

TECHNICAL MANUAL

No. TM-11

SERIES 106 - 108

INSULATION TESTERS

CONTENTS

APPLICATION NOTES PAGE 1

INTRODUCTION PAGE 2

DESCRIPTION PAGE 2

PRINCIPLE OF OPERATION PAGE 2

APPLICATION PAGE 3

CONTROLS & INDICATORS PAGE 6

INSTALLATION PAGE 7

OPERATING NOTES PAGE 8

MAINTENANCE & REPAIR PAGE 10

REPAIR PARTS LIST PAGE 11

CALIBRATION & ADJUSTMENT PAGE 15

SLAUGHTER COMPANY

SERIES 101 - 106 - 108 BREAKDOWN TESTERS

Basic units in this family are simple breakdown testers which operate on the principle that at breakdown, the resistance at the failure point falls to a low value and this change is used to trigger audible and visual signals.

The series 101 Tester is a minimum general utility unit providing an AC test voltage. It is available in ratings to 2500 volts RMS. The Series 106 Tester is identical with the Series 101 with the exception that the testing voltage is continuously variable (instead of variation in fixed steps) and a voltmeter, which monitors the actual test voltage, is provided. The Series 106 Tester is available in ratings to 10,000 volts RMS. The Series 108 Tester is identical with the Series 106 except that the testing voltage is DC instead of AC.

Basic Series 101 and 106 (AC) Testers have a sensitivity of about 10 ohms/volt at low voltages up to about 100 ohms/volt at higher voltages. Basic Series 108 (DC) Testers have a sensitivity range of 100 to 1000 ohms/volt. These units are intended for simple dielectric strength testing—to determine if the insulation under test will withstand the test voltage applied without breaking down. In some applications; particularly, testing equipment incorporating inorganic insulation material, higher sensitivities are desirable. This is because faults over or through inorganic materials are generally high impedance arcs, with insufficient current flow to reliably trip the standard rejection circuits. For such applications, these units are available with an optional sensitive detection feature, designated Option "M". Basic sensitivity with this feature is about 2500 ohms/volt. Even when equipped with this option, these units should still be considered simple breakdown testers, and not precision combination breakdown and leakage testers. For applications requiring precision measurement and detection of leakage current, the more sophisticated Series 122 or Series 103 equipment should be utilized.

SERIES 116 COMBINATION DIELECTRIC TESTERS

The Series 116 is a combination tester which incorporates the standard Series 106 dielectric test section plus a continuity test section to provide a convenient means of testing both ground lead integrity, line shorts and line opens in line cord fitted test objects.

By using this combination unit, the necessary electrical tests for simple appliances can be checked very quickly on the production line.

These units are recommended for the testing of components and simple assemblies such as switches, terminal boards, thermostats, heaters, wiring harness, etc. They are also used extensively at pre-check stations for more complex parts and assemblies. Generally speaking, Series 101 units are used in pre-check stations, while Series 106 and Series 108 units are used at regular inspection stations.

SERIES 122 - 125 - 122/125 LEAKAGE AND BREAKDOWN TESTERS

The Series 122, 125 and 122/125 family includes an AC Tester, a DC Tester and a combination AC/DC unit. This family is intended primarily for laboratory and field service, where portability and high sensitivity are of prime importance.

Testing voltage is continuously variable and monitored by a built-in voltmeter. Actual leakage is indicated by a dual range microammeter. This series also incorporates sensitive arc detection circuitry. However, it does not incorporate pre-settable go-no go visual and audible signals and hence, is not recommended for high production testing.

The Series 122 is available in AC test voltage ratings to 2500 volts RMS. Series 125 is available in DC ratings to 2500 volts. The Series 122/125 provides AC or DC test voltages and is available in ratings to 2500 volts.

These Testers are recommended for major components such as motors, transformers, solenoids, relays, all types of complete assemblies, as well as for critical small components such as diodes, capacitors, tubes, transistors, etc.

SERIES 103 - 105 - 103/105 LEAKAGE AND BREAKDOWN TESTERS

The Series 103, 105 and 103/105 family also includes an AC tester, a DC tester and a combination AC/DC unit. It is essentially the same as the 122 - 125 - 122/125 series except it incorporates a more rugged, less sensitive leakage milliammeter which is fitted with a pre-settable limit pointer used to actuate go/no-go visual and audible signals and to provide auxiliary external acceptance and rejection signals when desired. This family is intended primarily for production line service, where high production rates and adaptability to automated test installations are essential.

The Series 103 is available in testing voltage ratings to 10 KV RMS AC. The Series 105 is available in ratings to 10 KV DC. The Series 103/105 provides AC or DC test voltages in ratings to 10 KV.

SERIES 103-MP - 105-MP - 103/105-MP LEAKAGE AND BREAKDOWN TESTERS

The MP series family is a fully automatic version of the 103 - 105 - 103/105 series. It provides a controlled rate-of-rise in the application of the test voltage and a pre-settable dwell time. Removal of test voltage can be instantaneous or at a controlled rate-of-fall as desired.

This family is available in the same ratings as the 103 - 105 - 103/105 series and is intended for both production and laboratory applications in testing critical parts and assemblies.

This series is particularly useful in production line testing applications where mixed models must be tested on the same test station. The motor-driven voltage control insures that all units will be tested at the desired voltage regardless of unit characteristics.

AC vs DC TESTING AND MEGOHM TESTING

We recommend that insulation testing be made with an AC tester whenever possible. This is because the reversal of stress in the insulation will often detect weaknesses that go unnoticed in a DC test. However, there are cases in which DC testing is necessary and we offer the various DC testers listed above to handle these applications. Unless extensive DC testing is expected, the purchase of any straight DC unit is hardly justified in the average plant. Instead, we recommend the purchase of a universal AC/DC unit, such as Series 122/125 - 103/105 or 103/105-MP.

DC and AC/DC combination units may be used in most applications specifying limits on a megohm basis. The proper leakage meter range required may be calculated:

$$\text{Leakage Meter Range in Microamps} = \frac{20 \times \text{DC Test Voltage Specified}}{\text{Megohms Limit Specified}}$$

If a great deal of testing to megohm limits is required, the use of a regular megohmmeter is desirable. For this purpose we offer the Series 225, intended primarily for laboratory and field service and the Series 205 Limit Megohmmeter which is intended primarily for production line service where high production rates and adaptability to semi-automatic installations are essential.

VOLT AMPERE RATINGS

All basic units are rated at 50 VA. This is adequate for practically all applications involving components and assemblies up to 5 HP rating. All Series units are available in higher VA capacities where needed. The most popular higher capacity is 500 VA and is available as our standard Option "U". In case of doubt, the inherent capacity to ground of the item to be tested should be determined and the required VA capacity calculated thus:

$$\text{VA rating required} = 400 \times \text{Capacity in MFD} \times (\text{KV})^2$$

For a rough approximation, a figure of .001 MFD per horsepower for motors, generators, transformers, etc. can be used, and a figure of .000020 MFD (20 PF) per foot can be used for ordinary hook-up wire.

METER ACCURACIES

Meter movements utilized are conventional moving coil types of basic 2% DC accuracy. In high sensitivity applications, tau-band suspension styles are used. For AC metering, silicon diode bridges are used and factory calibration against standards traceable to the NBS is to better than $\pm 3\%$. No wave form distortion exists in these units and hence, RMS calibrations are guaranteed to be within $\pm 5\%$. DC calibrations are guaranteed to be within $\pm 2\%$.

SAFETY INTERLOCKS

All units may be safety interlocked with series manual or automatic safety switches, relays, etc. as desired. In the simpler units, this is done by inserting such interlocks in the AC supply line ahead of the tester. In the more complex units adapter plugs, terminal strips, etc. are provided for this purpose. In addition, all units except Series 101 are optionally available with Zero-Start Interlock, which requires the operator to always return the voltage control to zero volts before turning the unit on. This is designated Option "D" on data sheets and price lists.

OPTIONAL FEATURES

Experience has shown that various specific applications require certain special features. Since these features are not universally required, they are listed as standard optional features on the data sheets and price lists. Specifically, these include such items as EIA rack and panel mounting, automatic dwell timing, multiple range meters, automatic reset after rejection, automatic capacity compensation control, etc.

SPECIAL FEATURES

Since it is not practical to provide standard optional features covering all possible requirements, all other features are considered as special. In many cases, however, little if any extra charges are involved and since engineering has been previously completed, little delivery delay is involved.

Typical examples of such special features generally available for quick delivery are: non-standard Meter Dials and flush mounting units, with $\frac{1}{2}$ " mounting flange all around.

In such cases, contact us regarding your requirements and we will gladly forward our suggestions and recommendations.

SPECIAL PURPOSE UNITS—From the basic general purpose units listed above, many special purpose units have evolved to handle specific testing problems. Typical of these are the Model A106 159 Lamp Tester particularly useful in the testing of table and floor lamps, chandeliers, etc. and the Series 657 Wire Jacket Tester. Many other types of special purpose units are available—contact factory for suggestions.

INTRODUCTION

These instructions cover Series 106 and 108 High-Voltage Breakdown Testers, including all standard optional features. Though all of the information provided here may not apply to the unit you have, it has not been deleted because it may be of assistance as background information.

