

# SUPREME *Presents*



the **385 AUTOMATIC!**

# The New Supreme Model "385 AUTOMATIC" Tester

It is easy for professional radiomen to appreciate the fact that a large percentage of the cost of a well-designed piece of test equipment is involved in the essential items such as the hardwood carrying case, bakelite panel, the necessary meters, switches, etc., and that the additional cost for the "plus" features which can be added to the essentials is quite nominal. For example, the essential elements which we have just mentioned would be required in a simple voltmeter. By the addition of an "OHMS" scale, two or three multiplier resistors and another switch contact, all for a small additional cost, the same essential and basic constructional elements would be made to include an ohmmeter. Similarly, other features can be added to the tester at small cost, and, by making each part serve several purposes, a very useful tester can be economically produced.

The principles outlined above have been applied to a remarkable degree in the constructional design of the new Supreme Model "385 Automatic" multi-purpose tester, in which each fundamental element performs a number of different functions so as to make available to the professional radioman a most complete tester for a surprisingly small investment.

By employing the principles of single-unit construction and multiple-use of fundamental elements, the sensitive 5-inch fan-shaped d'Arsonval meters are made to provide (1) six D.C. potential-measuring ranges of 0/5/25/125/250/500/1250 volts D.C., (2) six A.C. potential-measuring ranges of 0/5/25/125/250/500/1250 volts A.C., (3) six current-measuring ranges of 0/5/25/125/250/500/1250 milliamperes, D.C., six (6) capacity-measuring ranges of 0/0.05/0.25/1.25/2.5/5.0/12.5 mfd., and (4) six resistance-measuring ranges of 0/200/2000/20,000/200,000/2,000,000/20,000,000 ohms; the four lower ranges of the ohmmeter are powered by a self-contained flashlight battery, and the two higher, or 0/2/20-megohm ranges, are powered with a self-contained miniature "power pack." One of the meters is, also, provided with an English-reading colored tube testing scale, and a new English-reading electrolytic capacitor leakage scale, so that electrolytic capacitors can be tested for "GOOD" or "BAD" leakage characteristics in the same manner as that which has heretofore been practiced for testing tubes. It is obvious to the professional radioman who uses one of these compactly-designed testers that he has, in two meters, the equivalent of six (6) single-range D.C. milliammeters, six (6) single-range D.C. voltmeters, six (6) single-range A.C. voltmeters, six (6) single-range capacity meters, six (6) single-range ohmmeters, one (1) English-reading tube testing meter, and one (1) English-reading electrolytic capacitor leakage meter, or a total equivalent of thirty-two (32) single range meters in a compact "uni-constructed" tester which is scientifically designed for use as:

1. An up-to-date Analyzer with Supreme's exclusive Free Reference Point System of Analysis for all tube circuits, including all of the new 8-pin metal tubes.
2. An English-reading tube tester which tests all tubes under approximate rated load conditions including all of the new 8-pin metal tubes, without adapters.
3. The Supreme-pioneered "neonized tester" for detecting any and all tube element leakages.
4. An electrostatic capacitor leakage tester, utilizing the well-known Supreme neonized circuit.
5. A new English-reading electrolytic capacitor leakage tester, and
6. A capacitor tester for measuring the capacity of electrostatic and electrolytic capacitors, which may be profitably used on every service job encountered by the busy professional radioman.

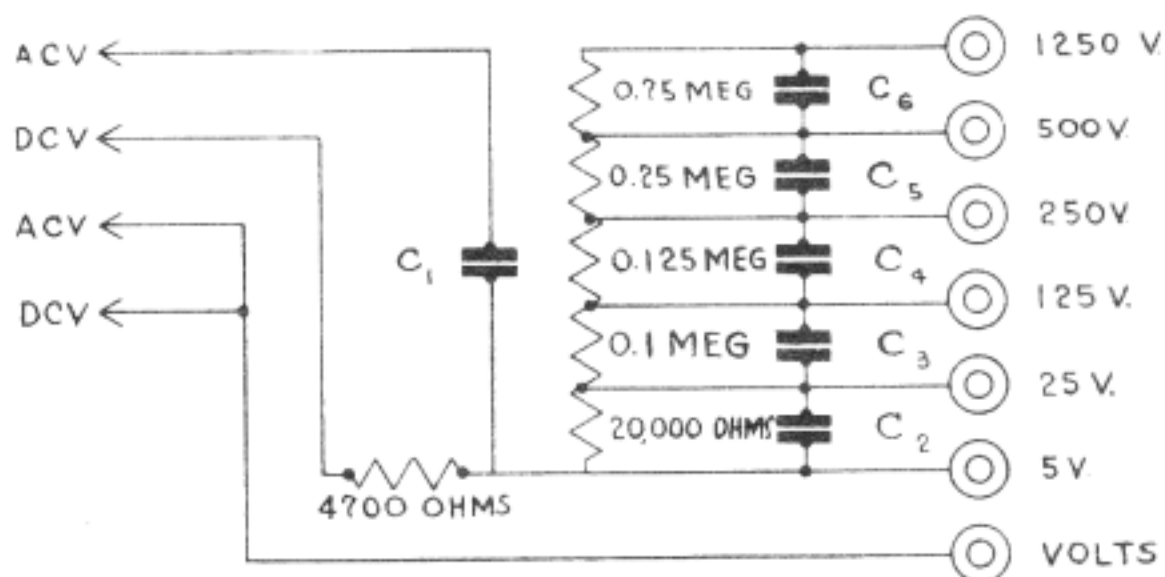


FIG. 1

The use of a copper-oxide rectifier to adapt a sensitive D.C. meter for A.C. potential measurements is necessary for output measurements where a sensitive meter is required, as there is no other practical arrangement whereby a sensitive A.C. meter can be realized. The most objectionable feature of copper-oxide rectifiers has been the susceptibility of these units to damage under electrical overloads. Fuses have proved impractical by reason of the thermal lag which characterizes even the best of fuses which will not open an overloaded circuit quickly enough to protect a rectifier which may be instantaneously damaged by an overload potential. A rectifier may be damaged by a surge from a transformer, a power choke, or a capacitor in any circuit into or across which the meter may be connected, so that the tester user is not always cognizant of his having inadvertently over-loaded the rectifier unit of his tester.

In the design of the Supreme Model "385 Automatic," the objectionable feature of susceptibility to surge and overload damage of the rectifier has been overcome by (1) having the rectifier connected to the functional switch so that it is kept clear of the tester circuits except when the A.C. potential-measuring and capacity-measuring circuits are closed by the meter, and by (2) having the rectifier input shunted with a normally-closed push button switch so that any surge potential from a transformer, power choke, or capacitor will be shunted around the rectifier before the operator opens the shunting switch. With this dual-protecting arrangement, the rectifier could be damaged only by a positive and purposeful act on the part of the user; accidental damage is extremely improbable.

