

SUPREME

Testing Instruments

"SUPREME BY COMPARISON"

TECHNICAL DATA

*R. E. Smith
Rt. 66 Campus Village
Silver City, N. M.*



GREENWOOD, MISSISSIPPI, U. S. A.

THE SUPREME MODEL 600 TUBE AND SET TESTER

ELECTRICAL SPECIFICATIONS: (Unless otherwise specified on special plate attached to unit.)

Voltage.....100-133 volts A-C
Frequency.....50-60 cycles/sec.
Power Consumption.....125 watts maximum

MECHANICAL SPECIFICATIONS:

Overall dimensions	Panel	Case
Length (Inches)	15	15½
Width (Inches)	11½	12½
Depth (Inches)	--	7½
Weights	Net	Shipping
Pounds	20	24

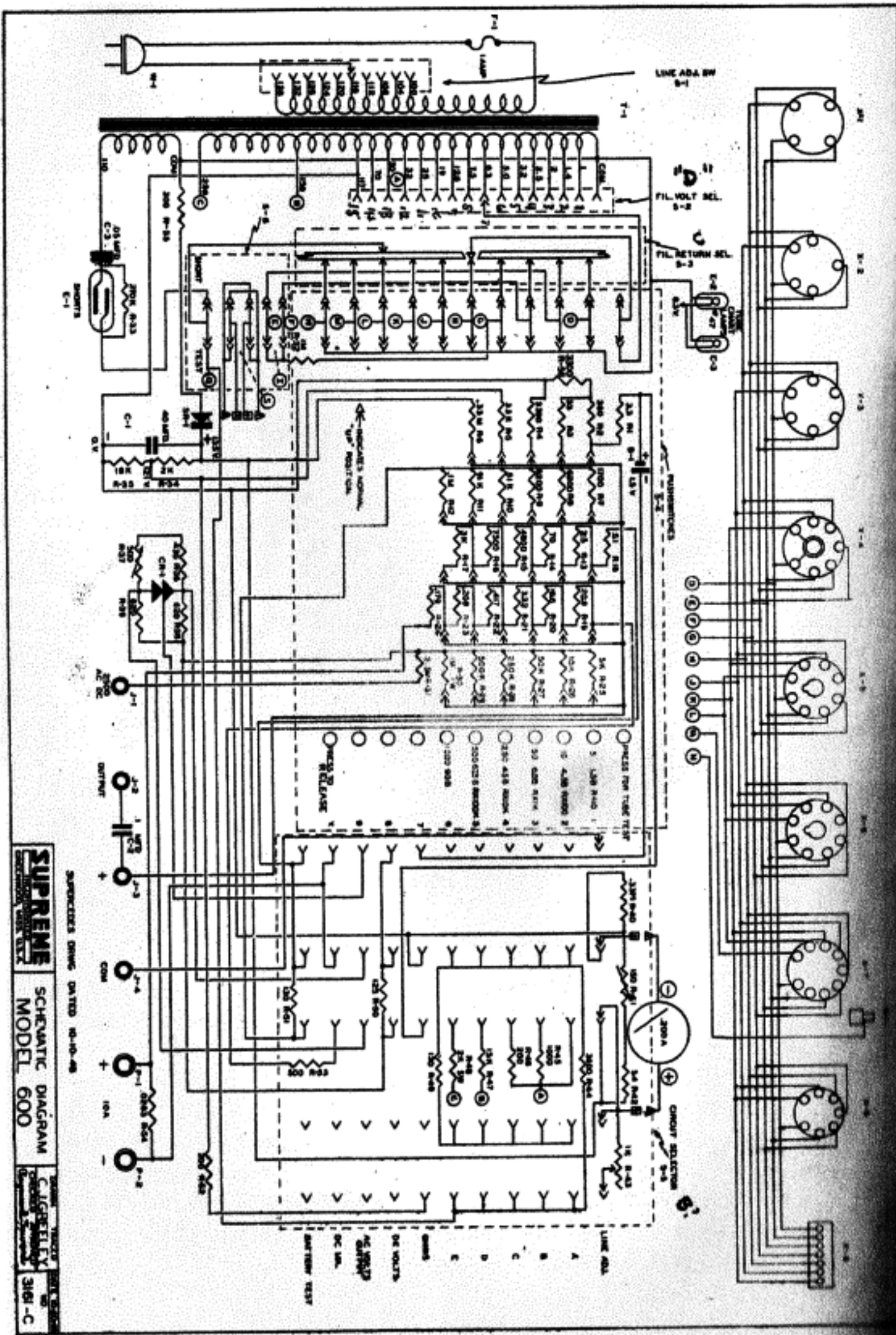
STANDARD EQUIPMENT SUPPLIED WITH THIS UNIT