DESCRIPTION

These units are general-purpose portable high-voltage Breakdown Testers. Series 106 units provide a continuously variable AC test voltage. Series 108 units provide a continuously variable DC test voltage. Output current is limited under short-circuit conditions to minimize damage to salvageable defective test objects. Detection circuits operate a breakdown signal lamp and a buzzer when failure occurs in the object being tested.

In units fitted with Option M, the detection circuits will respond to excessive leakage in the workpiece, as well as to breakdown.

In units fitted with Option W, reject signals "lock up" on rejection and the unit must be manually reset after a rejection. This feature is required in many UL bulletins.

PRINCIPLE OF OPERATION

Basically, these units apply a known voltage to the insulation under test and check for breakdowns. They operate on the principle that at breakdown, insulation resistance falls to a low value and the current in the tester is practically at the short-circuit value. The resultant increase in primary current is used to trigger detection circuits which indicate rejection of the product being tested.

Sensitivity of standard units varies from about 10 ohms per volt at low voltage settings to about 100 ohms per volt at high-voltage settings. High sensitivity, Option M units have a basic sensitivity of about 2500 ohms per volt.

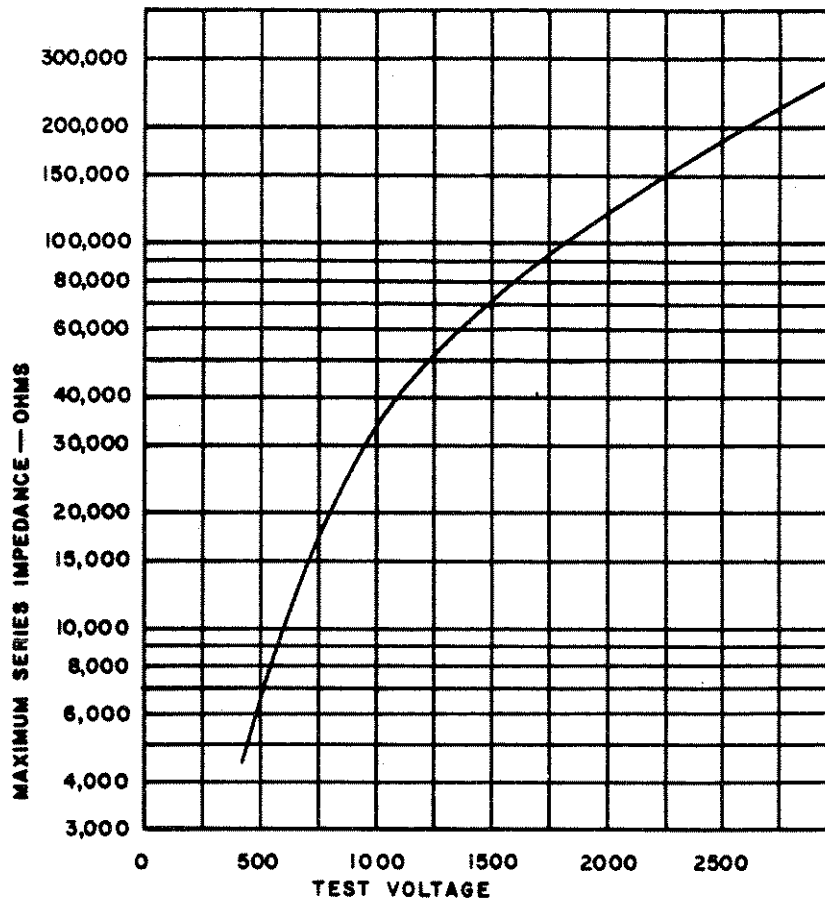
APPLICATION

Application of this equipment is to the testing of all types of electrical/electronic components and assemblies for insulation breakdown (dielectric strength, grounds, and shorts). For additional general information, refer to the preface of these instructions, and to the small Basic Facts booklet supplied separately with the unit.

When considering specific applications, consideration must be given to the rating of the unit, the characteristics of the product to be tested, and to the test conditions.

Under actual test conditions, the equivalent load on the tester is made up of the inherent shunt capacitance of the workpiece, plus a series impedance which may exist between the point of fault (if any) and the terminal at which the test is applied.

Since these testers respond to the low impedance normally created by a fault, sensitivity is defined on the basis of the minimum total impedance load that can be applied to the unit without tripping the reject circuits. Typically, standard units will respond as defined in the chart below.



Since the shunt capacitive characteristics of the workpiece is essentially a reactive load, if the shunt capacitive characteristics are too high, the load on the unit will be a very low impedance and false rejections will occur -- in other words, the tester will be overloaded and register a rejection as a result.

If excessive series impedance exists between the test terminals and the point of fault, the total load on the tester will be a very high impedance and the tester will not respond to the fault.

The shunt capacitive characteristics of typical electrical equipment generally varies with the rating, so usually the proper tester size can be established by consideration of the electrical rating of the part to be tested. In the charts below, these rule-of-thumb ratings are listed. In case of doubt, the actual capacitive characteristics of the part to be tested should be checked and compared with the capability of the unit. The capacitive ratings are also included in the charts below.

SERIES 106 -- STD. 50 VA UNITS			
Voltage Rating	2500	5000	10,000
Rated Capacitive Load MFD	.0075	.004	.0015
Appriximate Max. Hp. of Workpiece	5.0	2.5	1.0

NOTE: Standard factory adjustment of Option M units will not permit operation with the maximum load ratings listed above. However, unit can be readjusted to obtain maximum capabilities listed in chart. Consult Adjustment section for information.

SERIES 106 -- 500 VA OPTION "U" UNITS			
Voltage Rating	2500	5000	10,000
Rated Capacitive Load MFD	0.2	0.1	0.05
Approximate Max. Hp. of Workpiece	50	25	10

It is an easy matter to determine if the unit is overloaded. The test voltage should be set at the specified value, and the prods then applied to a known good workpiece. If voltmeter reading drops more than 10%, the tester is too small, and a higher VA rated unit should be used. In the case of Option M units, with standard factory adjustment, the unit may "false trip" on heavy loads, even though the unit is not actually overloaded. If this occurs, sensitivity adjustment of the unit should be changed to compensate for the heavy load. Consult Adjustment section for information.

It is also a simple matter to determine if the tester sensitivity is adequate. Again, a known good sample workpiece should be used. In this case, a synthetic fault should be introduced in the workpiece at the most "remote" possible point -- the point at which impedance between the point of test and point of fault is maximum. When the test prods are touched to this part, the fault should be detected reliably. If not, sensitivity is inadequate for the application. If the unit is an Option M type, it may be possible to readjust the sensitivity to meet the requirements of the application. If not, the more sophisticated Series 103 should be utilized. If the unit is a standard, consideration should be given to replacing it with an Option M type, or with the Series 103.

Most assemblies can be effectively tested by checking between frame or ground and the two line connection leads. In some cases, this may not be adequate. When testing complex appliances or assemblies, care must be taken to be sure that sections of wiring which may be isolated by thermostats, relays, or other switching devices are individually checked.

Time is a factor in this type of testing. If there are no specific requirements as to the duration of the test, it is recommended that a minimum of 1/4 second be used.

Since the voltmeter indication drops as the load on the tester increases, the voltmeter drop will be significantly greater with a defective or marginal workpiece than with a good workpiece. This drop in voltmeter reading can be used as an indicator of abnormal leakage in the workpiece. However, this is a qualitative sort of indication rather than a quantitative one, and if leakage within the workpiece is important, the use of the more sophisticated Series 103 is recommended.

For safety reasons, and to avoid possible tester damage in case of a catastrophic product failure, the product under test should not be connected in any way to the AC power lines. The high-voltage test circuits in the tester are isolated from ground, so the frame of the product to be tested may be grounded, or ungrounded, as the user prefers.

CONTROLS AND INDICATORS

Functions of the various controls and indicators are as follows:

1. POWER SWITCH -- Turns unit ON or OFF. In units supplied under Options A or B (Automatic Dwell Timing), the power switch is used only to initiate the automatic time cycle. When the preset time cycle is completed, the tester will be turned OFF. However, if the switch is held in the START position, this will override the timer and the unit will remain ON until the switch is released. If a rejection occurs, the switch must momentarily be moved to the RESET position, to release the lamp and buzzer signals.

In units supplied under Option D (Zero Start Interlock), the voltage control MUST be MANUALLY HELD in the zero, or extreme counter-clockwise position for the test switch to be effective in turning the unit ON.

In units supplied under Option W (lock-up on reject), the power switch must be momentarily turned OFF after a rejection in order to reset the rejection circuits. Alternatively, the power supply to the unit can be interrupted momentarily to achieve reset.

2. PILOT LAMP -- Indicates when unit is ON.
3. BREAKDOWN LAMP -- Indicates breakdown of product under test. In units supplied under Option M (Sensitive Leakage Detection), this lamp will also indicate rejections due to excessive leakage, in the range of 400 to 5000 microamperes.
4. VOLTAGE CONTROL -- Adjusts testing voltage.
5. VOLTMETER -- Indicates actual testing voltage at the test prods.
6. LEAKAGE SENSITIVITY -- This internal adjustment is supplied on units with Option M (Sensitive Leakage Detection) to adjust the sensitivity of the leakage detection circuits. A similar adjustment is provided in standard Series 108 units.

