1 + \beta}$$

Either quantity may be specified by the manufacturer, depending upon the use for which the transistor is intended. In either case, present manufacturing tolerances are very

broad; a glance at the following tables will illustrate this point. Therefore, even if a transistor falls outside of the indicated range, it may still be useable. This decision is left to the individual. Furthermore, many types have only a nominal value; that is, no information on the allowable deviation has been made public by the manufacturer. In these cases, a reasonable lower limit might be in the order of one-half of the nominal value. Where no data is shown, the information is not available. Where the beta is shown in parentheses, the data was taken on the basis of a small sampling and is not necessarily a nominal value. In all cases, considerable latitude should be given before deciding that a transistor is defective.

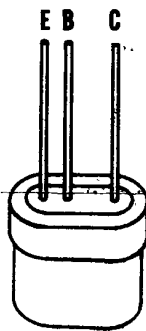


Fig. 1



Fig. 2

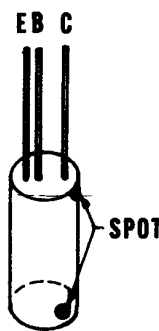


Fig. 3



Fig. 4

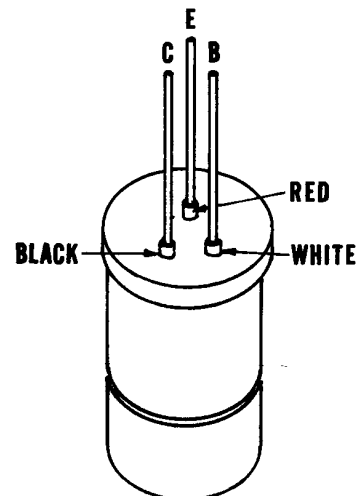


Fig. 5

\* Indicates that the  $I_{ceo}$  reading may exceed the normal " $I_{ceo}$  GOOD" range.

NO.	FIG.	TYPE	BETA	NO.	FIG.	TYPE	BETA
2N34	1	PNP	40	2N80	3	PNP	
2N35	1	NPN	40	2N81	1	PNP	20-66
2N36	3	PNP	45	2N82	1	PNP	20-60
2N37	3	PNP	30	2N94	1	NPN	40
2N38	3	PNP	15	2N94A	1	NPN	19
2N38A	3	PNP	18	2N97	1	NPN	6-19
2N41	4	PNP	40	2N97A	1	NPN	57
2N43	1,4	PNP	33-50	2N98	1	NPN	19-100
2N43A	1	PNP	30-65	2N98A	1	NPN	24-100
2N44	1,4	PNP	15-22	2N99	1	NPN	19-100
2N45	1,4	PNP	9-12	2N100	1	NPN	100-140
2N47	2	PNP	40	2N103	1	NPN	1.5-6
2N48	2	PNP	30	2N104	1	PNP	32-44
2N49	2	PNP	40	2N105	2	PNP	45-55
2N63	1	PNP	22	2N106	1	PNP	25
2N64	1	PNP	45	2N107	1	PNP	19
2N65	1	PNP	90	2N108	3	PNP	
2N76	1	PNP	9-100	2N109	1	PNP	70
2N77	4	PNP	55	2N111	1	PNP	40
2N78	1	NPN	20-50	2N112	1	PNP	40
2N79	1	PNP	46	2N113	1	PNP	45

<u>NO.</u>	<u>FIG</u>	<u>TYPE</u>	<u>BETA</u>	<u>NO.</u>	<u>FIG.</u>	<u>TYPE</u>	<u>BETA</u>
2N114	1	PNP	65	2N204	4	PNP	50-120
2N123	1	PNP	30-50	2N205	4	PNP	15-35
2N124	1	NPN	12-24	2N215	1	PNP	32-44
2N125	1	NPN	24-48	2N217	1	PNP	70
2N126	1	NPN	48-100	200	1	NPN	9
2N127	1	NPN	100-140	201	1	NPN	19
2N130	3	PNP	22	202	1	NPN	49
2N131	3	PNP	45	206	3	NPN	35
2N132	3	PNP	90	207	3	NPN	19
2N133	3	PNP	25	208	3	NPN	19
2N135	1	PNP	20	300	1	PNP	9-19
2N136	1	PNP	40	301	1	PNP	19-49
2N137	1	PNP	60	302	1	PNP	49-55
2N138	3	PNP	140	310	1	PNP	(90)
2N139	1	PNP	45-48	350	1	PNP	
2N140	1	PNP	45	352	1	PNP	35-55
2N145	1	NPN	(6)	353	1	PNP	(28)
2N146	1	NPN	(20)	354	1	PNP	(68)
2N147	1	NPN	(33)	880	1	NPN	
2N148	1	NPN		903	1	NPN	9-19
2N148A	1	NPN		904	1	NPN	19-39
2N149	1	NPN		904A	1	NPN	19
2N149A	1	NPN		905	1	NPN	39
2N150	1	NPN		951	1	NPN	9-140
2N150A	1	NPN		952	1	NPN	9-140
2N156	5	PNP	40*	953	1	NPN	9-140
2N158	5	PNP	40*	CK-721	3	PNP	45
2N160	1	NPN	13	CK-722	3	PNP	22
2N160A	1	NPN	13	CK-725	3	PNP	90
2N161	1	NPN	28	CK-727	3	PNP	25
2N161A	1	NPN	28	CK-760	1	PNP	40
2N162	1	NPN	40	CK-761	1	PNP	45
2N162A	1	NPN	39	GT-14	1	PNP	20-34
2N163	1	NPN	50	GT-20	1	PNP	35-45
2N163A	1	NPN	50	GT-34	1	PNP	10-19
2N167	1	NPN		GT-66	1	PNP	100
2N168	1	NPN	20	GT-81	1	PNP	50-65
2N168A	1	NPN	40	GT-83	1	PNP	35-45
2N169	1	NPN	7-40	GT-87	1	PNP	20-34
2N169A	1	NPN	30	GT-88	1	PNP	50-90
2N170	1	NPN	7-20	GT-109	1	PNP	120
2N172	1	NPN	(11)	GT-122	1	PNP	50-90
2N175	1	PNP	65	GT-760	1	PNP	40
2N180	3	PNP	60	GT-761	1	PNP	70
2N181	3	PNP	60	GT-762	1	PNP	140
2N186	1	PNP	24	GT-763	1	PNP	140
2N186A	1	PNP	24	HD-398	3	NPN	30
2N187	1	PNP	36	HD-399	3	NPN	30
2N187A	1	PNP	36	HD-401	3	NPN	30
2N188	1	PNP	54	HD-402	3	PNP	70
2N188A	1	PNP	54	HD-441	3	PNP	70
2N189	1	PNP	24	HD-454	3	PNP	19-65
2N190	1	PNP	36	OC-70	3	PNP	30
2N191	1	PNP	54	OC-71	3	PNP	47
2N192	1	PNP	75	OC-72	3	PNP	50
2N195	4	PNP	100-140	TS-161	3	PNP	19-100
2N196	4	PNP	50-65	TS-162	3	PNP	9-19
2N197	4	PNP	40-50	TS-163	3	PNP	19-32
2N198	4	PNP	30-40	TS-164	3	PNP	32-62
2N199	4	PNP	15-25	TS-165	3	PNP	62-90
2N200	4	PNP	30-60	TS-166	3	PNP	25