1 Technical Manual Part No. 9584
1 Registration Form Part No. 6725B

The above list has been checked by Supreme

Inspector.....

REGISTRATION: A number of valuable services are available to REGISTERED owners of Supreme testing equipment. A registration form 6725B is included with each new Supreme instrument which should be completed and mailed without delay. If, for any reason, this form is not found when your instrument is delivered, advise the factory REGISTRATION Department, stating the serial number as well as the Model number and from whom it was purchased.



GENERAL: This Supreme tester is a combination type unit incorporating facilities for checking receiving type tubes, portable radio batteries and making voltage, current and resistance measurements in diagnosing trouble in radio receivers, as well as other electronic devices.

Every professional radioman knows that tubes must be replaced for one or both of two reasons; namely, (1) by reason of service depreciation in the cathode or filament emission which lowers the conductance and tends to change the normal operating characteristics, and (2) by reason of inter-electrode leakage or short circuited conditions.

It is obvious, therefore, that a useful, practical tester should indicate the quality of a tube on the basis of REPLACE - GOOD and should also include a function for testing leakages and short circuits between elements.

These two objectives are accomplished in this tester, plus functions for testing batteries, ballast tubes, pilot lamps, resistors, capacitor resistance, voltage and current.

OUTSTANDING FEATURES: The maximum benefit will be realized in the application of this tester when the user fully appreciates its outstanding features. The professional radioman can always be identified by others as being thoroughly informed about the advantages of the instruments he uses - his test equipment. Five important characteristics of this Supreme tester are listed as follows.

(1) **SIMPLICITY OF OPERATION:** The ease with which one becomes familiar with the procedure for operating this tester is an illustration of thoughtful design. Supreme Engineers kept the user in

mind and, by reducing the set-up procedures to an absolute minimum, speedy tube testing is assured. Through the use of the Supreme patented 'FRS' (filament return selector) system, a number of complicated set-ups have been integrated into a few simple ones. Just set four controls and push the buttons. Again, because of the Supreme "FRS" System, only one socket of each type is required. Hence, there is no confusion as to which socket to use, nor is it possible to incorrectly test or possibly damage a tube because it has been placed in the wrong socket, as is possible in checkers which employ more than one socket of the same type.

(2) ILLUMINATED ROLLER TUBE INDEX: To eliminate the troubles that are caused by a misplaced tube chart, this tester is equipped with a double section, free rolling tube list with settings for over six hundred types. All special instructions are included on the chart and the index is illuminated to help guide the operator's eye to the proper listing. This illumination also serves as a pilot light to show when the tester is on.

(3) RELIABLE CIRCUIT DESIGN: The leakage test function incorporates the Supreme patented isolation test circuit which is regulated in sensitivity to conform with tube manufacturers recommendations for maximum leakage. A non-regulated circuit of the ordinary neon series type can easily cause an unduly large proportion of tubes to appear to be shorted. Such results lead to useless confusion and can cause harm to the legitimate serviceman. The quality test employs a time-proven circuit which was pioneered and developed by Supreme engineers working in close cooperation with tube manufacturers. It is a complete emission type tester with no compromise and should not be confused with the semi-emission, relative emission, partial emission or plate conductance types.

(4) PROFESSIONAL APPEARANCE AND DURABLE CONSTRUCTION: The ability or "know how" to make test equipment look good and still be able to take the knocks has brought commendations from Supreme owners for years. This tester is a worthy addition to the "Supreme by Comparison" family. You will be proud to show it to your professional associates.