INSTALLATION AND CHECKING

When first received, unpack this unit carefully and examine for evidence of hidden damage. Keep the carton and file claim with Carrier if any damage is evident.

To check the unit quickly, plug in and operate according to the procedures under Operating Notes. When the test leads are short-circuited, the unit should register rejection.

If the unit does not operate, remove rear panel and check for evidence of damage. If the difficulty is not readily apparent, do not attempt further work which might void warranty. Contact factory for instructions.

No special installation precautions are necessary. Avoid locations with extremes of temperature, humidity or vibration. As a matter of safety, avoid metal-topped benches and metal operator stools.

If an external interlock switch is desired as a safety feature, this can be connected in series with the primary line cord. Also, units equipped with Option A or B (Automatic Dwell Timing) can be operated with a remote START switch. For proper connections, refer to schematic in this book.

If it is desired to eliminate the override feature on units fitted with Options A or B (Automatic Dwell Timing) jumper on automatic dwell timing terminal strip must be transferred as indicated on schematic drawing in this book.

IMPORTANT: High-Voltage Testers of this type should be operated ONLY from a properly grounded and polarized line cord receptacle.

OPERATING NOTES

1. Usual production operating procedure with standard models is as follows:
 - A. Set test voltage to specified value.
 - B. Apply test prods to points to be checked -- usually, one to the frame of the machine, or the case of the part under test and the other to each live electrical circuit.
 - C. If the buzzer sounds (and the breakdown lamp flashes bright), the part is defective. If not, it's O.K.
 - D. Reject signals will cancel automatically when prods are removed from the defective part except on units fitted with Option W (Lock-Up on Rejection). With such units, it will be necessary to momentarily move the power switch to the OFF position, or to interrupt the power supply to the unit to cancel the rejection signals.
2. Usual production operating procedure with models incorporating Options A or B (automatic Dwell Timing) is as follows:
 - A. Set test voltage as specified.
 - B. Attach test lead clips to points to be checked.
 - C. Trip power switch momentarily to initiate automatic time cycle.
 - D. If the buzzer sounds (and the breakdown lamp flashes bright), the part is defective. If not, it's O.K.
 - E. To reset after a rejection, the power switch must momentarily be moved to the RESET position.
3. Usual production operating procedure with units incorporating Option D (zero Start Interlock) is as follows:
 - A. Attach test lead clips to points to be tested.
 - B. Depress power switch and hold ON.
 - C. Rotate voltage control full counter-clockwise until interlock switch clicks and pilot light comes ON.
 - D. Continue to hold switch ON, and adjust voltage to value desired.
 - E. If the buzzer sounds (and the breakdown lamp flashes bright), the part is defective. If not, it's O.K.
 - F. To terminate test, release power switch. Note that once the power switch has been released, the tester cannot be turned ON again until the voltage control has been returned to zero (extreme full CCW) position.

OPERATING NOTES (Cont'd.)

4. When using the tester to establish the actual breakdown voltage of a part, make successive tests, increasing the voltage slightly each time until breakdown occurs.
5. Test voltage will always be slightly lower when the unit is connected to a load (whatever is being tested), than under open circuit conditions. This is normal, due to current limiting circuits within the tester. In the case of Series 106 and 108 units, this drop in voltage as indicated on the voltmeter can be used as an indication of excessive leakage.
6. Even on good parts, a slight spark will be noticed when the tester prod is touched to the part under test. This also is normal, due to the fact that a charging current flows as a result of the inherent capacity of the part under test.
7. Operators should be cautioned that High-Voltage Test Equipment must be treated with respect. People will sometimes amuse themselves by holding the prods together and drawing an arc. Such "horseplay" can burn the lower portion of the prod barrel and create an unsafe condition. To avoid burning the barrel, prods should be used in such a manner that the arc created is broken by the metal extension of the prod and not "dragged" across the tip of the barrel.
8. Operators should also be instructed that these units should not be operated under short-circuit conditions for more than a few seconds at a time. "Smoke testing" a defective part by holding the test prods on it for extended periods may result in damage to the tester. However, the tester can be held on a defective unit for a few seconds at a time as an aid in detecting the defect if the duty cycle under these conditions is restricted to less than 20%.

TEST PRODS

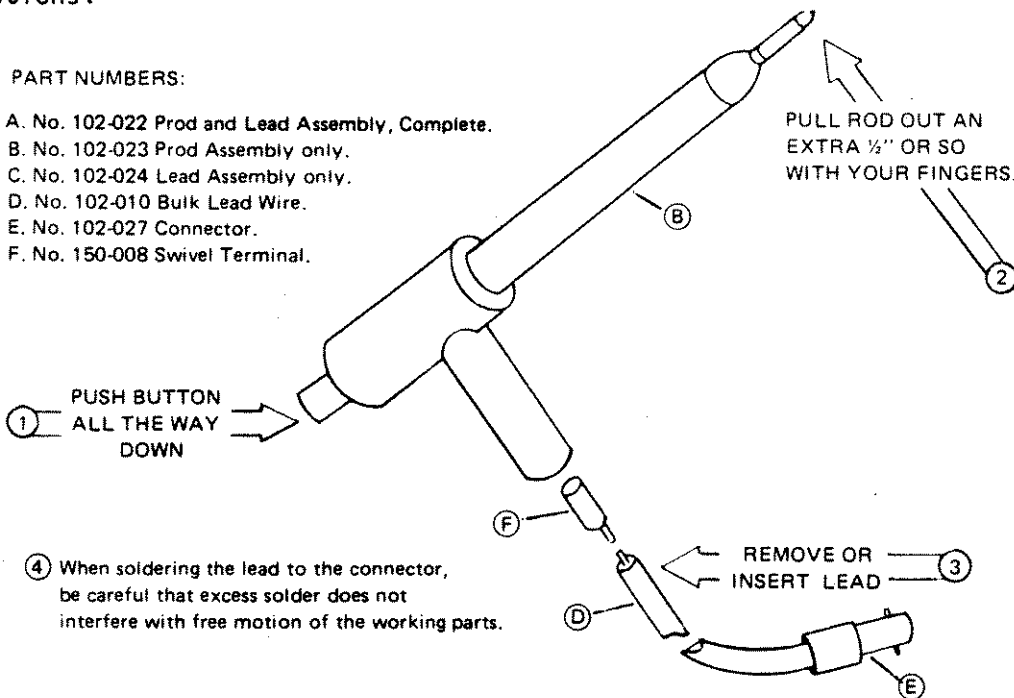
Prods and leads should be inspected periodically for damage or wear which might result in an unsafe condition. In particular, inspect the lower portion of the prod barrel for evidence of burning. If this is detected, replace, and check operating technique.

Test for possible tracking or contamination inside barrel by setting tester to full rated voltage, and bringing the tip ends of the barrels together in the retracted position. There should be no evidence of any arcing or rejection when this test is made. If there is, the prods should be considered unsafe and taken out of service.

Test prods are assembled with special epoxy cement. This is unconditionally guaranteed. If a cemented joint on your prod should ever fail, regardless of age, return to the factory for free repair or replacement.

It is characteristic of the construction of these parts that the prod and lead assembly may show an intermittent open condition when checked with an ordinary multimeter. This is normal and no reason for concern. To verify, hold a gentle pull on the cable where it enters the handle and work the button a few times. This should clear up the apparent discontinuity. If it does not, the trouble is probably in the core of the cable, near the handle.

Do not attempt to disassemble the prod. To replace test leads, follow these instructions:



Replacement prods with leads, prods only, leads only, etc., are available from factory stock. See service and repair parts list.

SERVICE & REPAIR PARTS INSULATION TESTERS

PARTS & SERVICES LISTED HERE ARE ONLY THOSE MOST COMMONLY REQUESTED. REPLACEMENT PARTS FOR ALL OF OUR EQUIPMENT ARE AVAILABLE GENERALLY FROM FACTORY STOCK. FOR PARTS NOT LISTED CONTACT FACTORY GIVING DESCRIPTION OF ITEM PLUS MODEL AND SERIAL NUMBERS OF UNIT INVOLVED. THESE NUMBERS ARE LOCATED ON THE FRONT PANEL OR ON THE UNDERSIDE OF THE CABINET.

NOTICE: All prices subject to change without notice. Parts orders will be acknowledged with current price indicated, and will be billed accordingly.

