SUPREME
MODEL 502 TUBE TESTER

OPERATING DATA

SUPREME INSTRUMENTS CORPORATION
GREENWOOD, MISSISSIPPI
U. S. A.

STOCK NO. 8727

ISSUED 7/25/37
MODEL 502 TUBE TESTER
ACCESSORIES PARTS
ORDER
TO
SUPREME INSTRUMENTS CORPORATION
GREENWOOD, MISSISSIPPI
U.S.A.

PLEASE SHIP TO

STREET ADDRESS

P.O. AND STATE

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IF THE DEPOSIT IS INSUFFICIENT TO COVER THE COSTS OF THE MERCHANDISE AND TRANSPORTATION CHARGES, YOU ARE REQUESTED TO MAKE SHIPMENT VIA C.O.D. EXPRESS FOR THE BALANCE DUE. IT IS UNDERSTOOD THAT YOUR QUOTED PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

..............................................
(SIGNED)...................................

P.O.
TO
THE PURPOSE OF THIS PAMPHLET IS TO ACQUAINT YOU WITH THE PROPER OPERATING PROCEDURE WHEN USING THE MODEL 502 TUBE TESTER. WE HAVE INCLUDED ALL THESE INSTRUCTIONS BECAUSE WE FEEL THAT THIS IS THE ONLY WAY YOU CAN BECOME FULLY FAMILIAR WITH YOUR NEW TEST INSTRUMENT AND UNDERSTAND THE POLICIES OF THE COMPANY WHICH MANUFACTURED IT.

REGISTRATION CARD

FIRST OF ALL, BEFORE YOU DO ANYTHING ELSE, PLEASE FILL OUT THE REGISTRATION CARD (A LITTLE 3" X 5" YELLOW CARD) ENCLOSED WITH THIS TESTER AND MAIL IT TO US. IF YOU FAIL TO DO THIS, YOUR INSTRUMENT IS NOT REGISTERED WITH US AND WE HAVE NO WAY OF KNOWING THAT YOU HAVE IT IN YOUR POSSESSION. IN CASE THE INSTRUMENT IS STOLEN, THIS REGISTRATION CARD MAY BE THE MEANS OF TRACING THE TESTER AND GETTING IT BACK FOR YOU. BECAUSE, WE KNOW YOU WANT SOME PROOF OF YOUR GUARANTEE, SO, WHEN WE RECEIVE YOUR REGISTRATION CARD, WE WILL SEND YOU A PROOF OF GUARANTEE CARD WHICH YOU CAN FILE OR CARRY WITH YOU.

DON'T FORGET TO INCLUDE THE MODEL NUMBER AND SERIAL NUMBER OF YOUR TESTER. THE MODEL NUMBER IS "502" AND THE SERIAL NUMBER WILL BE FOUND STAMPED DIRECTLY BELOW THE "PRIMARY VOLTS ADJUSTER" SWITCH AT THE BOTTOM OF THE PANEL.

WE ARE ALSO, FOR A LIMITED TIME, SENDING OUT TO ALL NEW SUPREME USERS, A 12" X 10" WINDOW POSTER WHICH TELLS THE WORLD IN NO UNCERTAIN TERMS THAT YOU OWN THE BEST TEST INSTRUMENT MADE AND THAT YOU ARE AFTER REPAIR BUSINESS, SO SEND YOUR REGISTRATION CARD TO US AND RECEIVE THIS FREE, ATTRACTIVELY COLORED WINDOW POSTER AND YOUR PROOF OF GUARANTEE CARD.

WHAT THE TESTER WILL DO

WE'VE BUILT A LOT OF TUBE TESTERS, BUT IT IS OUR BELIEF THAT THE TUBE TESTING CIRCUIT USED IN THE MODEL 502 IS THE BEST WE HAVE HAD. IT HAS (1) EMPIRICAL ELEMENTS (2) LEAKAGES BETWEEN ELEMENTS (3) OPEN CIRCUITS IN ANY ELEMENT (4) QUALITY TEST OF ALL ELEMENTS (5) QUALITY TEST OF EACH SECTION OF ELEMENT OR EACH PLATE OF DIODES OR FULL WAVE RECTIFIERS. YOU CAN'T GO WRONG WITH AS COMPLETE A TEST AS THIS.

THE PRINCIPAL CIRCUIT IS VERY EASY TO OPERATE AS THERE ARE ONLY FIVE BUCKS AND THREE SPECIAL SWITCHES TO OPERATE OTHERS THE REGULAR ELEMENT SWITCHES.

LET'S EXAMINE EACH TUBE TEST CONTROL SO THAT WE WILL UNDERSTAND ITS PURPOSE. THE CONTROLS FOR MULTI-METER USES WILL BE DISCUSSED LATER.

PRIMARY VOLTS ADJUSTER

FIRST OF ALL, LET'S LOOK AT THE CONTROL MARKED "PRIMARY VOLTS ADJUSTER" WHICH IS JUST BELOW THE METER. AS YOU KNOW, POWER COMPANIES TRY TO KEEP THE SUPPLY VOLTAGE CONSTANT AT ALL TIMES, BUT SOMETIMES THIS SUPPLY VOLTAGE VARIES A DOZEN OR MORE VOLTS DURING THE DAY. IF WE HAD NO METHOD OF COMPENSATING FOR THIS VARIATION, OUR TUBE TESTER READINGS WOULD BE ERRONEOUS. THEREFORE, WE INCLUDE A TAPPED PRIMARY POWER TRANSFORMER IN THE MODEL 502 WHICH CAN BE ADJUSTED UP TO THE LINE VOLTAGE AT THE TIME OF TEST. THE NUMBERS ON THE PANEL CORRESPOND TO THE LINE VOLTAGE TAPS ON THE TRANSFORMER, AND RUN FROM 100 TO 130 VOLTS, WITH AN "OFF" POSITION IF YOU DESIRE TO KEEP THE TESTER DIRECTLY CONNECTED TO THE LINE.

"LINE ADJ." SWITCH (ON LEFT EDGE OF PANEL)

THIS IS THE SWITCH USED IN "LINE ADJUSTING" THE TUBE TESTER. BY THROWING THE SWITCH TO THE "LINE ADJ." POSITION, THE METER IS CONNECTED AS AN A.C. METER. THE "PRIMARY VOLTS ADJUSTER" SWITCH IS THEN ADJUSTED UP TO THE LINE VOLTAGE AT THE TIME OF TEST. THE NUMBERS ON THE PANEL CORRESPOND TO THE LINE VOLTAGE TAPS ON THE TRANSFORMER, AND RUN FROM 100 TO 130 VOLTS, WITH AN "OFF" POSITION IF YOU DESIRE TO KEEP THE TESTER DIRECTLY CONNECTED TO THE LINE.

SOCKETS

YOU WILL NOTE SIX SOCKETS AT THE TOP OF THE PANEL. THERE IS NO CONFUSION, AS SOME SOCKETS, BECAUSE ONLY FOUR PRONG TUBE WILL FIT THE FIRST SOCKET, A FIVE PRONG TUBE THE SECOND SOCKET, ETC.

"FIL. VOLTS" SWITCH

TUBE FILAMENT VOLTAGES VARY FROM 1.5 VOLTS TO 25 VOLTS; THEREFORE, WE INCLUDE THIS "FILAMENT VOLTS" SELECTOR SWITCH SO THAT YOU MAY APPLY THE CORRECT FILAMENT VOLTAGE TO EACH TUBE TYPE. THIS SWITCH IS ALSO USED IN ELECTROLYTIC CAPACITANCE MEASUREMENT AS EXPLAINED LATER.

FILAMENT RETURN SELECTOR

ONE OF THE MOST AMAZING TESTER CIRCUITS BUILT OUT IN THE LAST FEW YEARS IS INCORPORATED IN YOUR TUBE TESTER. AS YOU KNOW, ALL FOUR PRONG TUBES HAVE THEIR FILAMENTS TERMINATING AT #1 AND #4 PRONGS. FIVE PRONG TUBES HAVE THEIR FILAMENTS TERMINATING AT #1 AND #5 PRONGS, AND SO FORTH, UP TO BUT NOT INCLUDING THE OIL OR EIGHT PRONG TUBES. HERE, FILAMENTS MAY TERMINATE AT THE #2, #6, #2 AND #7, #2 AND #8 OR, AS FAR AS THAT IS CONCERNED, A NEW TUBE MIGHT EVEN HAVE ITS FILAMENT TERMINATE AT ANY ONE OF ITS EIGHT PINS AND TOP CAP. THEREFORE, THERE ARE ALSO TUBES WITH CENTER TAPPED FILAMENTS, THE CENTER TAP BEING TERMINATED ON STILL A THIRD PIN.