For a study of the details involved in the design of this analyzer, the reader is referred to the accompanying diagrams. The elements involved in the A.C. potential and capacity measurements are indicated in Figure 1, which is helpful in a further study of the inherent characteristics of instrument rectifiers. Alternating current values, as measured by ordinary A.C. instruments, will not be indicated as having the same value after being rectified and measured with D.C. instruments. For example, an A.C. potential of 100 volts as measured with an ordinary A.C. instrument will, after full-wave rectification, be indicated by a D.C. instrument as having a value of about 90 volts. The reason is that ordinary A.C. voltmeters have a desirable characteristic of indicating R.M.S. values, whereas sensitive D.C. instruments indicate average values which are lower than R.M.S. values by the ratio of 1:1.11. This characteristic suggests that some means must be provided for correcting the sensitivity of the meter between the A.C. and D.C. values, to take care of this ratio between R.M.S. and average values. It might be well to state here, that the ratio 1:1.11 may be modified by the electrical characteristics of the rectifier unit, or of other circuit elements. In the

Milliamperes	Ohms
1.0	500
0.9	530
0.8	560
0.7	620
0.6	685
0.5	760
0.4	870
0.3	1030
0.2	1300
0.1	2000

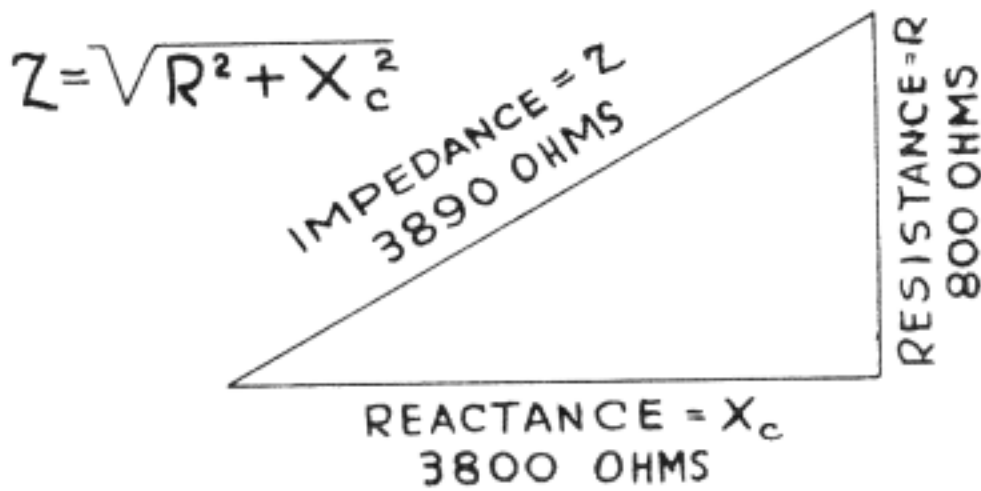


FIG. 2

current density is reduced, however, by the usual multiplier resistors as used in the rectifier type A.C. voltmeters. A table has been compiled (Table I) to show the current and corresponding resistance values. Let us suppose, for example, that we want to use an instrument rectifier, which has the tabulated characteristics, in a 5-volt potential-measuring circuit with a meter which requires a current load of 0.001 ampere (1.0 milliampere) for full scale deflection. Since we must increase the current by the ratio of 1:1.11 as explained above, we must decrease the multiplier resistance by the same ratio; that is, we must divide 5000 ohms (1000-ohms-per-volt) by 1.11 which leaves us a multiplier resistance value of 4500 ohms, 500 ohms of which is included in the rectifier, as indicated in Table I. At a half-scale meter deflection of 0.5 milliampere, the rectifier resistance will increase about 260 ohms (from 500 to 760 ohms) so that the total circuit resistance will increase from 4500 to 4760 ohms; this is an overall increase of 5.8% as contrasted with an increase of 52% in the rectifier resistance. This illustrates the minimizing effects of multiplier resistors on the rectifier errors, but an error of 5.8% is too much for the 5-volt range, and some means must necessarily be devised for reducing this error.

In the design of the analytical functions of the Model 385, it was found advantageous to minimize the "current density" characteristic of the instrument rectifier by using a series capacitor ( $C_1$ , Fig. 1) for the low range as a multiplier reactor, instead of using a multiplier resistor. This arrangement constitutes an impedance circuit wherein the capacitive reactance is about 90° out of phase with the meter and rectifier resistance. The adjustment of the 5-volt A.C. range of each Model 385 tester is accomplished by adjusting the capacity  $C_1$  until the meter needle deflects to the full-scale position with an applied 5-volt A.C. potential. The resultant impedance is 3890 ohms as represented by the triangle of Figure 2, in which the resistance value is 500 ohms for the rectifier and 300 ohms for the meter, or a total of 800 ohms. Now, if the resistance is increased by 260 ohms, as described above, the impedance is increased by only 50 ohms from 3890 to 3940 ohms; this value representing the square root of the sum of the squares of 1060 and 3800. An increase of 50 ohms in 3890 ohms is only 1.3% when a capacitive multiplier is used as contrasted to an increase of 5.8% when a resistive multiplier is used. Therefore, "by using a capacitor instead of a multiplier resistor for the low

Supreme tester, this correction is effected by means of a series capacitor and parallel capacitors, which have the effect of reducing the total impedance of the circuits for measuring A.C. values, so that more current is permitted to pass through the meter movement than is the case when using the tester for D.C. measurements.

A "current density" characteristic manifests itself in the form of an increase in rectifier resistance with a decrease in electrical load and must be taken into consideration in designing a universal tester, thus accounting for the departure from a linear scale in the usual rectifier instrument. The effect of the

