

# **SUPREME**

*Testing Instruments*

"SUPREME BY COMPARISON"

## **RADIO TESTING INSTRUMENTS**

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- TUBE TESTERS
- MULTIMETERS
- SET ANALYZERS - STATIC
- SIGNAL GENERATORS
- FREQUENCY MODULATORS
- CATHODE RAY OSCILLOSCOPES
- SET ANALYZERS - DYNAMIC
- ASSOCIATED TEST EQUIPMENT

**SUPREME INSTRUMENTS CORPORATION**

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**GREENWOOD - MISSISSIPPI - U. S. A.**

SUPREME TUBE TESTER  
MODEL 89-D

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TECHNICAL DATA

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

(Stock # 7145)

MODEL 89-D PACKING LIST

EFFECTIVE SEPT. 1, 1935.

ACCESSORIES INCLUDED IN ORIGINAL MODEL 89-D TUBE TESTER SHIPMENTS.

QUANTITY: INCLUDED:	STOCK : NUMBER:	DESCRIPTION	:PACKER'S :CHECK
1	7144	CARD, "OPERATING DATA" AND "TUBE LIST", MOUNTED IN COVER WITH FOUR THUMB SCREWS	✓
1	6725	CARD, RETURN REGISTRATION	✓
1	6298	CHART, SAMPLE ANALYSIS	✓
1	7051	CONNECTOR, 15-INCH UNIVERSAL TOP CAP	✓
1	6986	CONNECTOR, 4-FT. BLACK WITH ALLIGATOR CLIP AND INSULATED PIN PLUG	✓
1	6987	CONNECTOR, 4-FT. RED, WITH ALLIGATOR CLIP AND INSULATED PIN PLUG	✓
1	6744	CONNECTOR, 4-FT. BLACK TEST PROBE, WITH POINTED PIN PLUGS	✓
1	6745	CONNECTOR, 4-FT. RED TEST PROBE, WITH POINTED PIN PLUGS	✓
1	7145	DATA, MODEL 89-D TECHNICAL	✓
1	7146	FORM, MODEL 89-D ACCESSORIES ORDER	✓

THE ABOVE LIST OF ITEMS WAS CHECKED BY THE UNDERSIGNED WHO IS RESPONSIBLE FOR THE COMPLETION OF THIS PACKAGE.

463125 (SERIAL NUMBER)\* (SIGNED)..... *R. J. [Signature]*

\*THE SERIAL NUMBER OF THIS TESTER IS ENGRAVED (BUT NOT WAXED) IN THE CENTER OF THE LOWER MARGIN OF THE PANEL, AND SHOULD BE MENTIONED IN ALL CORRESPONDENCE PERTAINING TO THE TESTER.

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

SUPREME TUBE TESTER

MODEL 89-D

TECHNICAL DATA

! I M P O R T A N T !

THE GUARANTEE POLICY ON YOUR TUBE TESTER IS NOT APPLICABLE UNLESS THIS PARAGRAPH IS COMPLIED WITH!

REGISTRATION. THE RETURN REGISTRATION CARD, WHICH IS INCLUDED WITH EACH TESTER SHIPMENT, SHOULD BE COMPLETED WITH THE PROPER INFORMATION AND MAILED IMMEDIATELY AFTER THE USER'S RECEIPT OF THE TESTER. IT IS THE PURPOSE OF THE RETURN REGISTRATION CARD (1) TO APPLY THE GUARANTEE POLICY IN THE INTERESTS OF THE OWNER OF THE TESTER, AND (2) TO ASSURE THE USER'S RECEIPT OF ANY ADDITIONAL DATA WHICH MAY BE ISSUED WITH REFERENCE TO THE USE OF THE TESTER. THE ISSUANCE OF NEW DATA MAY NOT BE NECESSARY; BUT, IN CASE NEW DATA BE ISSUED, THE USER IS ENTITLED TO IT AND HE WILL RECEIVE SUCH NEW DATA IF HIS OWNERSHIP OF THE TESTER IS REGISTERED BY MEANS OF THE RETURN REGISTRATION CARD. THE GUARANTEE POLICY IS NOT APPLICABLE UNLESS THE TESTER IS REGISTERED WITHIN 10 DAYS AFTER ITS RECEIPT, AND THE SERIAL NUMBER OF THE TESTER SHOULD BE MENTIONED IN ALL CORRESPONDENCE.

GENERAL. THE "OPERATING DATA" AND "TUBE LIST" CARD WHICH IS MOUNTED IN THE CARRYING CASE OF THE TESTER OUTLINES THE GENERAL PROCEDURE WHICH SHOULD BE FOLLOWED FOR THE PROPER OPERATION OF THE TESTER. THE "TECHNICAL DATA" INCLUDED IN THIS PAMPHLET IS INTENDED FOR THE INFORMATION OF PROFESSIONAL RADIOMEN WHO USE THIS TESTER FOR SERVICE CALLS AND "SHOP" TESTS OF TUBES WHEN A MORE TECHNICAL FAMILIARITY WITH THE TESTER IS DESIRED. EVERY PROFESSIONAL RADIOMAN KNOWS THAT TUBES MUST BE REPLACED FOR ONE OR BOTH OF TWO REASONS; NAMELY, (1) BY REASON OF SERVICE DEPRECIATION IN CATHODE OR FILAMENT EMISSION WHICH LOWERS THE TRANSCONDUCTANCE (OR MUTUAL CONDUCTANCE) OF TUBES, OR (2) BY REASON OF INTER-ELECTRODE LEAKAGES OR SHORT-CIRCUITED CONDITIONS. IT IS OBVIOUS, THEREFORE, THAT A PRACTICAL "FIELD" TUBE TESTER SHOULD (1) INDICATE THE QUALITY OF A TUBE ON THE BASIS OF "GOOD" OR "BAD" TRANSCONDUCTANCE EMISSION WITH APPROXIMATELY CORRECT WORKING VOLTAGES AND PLATE LOAD RESISTANCE, AND (2) SHOULD BE CAPABLE OF INDICATING ANY LEAKAGES OR SHORT CIRCUITS, BETWEEN ELEMENTS, WHICH IMPAIR THE PROPER FUNCTIONING OF A RADIO TUBE. THESE ARE THE OBJECTIVES ACCOMPLISHED IN THE DESIGN OF THIS NEW SUPREME TESTER. (3) BESIDES THE NORMAL TUBE TESTING FUNCTIONS OF THIS TESTER, THE 89-D ALSO OFFERS 4 RANGES FOR MEASURING D. C. VOLTS, 5 RANGES FOR MEASURING RESISTANCE, AND ELECTROLYTIC AND AN ELECTROSTATIC CAPACITOR LEAKAGE TEST.

PANEL LAYOUT MODEL 89-D  
TUBE CHECKER

#1

PROPER PART NAME (USED IN INSTRUCTIONS)	FUNCTION	LOCATION ON PANEL
"METER"	SCALES— 4— D. C. RANGES 1— ENGLISH READING ELECTROLYTIC CAPACITOR LEAKAGE SCALE 1— ENGLISH READING TUBE SCALE 5— RESISTANCE RANGES	UPPER CENTER
"LEAKAGE INDICATOR" (NEON TUBE)	FOR LEAKAGE INDICATIONS WHEN TESTING TUBES OR ELECTROSTATIC CONDENSERS.	UPPER LEFT SIDE OF PANEL
TYPE O1A TUBE (RECTIFIER)	FOR RECTIFYING A. C. FOR USE IN D. C. MEASUREMENTS	UPPER RIGHT SIDE OF PANEL
"FILAMENT RETURN SELECTOR" SWITCH	FOR CONNECTING FILAMENT RETURN TO PROPER POSITION WHEN TESTING TUBES	LEFT SIDE OF PANEL UNDER "LKG. INDICATOR"
"MTR. CIRCUIT SELECTOR" SWITCH	FOR CONNECTING METER TO PROPER INTERNAL CIRCUITS WHEN TESTING. POSITIONS: #1— "OHMS" CONNECTS METER TO 5 RESISTANCE RANGES #2— "LKG." CONNECTS METER TO TUBE TESTING CIRCUIT FOR TUBE LEAKAGE MEASUREMENTS #3— "TUBE" CONNECTS METER IN QUALITY TUBE TEST CIRCUIT #4— "ELEC" CONNECTS "LEAKAGE INDICATOR" IN CIRCUIT FOR TESTING LEAKAGE OF ELECTROSTATIC CAPACITORS OF SMALLER THAN 1-MFD., CAP., AND METER IN CIRCUIT FOR TESTING LEAKAGE OF ELECTROLYTIC CAPACITORS AND ELECTROSTATIC CAPACITORS OVER 1 MFD. #5— "VOLTS" CONNECTS THE METER IN THE CIRCUIT FOR MEASURING D. C. VOLTS (4 RANGES)	LEFT SIDE OF PANEL AND TO LEFT OF "PRIMARY VOLTS SELECTOR" SWITCH
"PRIMARY VOLTS SELECTOR" SWITCH	FOR VARYING THE CONNECTION TO THE PRIMARY OF THE TRANSFORMER AND MATCHING SAME TO LOCAL LINE VOLTAGE	CENTER OF PANEL AND BELOW "METER"
"QUALITY TEST SELECTOR, ZERO OHMS ADJUSTER" SWITCH	FOR (1) USE IN TUBE TESTING. (2) USE IN PRELIMINARY ADJUSTMENT OF THE METER FOR MAKING RESISTANCE MEASUREMENTS	RIGHT SIDE OF PANEL TO RIGHT OF "PRIMARY VOLTS SELECTOR" SWITCH
"FILAMENT VOLTS SELECTOR, ELEC. CAP. SELECTOR" SWITCH	FOR (1) USE IN TUBE TESTING TO APPLY CORRECT FILAMENT POTENTIAL TO TUBE UNDER TEST (2) USE IN ELECTROLYTIC & ELECTROSTATIC CAPACITOR LEAKAGE MEASUREMENTS (1-MFD. TO 12-MFDS.)	RIGHT SIDE OF PANEL BELOW "TYPE O1A TUBE"
"PRESS FOR ELECTROLYTIC CAPACITOR" PUSH BUTTON	FOR USE WHEN TESTING LEAKAGE OF ELECTROLYTIC CAPACITORS (PRESS TO READ METER INDICATION)	LEFT SIDE OF "METER"
1225 - NORMAL	FOR USE WHEN TESTING 1225 TUBES; OTHERWISE, LEAVE IN "NORMAL" POSITION	RIGHT SIDE OF "METER"
12A5 - NORMAL	FOR USE WHEN TESTING 12A5 TUBES; OTHERWISE, LEAVE IN "NORMAL" POSITION	BELOW AND TO LEFT OF "METER"
625 - NORMAL	FOR USE WHEN TESTING 625 TUBES; OTHERWISE, LEAVE IN "NORMAL" POSITION	BELOW AND TO RIGHT OF "METER"
4 - 5 - 6 - 7 - 8 PIN SOCKETS	FOR USE WHEN TESTING TUBES	UPPER PORTION OF PANEL
F, 1 & 2, 3, 4, 5, 6, 7, 8, & T. C.	PUSH BUTTONS FOR DETERMINING "LEAKAGE" & "QUALITY" OF TUBE	LOWER SECTION OF PANEL
"ELECTROLYTIC CAPACITY LEAKAGE" PIN JACKS	PIN JACK TERMINALS FOR "ELECTROLYTIC CAPACITY LEAKAGE" MEASUREMENTS. OBSERVE POLARITY ON ELECTROLYTICS	LOWER RIGHT BOTTOM EDGE OF PANEL
"ELECTROSTATIC CAPACITY LEAKAGE" PIN JACKS	PIN JACK TERMINALS FOR "ELECTROSTATIC CAPACITY LEAKAGE" MEASUREMENTS	LOWER LEFT BOTTOM EDGE OF PANEL
"OHMS—2M, 20M, 200M" PIN JACKS	LOWER OHMMETER RANGES OF PIN JACK TERMINALS	FAR LEFT EDGE OF PANEL
"MEG.— 2, 20" PIN JACKS	HIGHER OHMMETER RANGES OF PIN JACK TERMINALS	
"VOLTS— 5, 125, 500, 1250" PIN JACKS	D. C. VOLTAGE RANGES OF PIN JACK TERMINALS	FAR RIGHT EDGE OF PANEL