TO FORESTALL ANY POSSIBLE TUBE TESTER OBSCURITY, SUPREME ENGINEERS HAVE DESIGNED THIS EXCLUSIVE FILAMENT SELECTOR CIRCUIT WHICH ALLOWS THE FILAMENT POTENTIAL TO BE APPLIED TO ANY TWO OF THE EIGHT PINS OR TOP CAP. IN CASES WHERE A TUBE HAS THREE FILAMENT CONNECTIONS, IT IS APPLIED HALF THE FILAMENT POTENTIAL TO EACH HALF OF THE FILAMENT BY CONNECTING THE FILAMENT HALVES IN PARALLEL.

THE "FILAMENT RETURN" SWITCH ARM IS CONNECTED TO ONE SIDE OF THE APPLIED FILAMENT POTENTIAL. BY ROTATING THIS SWITCH, ONE SIDE OF THE FILAMENT POTENTIAL IS CONNECTED TO ONE OF THE EIGHT PINS OR TOP CAP; ALSO, IT DISCONNECTS THAT PARTICULAR PIN CIRCUIT FROM ANY OTHER TEST CIRCUIT.
SWITCHES #1 TO #6 AND "T.C."

These switches are single pole, double throw types. The arm of each switch is connected to the tube base pin corresponding to the number under the switch. Switch #1 is connected to each #1 tube base pin on all the sockets. Switch #2 to all the #2 tube base pins, etc.

All the "up" sides of the switches are connected together and run to what might be termed the "anode" or "plus" side of the power supply. All the "down" sides of the switches are connected together and run to what might be termed the "cathode" or "minus" side of the power supply. (This is also the other side of the filament supply.)

The filament is a filament on any 4-tube type terminates at #1 and #6 pins. It is only necessary to turn the filament volts selector to #1 and leave the #4 switch in the normal "down" position as this is the "cathode" or "minus" side of the power supply, resulting in supplying the filament potential to the right tube base pins. By throwing any of these switches (connected to the various tube elements) to the "up" - "anode" - "plus" position, you connect those elements to the positive source of supply. As all the numbered and "T.C." switches normally should be kept in the "down" position, it is only necessary to turn the fil. volts selector switch to the number corresponding to one side of the filament and the other side will be connected automatically through the "down" connection of the switches.

"METER CIRCUIT SELECTOR" SWITCH

By supplying filament voltage to the right tube base pins and connecting one side of the filament to the "minus" side of the power supply (as well as any cathode or cathodes in the tube) and connecting the balance of the elements to the "positive" side of the power supply, a rectified current will be caused to flow through the meter, the amount of current being determined by the external resistance caused by the meter and the electron emitting ability of the cathode. A good tube will cause a certain amount of current to pass and a tube which is not so good would pass a relatively small current, etc. In other words, we measure the tube "conductance" to the flow of "electrons" - therefore, the term "electro-conductance" tester. There is much more to the theory of this test, but only sufficient information will be given here to enable you to basically understand the circuit.

Some tubes require a higher applied voltage than others and each tap on the "meter circuit selector" switch applies a different potential to the tube as well as connects the proper shunt and series resistors to the meter so that it will indicate correctly and cannot be damaged.

"QUALITY SEL." POTENTIOMETER

The "quality sele." potentiometer allows just the right amount of current to be passed by a good tube so that it will indicate in the "good" area of the meter scale. Tubes which are not as good as a truly good tube will result in the meter needle's not deflecting as far into the meter needle and a tube whose voltage or "bias" tubes will result in still less current flowing through the meter and a corresponding meter indication. The control is also used in ohmmeter tests as explained later on.

NEW SUPREME METER BY WESTINGHOUSE.

We believe that this new meter, built to our rigid specifications by Westinghouse, is the finest meter available on the market today. Within its price range, we believe it is the highest in precision and durability. We are not required to replace a negligible quantity. So, if you do not abuse your meter, it will give you years of satisfactory service. Of course, any meter can be damaged by dropping, jarring or overloading, so try to be as careful as possible.

METER SENSITIVITY

The meter incorporates into your Model 302 tube tester a sensitivity of 1000 ohms per volt of the other meter. A "H.A." movement.

If your meter needle does not rest at zero on the meter scale, it may be adjusted by slowly turning the bakelite screw (in the lower half of the meter case) in the proper direction.

NEON BULB

Directly above the meter may be seen the neon bulb, which is used for testing tube leakage. Some tube tester manufacturers advertise their testers as detecting tube leakage up to 25 megohms; however, the Radio Manufacturers' Association of which all tube manufacturers are members, definitely states that tube leakages above about 100,000 ohms are entirely permissible and will not harm the operation of the tube in any present radio circuit. Therefore, our tube element leakage circuit is limited to a value close to 100,000 ohms. This circuit also detects any direct shorts between tubes.

"TEST-NO." SWITCH

This switch, in the lower right corner of the panel, is to be thrown to the "test" position for a "quality" or "open element" test and to the "no" position for a tube "leakage" or "short" test.

TUBE CARD IN CASE OF TESTER (#7393)

This tube card gives you the proper connections and switches to throw, for about 78% of the replacement tube market.

TUBE BOOKLET (Also supplied)

This tube booklet gives you the proper connections and switches to throw, for all tube types up to the present writing. In the first portion of the booklet, a complete list of tubes, their base connections, and tube test settings are given. If a tube type is not
HUNDRED ADDITIONAL TUBE TYPES WHICH ARE IDENTICAL IN TUBE BASE CONNECTIONS AND TEST SETTINGS WITH SOME OTHER TUBE. A THIRTEEN SECTION GIVES A LIST OF RESISTANCE OR "GALLAST" TUBES WHICH ARE NOT ACTUAL RECEIVED TUBES, BUT ARE LISTED IN SAME ORDER. COVERED RESISTORS. ADDITIONAL TUBE DATA MAY BE OBTAINED FROM THE FACTORY, (ADDRESS "SERVICE ENGINEER", THE SUPREME INSTRUMENTS CORPORATION, GREENWOOD, MISSISSIPPI). IF A NEW CARD OR BOOKLET IS DESIRED, PLEASE ENCLOSE 15¢ FOR EACH.

POWER SUPPLY RATINGS

ABOUT 99% OF THESE TESTERS WILL BE USED IN CONNECTION WITH POWER SUPPLY POTENTIALS BETWEEN 100 TO 133 VOLS (THE RANGE WHICH IS LETTERED AROUND THE "PRIMARY VOLT ADJUSTER" CONTROL KNOB). TUBES SUPPLIED FOR OTHER POWER SUPPLY POTENTIALS ARE OF SPECIAL DESIGN AND THE "PRIMARY VOLT ADJUSTER" MARKINGS SHOULD BE INTERPRETED IN ACCORDANCE WITH THE FOLLOWING TABULATIONS.

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SPECIAL FREQUENCY RATINGS ARE ACCOMMODATED BY THE NECESSARY CHANGES IN TRANSFORMER CORE THICKNESS.

"6N6, 605, 6ES" SWITCH

THIS IS A SWITCH WHICH IS USED IN THE TEST OF "TARGET" TYPE TUBES SUCH AS THE 6N6, 605, 6ES, ETC., AS EXPLAINED IN THE TUBE BOOKLET.