(5) THE SUPREME EXTRA'S: Beside the full vision 7 inch Supreme meter and extra socket, this tester also includes facilities for checking portable radio batteries, pilot lamps, open elements, filament continuity and ballast tubes. There was no compromise made in the quality of its primary functions (tube tester and set tester) to bring these useful extras.

THE SIMPLICITY OF OPERATION FEATURE IN ACTION

After connecting this Supreme tester to a convenient A-C service outlet of proper voltage and frequency, the simplicity of operation is demonstrated by using the following procedure to check for shorts, leakage and conductance in receiving type tubes.

1. Set control B to LINE position. Then set the control located directly below the meter labeled LINE ADJUST to any position except OFF and observe meter pointer for about 15 seconds. Now rotate LINE ADJUST control to the position which will make the pointer rest at center scale mark on meter (LINE ADJUST).

2. Locate on the roll chart, tube type number to be tested. Set controls A, B, C and D to the position listed on the chart. Press RELEASE button. Now insert tube in socket on tester.

3. To check for shorted elements or excessive

leakage, press (one at a time) buttons 1, 2, 3, 4, 5, 6, 7, 8, 9 and X, observing SHORTS indicator as each button is depressed. The tube is not considered defective if:

- (i) SHORTS indicator glows when button with same number as setting of control C is depressed. This indicates a good filament.
- (ii) SHORTS indicator glows when certain special notes are listed on chart beside tube type. This indicates normally interconnected electrodes.

When SHORTS indicator glows under any conditions other than those two outlined above, the tube is defective due to leakage or short circuited elements and no further tests are necessary.

4. To check conductance, press TUBE TEST button. Then depress (one at a time) the button or buttons listed in the right hand or last column on tube chart. Now depress Q button and read condition of tube on meter.

BRAND VARIATIONS: While characteristic tolerance values are established for practically all types of tubes, some variations are to be expected when different brands are compared by using this or similar testers. Such variations may be attributed to the production procedure whereby one manufacturer may allow his production of tubes to run higher than rated values, whereas another manufacturer may hold his production very close to rated values. A similar condition may be observed when buying ordinary 45-volt "B" batteries; one brand may test 47 volts while another brand may test 52 volts when new. The mere fact that one brand of tubes tests lower than another does not mean that one of the brands is necessarily better

than the other, so long as the emission characteristic is within tolerance. We don't say that the brand of 45-volt batteries which tested 52 volts when new is necessarily better than a brand which tests 47 volts when new. We know there is a time element involved. When both brands are subjected to the same service over a period of time, the one which originally tested 52 volts may then test 40 volts and the one which originally tested 47 volts may test 41 volts. The test limits established for this tester represent average values between brands. A meter reading of 80 on a particular type of tube does not necessarily mean that it is better than a similar type which tests 76. In other words, a bad or very bad tube may read anywhere on the "REPLACE" scale and a good tube may test anywhere on the "GOOD" sector of the meter scale. The final verdict as to whether a tube is satisfactory is whether or not it performs in an operative radio or electronic device; and, even with such a simple, practical and apparently conclusive criterion as an operative radio, it is sometimes found that a tube which is almost completely unsatisfactory when used in one type of electronic circuit will be quite satisfactory in another type of circuit.

OPEN ELEMENT TESTS: Tube elements are very unlikely to open circuit and one should not expect to encounter such a case in ten thousand tubes tested; thus, the open element test has been greatly exaggerated in some sales literature. However, the supreme tube tester has facilities for making an open element test which will find any and every open element in a tube if such exists. Obtain a tube data book or base connection finder from your jobber if you don't have one handy. With the tester set up to check tube quality, press the proper button or buttons (O, I and/or S) to obtain a quality reading and hold these buttons down. Now, referring to the tube base data, press the numbered button which corresponds to the element the great-

est distance from the cathode or filament. This is usually a plate. If the plate is connected to No. 3 pin, push No. 3 button. The meter pointer will drop back a bit if this element is not open. Continue with the suppressor, screen, etc., until all elements have been checked, the control grid being the last to be checked. It will be noticed that the amount of drop back of the meter needle will vary for each element, depending on its relative distance from the cathode, thus, the plate will show very little change, whereas the control grid will show a marked change.