OUTSTANDING FEATURES. THE MAXIMUM OF VALUE WILL BE REALIZED IN THE USE OF THIS TESTER WHEN THE USER APPRECIATES ITS OUTSTANDING FEATURES. THE PROFESSIONAL RADIOMAN CAN ALWAYS BE IDENTIFIED BY OTHERS AS HAVING A THOROUGH KNOWLEDGE OF THE INSTRUMENTS OF HIS PROFESSION; I. E., HIS TESTING EQUIPMENT. THE SIX OUTSTANDING FEATURES OF THIS TESTER ARE LISTED AS FOLLOWS:

1. SIMPLICITY; THE TESTER HAS ONLY FIVE SOCKETS SO THERE DOES NOT EXIST THE PERPETUAL CONFUSION, AS TO WHAT SOCKET TO USE, WHICH CHARACTERIZED THE ORDINARY TESTER WITH A LARGE NUMBER OF SOCKETS — A TUBE CANNOT BE PLACED IN THE WRONG SOCKET OF THIS TESTER. THE TEST OPERATIONS ARE REDUCED TO AN ABSOLUTE MINIMUM, THEREBY ASSURING SPEEDY TUBE TESTING.
2. NEON LEAKAGE TEST; THIS TESTER EMPLOYS A FULL-SIZED NEON GLOW LAMP IN THE SUPREME-PATENTED ISOLATION CIRCUIT FOR DETECTING LEAKAGES AND SHORT-CIRCUITED CONDITIONS BETWEEN ANY AND ALL TUBE ELEMENTS. BECAUSE TUBE MANUFACTURERS ARE "SOLD" ON THIS TEST, IT IS BEING ADDED BY OTHERS, IN SOME FORM, TO ALL TUBE TESTER DESIGNS.
3. ELECTROLYTIC AND LARGE ELECTROSTATIC CAPACITORS LEAKAGE TEST; THIS TESTER EMPLOYS A SPECIAL CIRCUIT WITH 450 VOLTS D. C. APPLIED POTENTIAL ACROSS THE PROPER OUTPUT PIN JACKS TO TEST FOR LEAKAGE IN ELECTROLYTIC AND LARGE PAPER CAPACITORS FROM 1 MFD. TO 12.5 MFDS.
4. ELECTROSTATIC CAPACITOR LEAKAGE TEST FOR PAPER CONDENSERS BELOW 1 MFD.; THE TESTER INCORPORATES A SPECIAL CIRCUIT WITH AN APPLIED POTENTIAL ACROSS THE PROPER OUTPUT PIN JACKS.
5. 5 RANGES FOR RESISTANCE MEASUREMENTS; THIS TESTER ALSO INCLUDES 5 OHMMETER RANGES FOR MEASURING CONTINUITY AND VALUES OF MANY TYPES OF RESISTANCES FROM A FEW OHMS TO 20 MEG.
6. RUGGEDNESS; THE 89-D IS FOOL PROOF AND CANNOT BE HARMED BY SHORT-CIRCUITED TUBES, OR BY INCORRECT OPERATION.

ALL 4-PIN TUBES ARE TESTED IN THE 4-HOLE SOCKET, 5-PIN TUBES IN THE 5-HOLE SOCKET, ETC. THE TESTER CANNOT BE HARMED BY DEPRESSING THE WRONG BUTTON. IF THE WRONG BUTTONS BE DEPRESSSED DURING THE "TUBE" TEST, THE METER POINTER WILL EITHER NOT MOVE, OR ELSE IT WILL MOVE BACKWARDS SLIGHTLY — THE POINTER WILL MOVE FORWARD ONLY WHEN THE CORRECT BUTTONS ARE DEPRESSSED. THE "QUALITY TEST SELECTOR" MAY BE ROTATED TO ITS EXTREME CLOCKWISE POSITION WITHOUT OVER-LOADING THE METER ENOUGH TO HARM THE METER OR THE TESTER DURING A TUBE TEST. AN INCORRECT SETTING OF THE "FILAMENT VOLTS SELECTOR" CONTROL MAY RUIN A TUBE TEST, BUT THE TESTER WILL NOT BE HARMED.

POWER SUPPLY CONTROL. AN "OFF" POSITION OF THE "PRIMARY VOLTS SELECTOR" ROTARY SWITCH ENABLES THE USER TO DISCONNECT THE TRANSFORMER PRIMARY CIRCUIT FROM THE POWER SUPPLY SYSTEM, WHENEVER IT IS DESIRED TO DO SO. HOWEVER, THE TRANSFORMER IS SO DESIGNED THAT IT MAY BE LEFT CONNECTED INDEFINITELY TO THE POWER SUPPLY SYSTEM WITHOUT HARM TO THE TESTER AND, WHILE THE TESTER IS SO CONNECTED, THE POWER CONSUMPTION IS NEGLIGIBLE — IT WOULD AMOUNT TO ABOUT 10¢ IF THE TESTER WERE LEFT CONNECTED DAY AND NIGHT FOR A WHOLE MONTH! IT IS OBVIOUS, THEREFORE, THAT THE ADDITION OF AN "ON-OFF" TUMBLER SWITCH AND A PILOT LIGHT WOULD NOT ADD TO THE ECONOMY OR UTILITY OF THE TESTER.

POWER SUPPLY RATINGS. ABOUT 98% OF ALL TUBE TESTERS ARE USED WITH POWER SUPPLY POTENTIALS BETWEEN 98 AND 125 VOLTS, AND THIS RANGE IS LETTERED ON THE PANEL AROUND THE "PRIMARY VOLTS SELECTOR" CONTROL KNOB. THE REMAINING 2% OF THE TESTERS WHICH ARE REQUIRED FOR SPECIAL POWER SUPPLY RATINGS ARE OF SPECIAL DESIGNS, THE "PRIMARY VOLTS SELECTOR" MARKINGS OF WHICH MAY BE INTERPRETED IN ACCORDANCE WITH THE FOLLOWING TABULATION:

PRIMARY VOLTS SELECTOR MARKINGS	SPECIAL VOLTAGES BETWEEN 132 & 168	SPECIAL VOLTAGES BETWEEN 196 & 250
98	132	196
101	136	202
104	140	208
107	144	214
110	148	220
113	152	226
116	156	232
119	160	238
122	164	244
125	168	250

SPECIAL FREQUENCY RATINGS ARE ACCOMODATED BY THE NECESSARY CHANGES IN TRANSFORMER CORE THICKNESSES.

POWER SUPPLY ADJUSTMENTS. THE "PRIMARY VOLTS SELECTOR" ENABLES THE PROFESSIONAL RADIOMAN TO ADJUST THE TESTER TO WITHIN ABOUT  $\frac{1}{2}\%$  OF ANY POWER SUPPLY POTENTIAL WHICH MAY ORDINARILY BE ENCOUNTERED IN THE USE OF THE TESTER.

SCALE MARKING. THE SCALE ON THE METER SUPPLIED SHOWS THREE SETS OF MARKINGS.

- (1) THE UPPER SCALE IS ASSOCIATED WITH THE OHMMETER AND MEGOHMMETER CIRCUITS, AND IS READ DIRECTLY FOR THE 2000-OHM (2M) RANGE, MULTIPLIED BY 10 FOR THE 20,000-OHM (20M) RANGE, BY 100 FOR THE 200,000-OHM (200M) RANGE, BY 1000 FOR THE 2-MEGOHM RANGE, AND BY 10,000 FOR THE 20-MEGOHM RANGE.

- (2) MIDDLE ENGLISH READING SCALES FOR "GOOD-?-BAD" TUBE TESTER AND "GOOD - BAD" CAPACITY LEAKAGE TESTS.
- (3) LOWER SCALE IS USED FOR ALL READINGS OF D. C. VOLTAGE. THREE SETS OF INDEX NUMBERS ARE PROVIDED, WHICH AT FULL SCALE READ 5 - 25 - 125. THE PROPER METHOD OF READING THESE SCALES WILL BE DETERMINED BY THE PIN JACKS USED, AND SIMPLY INVOLVES THE PROPER LOCATION OF A DECIMAL POINT. IN READING D. C. VOLTAGE, THE SCALE MAY BE READ DIRECTLY FOR THE 5-VOLT RANGE AND THE 125-VOLT RANGE, AND MULTIPLIED BY 100 FOR THE 500-VOLT RANGE AND 10 FOR THE 1250-VOLT RANGE.