POWER SUPPLY ADJUSTMENTS

LET US NOW MAKE THE NECESSARY POWER SUPPLY ADJUSTMENTS. FIRST, CONNECT THE A.C. PLUS OF THE TESTER TO A CONVENIENT A.C. OUTLET. THEN THROW THE "LINE ADJUST." SWITCH UPWARD AND WHILE HOLDING IT IN THIS POSITION, ROTATE THE PRIMARY VOLT ADJUSTER UNTIL A POINT IS REACHED AT WHICH THE NEEDLE WILL REST NEAREST THE CENTER MARKING OF THE METER SCALE. (CENTER OF ORANGE "O"). RELEASE "LINE ADJUST." SWITCH. IT SOMETIMES MAY NOT BE POSSIBLE EXACTLY TO CENTER THE NEEDLE, BUT THE GREATEST POSSIBLE ERROR IS LESS THAN 2% AT ANY SETTING WHICH WILL CAUSE NO APPRECIABLE ERROR IN TUBE TESTING. THE PRIMARY WINDING OF THE TRANSFORMER IS NOT MATCHED TO THE LOCAL POWER SUPPLY POTENTIAL AND WILL NOT REQUIRE RESETTING UNLESS THE POWER SUPPLY POTENTIAL VARIES.

PRELIMINARY ADJUSTMENTS TO ANY TUBE TEST

WE ARE NOW READY TO TEST A TUBE. FOR OUR FIRST TEST, LET US TRY AN OIA TUBE, AS THIS SHOULD BE AVAILABLE IN ANY SHOP.

PROCEDURE

LOOK AT YOUR TUBE CARD IN THE COVER OF YOUR TESTER. THE OIA TUBE IS LISTED THEREON. TUBES NOT LISTED IN THE CARD MAY BE FOUND IN THE TUBE BOOKLET. OBSERVE THE "F.A.S." COLUMN AND SET THE "FILAMENT VOLS." SELECTOR SWtCH TO THE INDICATED POSITION (1), OBSERVE THE "F.A.S." COLUMN AND SET THE "FILAMENT SELECTOR" SWITCH TO THE INDICATED POSITION (2). OBSERVE THE "QUAL." COLUMN AND SET THE "QUALITY SELECTOR" POTentiOMETER TO THE INDICATED SETTING.

LEAKAGE AND SHORT TEST

NOTE THE THREE COLUMNS (MARKED "F.A." TO "F.B." AND "F.A.S." UNDER "SWITCHES (up)" ON THE CARD OR IN THE TUBE BOOKLET. THE LETTER UNDER EACH NUMBER DENOTES THE MAJOR ELEMENT CONNECTED TO EACH CORRESPONDINGLY NUMBERED TUBE BASE PIN. ON THE OIA TUBE, F1 IS "F" OR FILAMENT, F2 IS "P" OR PLATE, F3 IS "F" OR GRID AND F4 IS "F" OR FILAMENT. THE SWITCHES WHICH SHOULD BE SUCCESSIVELY THROWN UP AND LEFT IN THE "UP" POSITION ARE SHOWN IN HEAVY, BOLD-FACE TYPE. IN THE OIA TUBE THESE SHOW AS "P" AND "F." THROW FIRST THE F2 AND THEN THE F3 SWITCH TO THE "UP" POSITION, LEAVING THEM IN THE "UP" POSITION, WHILE OBSERVING THE NEON LAMP. IN ORDER TO MAKE THE NEON LAMP RESPONSIVE TO PERMISSIBLE TUBE LEAKAGES ONLY AND TO PREVENT ITS RESPONDING TO RECTIFIED POTENTIALS, THE LAMP IS CONNECTED IN SERIES WITH A "BLOCKING"
CAPACITOR. WHEN OPERATING THE SWITCHES DURING THESE LEAKAGE TESTS, IT WILL BE OBSERVED THAT, ON SOME TYPES OF TUBES, MOMENTARY FLASHES OF THE NEON LAMP WILL BE SEEN AS THESE SWITCHES ARE OPERATED. DISREGARD THESE FLASHES. A LEAKAGE OR SHORT WILL BE DISTINGUISHED FROM A FLASH BY A STEADY GLOW OF BOTH THE INNER AND OUTER NEON DULB ELECTRODE. WHEN A LEAKY OR SHORTED TUBE IS CONNECTED TO THE TUBE, IT IS OFTEN NECESSARY TO TEST WHICH THE FIRST-ELEMENT IS SHORTED OR LEAKING. TO DO THIS, CONTINUE WITH THE BALANCE OF THE SWITCHES UNTIL ANOTHER SWITCH IS ENCOUNTERED WHICH, WHEN THROWN, RESULTS IN THE NEON LIGHT GOING OUT. THE SHORT OR LEAK IS BETWEEN THESE TWO ELEMENTS. IF NO OTHER SWITCH IS ENCOUNTERED, THE SHORT OR LEAK IS BETWEEN THE ELEMENT FIRST ENCOUNTERED AND THE TUBE’S FILAMENT OR CATHODE.


NOW, CONNECT THE SHORTING WIRE TO THE RESISTOR BETWEEN #2 PIN AND THE #1 OR #4 PIN (EITHER SIDE OF THE FILAMENT). THE NEON DULB WILL LIGHT ON #2, BUT NOT ON #3, SHOWING THAT THE SHORT OR LEAKAGE IS BETWEEN #2 AND THE FILAMENT. DO NOT OPERATE THE SWITCH CORRESPONDING TO THE OTHER SIDE OF THE FILAMENT AS THIS WILL SHOW A SHORT AT ALL TIMES, DESPITE REMOVING THE FILAMENT POTENTIAL FROM THE TUBE. IT IS ONLY NECESSARY TO THROW THE SWITCHES CORRESPONDING TO THE FIGURES IN HEAVY BLACK TYPE AND IN THE CASE OF TUBES WITH A CATHODE, THE CATHODE SWITCH OR AS EXPLAINED EARLIER. REMEMBER, A STEADY GLOW IS AN INDICATION OF A SHORTED OR LEAKY ELEMENT. SUCH TUBES SHOULD BE DISCARDED REGARDLESS OF THEIR "QUALITY" READING.

QUALITY TEST


IF IT IS DESIRED TO MAKE CLOSE COMPARISONS OF QUALITY BETWEEN TUBES OF THE SAME TYPE, SUCH AS WHEN MATCHING AMPLIFIER TUBES, THE 0 TO 100 SCALE SHOULD BE USED UNDER THE SAME PROCEDURE AND TUBES CHOSEN FOR THEIR ABILITY TO INDICATE MOST CLOSELY THE SAME DEVIATION.

OPEN ELEMENT TEST

CONSIDERING THE NUMBER OF TUBES MANUFACTURED, TUBES WITH OPEN ELEMENTS ARE VERY RARELY ENCOUNTERED. AN OPEN ELEMENT TEST WILL PROVE VERY HELPFUL IN SOME CASES AND THE TESTER CAN BE USED TO INDICATE THE ABSENCE OF AN OPEN ELEMENT IN A TUBE. GENERALLY, AN OPEN ELEMENT WILL CAUSE THE TUBE TO INDICATE "BAD" ON A QUALITY TEST, BUT, IF THE OPEN CIRCUITED ELEMENT IS LOCATED SOME DISTANCE FROM THE ELECTRON EMMITTING ELEMENT, IT MAY CAUSE A RELATIVELY SMALL VARIATION IN THE QUALITY READINGS. THIS IS NOT SURPRISING WHEN WE CONSIDER THAT, IN A QUALITY TEST, WE ARE TESTING THE ELECTRON EMMITTING ABILITY OF THE CATHODE, NOT THE CONDITION OF ITS OTHER ELEMENTS.

PROCEDURE

AN OPEN ELEMENT TEST SHOULD BE CONDUCTED DIRECTLY AFTER THE "QUALITY" TEST, WITH ALL SWITCHES AND CONTROLS SET FOR A "QUALITY" TEST, AND WITH THE "TEST-LS" SWITCH IN THE "UP" POSITION. EACH OF THE SWITCHES IS IN THE "UP" POSITION AND RETURNED TO THE "UP" POSITION WHILE WATCHING THE METER NEEDLE. IN EACH CASE, WHEN THE SWITCH IS THROWN TO THE "DOWN" POSITION, THE NEEDLE SHOULD DROP BACK SOMewhat AND WHEN THE SWITCH IS RETURNED TO THE "UP" POSITION, THE NEEDLE SHOULD REACH ITS FORMER POSITION. USING THE OIA TUBE AS AN ILLUSTRATION, THROW THE #2 SWITCH (OIA) TO THE "DOWN" POSITION AND RETURN TO THE "UP" POSITION. THE NEEDLE DROPS BACK A RELATIVELY SMALL AMOUNT.

