ARKANSAS POWER & LIGHT COMPANY
POST OFFICE BOX 551 LITTLE ROCK, ARKANSAS 72203 (501) 371-4000

September 10, 1979

1-099-4

Director of Nuclear Reactor Regulation
ATTN: Mr. R. W. Reid, Chief
Operating Reactor Branch #4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Arkansas Nuclear One-Unit 1
Docket No. 50-313
License No. DPR-51
Degraded Grid Voltage
(File: 1510)

Gentlemen:

As a result of recent telecons (August 29, September 4, and September 6), the following is provided to document our responses to those telecons. This letter incorporates the applicable portions of our August 24, 1979, letter and therefore, supersedes the August 24, letter.

PART 1 - RESPONSE TO JUNE 20, 1979, LETTER

Item 7.

For each Section of IEEE 279, describe how the proposed undervoltage protection modification complies with the criteria.

Response:

The following briefly describes how our Millstone Modifications as proposed to you in our August 23, 1978, letter conform to the requirements of each Section of IEEE 279.

a. General Functional Requirements - The devices and equipment used are qualified for Class 1E application and the performance of the devices is highly reliable. The system is designed so that the protective action is automatically initiated as the system reaches preset levels.

b. Single Failure Criterion - The two load groups are provided with redundant protective actuation control systems. Also, wiring for each of the two control systems is routed in separate Class 1E raceways.

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c. Quality of Components and Modules - The devices used for the two protection systems are qualified for Class 1E application.

d. Equipment Qualifications - The available type test data for Class 1E components qualifications confirms the required satisfactory performance of the protection equipment under the environmental conditions stated in Section 3.7 & 3.9 of the IEEE-279-1971.

e. Channel Integrity - The protective systems proposed have been designed for fail safe operation. The devices and circuitry used are Class 1E and therefore shall remain operational under extreme environmental, energy supply and accident conditions.

f. Channel Independence - The equipment, devices, and raceways for one Class 1E system are independent and physically separated from the other system. The circuits for the two Class 1E protective systems are also routed in separate raceways.

g. Control and Protection System Interactions - All the equipment is considered part of the protection system which is designed to meet the requirements of IEEE 279 with the exception of the RCP starting bypass initiation signal (i.e. the contact from which the bypass signal is initiated). The signal, however, is isolated from the Class 1E portions of the system by a Class 1E buffer relay. For further details, refer to our response to Question 6.

h. Isolation Devices - Isolation devices are not used as the systems are completely Class 1E.

i. Single Random Failure and Multiple Failures Resulting from a Credible Single Event - There are no single failure points as the system are completely Class 1E, separate, and redundant.

j. Derivation of System Inputs - The undervoltage relays proposed at the 480V ESF buses will measure the system degraded conditions directly and initiate the protective action at the system level within its respective load group.

k. Capability for Sensor Checks - The 92% undervoltage relays have been provided with functional test switches. Periodic testing will ensure the sensors' operational capability.

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l. Capability for Test and Calibration - The system has the capability for testing. Calibration of devices is discussed under item 9.c.

m. Channel Bypass or Removal from Operation - As explained in the reply to Question 3, of our letter of July 12, 1979, systems have the capability to be tested in-service without initiating a protective action at the system level and also continue to meet the single failure criterion.

n. Operating Bypass - The protective action to the two systems can be bypassed manually during starting of the RCP motors. The operating bypasses are Class 1E.

o. Indication of Bypasses - The bypasses will be alarmed in the Control Room.

p. Access to Means for Bypassing - Manual bypass of protective action is provided through test switches. The access to the test switches will be under the administrative control of the Shift Supervisor.

q. Multiple Set Points - The protective devices are set at one set point only.

r. Completion of Protective Action Once It Is Initiated - Once the protective action has been initiated the off-site source is automatically disconnected and the on-site source (Diesel) is made available within a short time. The protective action will go to completion once initiated.

s. Manual Initiation - Manual control is provided on each of the two breakers for connecting or disconnecting the off-site and on-site sources to the auxiliary power systems. Manual initiation requires operation of a minimum number of switches.

t. Access to Set Point Adjustment Calibration and Test Points - Access to Set Point Adjustment, Calibration and Test Points is controlled Administratively under the Shift Supervisor and is limited to qualified personnel.

u. Identification of Protective Action - The breakers for the off-site and on-site sources have close and indications in the control room to identify the protective actions.

v. Information Read Out - Sufficient monitoring has been provided in the control room which will enable the operator to know the deteriorating conditions of the systems.

w. System Repair - Periodic testing of the system will ensure the detection of the malfunction of components or modules. Plug in type of components are used where possible so that the faulty units can be replaced, repaired or adjusted expeditiously. Also, the system protective action is designed such that the failure of one undervoltage relay will not disable protective action.

x. Identification - The equipment and wiring of the two protective systems have been identified as red and green channels.

Item 9,c.

The ANO-1 analysis assumed that protective action would be executed at (or above) the calculated value of 92% (Motor-base) voltage. Indicate: (c) allowance (above 92%) used to accommodate drifts. Describe the basis for determining these allowances. Describe the bases for determining the nominal setpoint which provides maximum protection consistent with minimum spurious shedding from the perferred power source (i.e., electric grid).

Response:

The 460 undervoltage relays are solid state relays set to trip at a specific voltage. The physical inaccuracies of the relay are within the error band of calibrated test equipment and are therefore indiscernible. Upon installation of the relay, it will be calibrated using instruments that are calibrated traceable to the National Bureau of Standards and accurate on the order of ± 0.02%.

To date, no information exists on possible drift of the relay either inhouse or from the vendor. We will calibrate the relays upon initial installation and quarterly thereafter until the next station refueling. The data gathered will be used to adjust the set point as appropriate to accommodate drift.

Relays normally exhibit little drift and in the case of these solid state relays, we expect to see drifts much less than 2% if indeed any exists at all. The purpose of these relays is to assure that safety equipment is not subjected to degraded voltage and in particular the motor starters and fuses. In our analyses we verified acceptable voltages to the starters and control fuses assuming they are located at the motor terminals. In reality, the starters and control fuses are located at the motor control center, where voltage is higher

than at tne motor terminals (to assure 90% voltage at the motor terminals, our acceptance criteria is higher than 90% voltage at the motor control center to allow for voltage drops in cabling, etc.). Therefore, a setpoint of 92% provides approximately 2% margin (conservatism) for the most critical components. As we anticipate relay drift to be much less than 2%, if any, we believe operation for one fuel cycle while drift data is being gathered is appropriate and within the conservatism of the analyses.

PART 2 - NRC AUGUST 16, 1979, LETTER

Item 2.

Provide the 480 volt and 4160 electrical schematics showing the proposed degraded voltage protection system (both levels of protection).

Response:

Attached are 4 copies each of drawings E-35 and E-36.

Item 3.

The proposed undervoltage relays will have test plug capability. Describe the test plugs, their function, and their effect on the relay. How is the test performed and specifically what is the function which is tested? Provide a schematic which illustrates the function of the test plug on the relay.