RE-CALIBRATION, REPAIR & OVERHAUL SERVICE	
PRICES LISTED BELOW COVER LABOR CHARGES ONLY. REPLACEMENT PARTS COSTS WILL BE ADDITIONAL, WITH PROPER CREDIT ALLOWED FOR SALVAGE VALUE OF OLD PARTS. MINOR REPAIRS ARE BILLED ON A TIME & MATERIAL BASIS, WITH A \$10.00 MINIMUM INSPECTION CHARGE IN ALL CASES.	
SERIES 101	OVERHAUL & ADJUST 20.00
SERIES 106	OVERHAUL, ADJUST & CALIBRATE 35.00
SERIES 103	OVERHAUL, ADJUST & CALIBRATE 66.00
SERIES 106	OVERHAUL, ADJUST & CALIBRATE 70.00
SERIES 103/106	OVERHAUL, ADJUST & CALIBRATE 106.00
SERIES 103-MP	OVERHAUL, ADJUST & CALIBRATE 150.00
SERIES 106-MP	OVERHAUL, ADJUST & CALIBRATE 160.00
SERIES 103/106-MP	OVERHAUL, ADJUST & CALIBRATE 190.00
SERIES 122	OVERHAUL, ADJUST & CALIBRATE 50.00
SERIES 125	OVERHAUL, ADJUST & CALIBRATE 56.00
SERIES 122/125	OVERHAUL, ADJUST & CALIBRATE 80.00
ALL OTHER MODELS -- APPROX. 15% OF UNIT REPLACEMENT COST.	
PRODS, LEADS, FITTINGS, LINE CORDS, ETC.	
NO. 102-022	RETRACTING SAFETY PRODS WITH 4' LEADS & BAYONET CONNECTORS - PAIR - 17.50
NO. 102-023	RETRACTING SAFETY PRODS, ONLY 14.00
NO. 102-024	LEADS ONLY, 4' FOR ABOVE, COMPLETE WITH BAYONET CONNECTORS . . . PAIR - 9.00
NO. 102-025	CLIP LEADS, 4', 6', OR 8' COMPLETE WITH BAYONET CONNECTORS PAIR - 14.00
NO. 150-006	SWIVEL TERMINAL 40
NO. 102-026	SOCKETS, BAYONET STYLE, TO MATE ABOVE LEAD CONNECTORS PAIR - 2.90
NO. 102-027	CONNECTORS, BAYONET STYLE, TO MATE ABOVE SOCKETS PAIR - 1.50
NO. 102-010	LEAD WIRE, BULK LENGTH PER FOOT .30
NO. 125-013	3 CONDUCTOR LINE CORD SET 3.25
NO. 150-088	BLANK 11 PIN ADAPTER PLUG 2.00
BULBS, INDICATOR JEWELS, FUSES	
NO. 350-003	TYPE 058 BULB 1.20
NO. 350-004	TYPE NE-51 BULB 1.40
NO. 350-005	TYPE 47 BULB80
NO. 350-029	TYPE 1815 BULB 1.00
ALL FUSES	SPECIFY RATING BOX OF 5 4.60
ALL 1" JEWELS	SPECIFY COLOR 3.75
ALL 1/2" JEWELS	SPECIFY COLOR 1.30
BUZZERS & SPEAKERS	
NO. 375-002	L.V. BUZZER 8.00
NO. 375-000	115 VOLT BUZZER 3.75
NO. 375-004	1 1/2" SPEAKER 4.50
NO. 375-001	3" SPEAKER 7.00
NO. 375-005	4" BELL 18.00
RECTIFIERS	
NO. 575-026	SILICON DIODE, 1000V, UNIVERSAL REPLACEMENT 1.50
NOTE: THIS PART MAY BE USED TO REPLACE ANY PIGTAIL TYPE POWER OR METERING SILICON DIODE. COPPER OXIDE RECTIFIERS IN EARLY UNITS SHOULD BE REPLACED WITH A BRIDGE OF 4 OF THESE DIODES.	
NO. 575-086	RECTIFIER VF26-5 5.50
NO. 575-088	RECTIFIER VF26-10 5.75
NO. 575-087	RECTIFIER VF26-25 8.00

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HIGH VOLTAGE TRANSFORMERS	
NOTE: A SALVAGE CREDIT OF 50% WILL BE ALLOWED ON THE PURCHASE OF ANY OF THESE IF YOUR OLD TRANSFORMER IS RETURNED, PREPAID	
(FOR 50VA UNITS)	
NO. 200-016	FOR ALL SERIES 103 & 106 UNITS IN 2500 V RATINGS 30.00
NO. 200-025	FOR ALL SERIES 101 UNITS IN 2500 V RATINGS 32.00
NO. 200-005	FOR SERIES 106 & SERIES 108 UNITS IN 5000 V RATINGS 50.00
NO. 200-007	FOR ALL OTHER SERIES UNITS IN 5000V RATINGS 64.00
NO. 200-018	FOR ALL OTHER SERIES UNITS IN 10,000 V RATINGS 250.00
(FOR 500VA UNITS)	
NO. 200-024	FOR ALL 2500 V OPTION U SERIES 101, 103, & 106 90.00
NO. 200-022	FOR ALL 5000 V OPTION U SERIES 103 & 106 220.00
NO. 200-029	FOR ALL 10KV OPTION U SERIES 103 & 106 285.00
MISCELLANEOUS TRANSFORMERS	
NO. 210-000	VARIABLE TRANSFORMER FOR ALL SERIES TESTERS (50VA) 15.00
NO. 240-001	L.V. ISOLATION TRANSFORMER FOR ALL SERIES TESTERS 7.50
NO. 240-000	BUZZER & SPEAKER TRANSFORMER FOR ALL SERIES TESTERS 7.50
NO. 240-024	L. V. SUPPLY 8.90
NO. 240-030	SENSING (IN OPTION) 7.50
SWITCHES	
NO. 300-000	SPST POWER SWITCH, SERIES 101 & 106 3.00
NO. 300-006	DP3T POWER SWITCH, SERIES 122, 125, 103, 106, ETC. 7.00
NO. 300-009	4P3T POWER SWITCH, ALL TYPE MP UNITS 14.00
NO. 300-003	4P3T CONTROL SWITCH, ALL TYPE MP UNITS 11.00
NO. 310-031	ALL COMPENSATION SWITCHES 8.75
NO. 310-000	SPST VOLTAGE SELECTOR SWITCH, SERIES 101 7.50
NO. 103-1	ALL METER MULTIPLIER SWITCHES (SPECIFY UNIT) 20.00
NO. 103-1	ALL AC/DC SWITCHES (SPECIFY UNIT) 25.00
NO. 330-031	PUSH SWITCH, SERIES 122 & 125 7.50
METER & PARTS	
NOTE: A SALVAGE CREDIT OF 50% WILL BE ALLOWED ON THE PURCHASE OF ANY OF THESE METERS IF YOUR OLD METER IS RETURNED, PREPAID.	
ALL VOLTMETERS & MILLIAMMETERS, PLAIN STYLE	(SPECIFY RANGE) 45.00
ALL MICROAMMETERS, PLAIN STYLE	(SPECIFY RANGE) 66.00
ALL VOLTMETERS & MILLIAMMETERS, SINGLE LIMIT STYLE	(SPECIFY RANGE) 186.00
ALL VOLTMETERS & MILLIAMMETERS, DOUBLE LIMIT STYLE	(SPECIFY RANGE) 230.00
ALL MICROAMMETERS, SINGLE LIMIT STYLE	(SPECIFY RANGE) 255.00
ALL MICROAMMETERS, DOUBLE LIMIT STYLE	(SPECIFY RANGE) 295.00
NO. 250-010	DIAL COVER FOR PLAIN STYLE METERS 4.50
NO. 270-011	DIAL COVER FOR SINGLE LIMIT STYLE METERS 13.00
NO. 270-034	DIAL COVER FOR DOUBLE LIMIT STYLE METERS 16.00
RELAYS & TIMERS	
NO. 400-1	ALL 8 PIN PLUG-IN RELAYS 13.50
NO. 400-1	ALL 11 PIN PLUG-IN RELAYS 16.00
NO. 103-050	TIMER, 8 PIN PLUG-IN AUTO RESET FOR 103 SERIES 36.00
NO. 400-029	TIMER, 3 MINUTE, FOR ALL MP SERIES 41.00
NO. 400-1	ALL FLUSH MOUNT TIMERS 42.00

MAINTENANCE AND REPAIR

Routine maintenance of this unit should include:

1. Cleaning dust and dirt from interior as required. Use a soft brush or low-pressure dry air.
2. Inspection of voltage control contacts every 3 to 12 months depending on severity of service.
3. Checking of meter calibration every 6 months. Check against standard meters of at least 1/2% accuracy.
4. Replacement of pilot and breakdown lamps as necessary. Rejection circuits will not function properly if breakdown lamp is bad.

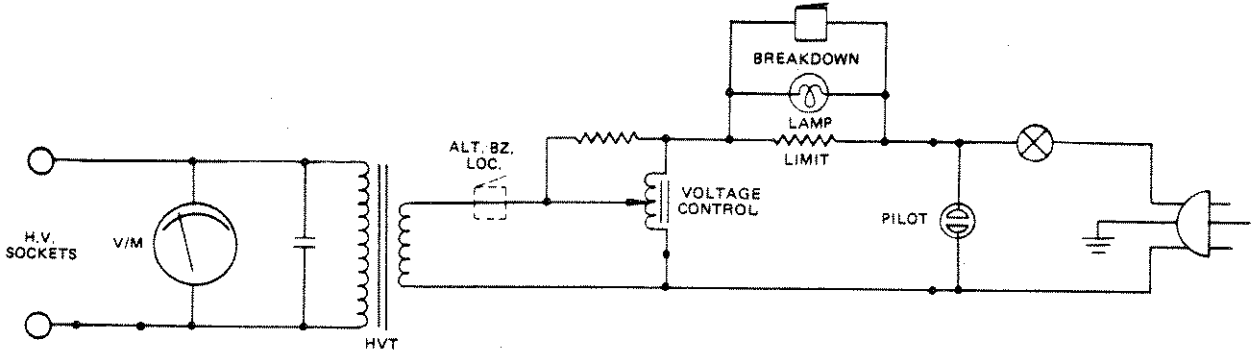
Repair of these testers in the field is not recommended. Testers sent in for repair will normally be repaired and returned within 48 hours. However, if field servicing must be done, follow the procedures suggested in the following paragraphs. Most replacement parts are available from radio supply houses. If replacement parts are to be ordered from the factory, be sure to include a reasonable description of the unit and the parts required.