IF, WHEN A SWITCH IS THROWN, THE NEEDLE DOES NOT MOVE BACKWARD, THE CORRESPONDING ELEMENT IS OPEN.

TESTING A CATHODE TYPE TUBE

IN TESTING CATHODE TYPE TUBES, DURING THE "LEAKAGE" TEST, DO NOT FORGET TO THROW ALSO TO THE "UP" POSITION THE SWITCH CORRESPONDING TO THE TUBE'S CATHODE AS WELL AS THE SWITCHES SHOWN ON THE TUBE LIST. THIS ALLOWS A LEAKAGE OR SHORT CHECK BETWEEN THE CATHODE AND HEATER WHICH IS A VERY POSSIBLE SOURCE OF SUCH TROUBLE. IF A TUBE HAS TWO CATHODES, THE SWITCHES CORRESPONDING TO EACH CATHODE SHOULD BE SUCCESSIVELY THROWN TO THE "UP" POSITION WHILE WATCHING THE NEON BULB. DO NOT FORGET TO RETURN IMMEDIATELY THESE SWITCHES TO THE DOWN POSITION. DO NOT LEAVE SWITCHES CORRESPONDING TO THE CATHODE OR CATHODES OF A TUBE, IN THE "UP" POSITION WHEN MAKING "QUALITY" TESTS AS YOU WILL NOT RECEIVE A CORRECT INDICATION AND, IN SOME Instances, WILL RESULT IN THE METER NEEDLE VIBRATING VIOLENTLY ABOUT ITS "ZERO" POSITION. USING A 27 TYPE TUBE AS AN ILLUSTRATION, LET US ILLUSTRATE THE ABOVE EXPLANATION.

SET THE PRIMARY VOLTAGE ADJUSTMENT, "FIL LAMPS SELECTOR," "FIL. RT. SEL," AND "QUALITY SELECTOR" TO POSITIONS AS GIVEN ON THE TUBE LIST. SEE ALL NUMBERED AND "10" SWITCHES AND SET THE "1000" "UP" AND "0" "DOWN." PROCEED TO THROW EACH OF THE "SWITCHES UP" SWITCHES TO THE "UP" POSITION, NOTING THE NEON BULB. LEAVE THEM IN THE "UP" POSITION. THEN THROW #4 SWITCH ("K") ON THE "SWITCHES UP" LIST, AND CATHODE IN THE TUBE TO THE "UP" POSITION, RETURNING IT TO THE "DOWN" POSITION AFTER NOTING WHETHER THE NEON BULB GLows IF THE BULB GLOws, A LEAKAGE BETWEEN THE NEON BULB AND FILAMENT AND SHOULD BE DISCARDED. FOR THE "QUALITY" TEST, MAKE SURE THAT THE "K" SWITCH OR SWITCHES, ARE IN THE "DOWN" POSITION AND PROCEED AS USUAL.
SLOW HEATING FILAMENTS

It has been found that some types of tubes of the filament or non-heater types have slow-heating filaments, requiring sometimes as much as two minutes to reach proper operating temperature. You should make allowances for such types which may appear doubtful when first tested, allowing about three minutes for the tube fully to heat before again taking a "quality" test.

THREE-HEATER PIN TYPE TUBES

Tube manufacturers offer several types of tubes such as the "6GS", "12A5", "12ZS", etc., which may be operated on either 12 volts or 6 volts, depending upon the connections to the heater filament. Such heaters are central tapped and this connection is brought out to a third heater pin on the tube base. By connecting the central tap to one side of the filament supply, only 3.3 volts potential and both ends of the filament to the other side of this potential, it is possible to check such tubes in this tester. In such cases, the "filament return selector" switch is placed in the numerical position corresponding to the tube's heater center tap, and both ends of the heater are connected to the other side of the filament supply by leaving their respective switches in the "down" position for all tests.

SPECIAL TESTS FOR TARGET TYPE TUBES

In order that such target type tubes as the "6ES", "605", "6ES", "6G5", "645", etc., be properly tested, a special switch is incorporated in this tester. This switch is to the right of the "quality selector" and should be thrown either to the "ES", "605" position or to the "ES", "645" position when testing target tubes, according to the instructions given on the tube list. The purpose of the switch is to connect the elements of the tube so the user will be able to observe the variations of the "tuning eye" angle and so determine whether the tube operates correctly. By moving the "fil. volts selector to some lower setting than normal, the angle of the eye can slowly become smaller and, returning this switch to its normal position should then restore the original angle of the eye. If this test has no effect on the angle of the "tuning eye", the tube should be discarded.

FULL WAVE DIODES, RECTIFIERS AND MULTI-ELEMENT SECTIONAL COMPARISONS

For the sake of simplicity from the customer's viewpoint, all anode elements of all tubes are paralleled on the tube card mounted in the cover. However, separate quality tests are available in the manual for multi-section tubes. Each plate of full wave rectifiers and each diode of diac-diode tubes. These tests in the tube booklet are differentiated from the "all" anode elements test by the code "DO" for a diode sectional test, "TR" for a triode sectional test, "PEN" for a pentode sectional test, etc. In diac-diode tubes, each triode section may be tested and there are given as "TR 1" and "TR 2," each plate of full wave rectifiers can be tested separately and these are shown as "RP" and "RP 3" etc. The number in this case referring to the numerical pin to which the individual plate is connected.

TOP CAP TUBES

On all tubes containing a "top cap", connect the top cap of the tube with the "top cap" pin jack in the upper left corner of the panel by means of the special connector provided.

FUTURE TUBES

The design of this tester is such that you can establish your own settings for tubes not listed on the "tube card" or in the "tube booklet", or for tube types which, because of manufacturers' variations or other causes, result in uniformly low or high readings for new, good tubes.

This procedure is not difficult and the results attained should be used until more authoritative settings are obtained from the factory. Information on new tube types is available by writing "service engineer", supreme instruments corporation, greenwood, mississippi, enclosing 15c.

Let us assume that a new tube type has been announced and that you have three new tubes of this type. One will suffice, but more accurate results will be obtained by testing three or more and averaging the results.

PROCEDURE

1. Connect the tester to a convenient power supply outlet and adjust the "primary volts adjuster" following the procedure as outlined previously.
2. Get a manufacturer's specifications sheet showing, filament, voltage, base connections, etc.
3. Rotate the "fil. volts" selector to the position corresponding to the tube's filament voltage rating. If this is not the "fil. ret. sel." to the position corresponding to one side of the filament (usually 11 for non-ocals and 77 for ocals), if the tube has a center tapped heater, set the "fil. ret. sel." to this position, making sure that the "fil. volts" selector is set to the voltage for the filament in parallel. If the voltage for the filaments in parallel is 6.6 volts, place the "test circuit" switch temporarily in the "G" position.
4. Place the "test-Ing" switch in the "Lkg" position, insert the tube and let it heat for about 10 seconds.
5. Now switch the base connections and start throwing to the "up" position each switch corresponding to all elements of the tube except the heater, filament or cathode pins. Watch the neon diud for leakages.
6. Throw to the "up" position and return to the "down" position all switches corresponding to the cathode or base of the tube. Watch the neon bulb for leakage indications. If the tube appears to be free of leakages, or shorts, throw the "test-Ing" switch to the "test" position and rotate the "quality selector" control so as to obtain a reading of 77 on the meter. If the needle cannot be so adjusted, vary the "circuit selector" and quality selector until this is accomplished.
10. RECORD THE SETTINGS ON A PIECE OF PAPER AND FOLLOW THE SAME TEST FOR A FEW ADDITIONAL TYPES OF THE SAME KIND.

11. DIVIDE THE TOTAL OF THE "QUALITY SELECTOR" SETTINGS BY THE NUMBER OF TUBES TESTED TO OBTAIN AN AVERAGE "QUALITY SELECTOR" SETTING.

12. enter these settings in the tube list booklet under the proper columns, recording the type of element in the switches up column as we have printed them for present type tubes, circling the figures corresponding to the switches which should be thrown up for a quality test.