SPECIAL TEST PROCEDURES: There are a few types of tubes that have electrodes and tube base connections tied together for use in special types of electronic devices. This is taken care of on the roll chart by special notes; for example, the notation "23" besides the type 35Z5 means that the neon lamp will glow when numbers 2 and 3 buttons are depressed. Some tubes have more than one setting, as they are multi-purpose types and each section should be checked.

THE ACCURACY AND EFFICIENCY OF TUBE TESTERS: What is the standard by which to compare accuracy of tube testers? From the standpoint of those who maintain the nations radio and electronic apparatus, an ideal tube tester should classify a tube as 'good' when it will operate satisfactorily in the particular radio or electronic device being serviced and it will indicate 'replace' if defective or very close to becoming faulty.

A successful serviceman is a busy person and does not have the time to stop and determine exactly what characteristics inside the tube changed and caused it to be defective. He tests too many tubes during a day's work to waste valuable time analyzing each case, as the only profits in tube testing is time saved. He does know, however, that tube performance is dependent on (1) the

type of circuit it is being used in (2) the cathode or filament emission and (3) the geometric relations or spacing between the electrodes. If, at sometime in his career, he has made a comparison, he knows that no method of tube testing is 100% accurate. He has found out that about 95 out of each 100 tubes found defective are caused by the inability of the cathode or filament to emit enough electrons to supply the other electrodes or else some of the electrodes are short circuited. The spacing and distance between the elements of all modern tubes is permanent, due to the elaborate systems of anchoring now employed. Hence, the possibility of any change in the actual or relative positions of the elements which in turn might cause a change in tube characteristics can be dismissed as an almost impossible cause of tube trouble. Thus, about 95% of the tubes found defective are caused by low emission, excessive leakage or short circuits.

Efficiency depends upon the number of tubes a tester can classify accurately in a given period of time. A tube tester which has design features making it capable of testing 75 tubes per hour with a minimum of 95% accuracy is certainly more efficient than a tube tester which is more complicated to operate and checks only 40 tubes per hour with the same accuracy. Even if the 40 tubes per hour tester was 96% or 97% accurate, its efficiency as an aid to the service technician would be considerably less than a 70 or 75 tube per hour unit.

There are two basic methods of checking tubes - one is by substitution and the other is by using a reliable, well designed tube tester built by a reputable manufacturer.

Substitution in an operative circuit such as a radio set is, of course, the most accurate method

yet it is the least efficient. This method would be ideal if there were only a dozen or less tube types and just one or two radio sets with all the various circuit designs incorporated. But, facing facts, there are over 500 tube types and hundreds of different electronic devices employing thousands of circuits. It is a further fact that some circuits are designed to take advantage of some single characteristics of a particular tube with the result that tubes must be pre-aged or otherwise selected to operate properly. In such a case, that tube is not being operated properly, and according to its published R.M.A. characteristics. So, unless you know the exact operating conditions and the equipment manufacturers test and tube selection procedure to enable you to select that tube from a group of tubes which test "good", your only recourse is to select a tube by substitution. In fact, that is what the equipment manufacturer often does himself in his final testing department.

It is especially recommended that in working with converter tubes, WHICH HAVE NO MUTUAL CONDUCTANCE that you try several tubes which test "good" in that socket to select the one which gives the best results in that set or circuit. You will find that the tubes you pass up will work beautifully in some other set.

No tube checker made can pick out the best tube for use in special circuits.

From the standpoint of accuracy, dependability, efficiency and investment, a well engineered tube tester was the only answer when Supreme pioneered this field over 20 years ago. Now, more than ever, it is the only practical method of checking tubes. The history of tube testing is synonymous with the great name of Supreme.

The first Supreme tube tester was the relative mutual conductance type and was very efficient for the two dozen types which existed, as most of them were amplifiers and had only 4 or 5 base connections. An investigation revealed that practically all of the tubes found defective were caused by low emission or inability of the cathode or filament to supply a sufficient quantity of electrons to the other electrodes. So Supreme engineers developed the standard emission type tube tester. Since that time, this type tube tester has long been recognized to be the most accurate for making a simplified test of tubes.