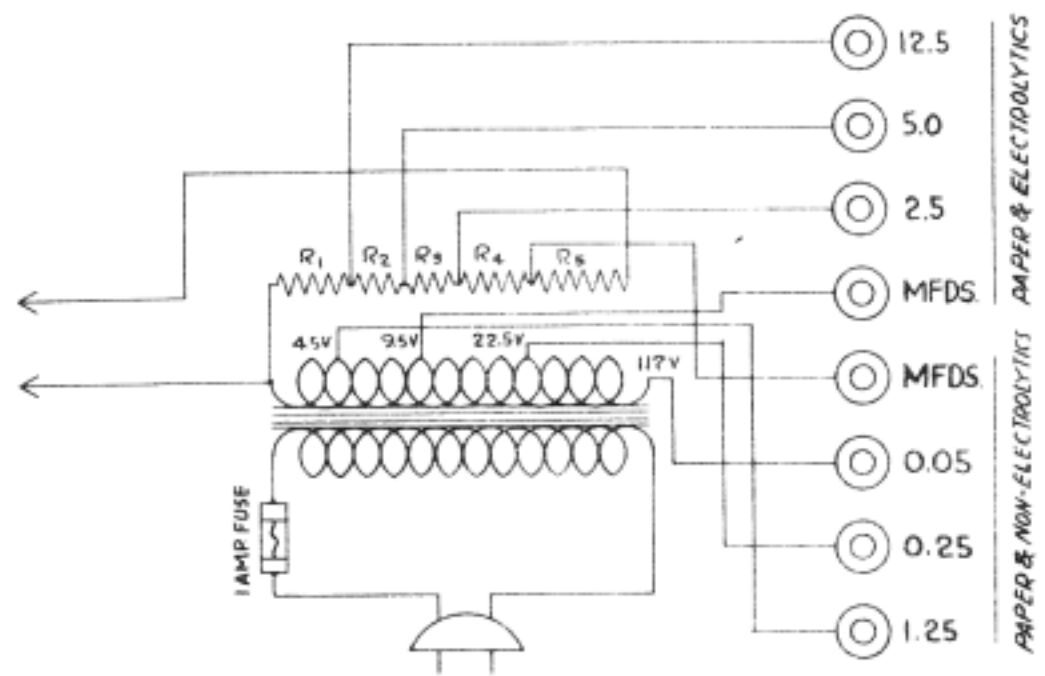


FIG. 3

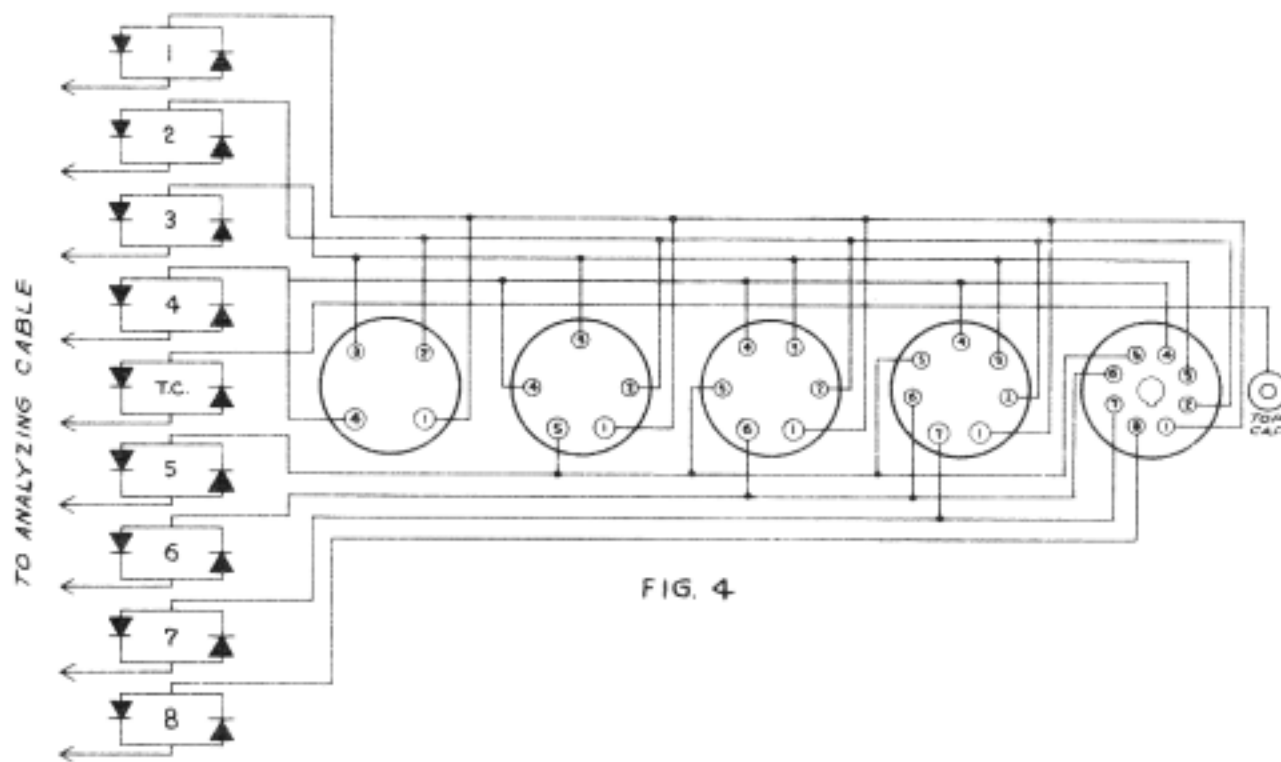


FIG. 4

voltage A.C. range, the readings are made to conform very closely to uniform scale distribution for practically all measuring requirements. The multiplier capacitor also serves to isolate A.C. from D.C. measuring functions; in other words, the meter will not register A.C. potentials when the switch is in the D.C. position and vice versa. The capacitors which parallel the multiplier resistors (Fig. 1) serve to calibrate the 25-volt and higher ranges for A.C. potential measurements, by by-passing enough current to conform to the form factor ratio of about 1:1.11.

The power transformer which is utilized in this tester provides the potentials indicated in Figure 3 to accommodate the different values of unknown electrostatic and electrolytic capacitive values, thereby constituting the capacity-measuring functions of this tester. A tapped resistor is used for the dual purpose of a shunt and series resistors with respect to the rectifier and meter. A fuse (1-A) is placed in the primary circuit as an effective safety element against possible shorted capacitors. One side of the A.C. potential is applied to one of the A.C. input terminals of the rectifier and to one side of R1, while the other side of the A.C. potential (approx. 9.5-V) is connected directly to the "Mfd's. Common" pin jack terminal.

The analyzer cable circuits of the Model 385, as indicated in Figure 4, are especially interesting because of their association with the new 8-pin socket for the new "metal tube" developments. While there have been, during the last two years, many rumors of the possibilities of the advent of such tubes, there has been no definite announcement, until the present time, of the actual terminal and socket details so that the design engineers of testing equipment could incorporate facilities for the accommodation of 8-pin tubes. This is probably the first tester to be announced for complete tests of all 8-pin tubes and circuits.