BRAND VARIATIONS

While standard transconductance 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 a 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. Consequently, when using ordinary 45-volt A batteries, one brand may test 56 volts while another may test 52 volts when new. The mere fact that one brand of tubes may test lower than another does not mean that the tubes are necessarily inferior to the others so long as both brands equal or exceed rated values of transconductance. We do not say that a brand of 45-volt batteries which tests 52 volts when new is necessarily better than a brand which tests 47 volts when new, because we know that there is a time element involved when both brands are subjected to the same service over a period of time. One which originally tested 52 volts may then test 40 volts whereas the battery which originally tested 47 volts may then test 56 volts. Thus, the test limits established by the tester represent average values as between brands, and whenever a brand is encountered in which certain types of new tubes test either "off scale" or below the "good" sector of the meter, the user should establish his own "quality test selector" settings for these types of tubes by following the procedure outlined herein under the paragraph for "future tubes".

GASEOUS TUBES

In the course of the development of this tester, it was deemed more important to provide facilities for indicating leakages and short-circuited conditions between all elements of all tubes than to provide a gas test for amplifier types of tubes. Both tests could not be provided without seriously complicating the operation of the tester. Furthermore, there are many instances of gaseous content so that the usual gas test of a tube tester has very little meaning in practice. When certain tubes, excepting gaseous detectors such as the type 100-A and mercury vapor rectifiers such as the type 2C and 85, become gaseous as to cause a purple glow between the elements during normal operating conditions, the tester will usually test low on the regular "test" card of the tester. Purple spots or irregular figures, which vary or come and go with signal intensity variations, are sometimes observed on the inside surface of the glass envelope of such tubes, but these are quite natural and should not be interpreted as an internal gaseous condition unless there be distortion or an unnatural hissing noise generated by the tubes.

KELLOGG TYPE TESTS

The Kellogg types 401 and 403 have top heater terminals, and it will be necessary to connect the top heater terminals with suitable conductors to the filament contacts of one of the unoccupied tubes in the socket of these tubes in the 4-hole socket plug. A special adapter for testing those obsolete tube types may be obtained from the Alden Products Company, 715 Center Street, Brockton, Massachusetts.

LOAD POTENTIALS

All of the transformer potential values applied to the filament and other circuits of tubess which are subjected to tests in this tester are necessarily based on no-load conditions because each tube imposes a different load on each other tube imposed upon the tester, the applied potentials may be expected to drop somewhat from the nominal values, but this condition should not be confounded because the test data on the "tube list" card is based on actual load conditions.

TUBE TESTER ACCURACY

The standard preferred test of amplifier types of tubes is known as the mutual conduction test, which involves laboratory equipment for measuring mutual conduction in terms of microamperes of specified D.C. potentials applied to the tubes. Obviously, such elaborate equipment is impractical for field use because of the complexity of the "set-up" for each type of tube, and because of the prohibitive cost of such equipment. Any departure from such equipment necessitates some compromise in practicality for the sake of simplicity of operation and lower unit cost. The practical radio dealers and the professional radio men feel that an investment of $50.00 which produces an accuracy of 94% is more profitable than an investment of $300.00 in an effort to obtain an accuracy of 99%, in addition to the greater simplicity and customer comprehension of the lower priced tester. An unusually high degree of simplicity of operation in a comprehensive test by reason of the fact that all tubes are tested under approximately full rated-load conditions, and a fixed ratio is automatically maintained between the tester circuit resistance and the effective internal resistance of each tube which is subjected to the test. The user of this tester, or of any other tube tester that anywhere in the "bad" test boxes of the meter scale and a "good" or very "good" tube may test anywhere in the "good" sector of the meter scale, the final verdict as to whether a tube is satisfactorily operable is whether or not the tube operates satisfactorily in an operational radio and, even with such a simple, practical and apparently conclusive
MULTIMETER FUNCTIONS OF THE MODEL 502

Having given you all the information on the tube testing functions of the Model 502, let us now explain its multimeter functions and ranges.

You will find that the "Meter Circuit Selector" has not only 7 lettered positions, but also has 4 additional positions, marked "D.C. Vols," "A.C. Vols," "Ohms," and "Electrolytic." These correspond to the multimeter functions of the tester. You will note that the "Quality Sel." switch is also marked "Zero Ohms" and this control is used in ohmmeter measurements as explained later.

The "A.C. Vols." switch is located second from the left along the bottom edge of the panel. This switch is used in A.C. volt measurements and, for Canadian users only, it is used in megohms and electrolytic and electrolytic tests.

The "D.C. Vols." switch which is third from the right along the bottom edge of the panel, is used in megohms and "Ohms" tests as explained later.

There are nine pin jacks on each side of the panel. Starting from the top on the left side, the first two pin jacks are used in electrostatic capacity leakage measurements, the next five pin jacks are used in both A.C. and D.C. voltage measurements. The bottom pin jack in this group of five is used as common (negative) in D.C. volt measurements and is used in conjunction with one of the other four pin jacks according to the range desired—"as explained later." Above the top pin jack, we have two jacks marked "+" and "-" and either pin jack may be used for a top cap connection during tube tests. The next three pin jacks are associated with the megohms measuring function. The last four pin jacks are associated with the ohms measuring circuits.

In this section we have explained the balance of the controls, switches and pin jacks which are used for multimeter functions.

TEST LEADS

Now let us make some actual measurements using each function of the tester. To do this it is necessary to obtain a set of test leads with pointed ends which will fit into the pin jacks.

We did not supply test leads with this tester because we felt that most servicemen had one or more sets of leads already and therefore we dropped the price of the tester by the cost of the leads and passed the saving on to you. If, by chance, you do not have a suitable set of test leads, they may be obtained from us by using the attached accessory parts order.

D.C. VOLTS MEASUREMENTS

It is suggested that the simple tests as given in this operating data be made, following the directions given, so that you will become fully familiar with your test instrument.

For the first D.C. volt measurement, obtain a small 4½ volt "C" battery or some other like unit as we are going to measure its potential.

PROCEDURE

Place the "Meter Circuit Selector" in the "D.C. Vols." position. See that all toggle switches along the bottom of the panel are "Down." Place a set of leads in the "Volts" and "7" pin jacks. Connect the other end of the lead (running to the "Volts" pin jack) to the minus post on the 4.5 volt battery and the other end of the other lead to the plus post on the battery. The meter needle should now deflect to some position to the right of center scale. Find the 0 to 7 scale on the meter and note where the needle deflects with respect to this scale. As each division denotes 0.5 volt, if the needle rests at the third indication past 4½, the battery's voltage would register as 4.5 volts.

Do not try to make measurements of any one voltage, current or resistance on more than one battery at a time or the same test may be given the same answer. Always make your measurements on the range which results in the meter needle deflecting further yet without going off scale.

Likewise, when the approximate voltage is not known, it is always good practice to set the selector control to the highest range and then back it down until a suitable range is found.

For the second D.C. voltage measurement obtain two 4½ volt batteries and hook them up in series. Place the "Meter Circuit Selector" on D.C. volts and place the battery around 50 to 100 volts. A "C" supply of any receiver will probably prove satisfactory if you make your connection between screen grid and cathode of a screen grid tube.

PROCEDURE

Disconnect leads from 4.5 volt battery. Change test lead from "7" pin jack to "100" pin jack. Connect other end to plus side of battery. Connect other lead running from "Volts" pin jack to minus side of other battery. Connect open plus and minus post on each battery together, leave all other connections as is.
The needle should now deflect to some point to the right of center scale. (If the "B" batteries are fresh), find the 0 to 140 scale on the meter (lowest scale) and note where the needle rests with respect to this scale. As each scale division now indicates 4 volts, if the needle rests at the third division after 90 volts, it indicates that the voltage measured is 92 volts.

For the next Dc volts test use a potential around 250 volts (the voltage applied to the average output tube's plate will suffice). Change the test probe in the "140" pin jack to the "250" pin jack. Connect other ends of leads across potential to be measured. Leave everything else as is. Observe polarity when connecting test leads to voltage under test. Read voltage on 0-500 scale (bottom scale).

For the last Dc volts range, a high voltage source of supply should be used, if available, around 500 volts. All connections remain the same except that the lead in the "250" pin jack should be changed over to the "1000" pin jack.

A.C. Volts Measurements

A.C. volts measurements are made exactly the same as Dc volts except that (1) no polarity of the test leads need be observed (2) the meter circuit selector switch should be rotated to the "A.C." position and (3) after all connections have been made, the "A.C." volts momentarily put the switch should be in the "A.C." volts position. The reading taken and the switch released before breaking or changing any connections. This last sentence is important so please read it again.