#### PRELIMINARY ADJUSTMENTS.

- I. CONNECT THE A. C. PLUG IN THE SOCKET.
- II. ROTATE "MTR. CIRCUIT SELECTOR" SWITCH TO "LKG." POSITION.
- III. ROTATE "PRIMARY VOLTS SELECTOR" SWITCH UNTIL NEEDLE OF METER READS ONE-HALF SCALE DEFLECTION. THIS AUTOMATICALLY SETS PRIMARY TAP OF TRANSFORMER CORRECTLY TO MATCH LOCAL LINE VOLTAGE.
- IV. LOCATE IN FIRST COLUMN OF THE "TUBE LIST" BELOW, THE TUBE WHICH IS TO BE TESTED.
- V. OBSERVE THE CORRESPONDING "FILAMENT VOLTS SELECTOR" SETTING AND SO SET.
- VI. AND THE PROPER SETTING FOR THE "FILAMENT RETURN SELECTOR" CONTROL KNOB WHICH IS "#7" FOR GLASS ENVELOPE TUBES, AND EITHER "#7" OR "#8" FOR OCTAL TUBES (DEPENDING ON THE TYPE TUBE).

#### LEAKAGE TEST.

- I. SET THE "MTR. CIRCUIT SELECTOR" SWITCH TO THE "LKG." POSITION.
- II. PLACE THE TUBE IN THE PROPER SOCKET AND CONNECT TOP CAP TERMINAL, IF ANY, TO THE "TOP CAP" PIN JACK, AND ALLOW TUBE TO ASSUME PROPER OPERATING TEMPERATURE, AND
- III. DEPRESS THE SWITCH BUTTONS, ONE AT A TIME, SO AS TO REVEAL ANY INTER-ELEMENTAL LEAKAGES OR "SHORTS" BY A GLOW OF BOTH ELEMENTS OF THE NEON LAMP; IF MORE THAN ONE SWITCH BUTTON IS INDICATED IN THE LAST COLUMN, THE INDICATED SWITCH BUTTONS SHOULD BE DEPRESSED AND RELEASED TOGETHER. A MOMENTARY "GLOW" OR "FLICKER" OF ONE ELEMENT, ONLY, OF THE NEON LAMP, INDICATES A CAPACITY SURGE RATHER THAN A TUBE DEFECT. INTERMITTENT TUBE LEAKAGES MAY BE REVEALED BY GENTLY THUMPING THE TUBE AS EACH BUTTON IS DEPRESSED.

WARNING! FILAMENT RETURN SELECTOR SWITCH MUST BE SET IN THE CORRECT POSITION; OTHERWISE, SHORTING OF THE TRANSFORMER AND CONSEQUENT DAMAGE OF THE EQUIPMENT MAY RESULT.

#### QUALITY TEST. AFTER COMPLETING THE PRELIMINARY ADJUSTMENT AND THE LEAKAGE TEST:

- I. SET THE "MTR. CIRCUIT SELECTOR" SWITCH IN THE "TUBE" POSITION.
- II. SET THE "QUALITY TEST SELECTOR" CONTROL TO THE POSITION INDICATED IN THE NEXT-TO-THE-LAST COLUMN, AND
- III. DEPRESS THE BUTTON (OR BUTTONS) INDICATED IN THE LAST COLUMN AFTER OBSERVING THE METER INDICATION OF THE TUBE CONDITION. A SHORT-CIRCUITED TUBE WILL CAUSE THE METER POINTER TO VIBRATE VIOLENTLY ABOUT ITS ZERO POSITION, AND IF SUCH PHENOMENA IS OBSERVED, THE DEPRESSED BUTTONS SHOULD BE RELEASED IMMEDIATELY.

TUBE LIST CARD. ALL RECEIVING TYPES OF TUBES, FOR WHICH DATA ARE AVAILABLE, ARE LISTED ON THE "OPERATING DATA" AND "TUBE LIST" CARD WHICH IS MOUNTED IN THE CARRYING CASE COVER. A SIMPLIFIED OPERATING PROCEDURE IS OUTLINED ON THE CARD, SO THAT ANY ONE, WITHOUT EVEN AN ELEMENTARY TECHNICAL KNOWLEDGE OF THE TESTER, CAN TEST TUBES WITHOUT DIFFICULTY. GROUP "A" OF THE "TUBE LIST" INCLUDES A FEW POPULAR TYPES OF TUBES WHICH CONSTITUTE ABOUT 75% OF THE REPLACEMENT MARKET. IT IS SUGGESTED THAT THE USER OF THE TESTER MEMORIZE THE DATA OF THIS GROUP SO THAT HE WILL NOT HAVE TO REFER TO THE "TUBE LIST" FOR THESE TYPES. THE EXPERIENCED RADIO MAN ALREADY KNOWS THE FIRST, SECOND AND LAST COLUMNS OF THIS GROUP, THE LAST COLUMN REPRESENTING THE TERMINALS OF THE ELECTRON-EMITTING ELEMENTS, SO THAT HE HAS ONLY THE THIRD COLUMN TO REMEMBER. GROUP "B" TESTS THE BALANCE OF THE "GLASS ENVELOPE" TYPE OF TUBES, AND GROUP "C" COMPRISE THE NEW OCTAL TUBES.

NEON LEAKAGE TEST. EVERY TUBE SHOULD BE SUBJECTED TO THE "LEAKAGE" TEST BEFORE IT IS SUBJECTED TO THE "TUBE" TEST. IF THE "TUBE" TEST BE APPLIED TO A SHORT-CIRCUITED TUBE, THE METER POINTER WILL VIBRATE VIOLENTLY ABOUT ITS ZERO POSITION, AND ANY SWITCH BUTTONS WHICH ARE BEING DEPRESSED SHOULD BE RELEASED IMMEDIATELY. THE TESTER IS DESIGNED TO WITHSTAND NORMAL INSTANTANEOUS OVERLOADS, BUT IT CANNOT BE EXPECTED TO INDEFINITELY WITHSTAND AN OVERLOAD IMPOSED BY DELIBERATELY KEEPING A SWITCH BUTTON DEPRESSED WITH A SHORT-CIRCUITED TUBE IN ONE OF THE SOCKETS.



A 110-volt, 2-watt, NEON GLOW LAMP WITH A STANDARD SCREW BASE IS UTILIZED FOR LEAKAGE AND "SHORT" TESTS BETWEEN THE ELEMENTS. IF, AT ANY TIME, THE OPERATING CONDITION OF THE LAMP IS IN QUESTION, THE LAMP MAY BE TESTED BY SCREWING IT INTO AN ORDINARY 110-VOLT LAMP SOCKET; AS A MATTER OF FACT, MANY PROFESSIONAL RADIOMEN ORDER EXTRA LAMPS FOR USE AS BATH ROOM AND HALL LAMPS, BECAUSE OF THEIR LOW POWER CONSUMPTION — ONE OF THESE LAMPS CAN BE OPERATED CONTINUOUSLY DAY AND NIGHT, AT A COST OF LESS THAN 10¢ PER MONTH. THIS LAMP IS PRIMARILY A VOLTAGE-OPERATING DEVICE, AS IT REQUIRES NEGLIGIBLE CURRENT FOR ITS OPERATION. THE NEON GLOW LAMP IS USED FOR LEAKAGE TESTS BECAUSE OF THE OBJECTIONS TO THE INHERENT MECHANICAL INERTIA OF METER MOVEMENTS, AND BECAUSE OF THE THERMAL LAG OF PILOT LAMP FILAMENTS WHEN METERS OR PILOT LAMPS ARE USED FOR SUCH TESTS. IT IS FOUND THAT THE MECHANICAL INERTIA OF METER MOVEMENTS AND THE THERMAL LAG OF PILOT LAMPS MAKES THESE DEVICES TOO SLOW FOR THE DETECTION OF INSTANTANEOUS LEAKAGES; WHEREAS, THE NEON GLOW LAMP RESPONDS INSTANTANEOUSLY TO ANY INTERMITTENT LEAKAGE POTENTIAL.

IN ORDER TO MAKE THE NEON LAMP RESPONSIVE ONLY TO LEAKAGE POTENTIALS IN THE TESTER, AND TO PREVENT ITS RESPONDING TO RECTIFIED POTENTIALS, THE LAMP IS CONNECTED IN SERIES WITH A "BLOCKING" CAPACITOR. WHEN OPERATING THE PUSH BUTTON SWITCHES DURING LEAKAGE TESTS, IT WILL BE OBSERVED THAT ONE ELECTRODE OF THE LAMP WILL GLOW MOMENTARILY WHEN OPERATING ONE PUSH BUTTON SWITCH AND THAT THE OTHER ELECTRODE WILL GLOW MOMENTARILY WHEN OPERATING ANOTHER SWITCH. FOR INSTANCE, WHEN TESTING A TYPE 27 TUBE, ONE ELECTRODE OF THE LAMP WILL FLASH WHEN THE NO. 3 BUTTON IS DEPRESSED, AND THEN THE OTHER ELECTRODE WILL FLASH WHEN THE NO. 4 BUTTON IS DEPRESSED. THESE SINGLE-ELEMENT GLOWS ARE CAUSED BY THE ALTERNATING CHARGES AND DISCHARGES OF THE "BLOCKING" CAPACITOR. A LEAKAGE OR "SHORT" WILL BE DISTINGUISHED FROM THESE SINGLE-ELEMENT OR CAPACITIVE-SURGE GLOWS IN THAT BOTH NEON ELEMENTS GLOW, AT THE SAME TIME, WHEN LEAKAGES OR "SHORTS" ARE ENCOUNTERED. WHEN A LEAKAGE OR SHORT-CIRCUITED CONDITION EXISTS BETWEEN ANY TWO ELEMENTS WITHIN A TUBE, THE OPERATION OF EITHER OF THE TWO PUSH BUTTON SWITCHES CORRESPONDING TO THE TWO TUBE ELEMENTS INVOLVED WILL CAUSE A SIMULTANEOUS GLOW OF BOTH ELEMENTS OF THE NEON LAMP, WHEN THE "MTR. CIRCUIT SELECTOR" TUMBLER SWITCH IS AT THE "LKG." POSITION.