Response:

Attached is instruction manual G.E. H-1768A showing the connecting plugs. A description of the test plug is shown by the attached publication GEI-25372. When the connecting plug is removed and a test plug is inserted in its place, all relay points are accessed, both the relay side and the source side, since each side is brough to a separate terminal on the test plug.

Since this relay is an undervoltage relay with contact closure output set to close at a specific set point, the relay contact closure can be verified at the set point without execution of the desired final action.

Item 4.

a) We interpret your response to say that calibration followed by a functional test will be conducted prior to initial operation of this system and during each

refueling outage thereafter. While we belie - this test interval is appropriate for calibration , irposes, operability should be verified by performing a functional test more often, e.g., monthly or quarterly. Propose a suitable test interval for functional testing.

b) We specifically requested a description of the test program which would verify (once prior to initial operation of the protection system) that no unacceptable voltage would be applied to ESF equipment when the grid is at the defined "minimum-normal" level. Describe the test program.

c) We are concerned about the adequacy of the voltage applied to ESF equipment during the starting of large non-Class 1E motors, such as reactor coolant pump motors. This is a major concern. Your analysis indicates that the lowest acceptable voltage is 92% for an eight-second duration.

During the starting of large motors, you have stated that the voltage falls below 92% and stays for longer than eight seconds. Provide the valves of these lower voltages and duration for the starting of each large non-1E motor (under appropriate plant and grid conditions). Explain why voltage levels below your minimum voltage acceptance criterion should be considered acceptable. Please note that the voltages when starting large motors must be determined to be acceptable (on an appropriate basis) before one considers the acceptability of a design feature that would bypass the degraded voltage protection during such startings.

Response:

a) At least once per month, the relays will be verified functional (Channel Functional Test). 'east once per 18 months or each refueling outage, the annel will be calibrated and functionally tested (Channel Calibration).

b) After installation, the system will be demonstrated operable by a functional test as described in our letter of July 12, 1979, response to Item 4a.

c) Your interpretation of the 92% bus voltage criteria is not correct in that it is not minimum allowable in all cases. Appendix I page 5 of our letter of August 23, 1978, identifies 90% component voltage (92% bus voltage) as limiting for continuous operation but notes that "Safety-related motors were designed to provide full load torque during momentary dip to 75% of rated voltage when other motors accelerate on the system. On the same page it states

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that "During large motor starting, voltages at the 4160V ESF busses were marginal", not unacceptable. The voltage dips on the safety related busses do not exceed 75% of rated voltage during starting of Reactor Coolant Pumps. Therefore, the voltage dips due to RCPs starting are within acceptance criteria.

The magnitude of the voltage dip due to RCPs starting is within the acceptance criteria for the safety equipment. However, the length of the voltage dip may exceed 8 seconds, therefore, as RCPs must be started during normal plant startup and may be restarted at some delayed time following an accident, the automatic bypass is necessary to avoid spurious trips of off-site power. The bypass signal will originate from a non-Class 1E contact on each RCP. The non-Class 1E signal will be isolated from the rest of the Class 1E bypass circuitry by use of a Class 1E timer. The timer will allow bypass of the undervoltage protection for 20 seconds while the RCP is started. If the timer does not reinstate the undervoltage protection within approximately 25 seconds an alarm will annunciate in the Control Room.

Item 5.

Submittal V-2A and V-3A shows motor base voltage on 4160V bus higher than designed maximum 110% and that on 480V bus as marginal. Further, if transformer secondary voltage gain (due to higher applied voltage (22kv) on lower rated (21.5kv) primary windings) is added to the bus voltages, the result will be unacceptably higher voltages on both 4160 and 480V equipment. The submittal further indicates that your assumed no load condition includes 25% of the transformer capacity as running load on 480V bus and 1.885 MVA on 4160V bus. You are requested to justify 1.0 PU tap under the above mentioned concerns. Also, provide the analysis that gives acceptable voltages on Class 1E equipment for maximum grid voltage and a realistic no load condition (such as 5% or less of the transformer capacity as 480V running load).

Response:

As noted, cases V-2A and V-3A do show bus voltages slightly above 1.1 P.U. However, the bus voltages do not take into consideration the voltage drops from the bus to the actual components. When these voltage drops are taken into consideration, the over excitation is minimal.

In addition, the above 2 cases were provided in response to a specific question and are not representative of voltages safety equipment would ever experience. These cases assume essentially no load on the busses. During the modes of which

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safety systems are required (e.g. Modes 1, 2, 3, and 4), there must be significant other plant loads on the busses for t e plant to be in that Mode. Only in the case of a loss of off-site power (in Modes 1, 2, 3 and 4) would there be no non-safety loads running and in this case, safety loads would be powered from the Diesel Generators.

Therefore, we conclude that the safety systems will not experience any over excitations.

Regarding your reference to transformer secondary gain due to applied voltage of 22kv on transformer winding of 21.5 kv. This gain was taken into account in the computation and appears as a tap 0.9773 on the top right corner of the case. The computer code, therefore considers the gain due to applied voltage being higher than rated voltage of transformer winding by using a tap of 0.9773.

Item 6.

Our review of the bypass circuit for the starting of large motors has determined that this single bypass is a single failure point for operation of ESF equipment. This is a major concern. Each large motor has a single time delay device. (This timer does have two output contracts which operate in a separate schemes to bypass the degraded voltage protection in both divisions of electric power). However, the postulated failure of the timer mechanism itself for any such motor can result in the loss of voltage protection in both electrical divisions. This single failure potential must be delineated, possibly by using two timer mechanisms per motor.

See our comment earlier regarding Item 4c.

Response:

As discussed in our response to Item 4c above we propose to install a delayed alarm in the Control Room to annunciate in the event that the undervoltage protection blocking circuit does not reset. The alarm detection circuit will be activated simultaneously with the blocking circuit and will use a Class 1E timer.

Item 8.

Your response dated July 12, 1979, indicated that load shedding of essential loads was proposed only when the station auxiliaries are supplied power from startup transformer No. 2 (ST 2). No load shedding would be applied to startup transformer No. 1 (ST 1) under the same conditions.

Response:

See our response to Item 9c in Part 1 of this letter.

PART 3 - TELECON ON AUGUST 21, 1979

Item 1

Provide a listing of equipment that comprise the 4160V and 480V running load as shown on Table 2 to AP&L's letter of May 21, 1979.

Response:

Table 1, attached, is a listing of all running loads assumed in the above analysis.

Very truly yours,

David C. Trimble
Manager, Licensing

DCT/JTE/ew

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Your August 23, 1978, analysis and all our subsequent communications have indicated that when operating on ST-1 during "abnormal" conditions, shedding of non-essential loads was essential to maintain acceptable voltage. Explain this change. Show why load shedding is not needed for ST-1.

Response:

During conversations with the staff in May, 1979, it was agreed that the initial grid conditions assumed in our submittal of August 23, 1978, were overly restrictive and conservative. We proposed new conditions that were more realistic which would result in analyses more consistent with NRC requirements. These new assumptions were agreed to by the Staff and were transmitted to you by our letter of May 21, 1979, along with new analyses.