According to the RMA committee on Test Equipment Nomenclature and Accuracy, there are six proposed classifications for tube testers, namely A, B, C, D, E and F. (This special committee was formed by the Radio Manufacturers Association so that reputable test equipment manufacturers would have some guide to keep their specifications and sales data in line with fair trade practices.)

Supreme manufactures the "A" and "B" types and uses the "E" type as a standard for comparison. The type "E" or true Mutual Conductance tester is the kind that is much talked about but seldom seen. Such a tester has never been built for general use, since they are custom built and useful only in making laboratory measurements. These testers are of no value whatsoever except for checking amplifier type tubes. The true Mutual Conductance tester such as the one Supreme uses in its engineering laboratory was custom built, cost several thousand dollars and uses six monitor indicators. The only transconductance testers in production are types which check Relative or Proportional mutual conductance. These are the "C" and "D" types. The "D" type which Supreme builds does automatically what used to be done manually on the early types of relative Gm testers. This type of tester is considered a little

more accurate and it costs more to build than either the standard emission ('A' type) or the semi-emission ('B' type).

Classification "A" is the standard emission type. This is the only type tube tester for which recommended voltages and loads have been established. The "A" type is a full-fledged emission tester which will check the total emission and Supreme is proud of the part it played in developing this method of checking tubes.

BALLAST TUBES: Continuity in ballast tubes is checked by setting control C to "X" position and control D to 18 position. Push RELEASE button and then push buttons 1, 2, 3, 4, 5, 6, 7, 8 and 9. SHORTS indicator should glow when buttons representing ballast element termination are depressed. For example: If ballast element is connected to pins 2 and 7 on the tube base, then the SHORTS indicator should glow when buttons number 2 and 7 are depressed. A list of the most common ballast tubes are included with each tester indicating the buttons to be depressed. Of course, this same procedure may be used to test continuity in any filament type tube.

FUTURE TUBE TYPES: As the highly progressive electronic industry moves forward, it is inevitable that the various tube manufacturers will develop many new types. As these new tubes are released, Supreme publishes the new listings which have been checked against approved laboratory standards. This supplementary data is distributed to all REGISTERED owners of this tube tester as long as the recorded mailing address assures prompt delivery. If the owner should change his mailing address, the factory TUBE SETTING SERVICE Department should be advised promptly. In addition to the supplementary data sent out by the factory, new roll charts (which

include all previously published supplementary data) are released from time to time when the quantity of new tube types justifies a new edition. The REGISTERED owner will be notified when the new edition of the roll chart is available, and the price. Supplementary listings for roll chart editions less than one year old are sent no charge.

While the factory is always glad to supply owners with data on new settings for receiving type tubes, the design of this tester is such that it is possible for the operator to make his own settings. By using a regular tube manual or base connection finder along with the following procedure, a practical setting can be obtained for many new types:

1. Set control C to one of the filament terminal numbers (For example, on a type 6J5 this may be either 2 or 7, so say we chose 2.)
2. Push the "PRESS FOR TUBE TEST" button and then depress the button representing the other filament terminal (which would be 7 on a 6J5). Now depress the cathode button (which would be 8 on a 6J5).
3. Set control D by referring to page 10 and the filament voltage recommended by the manufacturer. In the case of the 6J5, the setting would be 7 which is the position producing 6.3 volts.
4. Set control B by referring to a tube which has similar characteristics and use the same control B setting. Type 27 is similar to the 6J5, except for filament voltage and base connections, so we can safely use position C to apply the loading circuits.
5. Now depress Q button and rotate control A until the meter reads 77% of full scale deflection. Record the control A settings for six or more new tubes. Add all these control A settings together

*Press each, every button
Conn. to internal connections (multis end on A. Prod. etc.)*

and divide by the total number of tubes tested in order to obtain the average settings.

While the control A and control B settings determined by the above procedure may not be absolutely accurate when compared with laboratory results using special standards, they will be sufficiently accurate for all practical purposes, until the correct listing is supplied by Supreme. In most cases, the factory TUBE SETTING SERVICE supplies the new listings quite some time before the tubes are actually encountered by the tube tester operator.