FOR EXAMPLE, A LEAKY OR SHORT-CIRCUITED CONDITION INVOLVING THE CONTROL GRID AND SCREEN GRID ELEMENTS OF A TYPE 35 TUBE WOULD BE REVEALED BY THE GLOW OF BOTH ELECTRODES OF THE NEON LAMP WHEN THE "T. C." BUTTON IS DEPRESSED, AND AGAIN WHEN THE NO. 3 BUTTON IS DEPRESSED; IN OTHER WORDS, ANY LEAKY OR SHORT-CIRCUITED CONDITION WILL BE INDICATED BY THE OPERATION OF TWO OF THE PUSH BUTTONS, SO THAT THE MARKINGS OF THE BUTTONS INDICATE THE TWO TUBE ELEMENTS INVOLVED, IN EVERY CASE OF A LEAKY OR SHORT-CIRCUITED CONDITION. THE MARKINGS OF THE PUSH BUTTON SWITCHES CORRESPOND TO THE "TOP CAP" PIN JACK MARKINGS AND TO THE SMALL NUMBERS ON THE PANEL AROUND THE SOCKETS.

THE NEON LAMP IS SHUNTED SO AS TO REDUCE THE SENSITIVITY OF THE LAMP IN ORDER THAT PERMISSIBLE LEAKAGES OF ALMOST INFINITE VALUES WILL NOT BE INDICATED. IT SHOULD BE REMEMBERED THAT EVERY MATERIAL WHICH IS USED FOR INSULATION PURPOSES HAS SOME CONDUCTIVE PROPERTIES, AND ELECTRICAL LEAKAGES CAN BE DETECTED THROUGH ANY INSULATING MEDIUM, INCLUDING BAKELITE OR DRY AIR, IF A SUFFICIENTLY SENSITIVE MEANS BE EMPLOYED FOR DETECTING SUCH LEAKAGES. IN THE DESIGN OF A TUBE TESTER, IT IS NECESSARY TO LIMIT THE LEAKAGE DETECTING CAPACITIES OF THE TESTER, SO AS NOT TO REVEAL MINUTE LEAKAGES WHICH DO NOT IMPAIR THE PROPER FUNCTIONING OF A RADIO TUBE; OTHERWISE, THE TESTER MIGHT REVEAL LEAKAGES IN NEW TUBES OF ALL TYPES, ALTHOUGH THE TUBES ARE NORMAL IN EVERY RESPECT AND OPERATE SATISFACTORILY IN ANY RADIO. THE MANUFACTURERS OF SOME TUBE TESTERS, NOT REALIZING THE IMPORTANCE OF HAVING AN "UPPER LIMIT" TO LEAKAGE DETECTION AND ANXIOUS TO IMITATE THE MOST SUCCESSFUL TUBE TESTER EVER DESIGNED FOR PROFESSIONAL RADIOMEN, ARE DEMONSTRATING FAR AND WIDE THEIR PRODUCTS WHICH ARE HERALDED AS BEING "TWENTY TIMES MORE SENSITIVE", WHILE IGNORING THE PROTESTS OF RESPONSIBLE TUBE ENGINEERS TO THE EFFECT THAT USELESS CONFUSION AND DEFINITE HARM TO LEGITIMATE TRADE PRACTICES IS BEING DONE BY SUCH DEMONSTRATIONS AND SALES CLAIMS.

SLOW-HEATING FILAMENTS. IT IS FOUND THAT SOME TYPES OF TUBES OF THE FILAMENT OR NON-HEATER TYPE HAVE SLOW-HEATING FILAMENTS, EVEN SLOWER IN SOME INSTANCES THAN HEATER TYPES, AND MAY REQUIRE AS MUCH TIME AS TWO MINUTES TO ATTAIN A NORMAL OPERATING CONDITION. ACCORDINGLY, THE PROFESSIONAL RADIOMAN SHOULD ALLOW ABOUT THREE MINUTES FOR EACH TEST OF TYPES WHICH MAY APPEAR DOUBTFUL WHEN FIRST SUBJECTED TO TEST IN THIS TESTER.

THREE-HEATER PIN TUBES. THE DESIGNERS OF AUTOMOTIVE RADIOS WHICH ARE INTENDED FOR OPERATION IN AUTOMOBILES EQUIPPED WITH EITHER 6-VOLT OR 12-VOLT BATTERIES HAVE DEVELOPED 3-HEATER PIN TUBES, SO THAT THESE TUBES MAY BE OPERATED BY APPLYING 6-VOLT FILAMENT POTENTIALS TO A COMMON AND ONE PIN, OR BY APPLYING 12-VOLT FILAMENT POTENTIALS TO THE COMMON AND THE OTHER FILAMENT PIN. IN CONSTRUCTION, THE 6-VOLT FILAMENT PINS ARE INTERNALLY CONNECTED TO THE JUNCTION OF THE TWO SERIES-ED FILAMENTS. IT IS OBVIOUS THAT THESE TYPES OF TUBES CAN BE TESTED BY APPLYING A 6-VOLT FILAMENT POTENTIAL TO EACH FILAMENT, IN TURN, OR BY IGNORING THE "HEATER CENTER" PINS AND APPLYING A 12-VOLT POTENTIAL TO THE FILAMENTS IN SERIES; THE LATTER PROCEDURE IS FOLLOWED WITH THIS TESTER, SO AS TO MAKE THE TEST INVOLVE BOTH FILAMENTS. THE MODEL 89-D IS PROVIDED WITH "625", "12A5" AND "12Z5" TUMBLER SWITCHES WHICH SHOULD BE LEFT IN THEIR RESPECTIVE "NORMAL" POSITIONS EXCEPT WHEN ONE OF THESE SPECIAL 3-HEATER TYPE TYPES IS ENCOUNTERED, WHEN THE CORRESPONDING TUMBLER SWITCH, AS INDICATED ON THE "TUBE LIST" CARD, SHOULD BE SET FOR THE TEST AND RETURNED TO ITS "NORMAL" POSITION AFTER COMPLETION OF THE TEST. THE TUMBLER SWITCHES ARE USED TO OPEN THE "HEATER CENTER" PIN CONNECTIONS SO THAT BOTH FILAMENTS ARE IN SERIES DURING THE TESTS.

FULL-WAVE AND MULTIPLE-ELEMENT COMPARISONS. FOR THE SAKE OF SIMPLICITY FROM THE CUSTOMER'S VIEW-POINT, ALL PLATES OF FULL-WAVE RECTIFIER AND OF DIODE DETECTORS ARE PARALLELED BY THE "OPERATING DATA" CARD TESTS. THE RADIOMAN, HOWEVER, MAY WANT TO COMPARE THE FUNCTIONING OF THE PLATES OF SUCH TUBES, AND THIS CAN BE DONE VERY EASILY. AS AN EXAMPLE, THE PROCEDURE FOR COMPARING THE PLATES OF THE TYPE 80 TUBE IS OUTLINED AS FOLLOWS:

1. WHILE DEPRESSING THE "F" BUTTON FOR THE REGULAR "TUBE" TEST, DEPRESS THE NO. 2 BUTTON, WHEN THE METER POINTER MAY MOVE BACK INTO THE "BAD" SECTOR, AS ONLY THE NO. 3 (PLATE) ELEMENT WILL BE CARRYING CURRENT. OBSERVE THE POINTER READING ON THE NUMBERED SCALE, AND RELEASE THE NO. 2 BUTTON.



- II. WHILE DEPRESSING THE "F" BUTTON FOR THE REGULAR "TUBE" TEST, DEPRESS THE NO. 3 BUTTON, WHEN THE METER POINTER SHOULD MOVE BACK TO ABOUT THE SAME POSITION IT OCCUPIED WHEN THE NO. 2 BUTTON WAS DEPRESSED AS ONLY THE NO. 2 (PLATE) ELEMENT WILL BE CARRYING CURRENT. AFTER COMPLETING THE TESTS, RELEASE ALL BUTTONS.