Due to the over conservatism in the August 23, 1978, submittal, it was necessary to shed loads on ST-1 to assure adequate voltage. However, under the more realistic (yet still very conservative) assumptions of our May 21, 1979, letter, analyses indicate that load shedding upon fast transfer to ST 1 is no longer necessary. Load shedding upon fast transfer to ST 2 is still necessary.

Item 9.

As you have indicated, your response is not complete. You have committed to providing information on the set points of the undervoltage relays. Provide the information or a schedule for providing the information.

Our concern here is a proper stack up of the tolerances in the system including the inaccuracies of instrumentation in adjusting the set points to assure that the voltage applied to ESF equipment is not unacceptable. In your discussion display such tolerances and error bands and their stack up to assure that the voltage applied to the ESF equipment is not unacceptable.

Another concern is that, after considering the buildup of inaccuracies, etc., the nominal setpoint should not be so high as to cause the safety buses to be spuriously disconnected from the preferred power source.

INSTRUCTIONS

GEH-1768A
SUPERSEDES GEH-1768

UNDERVOLTAGE RELAYS

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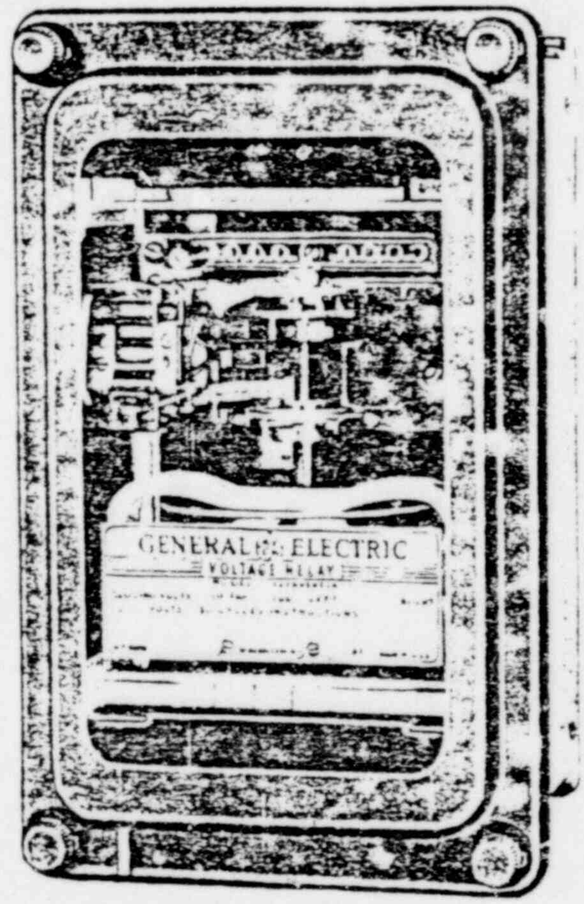

Types

IAV54E

IAV54F IAV55F

IAV54H IAV55H

IAV55C IAV55J

POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL ELECTRIC

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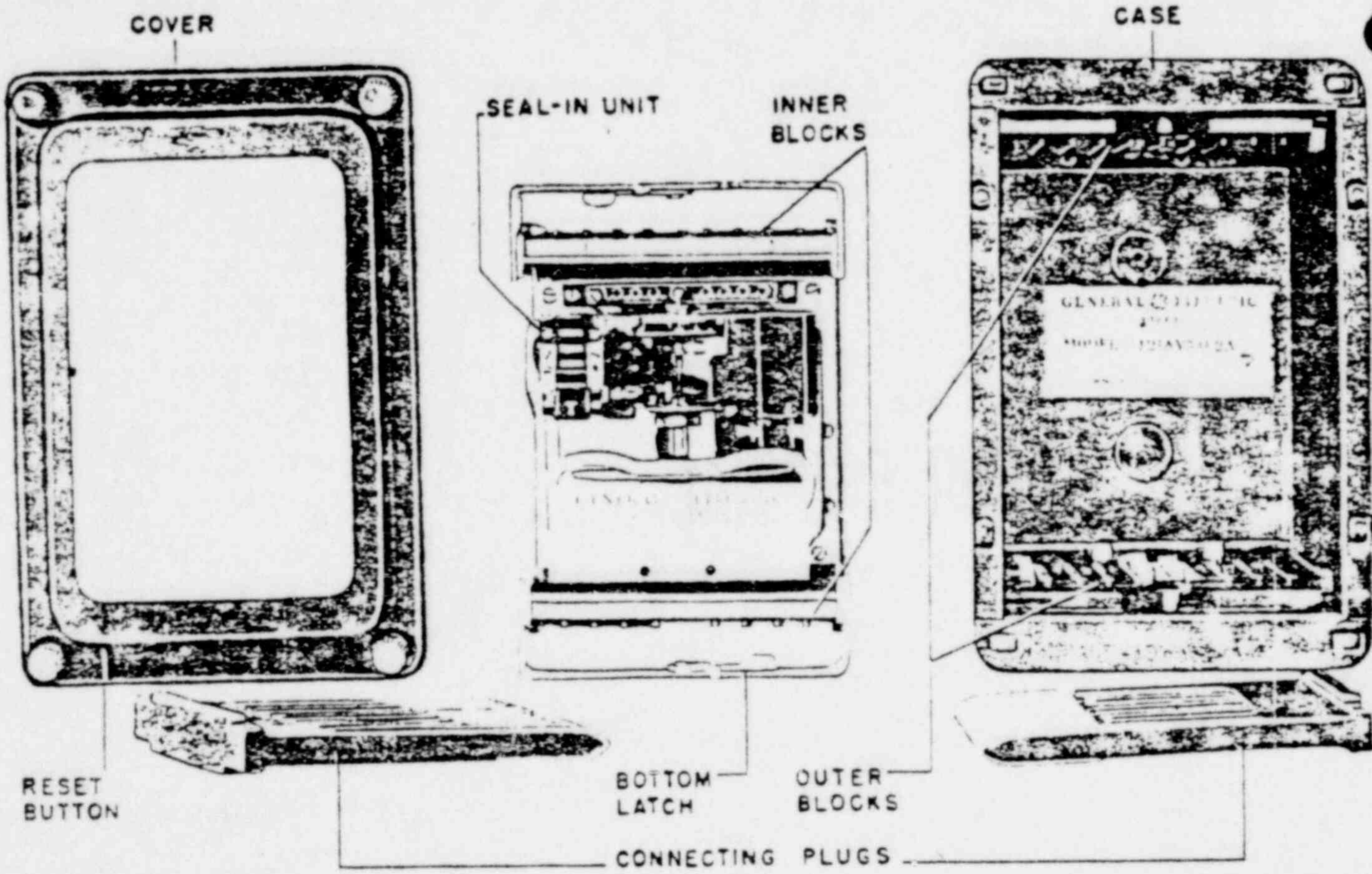

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Fig. 1 The Type IAV54E Relay Disassembled

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RECEIVING, HANDLING AND STORAGE

These relays, when not included as a part of a control panel will be shipped in cartons designed to protect them against damage. Immediately upon receipt of a relay, examine it for any damage sustained in transit. If injury or damage resulting from rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Apparatus Sales Office.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are injured or the adjustments disturbed.

If the relays are not to be installed immediately, they should be stored in their original cartons in a place that is free from moisture, dust and metallic chips. Foreign matter collected on the outside of the case may find its way inside when the cover is removed and cause trouble in the operation of the relay.