If in-plant servicing must be done, the schematic should first be carefully studied. The area of trouble should then be localized between the primary circuits and the high-voltage circuits.

Troubles in the primary circuitry will generally be due to defective switches, limiting resistors or variable transformers. Troubles in high-voltage circuits can generally be traced to open limiting resistors, shorted filter capacitors or a defective high-voltage transformer. Use great care in working on this section, as the voltages are lethal and capacitors can hold a charge even when the unit is "OFF".

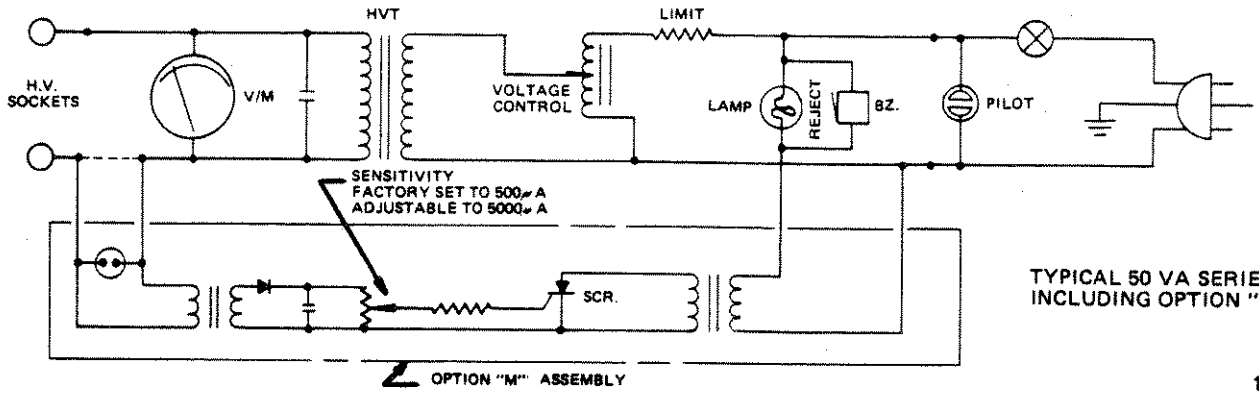
Troubles in rejection circuitry will generally be due to a defective breakdown lamp or buzzer. Buzzer action will be abnormal if lamp is burned out. In Option M units, the SCR may be at fault. These parts should show infinite resistance between cathode and anode when checked on a typical multimeter. Resistance ratio between gate and cathode should be at least 5:1 when checked on the lowest range of a typical multimeter. Between gate and anode, resistance should be infinite.

Trouble-shooting of meter circuits is covered in section on Calibration.



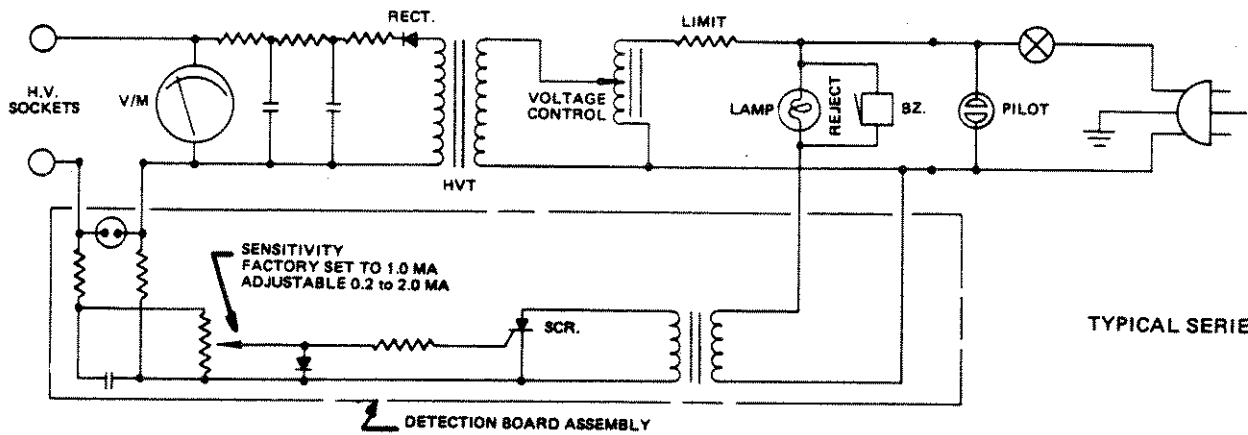
TYPICAL 50VA SERIES 106

106252



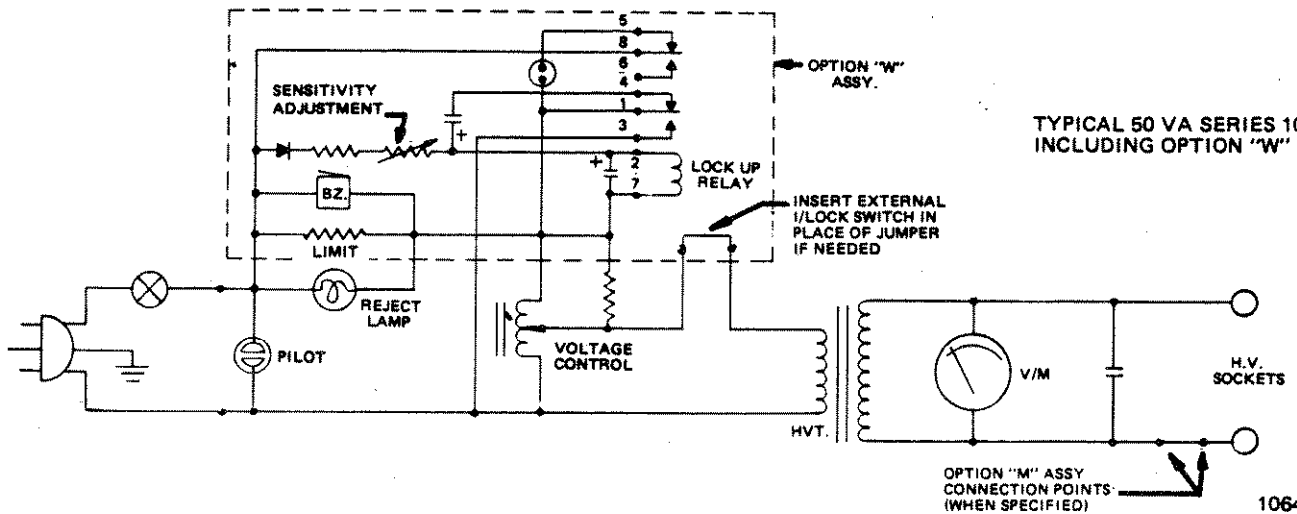
TYPICAL 50 VA SERIES 106 INCLUDING OPTION "M"