To allow a normal Dc movement meter to register A.C. volts, a small copper oxide rectifier is used which converts the alternating current to direct current. The average A.D. meter of this type uses what is known as an off-set or staggered scale, the scale being non-linear or curved at one end and very difficult to read. Supreme engineers have given you in the Model 502 Tube Tester a perfectly linear A.C. volts scale and this is accomplished by the use of small drop out paralleled with the usual series dropping resistors at the instant a voltage is applied to the meter circuit, the condensers are completely charged and have a negligible resistance to the flow of current being connected in parallel with the normal series dropping resistors, they act as a short across these units and, for the instant it requires to charge them, allow a relatively large current to pass through the rectifier. These copper oxide rectifiers are perfectly satisfactory under normal usage, but they will not stand more than about twice overload and if a heavy current is allowed to pass through them, usually increase in resistance which results in lower voltages being indicated than correct. To safeguard the rectifier and the tube and the engineers have incorporated a shorting switch across the input to the rectifier which, in its "normal" position, remains closed. This bypasses any damaging instantaneous surges and allows the condensers their moment to charge up. The safety switch may then be opened without harm to the rectifier. So, when you use this switch, remember that it was placed there for your protection and never press the switch before you have all your A.C. voltage connections made, releasing the switch before changing range or removing leads. If your meter suddenly reads all A.C. voltage measurements 30 to 50% low, you can be sure that on some previous A.C. voltage test you failed to follow the foregoing precautions.

The 7 volt A.C. voltage range may be tested by connecting it across the filament of an A.C. supplied 12 volt tube. Remember that tube filament potentials usually read somewhat lower than specified especially in the smaller, cheaper sets.

The 140 volt A.C. potential range may be tested by connecting it across your 110 volt A.C. house supply, keeping in mind the fact that, in some communities, this voltage may vary from as low as 95 volts at some hours of the day to as high as 135 volts. A condition as 0/0 as this should be remedied as house supply voltages should not vary more than about 5 volts plus or minus 115 volts.

The 300 and 1400 A.C. volt ranges can be tested by connecting the tester first across one side of the plate supply winding of a receiver's power transformer putting out about 250 V.D., and then from plate to plate of the rectifier tube.

Resistance Measuring Ranges

There are a total of five resistance measuring ranges - 200 - 2000 - 20,000 - 2 meg, and 20 meg. The first three ranges utilize an internal 1.5 volt battery which should be replaced when the meter needle will no longer zero adjust as explained later. To replace the battery, merely remove the screws holding the panel and carefully remove the instrument from its case, bringing the battery into view. The 2 meg, and 20 meg, ranges require an outside source of line supply from an ordinary house outlet. An internal power supply transformer and rectifier are used to rectify the house voltage and supplies about 45 volts for the 2 meg range and 450 volts for the 20 meg range. So when using these two ranges it is necessary to plug the A.C. line cord into a conventional A.C. outlet.

20 Ohms Range

By utilizing a unique circuit, supreme engineers have devised a low ohms range in this model 502 which measures resistance values down to 0.1 ohm. This makes the tester invaluable for checking the resistance of speaker voice coils, R.F. coil B and small A.C. chokes. For our first test we will require a loudspeaker voice coil of low resistance.
PROCEDURE

Set the "METER CIRCUIT SELECTOR" to "OHM". Place the test leads in the "OHMS" pin jack and the "200" pin jack. Make sure the "OFFSET-OMHS-OMHS" toggle switch is in "OHMS" position. Short the other ends of the test leads together which will result in the meter needle deflecting to some point around full scale. Adjust Zero Ohms Adjuster until meter needle rests over zero on "OHMS" scale. Shorting the test leads will not affect the VOM readings. The basic ohms scale is from zero to 10000 ohms or actually "INFINITY" which is represented by a star "*" symbol located at the far right of the "20" mark. This basic scale should be divided by 10 for readings taken on the 200 ohm range. If the needle deflects to "0" on the scale, dividing by 10 results in an actual ohms reading of 3 ohms. If the needle deflects to "50" on the scale, dividing by 10 results in 0.5 ohms reading. The first division from zero is 0.1 ohms, second division 0.2 ohms, etc. If, when making the above loudspeaker test, the needle should deflect to the second division to the right of "10" on the scale, the resulting reading would be 180 ohms. Remember that this is the voice coil's ohms. Another thing which is quite another thing, necessitating much more complex measuring instruments, it is suggested that resistance up to about 10 ohms be tested on the 200 ohm range, and resistance above 100 ohms should be tested on the next higher, or 2000 ohms range.

2000 OHMS RANGE

For this range we will test a resistor having a value of about 40 ohms.

PROCEDURE

Leave "METER CIRCUIT SELECTOR" in the "OHMS" position. Shift test lead from "200" pin jack to "2000" pin jack. Leave "OFFSET-OMHS-OMHS" switch in "OHMS" position. Short test leads together at free ends and vary zero ohms adjuster until meter needle rests over zero on "OHMS" scale. Release short and apply test leads across resistor to be tested. Note meter needle position with respect to ohms scale and read on ohms scale directly. If needle deflects to "40" on ohms scale, resistor's resistance is 40 ohms. If needle deflects to 200 ohms, as each scale division between "20" and "200" represents 2 ohms (on this range), needle deflection to second division to the right of "50" on ohms scale will indicate a resistance of 40 ohms. Resistors above 100 ohms and below 2000 ohms should be tested on the next range (20000 ohms).

20000 OHMS RANGE

For this test we will check a 500 ohm resistor.

PROCEDURE

Keep the "METER CIRCUIT SELECTOR" in the "OHMS" position. Shift test lead from "200" pin jack to "20000" pin jack. Keep "OFFSET-OMHS-OMHS" switch in "OHMS" position. Short leads together at free ends and vary zero ohms adjuster until meter needle rests over zero on "OHMS" scale. Release short and apply test leads across resistor to be tested. Multiply indication on meter by 10 (add one zero). I.e., if needle deflects to 50, multiplying by 10 would give actual resistance of 500 ohms. If the needle deflects to the third indication past 500 (5000 ohms) as each division between 70 and 50 equals 50 (500 ohms) the actual resistance would be indicated as 650 ohms.

For all resistance measurements from 2000 to 100,000 ohms use the 2 megs range.

2 MEGS RANGE

For our 2 megs range test let us choose a value of resistor around 50,000 ohms.

PROCEDURE

Plug the A.C. cord into a convenient supply outlet as this range uses the internal "B" pack. Leave the "METER CIRCUIT SELECTOR" switch in the "OHMS" position and one in the "2" pin jack. Think "OFFSET-OMHS-OMHS" switch in "OHMS" position. Short free ends of test leads together and vary zero ohms adjuster until meter needle rests over zero on the meter scale. Release test leads and apply across resistance to be tested. Note where needle rests with respect to ohms scale and multiply result by 1000 (add three zeros to result). I.e., if meter needle deflects to "500" (2000 ohms) on ohms scale, multiplying by 1000 (adding three zeros) results in an actual resistance reading of 200,000 ohms. As each division on ohms scale equals 50 (500 ohms) as each division between 60 and 50 equals 50 (500 ohms) the actual resistance reading would be 450,000 ohms.

For all resistance values between 100,000 ohms and 2 megohms, use the 2 megohms range.

20 MEGOHMS RANGE

For our 20 megohms test let us test a resistor having a value around 500,000 ohms.

PROCEDURE

Leave A.C. supply plug in socket. Leave "METER CIRCUIT SELECTOR" in "OHMS" position. Leave "OFFSET-OMHS-OMHS" switch in "OHMS" position. Leave one test lead in "MEGOMHS-OMHS" pin jack and plug the other lead in "METER JACK". Short leads together and rotate zero ohms adjuster until meter needle rests over zero on ohms scale. Canadian users will find that for this range it is also necessary to throw the "A.C. VOLS" switch to the "A.C. VOLS" position before the internal voltage is applied to the circuit and the needle indicates. After zero adjusting circuit, release short and apply across resistor to be measured. Note meter needle deflection and multiply result by 10,000 (adding four zeros), i.e., if the meter needle deflects to "50" on the ohms scale, multiplying by 10,000 (adding four zeros) would result in an actual...
RESISTANCE OF 500,000 OHMS. IF THE NEEDLE DEFLECTED TO THREE DIVISIONS PAST "70", AS EACH DIVISION BETWEEN "50" AND "50" IS EQUAL TO 5 OR 30,000 OHMS, THE ACTUAL RESISTANCE WOULD BE 650,000 OHMS.