It is interesting to observe the clever scheme which has been developed whereby one socket can be used for the accommodation of 4-pin, 5-pin, 6-pin, 7-pin and 8-pin "metal tubes." This is accomplished by equally dividing the 360-degree pin circle by 8, making the angular separation of the pins exactly 45 degrees, and it will be observed that the angular separation of the pins of the new "metal tubes" is 45 degrees or multiples of 45 degrees. With

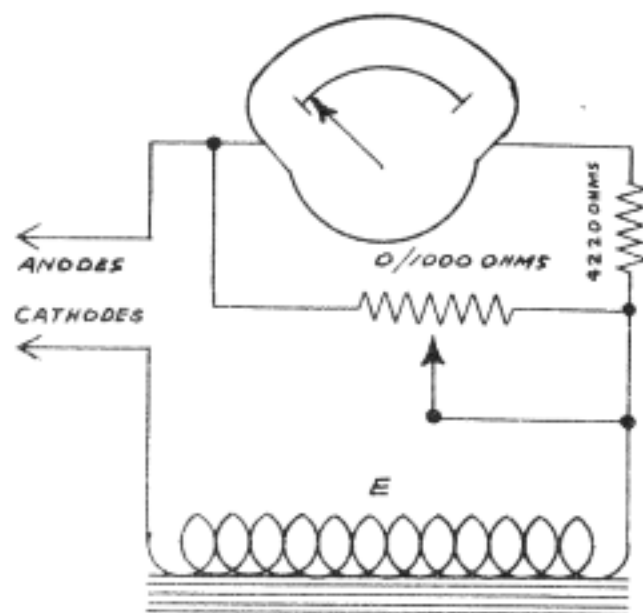


FIG. 5

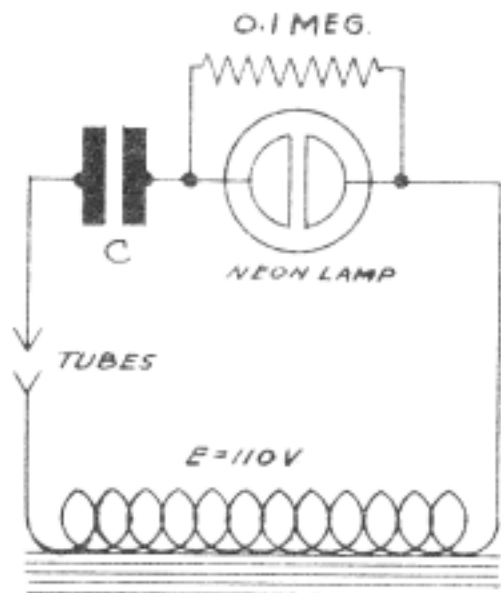


FIG. 6

for using push button switches to open the circuits for current measurements, thereby enabling automatic current measurements. The terminal arrangement enables the connection of other elements, such as "pick up" devices, microphones, head phones, or grid leaks, for numerous special tests.

The flexibility of the open switch-board arrangement of the circuit terminals is illustrated in the elimination of the use of troublesome adapters for output measurements, as it is only necessary to connect the desirable A.C. voltmeter range across the plate and cathode circuits, with the analyzer plug inserted in the power output stage of a radio while the tube is placed in the proper analyzer socket. The capacitor  $C_1$  (in Figure 1) effectively "blocks" the D.C. plate potential, so that the meter registers only the A.C. component of the output signal.

A careful study of Figure 4 indicates that the cable conductors, pin-jack terminals and switches are designated according to the new simplified Pin Numbering system and that, when the analyzing plug is inserted in a radio tube socket, the circuits of that socket are extended to the analyzer panel for any measurement desired, so that it is unnecessary to remove or dismantle a radio chassis in order to gain access to the circuits for the usual "point-to-point" tests, as is necessary with the usual multi-purpose meter.

A simplified arrangement of the "QUALITY TEST" tube testing circuit is indicated in Figure 5, in which it is observed that the direct current passed by the tubes is measured by one of the meters, and that the current is limited by the tubes and the two resistors, one of which is variable. The value of the variable resistor is predetermined for each type of tube, and the corresponding control knob setting is included in a "TUBE LIST" card which accompanies each tester. The resistance values are determined by the factors of (1) the desirability of maintaining a constant ratio between the effective internal resistance values of tubes and the external resistance values of the tube testing circuits, (2) the necessity of protecting the meter against short-circuited tube overloads, and (3) a desirable ballast effect to minimize the slight variations which may exist between different brands of tubes. The circuit constants are such that all tubes are tested at more nearly normal rated loads than is usually the case with commercial tube testers, thereby

this arrangement, a 7-pin "metal tube" will fit into the 8-contact socket, leaving one contact blank; a 6-pin "metal tube" will fit into the same socket, leaving two blank spaces; a 5-pin "metal tube" will fit into the same socket, leaving 3 blank spaces, and so on down to the minimum number of pins. This design feature does not characterize the tube pin arrangements of the tubes with which we have been familiar up to the present time, as 6-pin, 5-pin and 4-pin tubes could not be fitted into 7-contact sockets.

This design feature of the new "metal tubes" will greatly simplify the use of testing equipment, and all of the advantages of this new socket design are incorporated in this new tester advancement for "Free Reference Point" analyzing.

Each of the analyzing circuits is provided with a circuit-breaking twin jack, which keeps the circuit closed until two pin plugs are inserted. The use of circuit-breaking twin jacks in this tester eliminates the necessity