106253



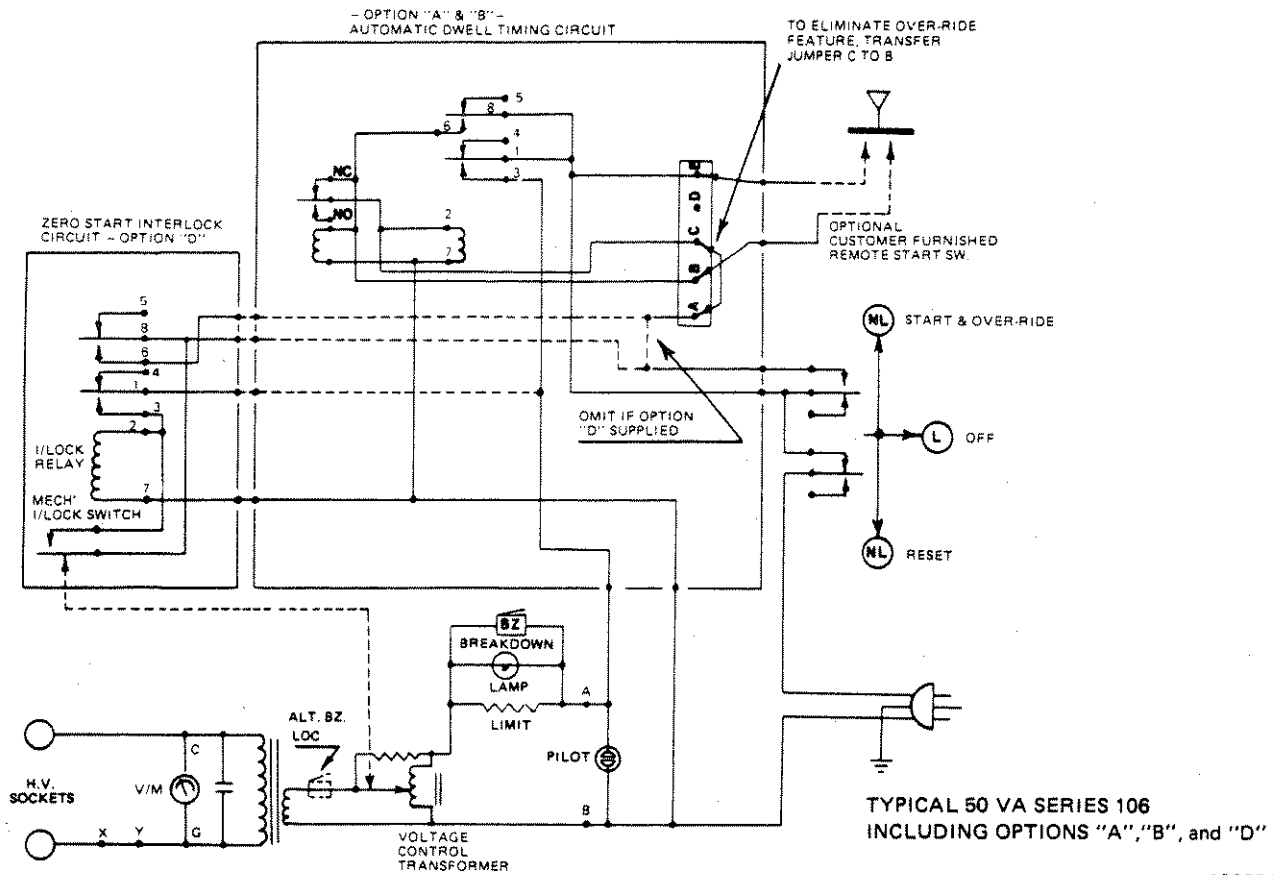
TYPICAL SERIES 108

106250

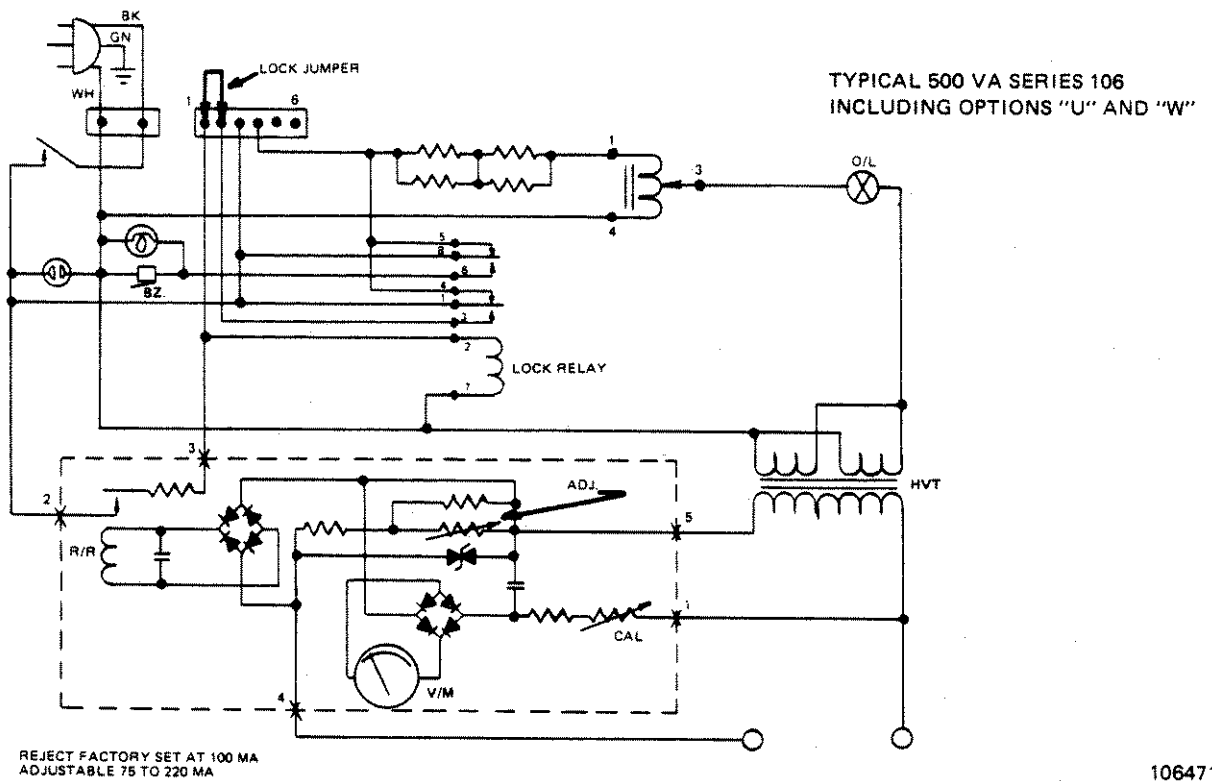


TYPICAL 50 VA SERIES 106 INCLUDING OPTION "W"

106444



106251



106471

NOTES:

1. THESE SCHEMATICS SIMPLIFIED FOR CLARITY.
2. FOR VOLTAGE METERING CIRCUITS, SEE DRAWING NO. 103210.
3. FOR SERIES 101, SEE DRAWING NO. 101117.

SLAUGHTER Company	
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TITLE	ISSUE NO. X
BASIC CIRCUITS Series 106 & 108	NO. 106254

CALIBRATION PROCEDURES

These are precision units and have been carefully calibrated at the factory. Do not attempt recalibration unless suitable standards are available.

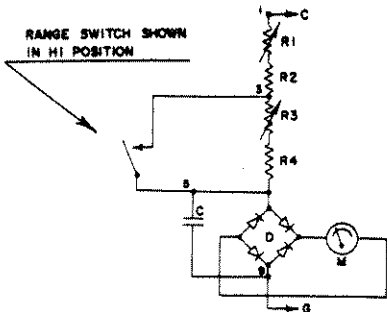
- A. CHECKING CALIBRATION -- Voltmeter calibration should be checked first. For this purpose, use a quality voltmeter of at least 1/2% accuracy and at least 5000 ohms per volt sensitivity. Check calibration at four or five points on the scale. At no place should the error exceed 5% of the full-scale rating of the voltmeter.

Buzzer calibration is checked by means of precision resistors which are utilized to build up a known load on the unit. See Adjustment section of this manual.

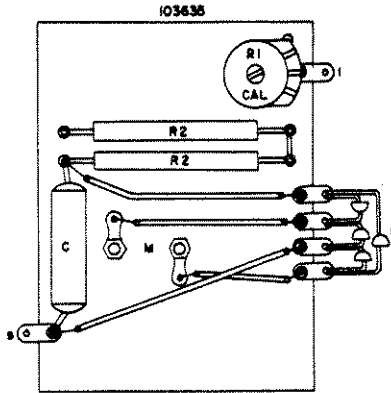
- B. TROUBLE-SHOOTING METER CIRCUITS -- If the meter calibration checks considerably off, some defect may exist which should be repaired before attempting recalibration. Consult the following notes for suggestions.

1. If the meter is consistently low on all ranges and appears heavily damped on all ranges, a defective meter movement is indicated.
2. If the meter is about 50% low on all AC ranges, but damping is satisfactory, even slightly under damped, a defective meter diode is indicated.

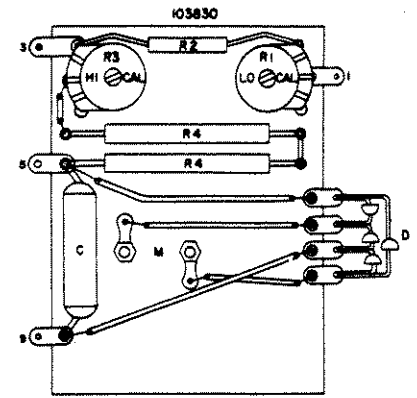
- C. RECALIBRATION PROCEDURES -- When recalibrating a unit, be sure to recalibrate the voltmeter first, then proceed to the adjustment of the buzzer. Voltmeters should be recalibrated at between 60% and 80% of full scale as convenient. The trimmers marked CAL should be adjusted as necessary. (Early units do not have trimmers and adjustment is made by substituting precision deposited carbon resistors as necessary.) On multiple range voltmeters, recalibrate lowest range first, proceeding onto the highest range.