RESUME OF POINTS TO REMEMBER WHEN MAKING RESISTANCE TESTS.

1. THE A.C. PLUG SHOULD BE CONNECTED TO CONVENIENT SOCKET WHEN MAKING 2 AND 20 MEG OHM TESTS AND THE "MEGOhm" Switch In The "MEGOhm" Position.
2. For the 200, 20,000, 2,000,000 OHM RANGES USE THE "200", "20k", and "20M" PIN JACKS RESPECTIVELY.
3. For the 2 AND 20 MEG OHM RANGES USE THE "MEGOhm" PIN JACK AND THE "2" AND "20" PIN JACKS RESPECTIVELY.
4. ALWAYS ZERO ADJUST EACH RANGE BEFORE USING IT. IF YOU ARE USING ONE RESISTANCE RANGE AND WANT TO CHANGE TO ANY OTHER RESISTANCE RANGE, ALWAYS ZERO ADJUST THE OTHER RANGE BEFORE ATTEMPTING TO MEASURE WITH IT.
5. CANADIAN USERS WILL HAVE TO THROW THE "A.C. VOLS" TOGGLE SWITCH TO "A.C. VOLS" POSITION WHEN MAKING TESTS. THIS IS A REQUIREMENT OF THE CANADIAN HYDRO COMMISSION.
6. WHEN TESTING THE RESISTANCE OF ELECTROLYTIC CONDENSERS ALWAYS OBSERVE POLARITY BY CONNECTING THE "PLUS" SIDE OF THE CONDENSER TO THE "OHMS" PIN JACK.

ONE RESISTANCE VALUE WILL ORDINARILY TEST THE SAME ON ANY TWO RANGES. THIS IS ALSO TRUE OF VOLTAGE AND CURRENT RANGES. WE GIVE BELOW THE PROPER RANGES TO USE FOR VARIOUS RESISTOR VALUES SO AS TO GET THE MOST ACCURATE RESULTS.

For 0-10 OHMS USE THE 0/200 OHM RANGE
For 10-100 OHMS USE THE 0/20 OHM RANGE
For 100-2,000 OHMS USE THE 0/200 OHM RANGE
For 200-100,000 OHMS USE THE 0/20 MEG OHM RANGE
For 100,000-50,000,000 OHMS USE THE 0/20 MEG RANGE.

OUTPUT MEASUREMENTS

DUE TO THE UNUSUAL A.C. VOLTAGE CIRCUIT INCORPORATED IN THE MODEL 502, THE A.C. VOLTAGE FUNCTION AND RANGE MAY BE USED FOR MAKING OUTPUT MEASUREMENTS. THE PROCEDURE IS EXACTLY THE SAME AS WHEN MAKING A.C. VOLTAGE MEASUREMENT. THE OUTPUT LEADS ARE CONNECTED TO THE LOUDSPEAKER VOICE COIL (1) THE SECONDARY OF THE OUTPUT TRANSFORMER, (3) THE PRIMARY OF THE OUTPUT TRANSFORMER OR (4) BETWEEN THE OUTPUT TUBE'S PLATE AND FILAMENT, CATHODE/GROUND OR CHASSIS. THE READER SHOULD NOT ATTEMPT TO MAKE ANY SUCH OUTSIDE LEAKAGE TEST.

OUTPUT METERS REQUIRE AN EXTERNAL FIXED CAPACITOR IN SERIES WITH ONE LEAD. THIS IS RENDERED UNNECESSARY IN THE MODEL 502 BY REASON OF THE INTERNAL CIRCUIT WHICH INCORPORATES A SERIES CAPACITOR AT ALL TIMES.

ALWAYS PULL THE "A.C. VOLS" SWITCH UNTIL ALL CONNECTIONS ARE MADE AND TO REPLACE THE "A.C. VOLS" SWITCH BEFORE ANY CONNECTIONS ARE BROKEN.

ELECTROLYTIC FILTER CAPACITOR LEAKAGE MEASUREMENTS

The MODEL 502 ALLOWS THE TESTING OF ELECTROLYTIC FILTER CAPACITORS FOR LEAKAGE. THIS IS READ ON THE "GOOD CAPACITOR - BAD CAPACITOR" ENGLISH READING METER SCALE.

Let us try testing an electrolytic filter capacitor having at least 450 WORKING VOLT RATING. INASMUCH, THEY ARE RELATIVELY SMALL CAPACITORS USED HAVING LESS THAN 400 W.S. RATING, NO PROVISION HAS BEEN MADE TO TEST THESE LOW VOLTAGE FILTER CAPACITORS. IN GENERAL IT IS GOOD PRACTICE MERELY TO REPLACE THESE LOW VOLTAGE-HIGH CAPACITY CAPACITORS IF THEY ARE SUSPECTED OF BEING DEFECTIVE.

PROCEDURE FOR TESTING LEAKAGE OF 450 W.V. OR OVER CAPACITORS

TEST THE CAPACITOR FOR A DIRECT SHORT. USING THE REGULAR "OHMETER" PROCEDURE. FOR THIS YOU ROTATE THE SELECTOR CIRCUIT SELECTOR TO THE "200 OHM" POSITION AND CONNECT LEADS TO THE "200 Ohm", "20M" PIN JACKS AND SEE THAT "MEGOhm" Switch Is IN "OHMS" Position. ZERO METER READING. LEAD CONNECTED FROM "Ohm" PIN JACK TO "PLUS" SIDE OF ELECTROLYTIC FILTER CAPACITOR AND LEAD CONNECTED FROM "200 Ohm" PIN JACK TO "MINUS" SIDE OF ELECTROLYTIC FILTER CAPACITOR. IF CAPACITOR IS SHORTED, NEEDLE WILL FULLY DEFLACT. IN THIS CASE, REPLACE CAPACITOR WITHOUT FURTHER TEST. IF CAPACITOR IS NOT DEEMED TO BE SHORTED, PROCEED WITH NEXT TEST.

CONNECT SUPPLY PLUG OF TESTER TO CONVENIENT OUTLET. SET "METER CIRCUIT SELECTOR" TO THE "ELEC" POSITION. CONNECT "ELECTRICITY PLUS" PIN JACK WITH TEST LEAD TO "PLUS" SIDE OF ELECTROLYSTIC FILTER CAPACITOR AND ELECTRICITY MINUS PIN JACK WITH TEST LEAD TO "MINUS" SIDE OF ELECTROLYSTIC FILTER. SET "ELEC CAP" SELECTOR SWITCH TO THE CLOSEST CAPACITY VALUE MARKING (IN OUTERFING OF FIGURES AROUND SWITCH) CORRESPONDING TO THE CAPACITIVITY VALUE UNDER TEST. YOU WILL NOTICE THAT THIS SWITCH USES 11 CONTACTS FOR ITS "FIL VOLS" FUNCTIONS. THESE ARE 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11. "FIL VOLS" FUNCTION USES 7 CONTACTS STARTING WITH 1 MFD. Opposite 2.4, 6.8, 10 AND 12 MFD. THESE ARE THE FIGURES YOU SHOULD USE FOR YOUR "ELECTRICITY" TEST. ANY CAPACITOR BELOW 1.5 MFD SHOULD BE TESTED ON THE 1 MFD. POSITION, ANY CAPACITOR BETWEEN 1.5 AND 3 MFD. SHOULD BE TESTED ON THE 2 MFD. POSITION, ANY CAPACITOR BETWEEN 3 AND 5 MFD. SHOULD BE TESTED ON THE 4 MFD. POSITION ETC.

AFTER SETTING THE "ELEC CAP" SELECTOR TO THE PROPER POSITION, THE NEEDLE SHOULD DEFLACT TO SOME READING ON THE "BAD CAPACITOR - GOOD CAPACITOR" SCALE. IF THE READING FALLS WITHIN "BAD" AREA, THE CAPACITOR HAS AN OBJECTIVE LEAKAGE AND SHOULD BE DISCARDED. IF THE READING FALLS WITHIN THE "GOOD" AREA, THE CAPACITOR IS STILL OPERABLE AND SHOULD BE RETAINED. DISCONNECT ALL LEADS FROM PANEL AND DISCHARGE CAPACITORS.