A SIMILAR PROCEDURE MAY BE FOLLOWED FOR COMPARING THE FUNCTIONING OF THE PLATE ELEMENTS OF DIODE DETECTORS AND OF OTHER FULL-WAVE RECTIFIER TUBES. IN SOME FULL-WAVE RECTIFIER TUBES, THE TWO FILAMENT ELEMENTS, ONE FOR EACH PLATE, ARE ELECTRICALLY CONNECTED IN SERIES, SO THAT AN ACCURATE COMPARISON CAN NOT BE MADE OF THE FUNCTIONING OF EACH PLATE, WITHOUT USING A SPECIAL CIRCUIT ARRANGEMENT FOR MAKING SUCH COMPARISONS. THIS IS BECAUSE THE PLATE POTENTIAL APPLIED BY THIS TESTER IS MEASURED FROM THE FILAMENT PIN WHICH CARRIES THE PLATE AND FILAMENT CURRENTS FROM THE TUBE. ONE SERIES FILAMENT OF DUAL-FILAMENT TUBES WILL BE POSITIVE BY ONE-HALF OF THE FILAMENT POTENTIAL WITH RESPECT TO THE OTHER FILAMENT, SO THAT THE EFFECTIVE APPLIED PLATE POTENTIAL WILL NOT BE THE SAME FOR BOTH PLATES. FOR EXAMPLE, THE TYPE 80 TUBE HAS ITS TWO FILAMENTS CONNECTED IN SERIES WITH A POTENTIAL DROP OF 2.5 VOLTS ACROSS EACH FILAMENT, OR A TOTAL OF 5.0 VOLTS FOR THE TWO FILAMENTS, AS MEASURED BETWEEN THE TWO FILAMENT PINS; AND, WHEN MEASURED FROM THE MORE NEGATIVE OF THE TWO PINS, ONE PLATE WILL HAVE AN EFFECTIVE APPLIED PLATE POTENTIAL 2.5 VOLTS MORE THAN THE POTENTIAL APPLIED TO THE OTHER PLATE. WHEN SUCH RECTIFIER TUBES ARE OPERATED IN HIGH-POTENTIAL RATIO "POWER PACKS", A DIFFERENCE OF 2.5 VOLTS IS NEGLIGIBLE; IN A 400-VOLT CIRCUIT, 2.5 VOLTS WOULD AMOUNT TO ONLY ABOUT SIX-TENTHS OF ONE PERCENT OF THE 400-VOLT POTENTIAL. IN ALL LOWER-POTENTIAL TESTERS, THE DIFFERENCE OF 2.5 VOLTS NATURALLY BECOMES A GREATER PERCENTAGE OF THE APPLIED PLATE POTENTIAL. HOWEVER, PRACTICALLY NO ADVANTAGE IS OBTAINED BY COMPARING THE PLATE FUNCTIONING OF SERIESED-FILAMENT FULL-WAVE RECTIFIERS; BECAUSE THE TWO FILAMENTS, BEING IN SERIES, WILL ALWAYS CARRY THE SAME FILAMENT LOAD, AND IT MAY BE ASSUMED THAT ONE FILAMENT WILL GENERALLY DEPRECIATE TO THE SAME EXTENT AS THE OTHER OVER A PERIOD OF OPERATING TIME, SO THAT THE SINGLE TEST COVERED BY THE "OPERATING DATA" CARD IS SATISFACTORY FOR ALL PRACTICAL PURPOSES. IN GENERAL, IT WILL BE FOUND THAT 2.5 VOLT FULL-WAVE RECTIFIER TUBES OF THE FILAMENT TYPE HAVE PARALLELED FILAMENTS AND 5.0 VOLT RECTIFIERS HAVE SERIESED FILAMENT. WIDE VARIATIONS MAY BE FOUND AS BETWEEN DIFFERENT MERCURY VAPOR RECTIFIER TYPES, AND THE METER POINTER MAY GO OFF SCALE DURING THE TESTS OF SOME OF THESE TUBES FOR WHICH THE "QUALITY TEST SELECTOR" ADJUSTMENTS MAY APPEAR CRITICAL. IT IS PROBABLE THAT SOME OF THESE TYPES WILL BE SUPERSEDED BY VACUUM TYPES; E. G., THE VACUUM TYPE 1-V MAY SUPERSEDE THE MERCURY TYPE 1, AND THE VACUUM TYPE 83-V MAY SUPERSEDE THE MERCURY TYPE 83, IN FUTURE POPULARITY.

**OPEN ELEMENT TESTS.** WHILE TUBES ARE VERY RARELY ENCOUNTERED IN WHICH OPEN-CIRCUITED ELEMENTS EXIST, THIS TESTER CAN BE USED TO DETECT THE PRESENCE OF AN OPEN-CIRCUITED ELEMENT, IF IT SHOULD EVER BE DESIRED TO DO SO. GENERALLY, AN OPEN-CIRCUITED ELEMENT WILL CAUSE THE AFFECTED TUBE TO TEST IN THE "BAD" SECTOR OF THE METER SCALE, UNLESS THE OPEN-CIRCUITED ELEMENT IS LOCATED CONSIDERABLY MORE REMOTELY THAN OTHER ELEMENTS FROM THE ELECTRON-EMITTING ELEMENT. FOR THE PURPOSE OF DETERMINING WHETHER OR NOT AN ELEMENT IS OPEN-CIRCUITED WITHIN A TUBE, THE USER SHOULD PROCEED AS FOLLOWS:

- I. COMPLETE THE ORDINARY "LKG." AND "TUBE" TESTS IN THE MANNER RECOMMENDED ON THE "OPERATING DATA" AND "TUBE TEST" CARD, AND LEAVE THE "MTR. CIRCUIT SELECTOR" TUMBLER SWITCH AT THE "TUBE" POSITION.
- II. SIMULTANEOUSLY DEPRESS ALL OF THE SWITCH BUTTONS CORRESPONDING TO THE MARKINGS AROUND THE TUBE SOCKET, INCLUDING THE "I. C." SWITCH BUTTON IF THE TUBE HAS A "TOP CAP" CONNECTION, SO THAT THE METER POINTER RESTS AT ITS ZERO POSITION.
- III. OMITTING THE SWITCH BUTTON (OR BUTTONS) INDICATED IN THE LAST COLUMN ON THE "TUBE LIST" CARD FOR THE TUBE UNDER TEST, MOMENTARILY RELEASE AND DEPRESS AGAIN EACH BUTTON, IN TURN, UNTIL ALL OF THE DEPRESSED BUTTONS HAVE BEEN MOMENTARILY RELEASED AND DEPRESSED AGAIN.
- IV. AS EACH BUTTON IS MOMENTARILY RELEASED, THE METER POINTER SHOULD MOVE SLIGHTLY FORWARD, UNLESS THE CORRESPONDING ELEMENT BE OPEN-CIRCUITED.

DURING THE ABOVE TEST, IT WILL BE OBSERVED THAT A RELEASE OF THE BUTTON CORRESPONDING TO THE ELEMENT WHICH IS CLOSEST TO THE ELECTRON-EMITTING ELEMENT WILL CAUSE THE METER POINTER TO DEFLECT FORWARD MORE THAN WHEN ANY OTHER BUTTON IS RELEASED, AND THAT A RELEASE OF THE BUTTON CORRESPONDING TO THE ELEMENT WHICH IS FARTHEST FROM THE ELECTRON-EMITTING ELEMENT WILL CAUSE THE METER POINTER TO DEFLECT FORWARD THE LEAST. IT IS OBVIOUS, THEREFORE, THAT THIS TEST MAY BE USED FOR DETERMINING THE RELATIVE PROXIMITY OF THE ELEMENTS TO THE ELECTRON-EMITTING ELEMENTS OF MOST TUBES. IN THE CASE OF THE ELEMENT LOCATED FARTHEST FROM THE ELECTRON-EMITTING ELEMENT, THE FORWARD MOVEMENT OF THE METER POINTER CAN BE MADE MORE DISCERNABLE BY A CLOCKWISE ADVANCE ROTATION OF THE "QUALITY TEST SELECTOR" CONTROL KNOB.

**OCTAL TUBE TESTS.** THE NEW 8-PIN TUBES ARE TECHNICALLY KNOWN AS "OCTAL TUBES" AND ARE TESTED IN THE SAME MANNER AS THAT PRESCRIBED FOR THE ORIGINAL TYPES OF GLASS TUBES, EXCEPT THAT THE "FILAMENT RETURN SELECTOR" CONTROL KNOB MUST BE SET AT THE POSITION INDICATED ON THE "TUBE LIST" CARD WHEN TESTING OCTAL TUBES. THE SETTING OF THE "FILAMENT RETURN SELECTOR" DOES NOT AFFECT THE TESTS OF GLASS TUBES. THE "TOP CAP" PIN JACK SHOULD BE USED WHEN TESTING OCTAL TUBES WHICH HAVE "TOP CAP" TERMINALS.

**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. 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 MAY TEST LOWER THAN ANOTHER, DOES NOT MEAN THAT ONE OF THE BRANDS IS NECESSARILY BETTER THAN THE OTHER, 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, THE ONE WHICH ORIGINALLY TESTED 52 VOLTS MAY THEN TEST 40 VOLTS WHEREAS THE BATTERY WHICH ORIGINALLY TESTED 47 VOLTS MAY THEN TEST 41 VOLTS. THE TEST LIMITS ESTABLISHED FOR THIS 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".

FUTURE TUBES. THE DESIGN OF THIS TESTER IS SUCH THAT THE RADIO MAN CAN ESTABLISH HIS OWN "QUALITY TEST SELECTOR" SETTINGS FOR THE TUBES NOT LISTED IN THE "TUBE LIST" CARD BY FOLLOWING THE PROCEDURE OUTLINED BELOW.

- I. CONNECT THE TESTER TO A CONVENIENT POWER SUPPLY OUTLET, THEN ROTATE THE "MTR. CIRCUIT SELECTOR" SWITCH TO "LKG." POSITION, THEN ROTATE THE "PRIMARY VOLTS SELECTOR" CONTROL KNOB TO A POSITION WHICH MOST NEARLY CORRESPONDS TO THE AVAILABLE POWER SUPPLY POTENTIAL AS OBSERVED BY A ONE-HALF SCALE DEFLECTION OF THE METER.
- II. ROTATE THE "FILAMENT VOLTS SELECTOR" CONTROL KNOB TO THE POSITION WHICH CORRESPONDS TO THE HEATER (OR FILAMENT) RATING OF THE TUBE.
- III. IF THE TUBE IS OF THE OCTAL TYPE, ROTATE THE "FILAMENT RETURN SELECTOR" CONTROL KNOB TO A MARKING CORRESPONDING TO ONE OF THE FILAMENT OR HEATER TERMINALS OF THE TUBE.
- IV. PLACE THE TUBE IN THE PROPER SOCKET AND CONNECT THE TOP CAP TERMINAL, IF ANY, TO THE PROPER "TOP CAP" PIN JACK, AND SET THE "MTR. CIRCUIT SELECTOR" SWITCH TO THE "TUBE" POSITION.
- V. DEPRESS THE PUSH BUTTON SWITCHES, ONE AT A TIME BEGINNING WITH THE "F" BUTTON, UNTIL A BUTTON IS DEPRESSED WHICH CAUSES THE METER POINTER TO DEFLECT TO THE RIGHT; THEN, WHILE HOLDING THAT BUTTON DOWN, CONTINUE WITH THE REMAINING BUTTONS, ONE AT A TIME, TO DETERMINE WHETHER THE DEPRESSION OF ADDITIONAL BUTTONS WILL INCREASE THE METER POINTER DEFLECTION.
- VI. AFTER DETERMINING THE BUTTONS WHICH CAUSE THE METER POINTER TO DEFLECT FORWARD, RECORD THEIR NUMBERS IN THE LAST COLUMN OF THE "TUBE LIST" CARD.
- VII. ADJUST THE "QUALITY TEST SELECTOR" SO AS TO OBTAIN A METER READING OF 77 WHILE DEPRESSING THE PROPER BUTTONS, AND RECORD THE CORRESPONDING "QUALITY TEST SELECTOR" SETTING FOR SIX OR MORE NEW TUBES.
- VIII. ADD THE "QUALITY TEST SELECTOR" VALUES, AND DIVIDE THE TOTAL BY THE NUMBER OF NEW TUBES TESTED SO AS TO OBTAIN AN AVERAGE SETTING OF THE CONTROL TO BE RECORDED ON THE "TUBE LIST" CARD.
- IX. THE OTHER COLUMNS OF THE "TUBE LIST" CARD CAN BE FILLED IN FROM DATA PUBLISHED BY TUBE MANUFACTURERS.