TESTING PILOT AND FLASHLIGHT BULBS: It is always a good idea to check a pilot lamp before installing it in one of those "hard to get to" locations. Set control C to position 7. Then press TUBE TEST and button No. 1. Set control D as indicated below and lamp should glow with normal brilliance when inserted in center of seven hole socket.

<u>BULB VOLTAGE</u>	<u>CONTROL D</u>	<u>BULB VOLTAGE</u>	<u>CONTROL D</u>
1.5V	2	6.3V	7
2.0V	3	7.5V	8
2.5V	4	12.6V	9
3.3V	5	25.0V	10
5.0V	6	30.0V	11

BATTERY TESTS: Batteries used in portable radio sets may be checked under current drain recommended by battery manufacturers by setting control B to BATTERY, and pushing the button corresponding to the normal battery voltage. With test leads in TEST PROBES jacks, connect to battery and read the results on the REPLACE-GOOD scale.

SET TESTER OPERATION: To measure voltage, current resistance or check batteries, a pair of test leads with standard pin tips are required. For those who prefer high quality test leads, we recommend the Supreme type 4437-38 connectors for probing operations such as voltage and resistance measurements. In cases where it is necessary to clip across or into a circuit, the Supreme type 6986-87 will give the operator some advantages. In the following procedures, the operator will observe that the TEST PROBES pin jacks are used for the majority of applications.

D-C CURRENT: (Amperes, Milliamperes, MA, Mils) If there is a possibility that the current in a circuit will be between 1 and 10 amperes, set B control to Mils and connect "D-C 10 AMP" binding posts in series with the circuit being checked. If the current is below 1 ampere (1000 milliamperes) insert test leads in TEST PROBES pin jacks and push the 1000 button. If meter reads less than 500 M.A., push the 500 button and if less than 250, push the 250 button. Continue to decrease the ranges, but do not use a range button less than the value being indicated by the pointer.

D-C VOLTAGE: If the voltage to be checked might be above 1000 volts but less than 2500, insert the negative (black) lead in the minus (-) TEST PROBES pin jack and the positive (red) in the 2500 VOLTS jack above control B. Set B control to DCV. Place other end of leads across points to be checked. (IT IS RECOMMENDED THAT CONNECTIONS BE MADE WITH NO VOLTAGE ON POINTS TO BE CHECKED WHEN VOLTAGE MIGHT BE HIGHER THAN EXPECTED. IT IS ALWAYS ADVISABLE TO KEEP ONE HAND BEHIND YOU WHEN MEASURING HIGH VOLTAGES.) If the voltage is less than 1000 insert red probe in positive () TEST PROBES jack and press 1000 button. Reduce the range until adequate deflection is obtained, but do not use a button less than the value being indicated by the pointer.

A-C VOLTAGE: The procedure is exactly the same as for D-C volts except the B control should be in ACV position.

OUTPUT VOLTS (OPV): This function is to be used where it is necessary to measure the A-C component of a circuit carrying both A-C and D-C such as the output stage of a radio receiver. The operation of this function is the same as the A-C volts, except the Red or positive test probe should be inserted in the OUTPUT VOLTS jack located above the octal socket.

RESISTANCE (OHMS-MEGOHMS): Set B control to OHMS and insert test leads in TEST PROBES pin jacks. Push R x 100 button and touch ends of test leads together. While meter is reading, adjust control A until pointer is at "0" on right hand side of red scale. Now place across a color coded resistor. If it reads almost "0", use next lower range (R 10) and re-zero meter with control A while leads are being touched together. If pointer reads more than 2M, use a range higher than R x 100. Control A must be adjusted each time the range is increased or decreased. After a little practice, the operator will learn to press the most suitable button in order to check a certain value resistor. It should be remembered that most color coded resistors used in radio set manufacturing may have actual values more or less than the coded values.

Information provided by John Petzold, Huston TX

FREE DOWNLOAD - NOT FOR RESALE



Steve's Antique Technology

www.StevenJohnson.com