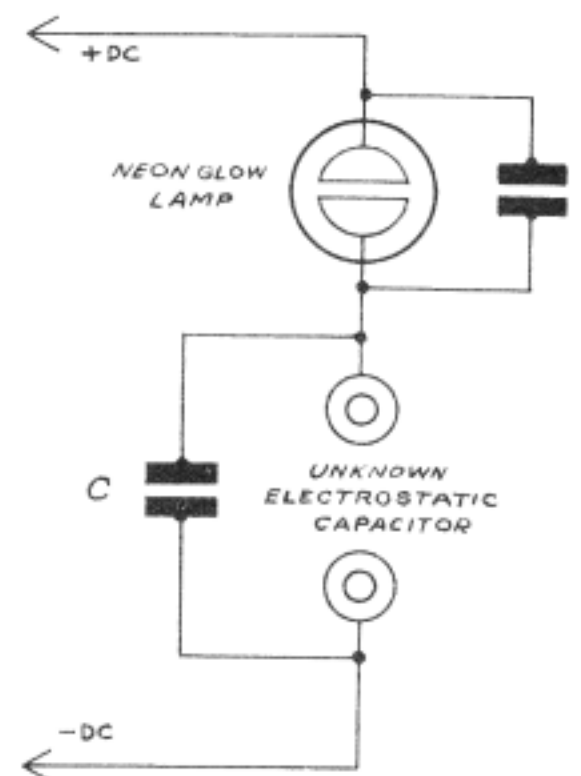


FIG. 7

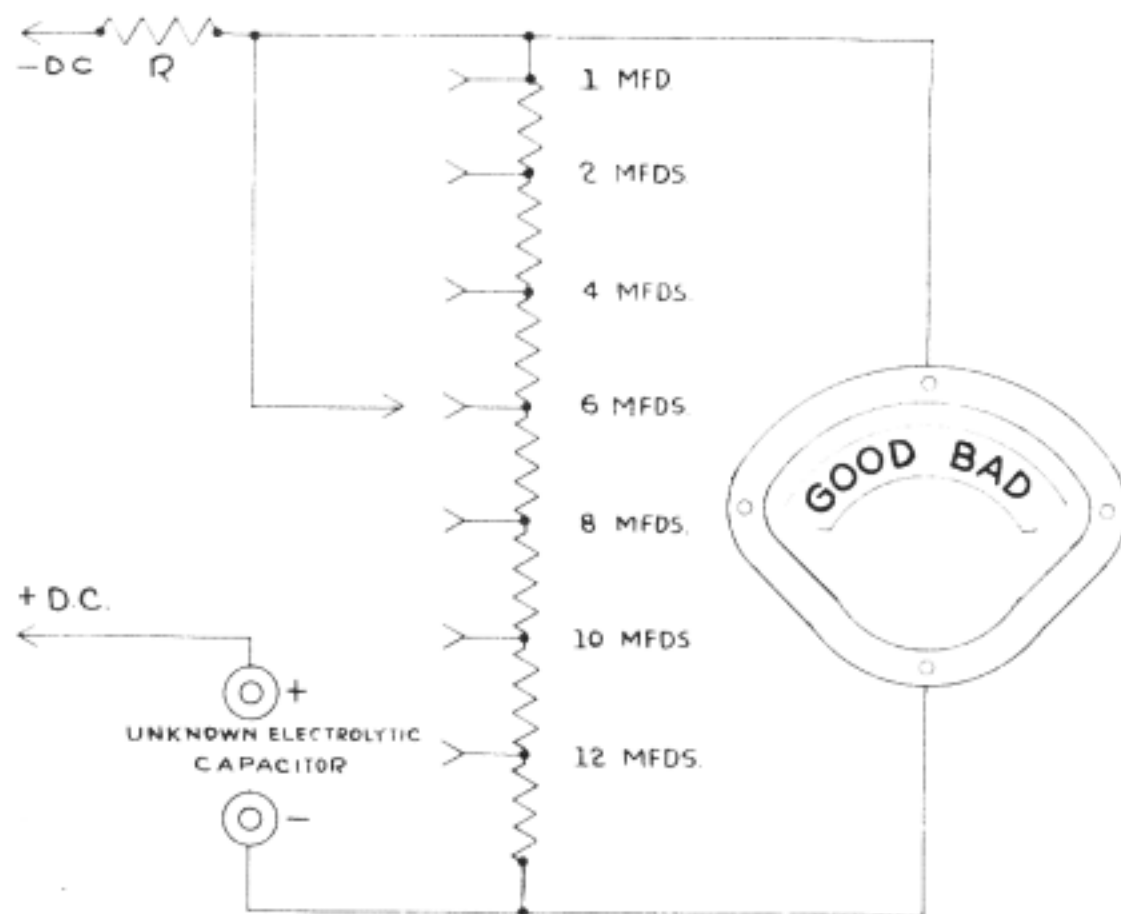


FIG. 8

assuring a correspondingly greater degree of accuracy in the classification of tubes, and the external resistance value of the tube testing circuit when the "QUALITY TEST" Selector is properly set, is 10% of the total circuit resistance, including that of a normal tube under test, regardless of the type of tube involved. Since 10% of the maximum available potential value is normally developed across the meter, a short-circuited tube cannot impose more than a ten-times overload which the meter is capable of withstanding without harm.

The "grid shift" method of testing tubes is well known as it has been used for several years. It is wrong, however, to refer to a "grid shift" test as being a mutual conductance test, unless rated D. C. potentials are applied to the tubes during the tests. Any variation from rated D. C. potentials will produce corresponding variations in mutual conductance ratings. This is proved by a casual observation of a table of tube characteristics such as that published by any tube manufacturer.

For example, it may be observed that the type O1A tube has a rated mutual conductance value of 725 micromhos when operated with a negative controlling grid potential of 4.5 volts and with a positive plate potential of 90 volts; but when the applied negative controlling grid potential is 9.0 volts and the applied positive plate potential is 135 volts, the mutual conductance is rated at 800 instead of 725 micromhos.

It is noted that the change in rated mutual conductance has been effected by changing both controlling grid and plate potentials; what would happen if only one of these potentials were changed? It is obvious that any departure from any rated potential will result in a departure from rated mutual conductance, and that a mutual conductance tester which is designed to test tubes by mutual conductance measurements for comparison with rated values must be so designed as to enable the application of rated D.C. values; and when it is remembered that there are almost innumerable combinations of filament (or heater), plate, controlling grid, screen grid, suppressor grid, pentode, etc., potentials, it is readily appreciated that a mutual conductance tube tester, made up as a single unit, would be quite complicated in its design and operation, and would be too expensive for practical commercial purposes.