DESCRIPTION

CASE

The case is suitable for either surface or semiflush panel mounting and an assortment of hardware is provided for either mounting. The cover attaches to the case and also carries the reset mechanism when one is required. Each cover screw has provision for a sealing wire.

The case has studs or screw connections at both ends or at the bottom only for the external connections. The electrical connections between the relay units and the case studs are made through spring backed contact fingers mounted in stationary molded inner and outer blocks between which nests a removable connecting plug which completes the circuits. The outer blocks, attached to the case, have the studs for the external connections, and the inner blocks have the terminals for the internal connections.

The relay mechanism is mounted in a steel framework called the cradle and is a complete unit with all leads being terminated at the inner block. This cradle is held firmly in the case with a latch at the top and the bottom and by a guide pin at the back of the case. The cases and cradles are so constructed that the relay cannot be inserted in the case upside down. The connecting plug, besides making the electrical connections between the respective blocks of the cradle and case, also locks the latch in place. The cover, which is fastened to the case by thumbscrews, holds the connecting plug in place.

To draw out the relay unit the cover is first removed, and the plug drawn out. Shorting bars are provided in the case to short the current transformer circuits. The latches are then released, and the relay unit can be easily drawn out. To replace the relay unit, the reverse order is followed.

A separate testing plug can be inserted in place of the connecting plug to test the relay in place on the panel either from its own source of current and voltage, or from other sources. Or, the relay unit can be drawn out and replaced by another which has been tested in the laboratory.

INSTALLATION

LOCATION

The location should be clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

MOUNTING

The relay should be mounted on a vertical surface. The outline and panel drilling dimensions are shown in Fig. 11.

CONNECTIONS

The internal connection diagrams are shown in Figs. 5 and 6. Typical external connections are shown in Fig. 7.

One of the mounting studs or screws should be permanently grounded by a conductor not less than No. 12 B&S gage copper wire or its equivalent.

ADJUSTMENTS

TARGET AND SEAL-IN UNIT

For trip coils operating on currents ranging from 0.2 up to 2 amperes at the minimum control voltage, set the target and seal-in tap plug in the 0.2 ampere tap.

The tap plug is the screw holding the right-hand stationary contact of the seal-in unit. To change the tap setting, first remove the connecting plugs. Then take a screw from the left-hand stationary contact and place it in the desired tap. Next, remove the screw from the other tap, and place it in the left-hand contact. This procedure is necessary to prevent the right-hand stationary contact from getting out of adjustment. Screws should not be in both taps at the same time, as d-c pickup will have a higher tap value, whereas a-c pickup will be increased.

UNDERVOLTAGE RELAYS

TYPE IAV

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INTRODUCTION

These relays are of the induction-disk construction. The disk is actuated by a potential operating coil on a laminated U-magnet. The disk shaft carries the moving contact which completes the trip or alarm circuit when it touches the stationary contact or contacts. The disk shaft is restrained by a spiral spring to give the proper contact-closing voltage and its motion is retarded by permanent magnets acting on the disk to give the correct time delay.

There is a seal-in unit mounted to the left of the shaft as shown in Fig. 1. This unit has its coil in series and its contacts in parallel with the main contacts such that when the main contacts close, the seal-in unit picks up and seals in. When the seal-in unit picks up, it raises a target into view which latches up and remains exposed until released by pressing a button beneath the lower-left corner of the cover.

The relays are all mounted in single-unit double-end cases. The case has studs for external connections at both ends. The electrical connections between the relay and the case are made through stationary molded inner and outer blocks between which rests a removable connecting plug which completes the circuits. The molded outer blocks carry the studs for the external connections while the inner blocks carry the terminals for the internal connections. The operating coil is connected in parallel with both the upper and the lower inner molded blocks while the trip circuit is connected in series with these blocks. In this way, insertion of either the upper or lower connecting plug will energize the operating coil but the trip circuit will not be completed until the second connecting plug is inserted. For relays which have contacts closed when the relay is de-energized but open under normal operating conditions, the double connecting plug feature allows the relay contacts to open before the trip circuit is completed, thus minimizing the possibility of incorrect tripping when returning the relay to service after tests and inspection.

APPLICATION

These relays are protective devices designed to close trip or alarm circuits whenever the voltage applied to their operating coils reaches some predetermined value. The functions are described in greater detail in the following paragraphs.

OPERATING CHARACTERISTICS

The Type IAV54E relay has a single circuit-closing contact which closes when the voltage is reduced to some predetermined value. Thus, the contacts are closed at zero volts. This relay is a time undervoltage relay with inverse time characteristics which are shown in Fig. 2.

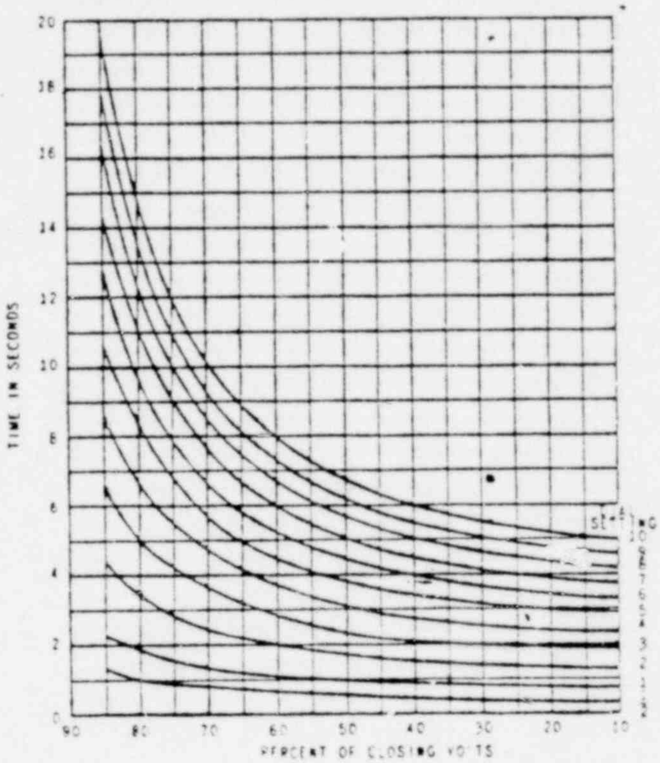

Fig. 2 Time-Voltage Curves For Relay Types IAV54E And IAV55C

The Type IAV54F relay is similar to the Type IAV54E relay except that it has a longer operating time. The time characteristics are shown in Fig. 3.

The Type IAV54H relay is also similar to the Type IAV54F relay except that it has much longer operating time than either the Type IAV54E or the Type IAV54F relays. The time characteristics are shown in Fig. 4.

The Type IAV55C relay is similar to the Type IAV54E relay except that it has two circuit-closing contacts.

The Type IAV55F relay is similar to the Type IAV54F relay except that it has two circuit-closing contacts.

The Type IAV55H relay is similar to the Type IAV54H relay except that it has two circuit-closing contacts.