WHILE THE "QUALITY TEST SELECTOR" SETTING DETERMINED BY THE ABOVE PROCEDURE MAY NOT BE ABSOLUTELY ACCURATE, IT WILL GENERALLY BE FOUND TO BE SUFFICIENTLY ACCURATE FOR ALL PRACTICAL PURPOSES, OR UNTIL A NEW "TUBE LIST" CARD CAN BE OBTAINED.

THORIATED FILAMENTS. THE ORIGINAL DESIGN OF THE TYPE 99 TUBE UTILIZED A THORIATED FILAMENT WITH LIMITED EMITTING QUALITIES, AND A FEW TUBE MANUFACTURERS ARE STILL SUPPLYING THORIATED TYPE 99 TUBES FOR REPLACEMENT PURPOSES. OTHER TUBE MANUFACTURERS ARE OFFERING THE TYPE 99 TUBE WITH OXIDE FILAMENT OF THE SAME CONSTRUCTION AS THAT EMPLOYED IN NEWER TUBE TYPES. A SIMILAR SITUATION EXISTS FOR THORIATED TYPE 22 TUBES. THOSE TYPES OF TUBES WHICH ARE BEING SUPPLIED BY DIFFERENT MANUFACTURERS IN TWO TYPES OF FILAMENT CONSTRUCTIONS ARE LISTED TWICE ON THE "TUBE LIST" CARD; THE THORIATED TYPES ARE FOLLOWED BY THE LETTER "T", AND THE OXIDE TYPES ARE FOLLOWED BY THE LETTER "O". ACCORDINGLY, IT IS ADVISABLE FOR THE TESTER USER TO DETERMINE, FROM THE TUBE MANUFACTURER'S OWN LITERATURE, THE TYPE OF FILAMENT CONSTRUCTION EMPLOYED IN THOSE TUBES WHICH ARE LISTED TWICE, SO AS TO BE ABLE TO PROPERLY TEST THESE TUBES.

MULTI-CATHODE TUBES. THE TYPES 12A7, 12Z5, 25Z5 AND SIMILAR TUBES, HAVE MORE THAN ONE CATHODE ELEMENT AS INDICATED IN THE LAST COLUMN OF THE "TUBE LIST" CARD, AND THE CORRESPONDING CATHODE BUTTONS SHOULD BE SIMULTANEOUSLY DEPRESSED FOR ALL "LKG." AND "TUBE" TESTS INVOLVING THESE ELEMENTS. FOR EXAMPLE, WHEN CONDUCTING THE "LKG." TEST FOR THE TYPE 12A7 TUBE, THE BUTTONS MARKED F, 2, 3, AND T. C. SHOULD BE DEPRESSED SUCCESSIVELY; THAT IS, ONE AT A TIME, BUT INSTEAD OF DEPRESSING THE NO. 4 BUTTON ALONE, THE NO. 4 AND NO. 6 BUTTONS SHOULD BE DEPRESSED TOGETHER; OTHERWISE, THE NEON LAMP WILL GLOW WHEN EITHER THE NO. 4 OR THE NO. 6 BUTTON IS DEPRESSED ALONE. AFTER DEPRESSING THE NO. 4 AND NO. 6 BUTTONS TOGETHER, AND RELEASING THEM, THE NO. 5 BUTTON MAY BE DEPRESSED FOR COMPLETING THE "LKG." TEST. A SIMILAR PROCEDURE SHOULD BE FOLLOWED FOR OTHER MULTI-CATHODE TUBES, EXCEPT THAT THE MARKINGS MAY BE DIFFERENT FOR THE CATHODE BUTTONS INVOLVED.

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, TUBE ENGINEERS ARE NOT GENERALLY AGREED AS TO THE TEST LIMITS OF GASEOUS CONTENT SO THAT THE USUAL GAS TEST OF A TUBE TESTER HAS VERY LITTLE MEANING IN PRACTICE. WHEN TUBES, EXCEPTING GASEOUS DETECTORS SUCH AS THE TYPE 900-A AND MERCURY VAPOR RECTIFIERS SUCH AS THE TYPES 82 AND 83, BECOME SO GASEOUS AS TO CAUSE A PURPLISH GLOW BETWEEN THE ELEMENTS DURING NORMAL OPERATING CONDITIONS THEY SHOULD UNQUESTIONABLY BE REPLACED. SUCH TUBES WILL USUALLY TEST LOW ON THE REGULAR "TUBE" TEST 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 ENVELOPES OR POWER TUBES, BUT THESE ARE QUITE NATURAL AND SHOULD NOT BE INTERPRETED AS AN INDICATION OF A DETRIMENTAL 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 TUBE TESTER SOCKETS, AFTER PLACING ONE OF THESE TYPES IN THE 4-HOLE SOCKET. IF DESIRED, 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 VALUE APPLIED TO THE FILAMENT AND OTHER CIRCUITS OF TUBES WHICH ARE SUBJECTED TO TESTS IN THIS TESTER ARE NECESSARILY BASED ON NO-LOAD CONDITIONS BECAUSE EACH TUBE IMPOSES A DIFFERENT LOAD FROM EACH OTHER TUBE. WHEN A TUBE LOAD IS IMPOSED UPON THE TESTER, THE APPLIED POTENTIALS MAY BE EXPECTED TO DROP SOMEWHAT FROM THE NOMINAL VALUES, BUT THIS CONDITION SHOULD NOT BE CONFUSING 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 CONDUCTANCE TEST, WHICH INVOLVES LABORATORY EQUIPMENT FOR MEASURING MUTUAL CONDUCTANCE IN TERMS OF MICRO-MHOS WITH SPECIFIED D. C. POTENTIALS APPLIED TO THE TUBES. OBVIOUSLY, SUCH ELABORATE EQUIPMENT IS IMPRACTICAL FOR FIELD USES 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 ACCURACY FOR THE SAKE OF SIMPLICITY OF OPERATION AND LOWER UNIT COST PER TESTER, BUT PRACTICAL RADIO DEALERS AND THE PROFESSIONAL RADIOMEN 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 ACCURACY IS ENABLED BY THE SUPREME TESTER BY REASON OF THE FACT 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 OFFERED IN A SIMILAR PRICE CLASS, SHOULD APPRECIATE THE FACT THAT THE TESTER IS NOT A GRADUATED QUALITATIVE TESTER IN WHICH A TUBE WHICH TESTS AT A METER READING OF 80 IS NECESSARILY BETTER THAN A TUBE WHICH TESTS AT 76, BUT THAT THE TESTER IS USEFUL PRIMARILY AS A MEANS FOR SEPARATING "BAD" TUBES FROM "GOOD" TUBES. IN OTHER WORDS, A "BAD" OR VERY "BAD" TUBE MAY TEST ANYWHERE IN THE "BAD" OR "2" SECTORS 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 OPERATIVE RADIO; 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 INOPERATIVE IN ONE OPERATIVE RADIO CIRCUIT MAY BE FOUND QUITE SATISFACTORILY OPERATIVE IN ANOTHER OPERATIVE RADIO CIRCUIT. THE FACILITIES OF THE SUPREME TESTER FOR INDICATING INTER-ELEMENT LEAKAGES AND SHORT-CIRCUITED CONDITIONS ARE UNEXCELLED BY ANY TESTER AT ANY PRICE, AND CONSTITUTE AN INVALUABLE AUXILIARY TEST FOR "WEEDING OUT" UNSATISFACTORY TUBES; IT IS OFTEN FOUND THAT MORE TUBES OF A PARTICULAR RADIO REQUIRE REPLACEMENT BECAUSE OF INTER-ELEMENT LEAKAGES THAN REQUIRE REPLACEMENT BECAUSE OF LOSS OF TRANSCONDUCTANCE (MUTUAL CONDUCTANCE) INCIDENTAL TO THE DEPRECIATION OF THE ELECTRON-EMITTING QUALITIES OF THE TUBES INVOLVED. THIS TESTER IS AN INVALUABLE "SELLING TOOL" FOR THE RADIO DEALER, AND A VERY USEFUL ITEM IN THE EQUIPMENT OF THE PROFESSIONAL RADIOMAN WHOSE PRACTICAL MIND NECESSITATES HIS QUICKLY APPROXIMATING A PRACTICAL SOLUTION FOR EVERY TUBE AND SERVICE PROBLEM WHICH CONFRONTS HIM IN HIS DAILY ROUTINE.

**VOLTMETER CONNECTIONS.** WITH THE "MTR. CIRCUIT SELECTOR" SWITCH SET IN THE "VOLTS" POSITION, THE PIN JACKS ON THE RIGHT SIDE OF THE PANEL ARE CONNECTED TO THE METER THROUGH THE PROPER MULTIPLIER CIRCUITS. THE LOWEST PIN JACK WHICH IS MARKED "VOLTS" IS COMMON TO ALL RANGES, AND SHOULD BE USED AS THE NEGATIVE TERMINAL. AS A RESULT OF THIS REQUIREMENT, THESE RANGES MAY BE USED FOR POLARITY TESTING, INCORRECT CONNECTIONS CAUSING THE NEEDLE TO BACK OFF SCALE. TEST LEADS SHOULD BE BROUGHT FROM THE "VOLTS" TERMINAL AND ONE OTHER, WHICHEVER PROVIDES AN ADEQUATE RANGE SO THAT THE METER NEEDLE WILL NOT BE SLAMMED OFF SCALE.