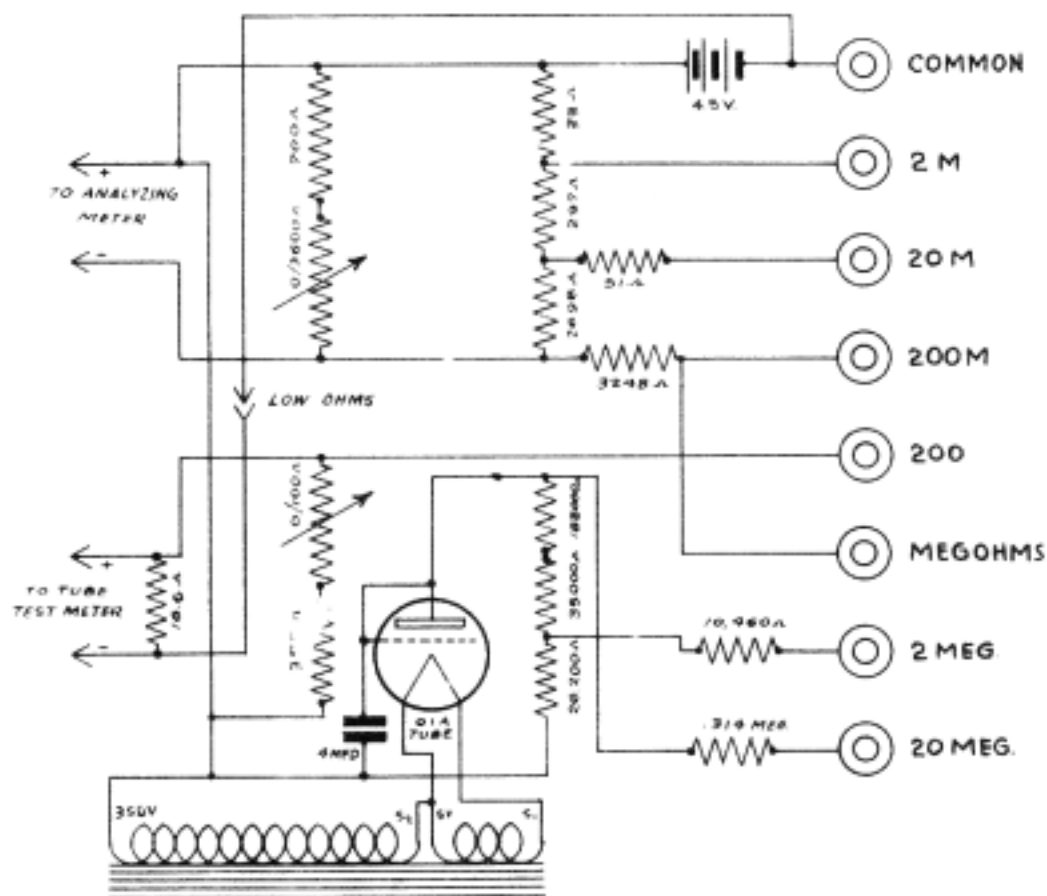


FIG. 9

ance between absolute accuracy and practical utility; such a practical compromise involves (1) a commercially acceptable selling price, (2) a reasonable degree of simplicity of operation, and (3) a practical degree of accuracy. This results in a departure from the use of the various rated D.C. values to a compromise of a few average values which can be applied to all tubes alike, thereby lowering the number of controls and providing the desired element of simplicity of operation, without a serious sacrifice of accuracy, so that the practical radioman can obtain, at a comparatively low cost, a simple tester with an accuracy in the order of 90% instead of having to pay several hundred dollars for a more complicated tester with an accuracy of 95% or more; but never 100%, as perfection can only be approached but never attained by human effort.

The "grid shift" tester with its compromise of applied potentials was simple enough until the sudden avalanche of about 150 types of new multiple-element tubes, when the simple "grid shift" tester had to take on a larger number of sockets, or a larger number of controls, or both, with additional compromises with accuracy. It was then that the design engineers began to study the possibilities of other types of testers which could be designed with a more desirable element of operating simplicity, without too much sacrifice of the desirable element of practical accuracy.

As a result of the practical necessity for eliminating the "grid shift" tester for general tube testing practices, the emission tester came into favor, because it was found that a well-designed emission tester is more accurate than a poorly-designed "grid shift" tester with compromised potentials and a multiplicity of sockets and/or controls. After all, about all that can happen, within the realm of probability, to a radio tube after the tube is placed in service, is the depreciation of the emitting qualities of the cathode element, so why not test a tube by measuring the emission current?

There are other possible causes of tube failure, of course, such as lightning strokes, air leakage through the glass envelopes, etc., but we are speaking of a probability and not of extremely unlikely possibilities, so that it is quite practical to conclude that an amplifier tube loses its mutual conductance in service by reason of a lowering of the emission incidental to the prolonged service; in other words, all tubes, amplifiers and

Such a tester would require batteries or a D.C. "power pack" with good regulation and designed to supply all of the D.C. potentials and currents listed by tube manufacturers, with a control for each tube element, plus one or more controls for the meter sensitivity. As applied to a 7-element tube, the tester would require about ten controls. Boiled down to a practical appraisal, the tester would cost several hundred dollars, and require about an hour to test a set of tubes. Imagine spending 30 minutes to an hour to test a customer's tubes to make a 60-cent sale with a profit of 24 cents! How long would it take to pay for such a tester in profits from tube sales?

The high cost and operating complications of a true mutual conductance tester have resulted in efforts on the part of testing equipment design engineers to make such compromises in absolute accuracy as are necessary to strike a bal-



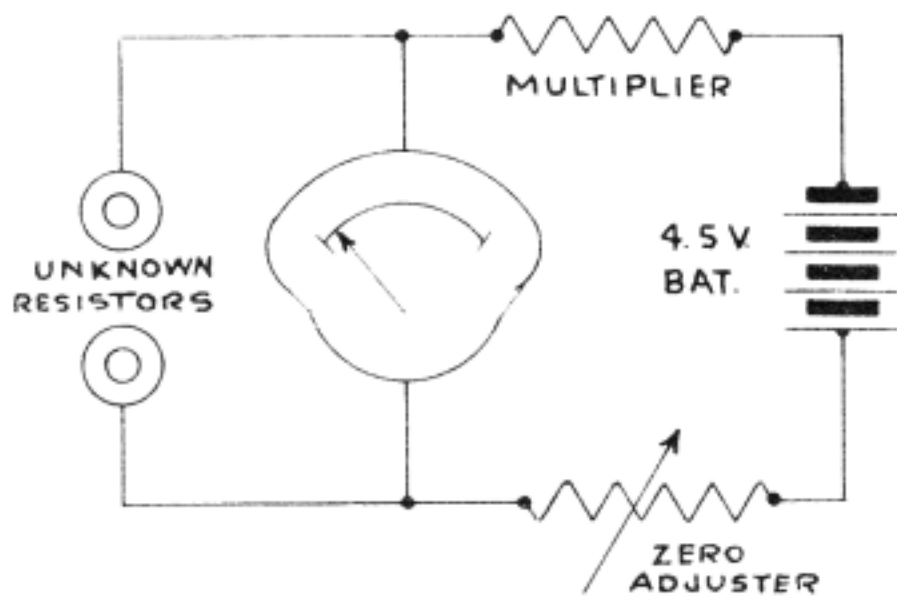


FIG. 10

neon glow lamp will indicate the passage of A.C. leakage current by a glow of both elements of the neon lamp.

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 capabilities 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.

It was shown in the first part of this discussion that the analytical functions of this tester, based on the well-known "Free Reference Point System of Analysis," is remarkably applicable to the test requirements of the new 8-pin "metal tubes," and it is now interesting to observe that the tube testing functions of the tester are also applicable to these new tubes, without affecting, in the least, the simple 3-step testing procedure which has characterized Supreme's tube tester developments of the past. A tube, old-style or new-style, cannot be placed in the wrong tube testing socket, nothing happens if the wrong button is depressed, and the tester cannot be harmed by an incorrect selector setting or by a "shorted" tube; the leakage test is applicable between all elements of all tubes, whether the tubes be of the old type or of the new "metal" type. The "Quality" test on the English-reading meter scale involves all tube elements, and provisions are incorporated for detecting "open" elements, which is an exclusive feature of this design. A unique circuit arrangement is incorporated to enable the accommodation of any future tube developments in which the heater or filament terminals may occupy positions entirely different from the conventional positions; this arrangement assures a minimum of obsolescence probabilities.

rectifiers, depreciate with a loss of emission, and a measure of the emission of an amplifier tube is a measure of its operating merit, just as a measure of the emission of a rectifier tube is a measure of its operating merit.