The Type IAV55J relay is similar to the Type IAV55H relay except that it is provided with two separate seal-in units; one for each set of normally closed contacts.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

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INSTRUCTIONS

GEI-25372B

SUPERSEDES GEI-25372A

TEST PLUGS

FOR
DRAWOUT RELAYS AND METERS

Types

XLA12A
and
XLA13A

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POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

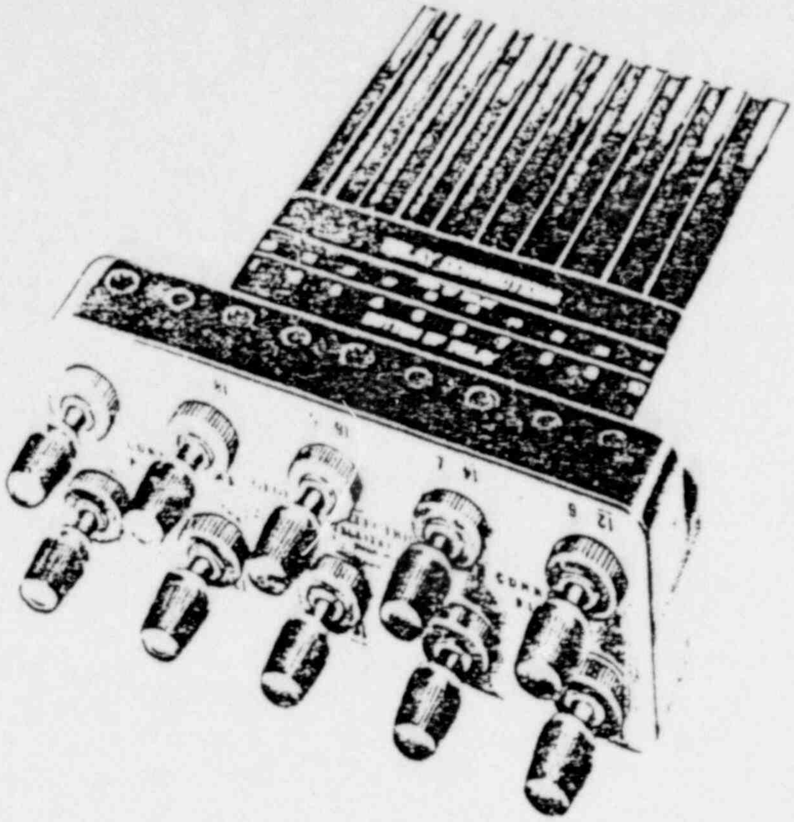

Fig. 1 XLA12A Test Plug

Fig. 1 (8005524)

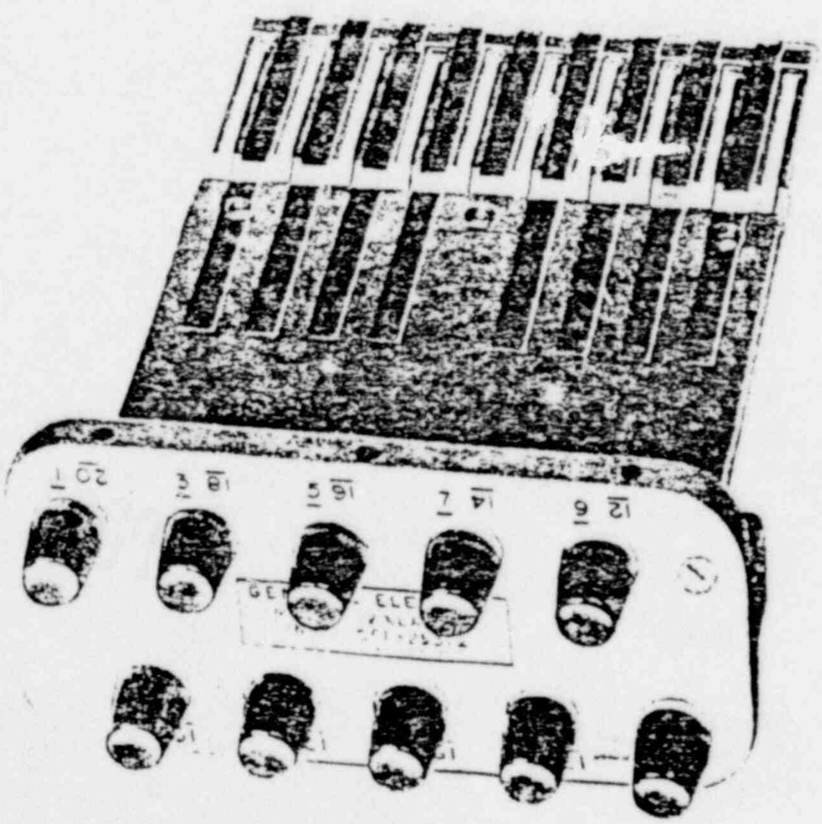

Fig. 2 XLA13A Test Plug

Fig. 2 (8024186)

TEST PLUGS
FOR DRAWOUT RELAYS AND METERS

TYPE XLA

APPLICATION

The Type XLA test plugs are used to test drawout relays and meters. The XLA12A enables power to be applied to the relay from either a separate source or the source that feeds the equipment. The XLA13A can only be used when a separate source of power is available.

CONSTRUCTION

XLA12A

The XLA12A test plug consists of a black and red Textolite* molding with twenty electrically separate contact fingers connected to ten concentric binding posts. The ten contact fingers on the black side are connected to the inside binding posts with the black thumb nuts and engage the relay internal connections. The contact fingers on the red side are connected to the outer binding posts with the red thumb nuts and engage the equipment case stud connections. See Fig. 1. The concentric binding posts are numbered on the nameplate, and the corresponding contact fingers are numbered on each side of the test plug. When using the test plug in the bottom of the relay, numbers one to ten, corresponding to the relay studs, appear upright, while numbers eleven to twenty are upside down. It is impossible, due to its construction, to insert the plug into the bottom of a relay with numbers one to ten up-side down. By the same token, numbers eleven to twenty will always appear in the up-right position when the plug is inserted in the top of a relay.

Removable test links for through connection, test clips and short-circuiting clips are furnished with each test plug. See Fig. 4.

XLA13A

The XLA13A test plug consists of a black Textolite* molding with ten electrically separate contacts. Each contact terminates at a separate binding post. See Fig. 2. When the relay connecting plug is withdrawn any current transformer secondaries will be short circuited by shorting bars in the case. The insertion of the XLA13A test plug does not disturb the current transformer shorting arrangement. The diagonally staggered binding posts are numbered. Numbers one to ten, corresponding to the relay stud connections, appear up-right when using this plug in the bottom of a relay, while number eleven to twenty appear up-side down. Because of its design, the XLA13 test plug cannot be inserted into the bottom of a relay with numbers one to ten up-side down. Thus, the contacts of the inserted plug will always be toward the relay.

TESTING

Routine testing can be accomplished by removing the relay cover and substituting either test plug for the connecting plug.

XLA12A

Several pieces of hardware are supplied with this test plug (See Fig. 6). The U-shaped link is used to make through connections, relay stud to case terminals. The long, open end link is used to short circuit any current transformers and any normally closed contacts. This link must be inserted in the proper place under the red thumb nuts before the test plug is inserted in the unit. Two sizes of corregated end links are provided so standard test clips can be used. These links are also provided with a hole so that a secure bolted connection may be obtained.