**OHMMETER CONNECTIONS.** A BATTERY OF THREE 1.5 VOLT FLASHLIGHT CELLS (EVEREADY No. 935, OR EQUIVALENT) SHOULD BE OBTAINED LOCALLY, AND AFTER SAND PAPERING OF BOTH THE TOP AND BOTTOM OF EACH BATTERY, TO ASSURE GOOD ELECTRICAL CONTACT, INSERT THEM IN THE SMALL BATTERY COMPARTMENT (UNDER METAL SIDE PLATE) SO THAT THE POSITIVE BRASS TERMINAL OF EACH CELL IS TOWARDS THE OPENING OF THE BATTERY COMPARTMENT. THE TESTER IS SHIPPED WITHOUT BATTERIES BECAUSE OF THE POSSIBILITY OF "SHELF DEPLETION" BETWEEN THE TIME THE TESTER IS PACKED AND THE TIME OF ITS ULTIMATE DELIVERY TO THE USER. THE BATTERIES SHOULD BE REPLACED WHEN THEY DEPRECIATE TO SUCH AN EXTENT THAT THE METER POINTER CANNOT BE ADJUSTED TO FULL-SCALE DEFLECTION FOR THE LOWER RESISTANCE RANGES.

**HIGH RESISTANCE MEASUREMENTS.** A MINIATURE "POWER PACK" IS INCLUDED IN THIS TESTER FOR EXTENDING THE RESISTANCE-MEASURING RANGES FROM 200,000 OHMS TO 2 AND 20 MEGOHMS, AND THESE HIGH RANGES MAY BE USED IN THE FOLLOWING MANNER:

- I. SET THE 4-POSITION ROTARY SWITCH AT THE "OHMS" POSITION.
- II. CONNECT THE TESTER TO A CONVENIENT A. C. POWER SUPPLY OUTLET.
- III. CONNECT TEST LEAD CONDUCTORS TO THE "MEGOHMS" AND THE "2-MEG.", OR "20-MEG.", PIN JACKS.
- IV. WHILE HOLDING THE FREE CONTACT ENDS OF THE TEST LEAD CONDUCTORS TOGETHER, ROTATE THE "ZERO OHMS ADJUSTER" CONTROL KNOB FOR AN EXACT FULL-SCALE METER POINTER DEFLECTION OF ZERO OHMS.

- V. THE RESISTANCE VALUE OF AN UNKNOWN RESISTOR, IF DISCONNECTED FROM OTHER POWER-SUPPLYING OR GROUNDED CIRCUITS AND CONNECTED BETWEEN THE FREE CONTACT ENDS OF THE TEST LEAD CONDUCTORS, WILL BE INDICATED ON THE OHMS RANGE. THE INDICATIONS OF THE METER SHOULD BE MULTIPLIED BY 1,000 BY ADDING THREE ZEROS TO THE FIGURES OF THE "OHMS" RANGE OF THE METER FOR THE 2-MEG. RANGE, AND 10,000 FOR THE 20-MEG. RANGE.

OHMMETER ADJUSTMENTS. BEFORE USING ANY RANGE OF THE "ANALYZER METER" RESISTANCE RANGES, THE FOLLOWING ADJUSTMENT PROCEDURE SHOULD BE FOLLOWED:

- I. SET THE "METER CIRCUIT SELECTOR" AT THE "OHMS" POSITION.
- II. CONNECT A TEST LEAD CONNECTOR TO THE "OHMS" PIN JACK.
- III. CONNECT A TEST LEAD CONDUCTOR TO THE "2M", "20M", OR "200M" PIN JACK, DEPENDING UPON THE DESIRED 2,000, 20,000, OR 200,000 RANGE FOR OHMIC MEASUREMENTS.
- IV. WHILE HOLDING THE FREE CONTACT ENDS OF THE TEST LEAD CONDUCTORS TOGETHER, ROTATE THE "ZERO OHMS ADJUSTER" CONTROL KNOB FOR AN EXACT FULL-SCALE POINTER DEFLECTION FOR INDICATING ZERO OHMS.
- V. THE RESISTANCE VALUE OF AN UNKNOWN RESISTOR, IF DISCONNECTED FROM OTHER POWER SUPPLYING CIRCUITS AND CONNECTED BETWEEN THE FREE CONTACT ENDS OF THE TEST LEAD CONDUCTORS, WILL BE INDICATED ON THE "OHMS" RANGE. THE INDICATIONS WILL BE DIRECT FOR THE "2M" RANGE, SHOULD BE MULTIPLIED BY 10 FOR THE "20M" RANGE AND BY 100 FOR THE "200M" RANGE.

PRECAUTIONS WHEN USING THIS INSTRUMENT. IT IS ESSENTIAL THAT BEFORE MAKING ANY MEASUREMENTS THAT ALL SELECTOR SWITCHES BE SET IN THEIR PROPER POSITIONS AND THAT THE PRIMARY TAP BE CORRECTLY FIXED FOR LOCAL LINE VOLTAGE. WHEN MAKING D. C. VOLTAGE MEASUREMENTS, THE TEST LEADS SHOULD BE CONNECTED TO THE PIN JACKS WHICH WILL PROVIDE AN ADEQUATE RANGE AGAINST OVERLOADING THE METER OR ASSOCIATED APPARATUS. IT IS ALWAYS ADVISABLE TO START WITH THE HIGHEST RANGE AND WORK DOWN IF THE ACTUAL VOLTAGE IS NOT KNOWN.

TESTING OCTAL TUBES. THE NEW METAL TUBES ARE CHARACTERIZED BY AN OCTAL ARRANGEMENT OF THE PINS WHICH ARE SEPARATED FROM EACH OTHER BY ANGLES OF 45 DEGREES, OR MULTIPLES THEREOF, SO THAT SEVEN PINS IN AN OCTAL BASE WOULD BE SO ARRANGED THAT TWO OF THE PINS WOULD OUTLINE ONE ANGLE OF 90 DEGREES (2 X 45), AND ALL OTHER ANGLES WOULD BE OUTLINED BY THE PINS AS 45-DEGREE ANGLES. IT IS OBVIOUS, THEREFORE, THAT OCTAL TUBES, REGARDLESS OF THE NUMBER OF PINS PER TUBE, CANNOT BE FITTED INTO EARLIER TYPES OF SOCKETS; BUT ALL OCTAL TUBES, REGARDLESS OF THE NUMBER OF PINS PER TUBE, CAN BE FITTED INTO ANY OCTAL TUBE SOCKET, BECAUSE THE HOLES OF THE OCTAL SOCKETS ARE SEPARATED FROM EACH OTHER BY AN ANGLE OF 45 DEGREES.

THE ADDITIONAL PIN OF THE NEW OCTAL TUBES IS A "GROUNDING PIN" FOR THE METAL SHIELD; OTHERWISE, THE OCTAL TUBES WILL OPERATE IN CONVENTIONAL CIRCUITS AND WILL INVOLVE NO NEW TEST PRINCIPLES INSOFAR AS THE APPLICABILITY OF TEST EQUIPMENT IS CONCERNED. LOOKING AT THE BASE END OF THE NEW OCTAL TUBES, AND WITH THE LOCATOR GUIDE RIDGE UPPERMOST THE FIRST PIN CLOCKWISE FROM THE LOCATOR GUIDE RIDGE IS THE #1 PIN, THE SECOND PIN CLOCKWISE FROM THE LOCATOR GUIDE RIDGE IS THE #2 PIN, AND SO ON CONSECUTIVELY IN A CLOCKWISE DIRECTION. IN THE TYPE 5Z4 OCTAL TUBE, THE FILAMENT TERMINATES AT THE OCTAL PINS NUMBERED 2 AND 8, WHILE THE OCTAL PINS NUMBERED 2 AND 7 TERMINATE THE FILAMENT CIRCUIT IN ALL OTHER OCTAL TUBES. #1 POSITION IS THE SHIELD WHICH IS NORMALLY ALWAYS AT GROUND POTENTIAL.

#### ELECTROLYTIC CAPACITY LEAKAGE TESTS WITH HIGH D. C. VOLTAGE.

**WARNING!** WHEN MAKING ELECTROLYTIC CAPACITY LEAKAGE TESTS, THERE IS AN APPROXIMATE POTENTIAL OF 450-VOLTS ACROSS THE "PLUS" AND "MINUS" PAIR OF THE "ELECTROLYTIC CAPACITY LEAKAGE" PIN JACKS. "PLUS" IS RED AND "MINUS" IS BLACK. HANDLE WITH CARE! USE INSULATED ALLIGATOR CLIP TEST LEADS WHICH ARE PROVIDED WITH EACH UNIT.

#### PROCEDURE.

- I. TURN "MTR. CIRCUIT SELECTOR" SWITCH TO "LKG." POSITION.
- II. TURN "PRIMARY VOLTS SELECTOR" SWITCH UNTIL METER NEEDLE RESTS AT HALF SCALE DEFLECTION.
- III. SET "MTR. CIRCUIT SELECTOR" SWITCH TO "ELEC." POSITION.
- IV. SET "ELECTROLYTIC CAPACITOR SELECTOR" SWITCH TO POSITION AND NUMERAL IN THE OUTER CIRCLE WHICH MOST NEARLY CORRESPONDS WITH THE VALUE OF THE CAPACITOR TO BE TESTED.
- V. CONNECT TIP ENDS OF ALLIGATOR CLIP TEST LEADS TO "PLUS" (RED) AND "MINUS" (BLACK) PAIR OF "ELECTROLYTIC CAPACITY LEAKAGE" PIN JACKS.
- VI. CONNECT INSULATED ALLIGATOR CLIP ENDS OF TEST LEADS TO CAPACITOR TO BE TESTED, OBSERVING PROPER POLARITY (RED JACK TO PLUS SIDE OF CAPACITOR — BLACK JACK TO MINUS SIDE OF CAPACITOR). THIS CAPACITOR MUST BE FREE OF ANY OTHER CIRCUIT. NEVER TOUCH BOTH TERMINALS WITH YOUR FINGERS AS THEY ARE HOT!

- VII. PRESS "PRESS FOR ELECTROLYTIC CAPACITORS" PUSH BUTTON AND OBSERVE READING ON METER. IF NEEDLE RESTS WITHIN THE "GOOD" PORTION, CAPACITOR HAS A SATISFACTORILY LOW LEAKAGE. IF IT RESTS WITHIN THE "BAD" PORTION, CAPACITOR HAS OBJECTIONABLE LEAKAGE AND SHOULD BE DISCARDED. IF CAPACITOR IS SHORTED NEEDLE WILL FULLY DEFLECT.