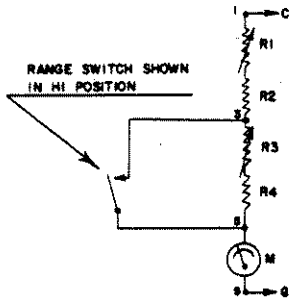
AC VOLTAGE METERING CIRCUIT



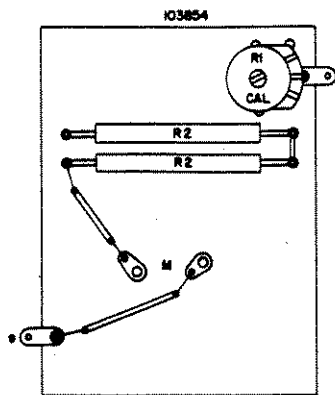
SINGLE RANGE AC VOLTMEETER BOARD



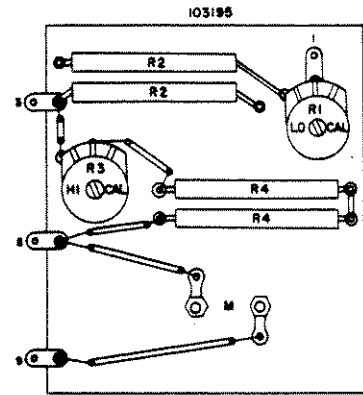
DUAL RANGE AC VOLTMEETER BOARD



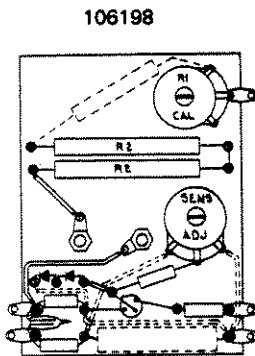
DC VOLTAGE METERING CIRCUIT



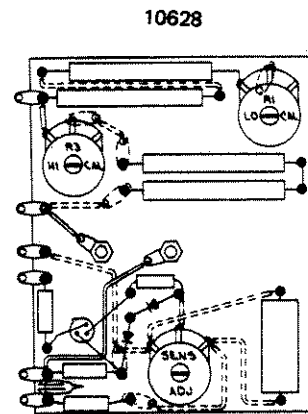
SINGLE RANGE DC VOLTMEETER BOARD



DUAL RANGE DC VOLTMEETER BOARD



SINGLE RANGE VOLTMEETER BOARD WITH SENSITIVITY ADJUSTMENT POT.



DUAL RANGE VOLTMEETER BOARD WITH SENSITIVITY ADJUSTMENT POT.

NOTES:

- 1 BOARDS ARE TYPICAL - DETAILS VARY WITH RATING AND MODEL.
- 2 ALL DIODES ARE *575026.
- 3 MOST METER MOVEMENTS ARE 1 MA.
- 4 FOR INTERCONNECTIONS, SEE BASIC TESTER SCHEMATICS.

SLAUGHTER <i>Company</i>	
<small>MEMPHIS, TENNESSEE ARMOORE, OKLAHOMA</small>	
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TITLE	ISSUE NO. X
VOLTAGE METERING CIRCUITS	NO. 106506

ADJUSTMENT PROCEDURES

IMPORTANT: These units will not function properly if the breakdown lamp bulb is burned out or missing. Be sure to check the bulb before attempting adjustment.

Adjustment of these units requires the use of a variable voltage power source, such as a "powerstat," and precision resistors. The proper procedure is to adjust in such a manner as to obtain the action specified in the chart when test prods are touched to the specified load.

The actual physical location of the adjustment point in these units will vary with the voltage rating of the unit and with certain options. Consult the following notes and chart to establish the location of the adjustment point in the unit you are working with.

- A. In all AC Series 106 units in 2500-volt ratings which do NOT include Option M or W, the adjustment point is a small screw in the end of the buzzer housing. Best results will be obtained if this screw is backed out and then turned IN slowly during the adjustment procedure. It should be sealed with glyptal or similar material after adjustment.
- B. In all AC Series 106 units in 2500-volt ratings incorporating Option M, the adjustment point is a pot on the circuit board mounted on the high-voltage transformer. This should also be sealed after adjustment.
- C. In all AC Series 106 units in 2500-volt ratings incorporating Option W the adjustment point is a pot mounted on a printed circuit board in the base of the cabinet to the left of the plug-in relay.
- D. In all AC Series 106 units in 5000-volt ratings which do NOT include Options M, W, or U, the adjustment point is a small lever stop on the "clapper" of the buzzer. Do NOT seal.
- E. In all AC Series 106 units in 5000-volt ratings incorporating Option M the adjustment point is a pot mounted on the main insulation board in the bottom of the cabinet. Seal after adjusting.
- F. In all AC Series 106 units in 5000-volt ratings incorporating Option W the adjustment point is a pot located on the rear panel. Seal after adjusting.
- G. In the AC Series 106 in ratings up to 5000 volts at 500 VA (Option UW), the adjustment point is an auxiliary pot on the voltmeter board. When adjusting this, use care not to confuse this adjustment with the voltmeter calibration pot. The voltage calibration pot is always the PC pot which has a flush plastic adjustment shaft, while the buzzer adjustment pot has a metal adjustment slot. Both should be sealed after adjustment.

ADJUSTMENT PROCEDURES - Cont'd.

- H. A similar adjustment point -- lower pot on voltmeter board -- is used in the DC Series 108 in both the 2500 and the 5000-volt ratings. Seal after adjustment.
- I. In 10,000 volt units the adjustment point is a pot on the circuit board mounted inside the cabinet on the right. Access is through the top cover of the unit. Seal after adjustment.

SERIES 106

ADJUSTMENT POINT LOCATIONS

Voltage Rating	Std. 50 VA	Option "M"	Option "W"	500 VA Option "UW"
2,500 AC	A	B	C	G
5,000 AC	D	E	F	G
10,000 AC	I	I	I	I
2,500 DC	H			N/A
5,000 DC	H			N/A
10,000 DC	I			N/A

See lettered paragraphs in text above for location data.
N/A means Not Applicable.

ADJUSTMENT SPECIFICATIONS

Adjustment information for the various types of units are listed below. The proper procedure is to set the input voltage to level specified and test volts to the specified point. Then adjust in such a manner as to obtain the action specified in the chart when the test prods are touched to the specified precision resistor load.

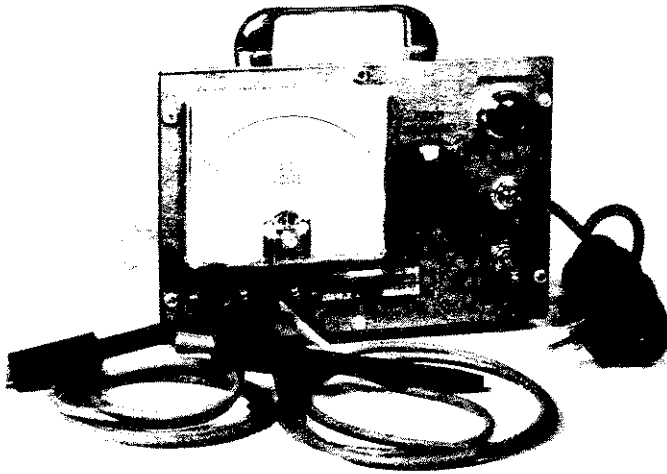
UNIT	INPUT VOLTS	TEST VOLTS	LOAD RESISTORS		CURRENT	ACTION
			OHMS	WATTS		
106 Std. 50 VA	130	2500	None		None	Slight Hum Permissible
	117	1000	30,000	20	N.S.	Must Buzz
	104	500	Short Circuit		N.S.	Must Buzz
106 Option UW 500 VA	130	2500	None		None	Slight Hum Permissible
	117	1000	10,000	100	100 MA	Must Buzz
	104	500	Short Circuit		N.S.	Must Buzz
106 Option M	130	2500	None		None	Must NOT Buzz
	117	1000	2 Meg	2	500 UA	Must Buzz
	117	1000	2.5 Meg	2	400 UA	Must NOT Buzz
	104	500	Short Circuit		N.S.	Must Buzz
108 Std.	117	1500	1 Meg	2	1.5 MA	Must Buzz
	117	800	1 Meg	2	0.8 MA	Must NOT Buzz

Data in the chart above covers adjustment of AC Option M Series 106 units to maximum sensitivity and DC Series 108 units to standard sensitivity. These units can be de-sensitized over a limited range by selecting appropriate load resistors and adjusting accordingly. For example, if the ohmic value of the load resistor is cut in half and adjustment made with this value load, the sensitivity will be 1/2 normal. In case of doubt, or to adjust to a specific set of conditions, contact factory for recommendations and suggestions.

Adjustable High-voltage Tester with buzzer signal on breakdowns

SERIES 106 AND 108

... grounds
... shorts



FASTER

*You watch what you're doing
—not the Tester.*

BETTER

*Can be adjusted when your
line voltage varies.*

FOR SAFE PRODUCTS

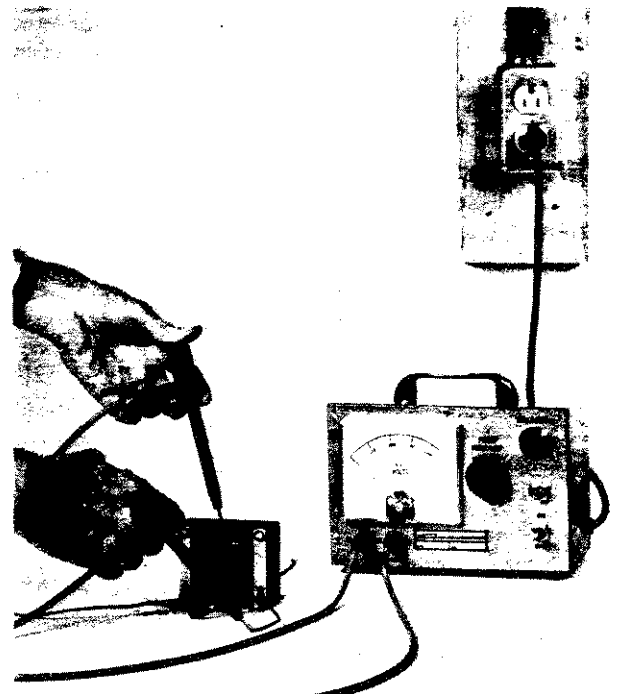
Use these testers to apply a high voltage to your electrical products at various stages of manufacture to detect insulation weakness, grounds, or shorts. Use Series 106 Tester if AC testing voltage is required, and Series 108 if DC testing voltage is needed.