It is the purpose of Figure 6 to indicate the circuit arrangement for indicating a leakage between any two elements of a tube. It is observed that a 110-volt A.C. potential is applied in series with a neon glow lamp, a blocking capacitor, "C", and the tube under test. A tube cannot rectify the applied potential because of the "C" blocking capacitor which will not allow a continuous passage of uni-directional current, but which will pass alternating current, only. However, an alternating current cannot pass through the tube, unless there be a leakage through the tube, in which case the

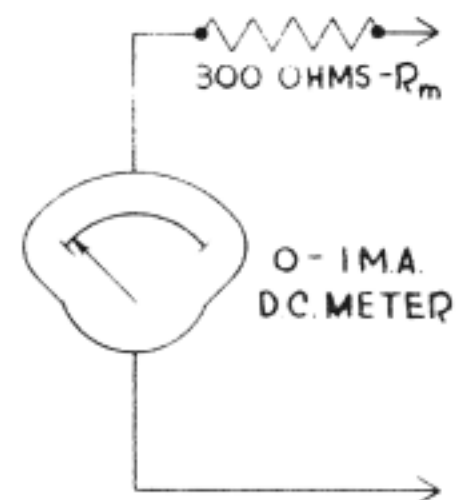


FIG. 11

For electrostatic capacitor leakage tests, the tester circuits are resolved into the scheme suggested by Figure 7. The required D.C. potential is supplied by a self-contained rectifier tube. After the initial surge through an "unknown capacitor," there'll be no current through the neon lamp unless there be a leaky or short-circuited condition within the unknown capacitor to pass direct current. If the unknown capacitor be short-circuited or if it has very low D.C. resistance, one element of the neon lamp will glow continuously, indicating the presence of a direct current through the unknown capacitor. If the unknown capacitor is not short-circuited, but has a high resistance leakage, the leakage resistance will periodically discharge the accumulated charges of the known capacitor, C, through the neon lamp and the rectifier tube, so that the presence of such a leakage within the unknown capacitor will be indicated by intermittent glows of one element of the neon lamp.

The condition of an electrolytic capacitor is indicated on a "GOOD-BAD" scale of one of the meters which is connected into a circuit arrangement indicated in Figure 8. The required D.C. potential is supplied by the self-contained rectifier tube and filter arrangement through the resistance R, which limits the current to a safe value for good capacitors and protects the meter against short-circuited electrolytic capacitors. The scale arrangement of this meter is also shown in an accompanying drawing.

The miniature D.C. "power pack" also supplies the power for the two 0/2/20-megohm resistance-measuring ranges which, being an amplification of the conventional arrangement of Figure 9, are not shown in a separate drawing. However, the circuits of the lowest 0/200-ohm range are shown in Figure 10, in which it is observed that the calibration is effected for unknown resistors as shunts. The lowest meter scale division represents  $\frac{1}{4}$  of 1 ohm, and a half-scale deflection is obtained with the resistance value of only 15 ohms, as shown in an accompanying drawing of the meter scales.

Figure 11 indicates the circuit values of the meter employed for resistance measurements in ranges above the 200-ohm range, for current, potential and capacity measurements, and Figure 12 indicates the shunt arrangement for current measurements, using the meter of Figure 11. A complete diagram of the tube testing circuit is shown in Figure 13.

All tubes are tested in five of the tester sockets, without adapters. All necessary accessories are supplied with the tester, including complete operating instructions, so that the professional radioman is ready to begin, immediately, to render more efficient service upon receipt of a new Supreme Model "385 AUTOMATIC."

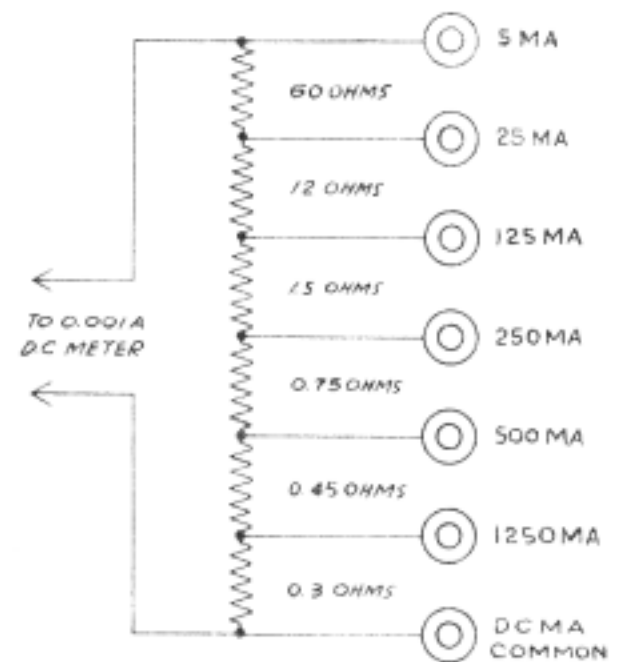


FIG 12

**DEALER NET  
WHOLESALE PRICE**      **\$77<sup>95</sup>**

For 98-125 volt, 60-cycle. Special voltage or frequency instruments can be supplied at slight additional cost.