Typical separate source test connections and wiring diagram for TYPE IAC overcurrent relays are shown in Fig. 3.

A conventional representation of test connections used on wiring diagrams is shown in Fig. 9. An outline of this plug is shown in Fig. 11.

XLA13A

No external provisions need be made for shorting current transformer secondaries or any normally closed contacts because the plug is so designed that the side away from the relay to be tested does not come into contact with any of the connecting fingers in the case. Power source connections can be secured to the studs of the plug by the black thumb nuts.

* Reg. Trade-Mark of General Electric Company

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These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

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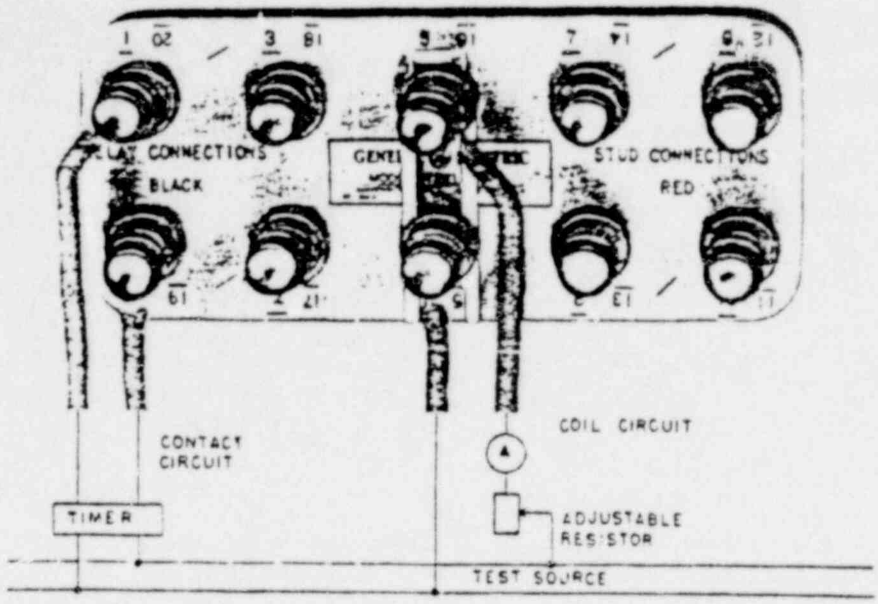

Fig. 3 (8004359)

Fig. 3 Typical Separate Source Connections and Wiring Diagram for Testing an IAC Overcurrent Relay Using the XLA12A Test Plug

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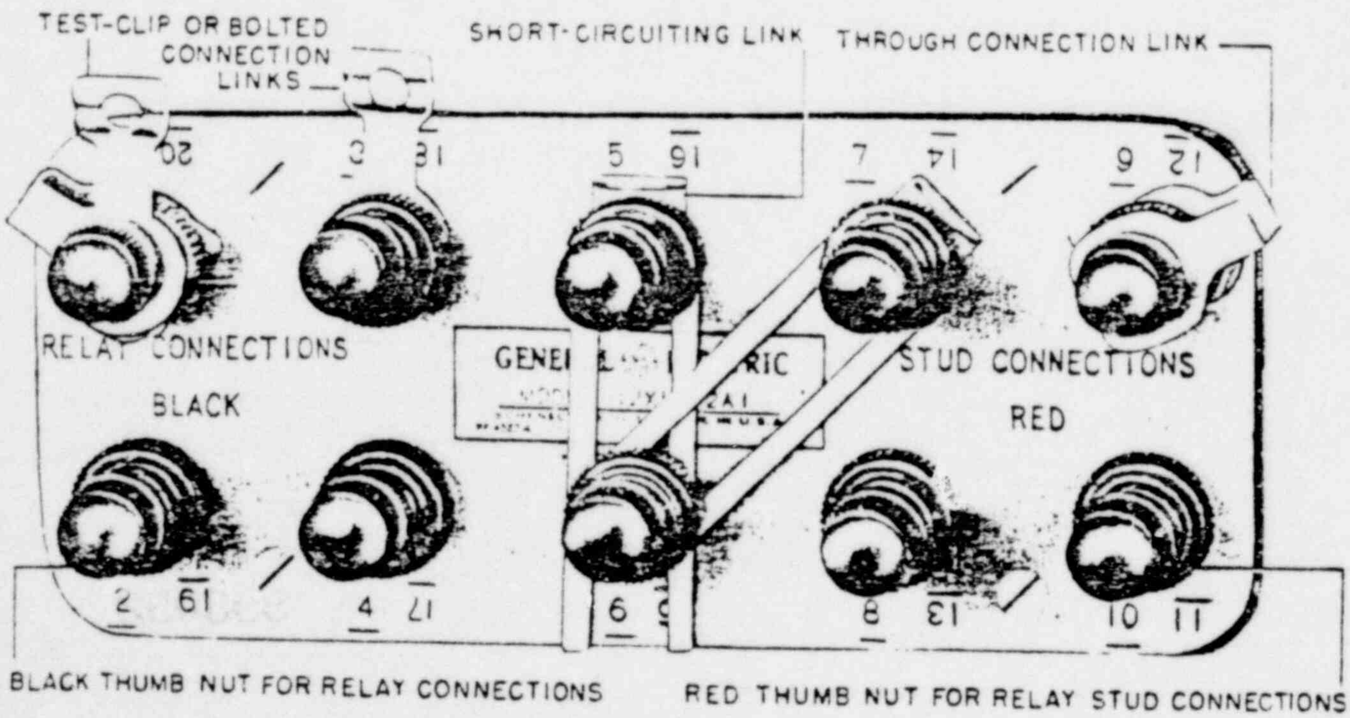

Fig. 4 (8004307)

Fig. 4 Test Links in Use on the XLA12A Test Plug

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Fig. 5 (8024187)