DESCRIPTION

These breakdown testers operate upon the principle that when breakdown occurs, insulation resistance drops sharply. They are limited energy units, and will not damage delicate parts, or highly finished surfaces. Test voltage is continuously variable and the panel voltmeter monitors the actual test voltage at the output terminals of the unit.

BUILT FOR PRODUCTION

Test leads are detachable making it easy to replace worn leads and prods. Require no routine maintenance, and repair parts are readily available.



Here's the details...

SLAUGHTER COMPANY _____ **ARDMORE, OKLAHOMA**

TWX 910-830-6972

TELEPHONE: 405-223-4773

Hear the test—Watch your work!

VOLT METER

Reads actual testing voltage at prods.

BREAKDOWN LIGHT

Lights only while a breakdown, ground, or short exists. . . . also rings . . .

BUZZER

Inside case.

PILOT LIGHT

Always lit when Tester is on.

ON-OFF SWITCH

Industrial type. No warm-up needed.

LINE CORD

7 1/2 feet long. Plugs into any 117 volt, 60 cycle outlet.

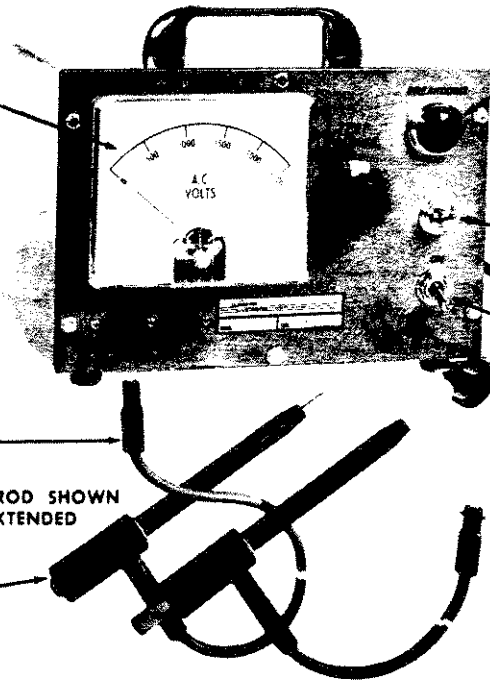
TEST LEADS

4 feet long. Very flexible.

PROD SHOWN EXTENDED

RETRACTING PRODS

Slim enough to test parts in tight spaces.



Shown above is a standard Model 106-2.5 unit in the 50 VA rating. The same construction is utilized in all ratings, though cabinet size varies. Test prods are standard and are included in the price of the unit.

The 50 VA rating is sufficient for most applications, in which the inherent capacity to ground or the product under test does not exceed .0075 MFD — about 5 hp. In cases where higher capacity is needed, either because the equipment to be tested is large, or to meet the detail requirements of particular specifications, a 500 VA unit should be specified.

Units equipped with LOCK-OUT feature require manual reset after rejection. This feature is now required for many UL applications.

SPECIFICATIONS — Standard AC Series 106 Models

Voltage RangeRMS	400/2500		800/5000		1000/10,000	
RatingVA	50	500	50	500	50	500
Max. Short Circuit.....MA	20	325	10	180	10	110
Cabinet Sizewxhxd	9x6x5	14x8x10	12x7x6	17x10x11		22x16x18
Weightlb.	9	40	16	55	50	75

Standard units are for use on 50/60-cycle, single-phase, 117-volt power. Other input voltages available on special order.

In ratings above 5,000 volts, the construction shown here is used. The cabinet is larger, and the voltmeter is recessed behind a safety shield of clear plastic. Zero-start interlock voltage control is standard on these higher voltage units and clip-on test leads are supplied instead of test prods.



SLAUGHTER COMPANY

ARDMORE, OKLAHOMA

PRICES AND ORDERING INFORMATION

PREFERRED UNITS

SERIES 106 AC HIGH VOLTAGE BREAKDOWN TESTERS

STK. #BT-11 MODEL 106-2.5, 400/2500 VOLTS — 50 VA (FSN 6625-801-3863).....	\$172.50
STK. #BT-12 MODEL 106-2.5W, 400/2500 VOLTS — 50 VA WITH LOCKOUT FEATURE.....	\$232.50
STK. #BT-14 MODEL 106-2.5UW, 400/2500 VOLTS — 500 VA WITH LOCKOUT FEATURE.....	\$345.00

STK. #BT-21 MODEL 106-5.0, 500/5000 VOLTS — 50 VA.....	\$220.00
STK. #BT-22 MODEL 106-5.0W, 500/5000 VOLTS — 50 VA WITH LOCKOUT FEATURE.....	\$265.00
STK. #BT-24 MODEL 106-5.0UW, 500/5000 VOLTS — 500 VA WITH LOCKOUT FEATURE.....	\$485.00

STK. #BT-31 MODEL 106-10.0DW, 1000/10,000 VOLTS — 50 VA WITH ZERO START INTERLOCK, WITH LOCKOUT FEATURE	\$750.00
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STK. #BT-32 MODEL 106-10.0DUW, 1000/10,000 VOLTS — 500 VA WITH ZERO START INTERLOCK, WITH LOCKOUT FEATURE	\$825.00
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SERIES 108 DC HIGH VOLTAGE BREAKDOWN TESTERS

Series 108 units are companion units to the AC Series 106. They provide DC output and are available in the same voltage rating as the Series 106. Cabinet sizes and weights are the same as the 50 VA series 106. Maximum short circuit current of DC units is less than 10 milliamperes, and all DC units are adjusted to reject on a load current of 1.0 to 1.5 milliamperes.

STK. #BT-51 MODEL 108-2.5 — 0/2500 DC VARIABLE TEST VOLTAGE.....	\$ 225.00
STK. #BT-52 MODEL 108-5.0 — 0/5000 DC VARIABLE TEST VOLTAGE.....	\$ 325.00
STK. #BT-53 MODEL 108-10D — 0/10,000 DC VARIABLE TEST VOLTAGE, ZERO START INTERLOCK	\$ 795.00

MODIFICATIONS AND OPTIONS

SENSITIVE LEAKAGE DETECTION—This Option "M" is available on 50 VA units only. It is incompatible with 500 VA rated units. It increases the sensitivity of the standard rejection circuits so that the unit will trip on a leakage current limit, as well as on a complete breakdown. Trip point is internally adjustable between 500 and 5000 micro-amperes, as desired. Standard factory adjustment is for a 500-micro-ampere trip point.

Additional cost for Option "M" \$85.00

ZERO START INTERLOCK—This feature, Option "D", provides circuitry requiring the operator to always return the voltage control to zero before starting the test. This is standard on 10,000-volt units. It is available on order on all other ratings of units. Testers supplied with this option are equipped with clip-on leads instead of test prods.

Additional cost for Option "D"..... \$65.00

AUTOMATIC DWELL TIMING—This modification automatically controls the duration of time that the test voltage is applied. Testers supplied with this option are equipped with clip-on leads instead of test prods. Specify Option "A" if a timing period of between .1 and 6 seconds is required, Option "B" if the period is between 3 seconds and 3 minutes. Timing may be easily preset to any period within these ranges.

Additional cost for Option "A" or "B" \$150.00

RACK AND PANEL MOUNTING—Specify Option "C" for this type of construction. DC and 50 VA AC units in ratings through 5000 volts are supplied on standard 5¼" x 19" panel and extend approximately 10" deep. AC 500 VA units are supplied on 10½" x 19" panels and extend approximately 10" deep. AC 50 VA 10,000-volt units are supplied on standard 10½" x 19" panels and extend approximately 12" deep. AC 500 VA units in 10,000-volts ratings are supplied on 14¼" x 19" panels and extend approximately 16" deep. Protective covers are provided to fully enclose the unit behind the panel. Some option combinations require an increase in panel size.

Additional cost for Option "C"..... \$27.50

For complete Model number, add the suffix letter corresponding to each optional feature to the basic number of the Model selected. For total price, add cost of each option to cost of basic

model. For example: Model 106-2.5 BC is a 2500 volt unit, with 6 sec. to 3 minute automatic dwell timing, in rack and panel mounting. Price is $172.50 + 150.00 + 27.50 = 350.00$.

Prices listed on this bulletin were correct on publication date, and are subject to change.

Current price quotation will be forwarded on request.

SLAUGHTER COMPANY

ARDMORE, OKLAHOMA

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