TUBE TEST  
TOP CAP

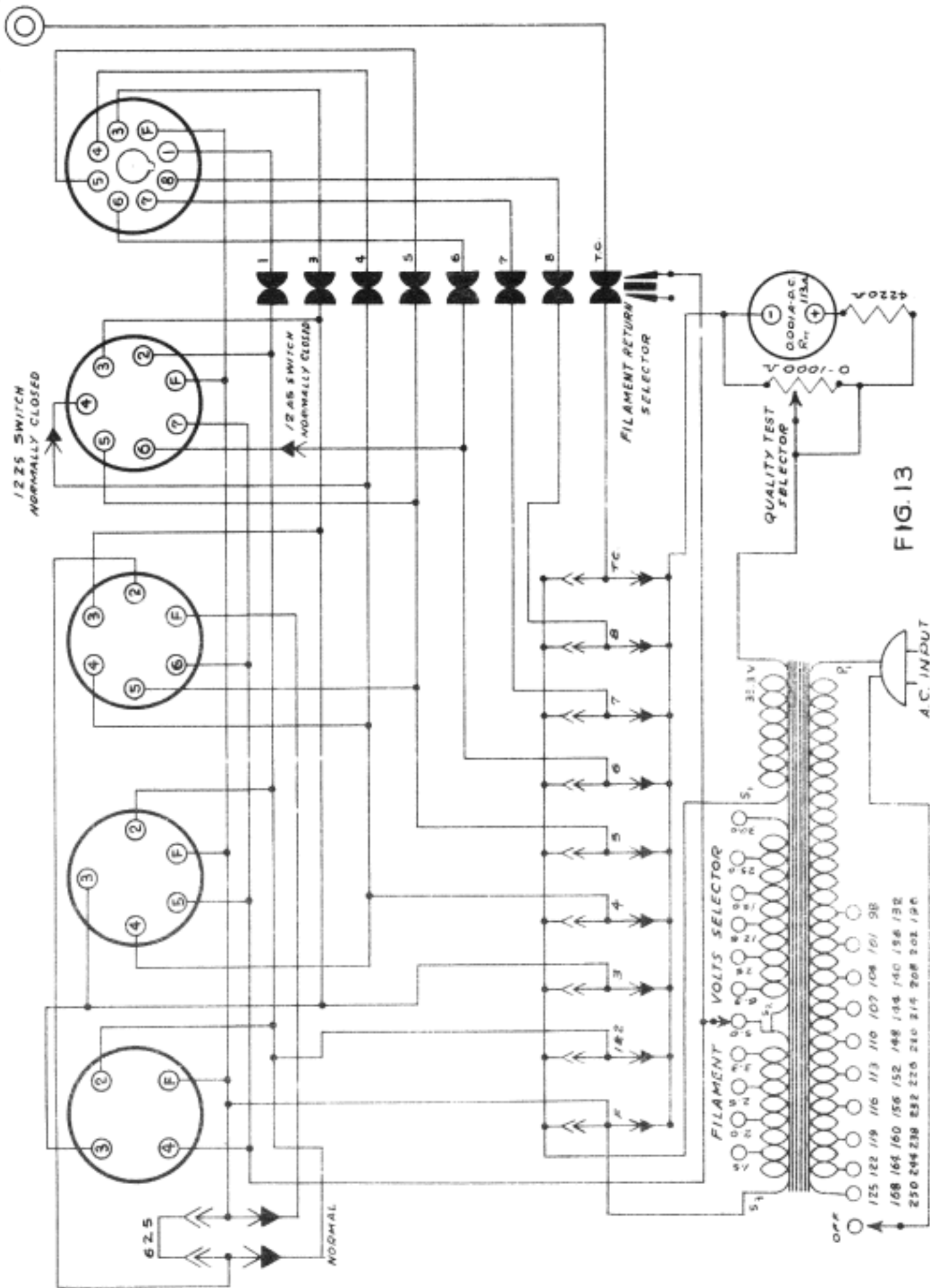


FIG. 13

A.C. INPUT

FILAMENT VOLTS SELECTOR

FILAMENT RETURN  
SELECTOR

QUALITY TEST  
SELECTOR

OFF

- 125 122 119 116 113 110 107 104 101 98
- 168 164 160 156 152 148 144 140 136 132
- 250 244 238 232 226 220 214 208 202 196

# 385 QUICK-FACTS

## 1. CAPACITY RANGES:

0.001 to 0.05 mfd  
0.005 to 0.25 mfd  
0.025 to 1.25 mfd  
0.05 to 2.5 mfd  
0.1 to 5.0 mfd  
0.25 to 12.5 mfd

## 3. D.C. M.A. RANGES:

0 to 5 M.A.  
0 to 25 M.A.  
0 to 125 M.A.  
0 to 250 M.A.  
0 to 500 M.A.  
0 to 1250 M.A.

## 5. D.C. VOLTAGE RANGES:

0 to 5 volts  
0 to 25 volts  
0 to 125 volts  
0 to 250 volts  
0 to 500 volts  
0 to 1250 volts

## 2. A.C. VOLTAGE RANGES:

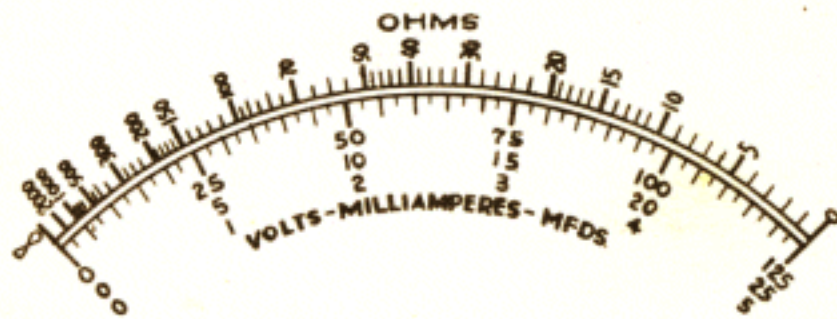
0 to 5 volts  
0 to 25 volts  
0 to 125 volts  
0 to 250 volts  
0 to 500 volts  
0 to 1250 volts

## 4. RESISTANCE RANGES:

0.25 to 200 ohms  
1.0 to 2,000 ohms  
10.0 to 20,000 ohms  
100.0 to 200,000 ohms  
1000.0 to 2,000,000 ohms  
10000.0 to 20,000,000 ohms

## 6. OUTPUT RANGES:

0 to 5 volts  
0 to 25 volts  
0 to 125 volts  
0 to 250 volts  
0 to 500 volts  
0 to 1250 volts



- Free Reference Point System of Analysis.
- Point to Point resistance current and voltage analysis.
- All resistance ranges from SELF CONTAINED POWER SUPPLY.
- Tube Testing from radio sockets with self-contained "grid-shift" battery.
- Six-range output meter for use without necessity of output adapters.
- A.C. and capacity measurements on uniformly-divided scales.
- Exclusive design 5-in. Supreme fan-type meters.
- Positive rectifier protection.
- Neon condenser tests for leakage, opens, and shorts.
- English Reading condenser analyzer.
- Constant ballast ratio between tube and circuit resistance values.
- Simple 3-step A.C. tube Tester.
- Accurately classifies all tubes as "Good" or "Bad" on English Reading scale.
- Tests all tubes at approximately RATED LOAD for utmost accuracy.
- Only 5 sockets for tube testing—no adapters—including 8-pin metal tubes.
- Obsolescence Probabilities reduced to a minimum.
- Neon leakage test between ALL tube elements.
- Indicates automatically elements between which leakage exists.
- Tube leakage tests while tubes are heated.
- Leakage tests made in same socket as Quality tests.
- Both meters fully protected.
- Economy of Uni-construction—Plus features at no extra cost.

## Supreme Instruments Corporation

Greenwood, Mississippi, U. S. A.

Export Dept., Associated Exporters Co., 145 West 45th St., New York City. Cable Address, LOPREH, New York



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