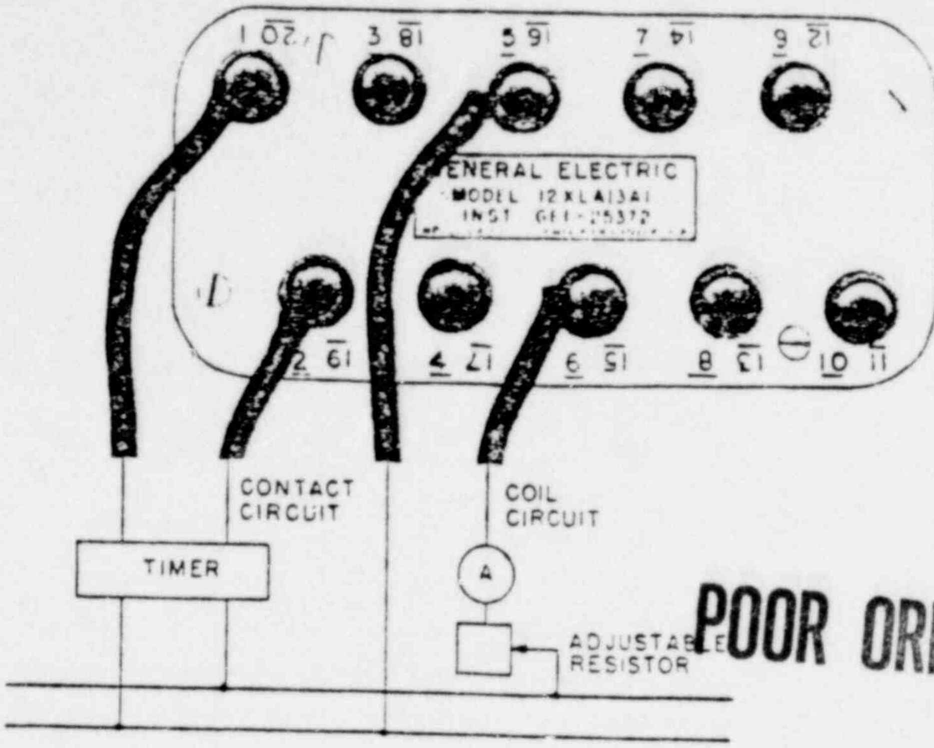

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Fig. 5 Typical Separate Source Connections and Wiring Diagram for Testing an IAC Overcurrent Relay Using the XLA13A Test Plug

Typical separate source test connections and wiring diagram for Type IAC overcurrent relays are shown in Fig. 5.

A conventional representation of the XLA13A test plug connections used on wiring diagrams is shown in Fig. 10.

An outline diagram of the XLA13A test plug is shown in Fig. 12.

SHIPPING - UNPACKING

Type XLA test plugs are shipped in individual cartons which may be used for storage. All necessary hardware is packed in the individual carton.

Immediately upon receipt of the test plug, an examination should be made for any damage sustained in transit. If injury or rough handling is evident a damage claim should be filed at once with the transportation company and the nearest General Electric Sales Office should be notified.

RENEWAL PARTS

Orders for renewal parts, should be addressed to the nearest Sales Office of the General Electric Company, giving the name of part wanted, quantity required and complete nameplate data.

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Fig. 6 (8005525)

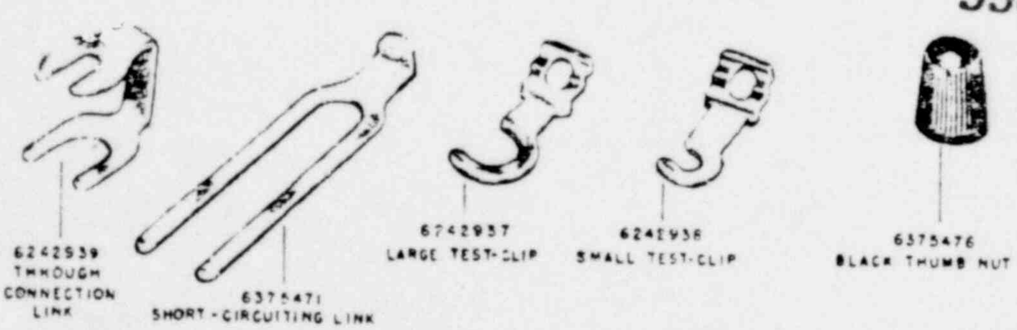


Fig. 6 Accessory Links for the XLA Test Plugs

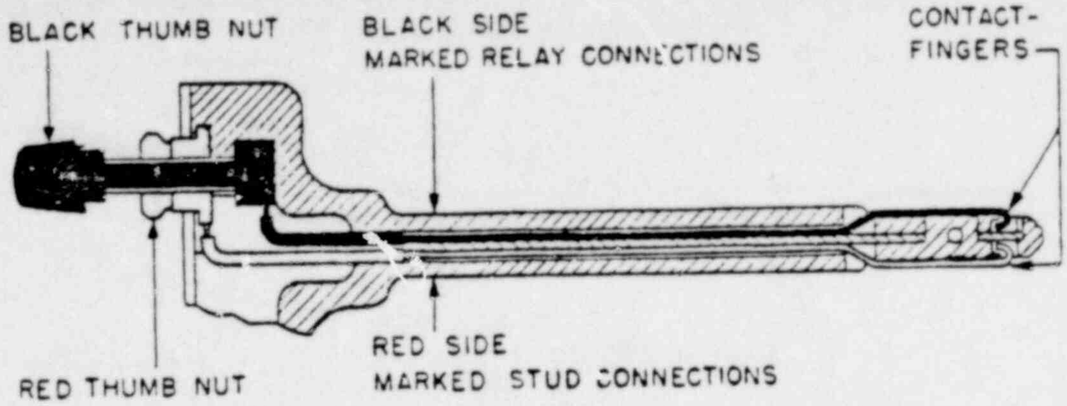


Fig. 7 Sectional View of XLA12A Test Plug Showing Internal Wiring

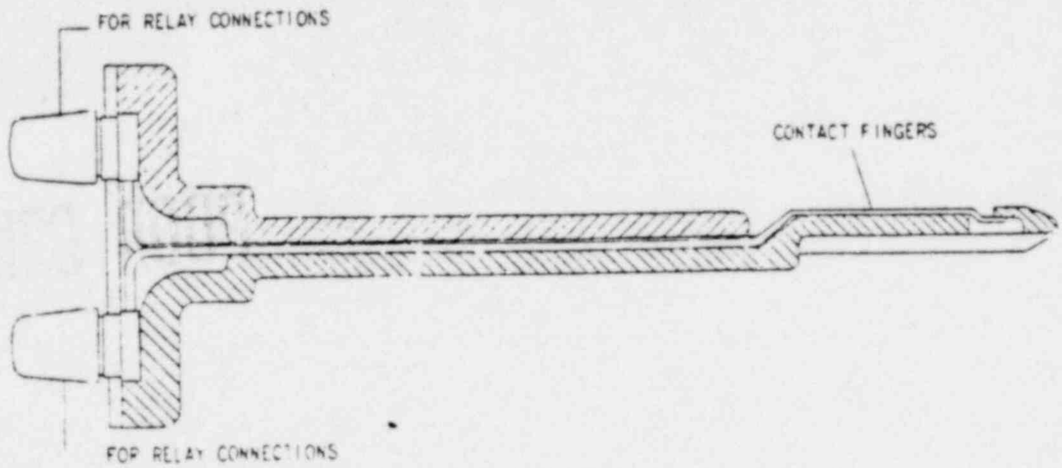
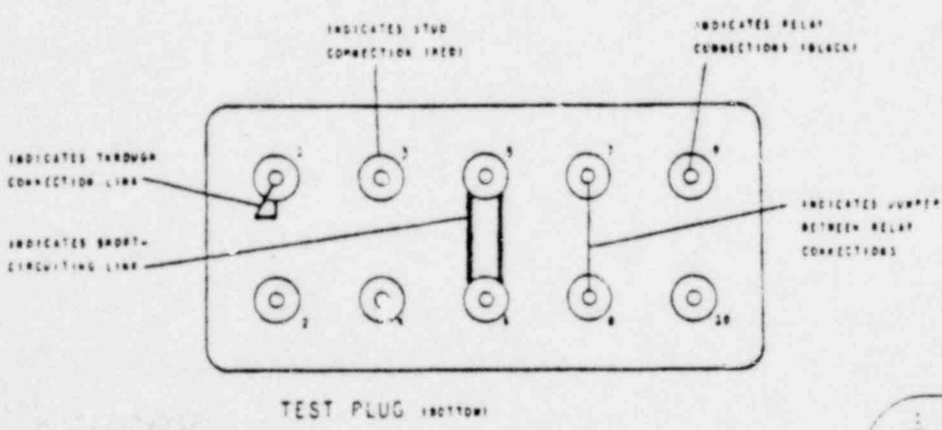