NOTE: ELECTROSTATIC & ELECTROLYTIC CAPACITORS HAVING LOWER WORKING VOLTAGES THAN 450-VOLTS SHOULD NOT BE TESTED IN THIS MANNER.

TESTING PAPER CONDENSERS. THE SAME PROCEDURE MAY BE OBSERVED AS THAT PRESCRIBED FOR ELECTROLYTICS, WITH THE EXCEPTION THAT NO POLARITY NEED BE OBSERVED AS TO THE CONNECTION OF THE CONDENSER TO THE PIN JACK TERMINALS.

PROCEDURE:

- I. TURN "MTR. CIRCUIT SELECTOR" SWITCH TO "LKG." POSITION, AND
- II. ROTATE "PRIMARY VOLTS SELECTOR" SWITCH UNTIL METER NEEDLE DEFLECTS HALF SCALE.
- III. ROTATE "MTR. CIRCUIT SELECTOR" SWITCH TO "ELEC." POSITION.
- IV. CONNECT TIP ENDS OF ALLIGATOR CLIP TEST LEADS TO "ELECTROSTATIC CAPACITY LEAKAGE" PIN JACKS.
- V. CONNECT INSULATED ALLIGATOR CLIP ENDS OF TEST LEADS TO CAPACITOR TO BE TESTED. ELECTROSTATIC CONDENSERS HAVE NO POLARITY, HOWEVER, THEY MUST BE FREE OF ANY OTHER CIRCUIT.
- VI. OBSERVE INDICATION ON "LEAKAGE INDICATOR" GLOW LAMP.

OPEN CIRCUIT CAPACITORS. IF AN OPEN CIRCUIT CAPACITOR BE CONNECTED BETWEEN THE "ELECTROSTATIC CAPACITOR LEAKAGE" PIN JACK TERMINALS, THE NEON LAMP WILL NOT GLOW. IT IS, THEREFORE, OBVIOUS THAT THIS TESTER WILL INDICATE OPEN-CIRCUITED CAPACITORS AS WELL AS OTHER CAPACITOR DEFECTS; THIS IS A FEATURE WHICH IS NOT INCLUDED IN MANY OTHER TYPES OF CAPACITOR TESTING INSTRUMENTS.

LEAKY CAPACITORS. IF A LEAKY CAPACITOR BE CONNECTED BETWEEN THE "ELECTROSTATIC CAPACITOR LEAKAGE" PIN JACK TERMINALS, ONE ELECTRODE, ONLY, OF THE NEON LAMP WILL GLOW INTERMITTENTLY; THAT IS, THE GLOW WILL COME AND GO, AT REGULAR INTERVALS, AS LONG AS THE CAPACITOR REMAINS CONNECTED. THE INTERVAL OF TIME BETWEEN EACH GLOW WILL BE DETERMINED BY THE CAPACITY OF THE CAPACITOR AND BY THE AMOUNT OF THE LEAKAGE.

SHORT CIRCUITED CAPACITORS. WHEN A SHORT-CIRCUITED CAPACITOR IS CONNECTED BETWEEN THE "ELECTROSTATIC CAPACITOR LEAKAGE" TERMINALS, ONE ELECTRODE, ONLY, WILL GLOW CONTINUOUSLY.

GOOD CAPACITORS. WHEN A GOOD CAPACITOR IS CONNECTED BETWEEN THE "ELECTROSTATIC CAPACITOR LEAKAGE" TERMINALS, THE NEON LAMP WILL REMAIN UNILLUMINATED INDEFINITELY AFTER A MOMENTARY GLOW OF ONE ELEMENT WHICH MAY NOT OCCUR AT THE INSTANT THE CAPACITOR IS CONNECTED.

NEON LAMP FOR CONTINUITY PURPOSES. WHEN USING THE NEON LAMP AS A CONTINUITY TESTER, CONNECT THE TEST LEADS TO THE "ELECTROSTATIC CAPACITOR LEAKAGE" PIN JACKS AND AFTER PRELIMINARY ADJUSTMENTS ARE MADE AS OUTLINED PREVIOUSLY THE CLIP ENDS OF THE LEADS MAY BE CONNECTED ACROSS THE UNIT TO BE TESTED.

IF THE UNIT HAS CONTINUITY, THIS WILL BE INDICATED BY A CONTINUOUS GLOW OF ONE ELEMENT OF THE NEON LAMP.

TRANSPORTATION DAMAGES. THE OFFICE OF ORIGIN OF THE TRANSPORTATION AGENCY WHICH ACCEPTED THIS TESTER FOR THE ORIGINAL SHIPMENT ASSURED THE SHIPPER AGAINST EXTERNAL AND CONCEALED DAMAGES IN TRANSIT. IF THE TESTER BE RECEIVED IN A DAMAGED CONDITION, OR IF SOME PART OF THE TESTER BE 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 FOR EFFECTING THE 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 SERVICES OF THE SUPREME SERVICE STATIONS MAY BE UTILIZED INSTEAD OF RETURNING DAMAGED TESTERS TO THE FACTORY. A LIST 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 SUPREME 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 MAY BE REFUSED BY THE CONSIGNEE. IMMEDIATE REPAIRS OR REPLACEMENTS CAN USUALLY BE EFFECTED FOR CUSTOMERS WHO HAVE NOT ESTABLISHED CREDIT; SOME DELAY MAY BE EXPECTED ON SERVICES RENDERED FOR A CREDIT CUSTOMER WHEN IT IS NECESSARY TO WRITE TO THE CREDIT CUSTOMER FOR AN ACCEPTANCE OF THE TRANSPORTATION AND ANY REPAIR OR REPLACEMENT COSTS WHICH ARE NOT COVERED BY THE STANDARD GUARANTEE POLICY. WHEN REPAIRS ARE REQUESTED OF A SERVICE STATION ON A TESTER WHICH HAS BEEN REGISTERED WITHIN 10 DAYS AFTER ITS RECEIPT, AND UNDER THE OTHER PROVISIONS OF THE GUARANTEE POLICY, THE REPAIR CHARGES SHOULD BE PAID OR ACCEPTED, AND A COPY OF THE INVOICE COVERING THE REPAIRS SHOULD BE OBTAINED FROM THE SERVICE STATION AND FORWARDED TO THE FACTORY FOR ANY REFUND OR CREDIT WHICH MAY BE PROPERLY MADE UNDER THE TERMS OF THE GUARANTEE POLICY.

REPLACEMENT PARTS, ETC. IF SOME PART OF THE TESTER BE DAMAGED IN SERVICE, OR IF THE USER SHOULD WANT TO ORDER CIRCUIT DRAWINGS, ANALYSIS CHARTS, TEST LEADS, OR OTHER ACCESSORIES, HIS ORDER SHOULD BE ACCOMPANIED BY A DEPOSIT AMOUNTING TO NOT LESS THAN FIFTY CENTS. SINCE AN ORDER AMOUNTING TO LESS THAN FIFTY CENTS CANNOT BE ASSEMBLED, PACKED AND SHIPPED WITHOUT FINANCIAL LOSS, A HANDLING CHARGE MAY BE MADE SO AS TO MAKE THE ORDER TOTAL FIFTY CENTS, INCLUDING TRANSPORTATION CHARGES. IF AN ORDER BE 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.

GUARANTEE. THIS 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, THE TESTER WILL BE GUARANTEED TO BE FREE FROM DEFECTS IN MATERIAL OR WORKMANSHIP; AND ANY SUCH DEFECTS IN MATERIAL OR WORKMANSHIP WILL BE CORRECTED, WITHOUT CHARGE, WHEN THE TESTER IS DELIVERED TO THE SUPREME INSTRUMENTS CORPORATION, GREENWOOD, MISSISSIPPI, WITHIN 90 DAYS AFTER ITS RECEIPT BY THE USER; OR, THE SUPREME INSTRUMENTS CORPORATION WILL REFUND THE REPAIR CHARGES PAID TO AN AUTHORIZED SUPREME SERVICE STATION FOR THE CORRECTION OF SUCH DEFECTS IN MATERIAL OR WORKMANSHIP UPON THE USER'S PRESENTATION, WITHIN 90 DAYS AFTER THE USER'S ORIGINAL RECEIPT OF THE TESTER, OF A PAID INVOICE FOR SUCH REPAIRS, INDICATING THE CORRECT SERIAL NUMBER OF THE TESTER AND DESCRIBING THE REPAIRS; PROVIDED THE USER ACCEPTS THE OBLIGATION OF THE PAYMENT OF ALL TRANSPORTATION COSTS INVOLVED IN ANY CORRECTIONS EFFECTED UNDER THE CONDITIONS OF THIS GUARANTEE POLICY, IN ACCORDANCE WITH THE STANDARD PRACTICES OF THE RADIO MANUFACTURER'S ASSOCIATION.

SUPREME INSTRUMENTS CORPORATION

GREENWOOD, MISSISSIPPI

U. S. A.





MODEL 89-D ACCESSORIES ORDER  
 TO  
 SUPREME INSTRUMENTS CORPORATION  
 GREENWOOD, MISSISSIPPI  
 U. S. A.

PLEASE SHIP TO.....  
 STREET ADDRESS.....  
 P. O. & STATE.....

QUANTITY	STOCK NO.	DESCRIPTION	PRICE	TOTAL
.....	6288	CHART, ANALYSIS, PER PAD OF 50	0.25	.....
.....	6487	LAMP, 110-VOLT, 2-WATT NEON GLOW TO BE USED AS A SPARE REPLACEMENT, ETC.	0.45	.....
TOTAL				.....

A DEPOSIT, AMOUNTING TO NOT LESS THAN FIFTY CENTS IS ENCLOSED HERewith; AND IT IS UNDERSTOOD THAT, IF THIS ORDER AMOUNTS TO LESS THAN FIFTY CENTS INCLUDING TRANSPORTATION COSTS, A HANDLING CHARGE WILL BE MADE SO AS TO MAKE THE ORDER TOTAL FIFTY CENTS. IF THE DEPOSIT IS INSUFFICIENT TO COVER THE COST 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.

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

(Stock #7146)

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