CANADIAN USERS MUST THROW "A.C. VOLS" SWITCH TO "A.C. VOLS" POSITION WHEN MAKING THIS TEST. THE SWITCCH HAS BEEN SOLDERED IN THE "ELECTRICITY LEAKAGE" MEASURING CIRCUIT TO COMPLY WITH CANADIAN HYDRO COMMISSION SPECIFICATIONS.

ELECTROSTATIC CAPACITOR LEAKAGE MEASUREMENTS

NO POLARITY NEED BE OBSERVED AS TO CONNECTIONS TO THE PIN JACK TERMINALS MARKED "ELECTROSTATIC". ELECTROSTATIC (PAPER AND NICA) CAPACITORS ARE TESTED ON THE NEON BULB FOR
LEAKAGES

PROCEDURE

Rotate "Meter Circuit Selector" to "Elect." position. Connect capacitor under test by means of leads to the "Electrostatic" pin jacks. Observe indication on neon lamp. If neon lamp does not glow momentarily, the capacitor is open and should be discarded. If the neon lamp glows intermittently, that is, the glow begins and goes at regular intervals, the capacitor is leaky and should be discarded. The interval of time between each glow will be determined by the capacity of the capacitor and by the amount of its leakage. If the neon bulb glows continually on one element, the capacitor is shorts and should be replaced. If the neon bulb glows momentarily and then indefinitely remains unilluminated, the capacitor is good and should be retained. This momentary glow may not occur at the instant the capacitor is connected.

Canadian users will have to press the "A.C. Volts" switch when making this test. This switch is incorporated to pass Canadian Hydro Commission regulations. So that open capacitors may be shown as such, it is suggested that Canadian users press the "A.C. Volts" switch before connecting a capacitor across the "Electrostatic" pin jacks. This will charge the internal capacitor and will prevent the glow resulting from the charge of the internal capacitor from giving a false reading on an open capacitor. When the capacitor is connected to the proper pin jacks, the "A.C. Volts" switch should again be pressed and, if the capacitor is open, the no glow will occur. If the capacitor is good it will result in a momentary flash, etc.

MISCELLANEOUS SUGGESTIONS

It is beyond the province of this operating data to include an actual test procedure for radio servicing work or any diagrams or information on actual receivers, their L.F. peaks, voltages, currents, etc.

For the serviceman who is just starting in the business or for students who desire a good foundation of the theory and practice of radio in general, we can recommend Mr. Alfred Ghirardi's "Radio Physics Course." For those who desire definite information in radio service work, let us suggest Mr. Ghirardi's "Modern Radio Servicing" and "Radio Field Service Data," two excellent, practical books. There are also several available books on specific radio subjects such as resistance, a.c. voltage, automatic volume control, etc., written and published by Mr. John Rider. We can recommend these as well as "Servicing Superhet-"" and "The Cathode Ray Tube at Work" by the same author.

Many servicemen write us about receiver diagrams. We believe that there is no better or more complete source of information on receiver circuits, constants, service data, etc., than "Rider's Manuals," a series of seven volumes which should be on every serviceman's shelf.

The books as recommended by us above are, in our estimation, vital to your successful development. We do not sell them, but we know they are all obtainable from your local jobber or from the publishers:

John F. Rider, 1440 Broadway, New York, N. Y.
Radio & Technical Publishing Company (Alfred Ghirardi)
45 Astor Place, New York, N. Y.

These are many other books which may prove interesting and worth studying. These are listed below:

"Elements of Radio Communication" - John H. Morecroft
"Experimental Radio Engineer" - John H. Morecroft
- John Wiley & Sons, Inc.
- 440 West 4th Avenue, New York, N. Y.

"Sound Motion Pictures Recording and Reproduction"
"Servicing Sound Equipment"
"Public Address Systems"
- By James R. Cameron
- Cameron Publishing Company
- Woodmont, Conn.

"Projection Sound Pictures" - Aaron Nadell
- Macgraw Hill Publishing Company
- 330 West 42nd Street
- New York, N. Y.
TRANSPORTATION DAMAGES

The office of origin of the transportation agency which accepted this tester for the original shipment assumes all external and concealed damages in transit. If the tester is received in a damaged condition, or if some part of the tester is damaged in transit, the user of the tester should ask the transportation agency which delivered the tester, for a concealed damage report, which should be forwarded to the factory, with the return registration card, for factory instructions as to the procedure which should be followed. In cases of necessary repairs or replacements, if the destination office of the transportation agency refuses to furnish a "concealed damage report" that fact should be reported in a letter to the factory with the return of the registration card.

SUPREME SERVICE STATIONS

For the purpose of effecting prompt repair of damages sustained by inadvertent misuse, or for any other reason, the addresses of the Supreme Service stations may be obtained from the Supreme Factory offices. If it should be necessary to ship a tester to the factory or to a service station, the shipment should be made via express - never via parcel post - and a letter should be written and forwarded separately advising of the shipment and including complete instructions as to the desired handling and disposition of the merchandise; otherwise, the merchandise will be refused by the consignee.

If a separate letter is received by the factory, ahead of the tester's arrival, the proper acceptance forms will be made out by the factory, the tester will be received and usually repairs will be effected at once and the tester re-shipped. If the tester is not received within the 90 day guarantee period, repairs will be made up to $50.00 without sending the user an estimate unless we receive specific instructions to send an estimate in any case.

If the necessary repairs total more than $50.00, an estimate will be sent in any case, unless the factory has received specific instructions to repair the tester regardless of cost. When the user sends his registration card to the factory within 10 days after receipt of the tester, he will be furnished with a pocket size "Guarantee Card" which should be included with the tester shipment to either the factory or an authorized Service station if the tester is still within the 90 day period.

If the tester is desired at the factory or a service station by a customer having a "Guarantee Card" and including same in the shipment and the guarantee is found to be still in effect, the factory or authorized service station will make the repairs in accordance with the guarantee policy herein stated and will return the tester to the user without charge with the insertion of (1) an instrument rectifier replacement (instrument rectifiers are not guaranteed) and (2) transportation charged which must be borne by the customer. Our service stations are not authorized to make no-charge repairs on Supreme testers unless the "Guarantee Card" furnished the user by the factory upon return of the user's registration card accompanies the tester and the tester is returned before the expiration of the 90 day period.

All disputes regarding repair charges should be referred to the "Service Engineer" at the factory.

REPLACEMENT PARTS, ETC.

If some part of the tester is damaged in service, or if the user should want to order circuit drawing, analysis charts, test leads, or other accessories, the user should correspond with the "Service Engineer" at Greenwood, Mississippi, at once. If an order is accompanied by a deposit which does not cover the cost of the merchandise and transportation charges, the shipment will be made via express C.O.D. for the balance due. A list of replacement parts may be obtained upon request.

INSTRUMENT RECTIFIERS

We do not recommend the installation of instrument rectifiers by the user as this invariably leads to difficulties with the factory. Servicemen do not have proper standards of calibration by which the A.C. ranges can be recalibrated. Instrument rectifiers are very liable to damage by inexperienced repairmen and are, therefore, not guaranteed in any manner, even when new. Instrument rectifiers should be replaced by the factory or an authorized service station.

GUARANTEE

The tester is not guaranteed unless the ownership thereof is properly registered. When the user registers his ownership of this tester within 10 days after he receives it, he will receive, in return, a "Guarantee Card" stating that the tester will be guaranteed to be free from defects in material or workmanship. Any such defect in material or workmanship will be corrected without charge when the tester, together with the "Guarantee Card" is delivered to the Supreme Instruments Corporation, Greenwood, Mississippi, or to any authorized Service Station, within 90 days after its receipt by the user, provided that (1) the free repair or replacement of materials shall not include the cost of the installation of instrument rectifiers which are inexpensive and are deli交付 serviceable by the manufacturers, and (2) the user accepts the obligation of the payment of all transportation costs involved in the corrections effected under the conditions of this guarantee policy, in accordance with the standard practices of the Radio Manufacturers' Association.

SUPREME INSTRUMENTS CORPORATION

GREENWOOD, MISSISSIPPI

"S. A."