Fig. 8 Sectional View of XLA13A Test Plug Showing Internal Wiring



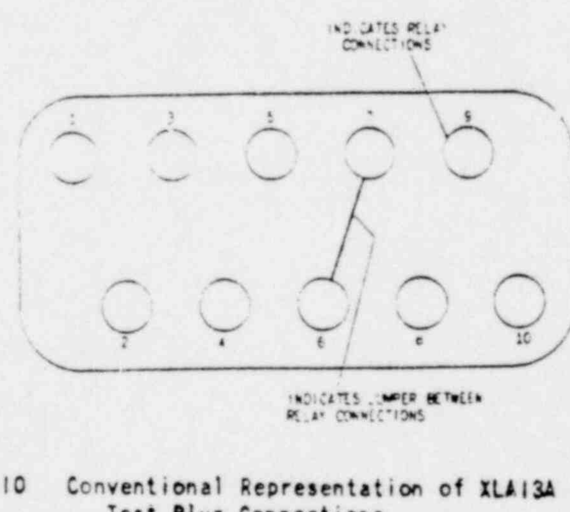


Fig. 9 Conventional Representation of XLA12A Test Plug Connections

Fig. 10 Conventional Representation of XLA13A Test Plug Connections

Fig. 8 (459A246)
Fig. 9 (K-6375616)
Fig. 10 (459A245)

993055

Fig. 11 (K-6305856)

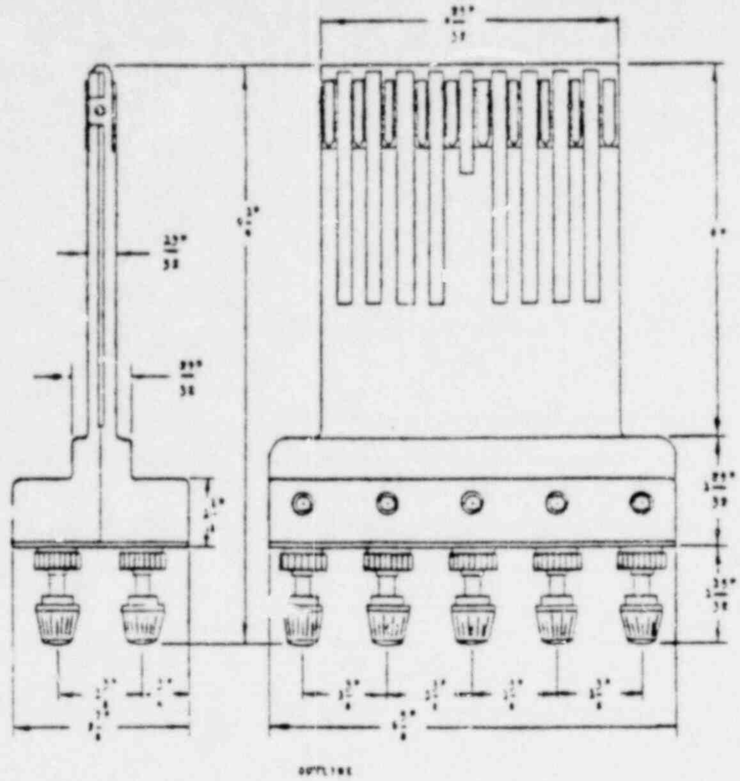


Fig. 11 Outline of the XLA12A Test Plug

Fig. 12 (459A230)

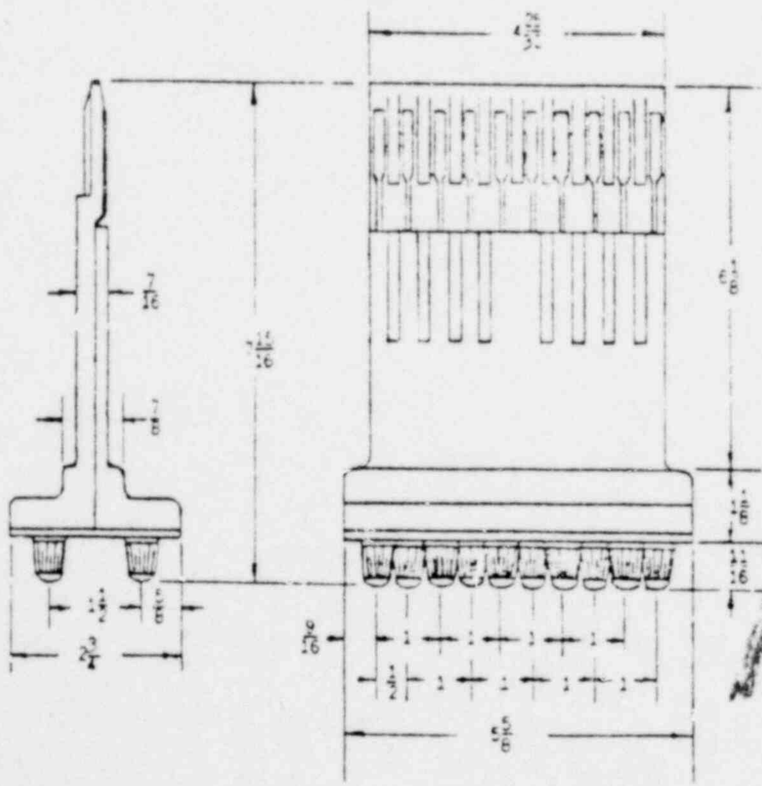


Fig. 12 Outline of the XLA13A Test Plug

TABLE 1

ANO-1 RUNNING LOADS UPON FULL HOUSE TRANSFER TO ST 1

Control Room Chiller (2)
Instrument Air (2)
Spent Fuel Pool Cooler (2)
Service Water Pump (2)
Makeup Pump (2)
Auxiliary L. O. Pump (1)
Reactor Building Cooler (2)
Reactor Building Cooler (2)
Relay Room Unit Clr. (2)
Inverter Trans. (2)
Pipe Heat Tracing (1)
Battery Charger (2)
Inst. AC Transformer (2)
Press. 14 trs. (2)
Inverter Trans. SW. (2)
Battery Room Extinguisher Fan (2)
Discharge Flume Rad. Monitor (1)
Stack Rad. Monitor PP. (1)
Prim. Makeup Room (1)
ICW Rad. Mon. (2)
Service H2O Rad. Monitor (2)
Auxiliary Building Switchgear (1)
Inst. Air Dryer (1)
Computer Inverter (1)
Auxiliary Building Ltg. (1)
Reactor Building Ltg. (1)
Condensate Pumps (2)
Circulating Water (4)
Non-safety Load Centers (5)