

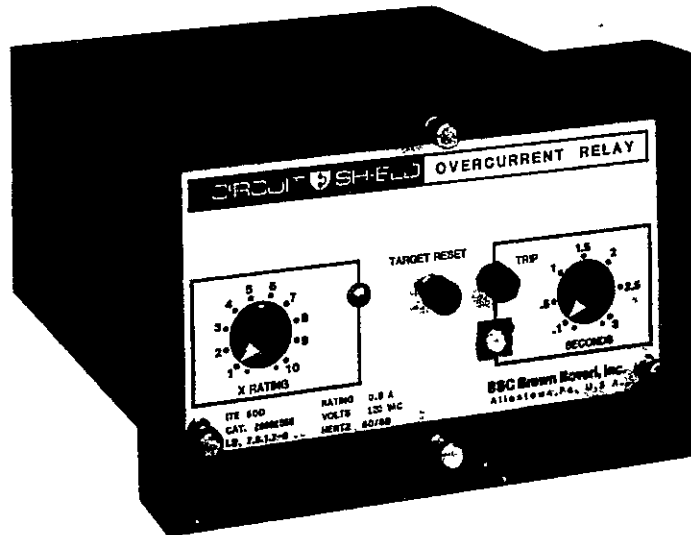
# INSTRUCTIONS

## High-Dropout Current Relays

REFER TO ADDENDUM  
FOR CATALOG NUM  
CORRECTING WITH DIS

### CATALOG SERIES 268

- ITE-50H Instantaneous Overcurrent
- ITE-50B Instantaneous Fault Detector
- ITE-50D Definite Time Overcurrent
- ITE-37H Instantaneous Undercurrent
- ITE-37D Definite Time Undercurrent



ITE-50D

TABLE OF CONTENTS

Introduction .....	Pg. 2
Precautions .....	Pg. 2
Placing Relay into Service .....	Pg. 3
Application Data .....	Pg. 4
Testing .....	Pg. 10

INTRODUCTION

These instructions contain the information required to properly install, operate and test the ITE-50H, ITE-50D, and ITE-50B Overcurrent Relays and the ITE-37D, ITE-37H Undercurrent Relays. These current relays are housed in a semi-flush drawout relay case suitable for conventional panel mounting. All connections to the relay are made at terminals located on the rear of the case and clearly numbered. All controls are located on the front panel behind a removable clear plastic cover. Target indicators are also mounted on the front panel. Targets are reset by means of a pushbutton extending through the relay cover.

PRECAUTIONS

The following precautions should be taken when applying these relays:

1. Incorrect wiring may result in damage. Be sure wiring agrees with the connection diagram for the particular relay before the relay is energized. Be sure control power is applied in the correct polarity.
2. Apply only the rated control voltages marked on the relay front panel.
3. These relays are shipped with a shorting link between terminals 9 and 10. This link must be in place for proper operation, unless the relay is being used in a "torque-control" application. See INSTALLATION Section.
4. Do not attempt to manually operate target vanes on the relays. The targets can be damaged by manual operation with a pencil or pointed object.
5. Do not apply high voltage tests to solid-state relays. If a control wiring insulation test is required, withdraw the circuit board from the case before applying test voltage.
6. Only the lower circuit board of these relays is removable. This board should insert smoothly. Do not use force.
7. Follow test instructions to verify that relay is in proper working order. If a relay is found to be defective, we suggest it be returned to the factory for repair. Immediate replacement of the removable element or the fixed element can be made available from the factory; identify by catalog number. We suggest that a complete spare relay be ordered as a replacement, and the inoperative unit be repaired and retained as a spare.

**CAUTION:** Since troubleshooting entails working with energized equipment, caution should be taken to avoid personal shock. Only competent technicians familiar with good safety practices should service these devices.

Catalog Series 468      High-Dropout Current Relays  
ITE-50B    ITE-50D    ITE-50H    ITE-37D    ITE-37H

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## INTRODUCTION

High-Dropout Current Relays with catalog numbers starting with 468 are similar to relays of the 268 series, but offer totally drawout construction with integral test facilities. Current transformer shorting is accomplished by a direct-acting spring and blade assembly upon removal of the relay from its case. Sequenced disconnects eliminate any possibility of nuisance tripping during withdrawal or insertion of the relay, if the normally open output contacts are used.

Basic operation, external connections, and electrical specifications for the 468 series are the same as for the 268 series. All catalog numbers translate directly from 268 to 468 to specify totally drawout construction. (see IB pg. 6)

OBSERVE ALL PRECAUTIONS listed in the basic instruction book IB 7.2.1.7-3A, page 2. Precaution #6 as applicable to the 468 series should read: "6. The entire assembly of the relay is removable. This assembly should insert smoothly. Do not use excessive force."

## CONNECTIONS

Typical external connections are as shown in Fig. 3, page 8 of IB 7.2.1.7-3A.

External test devices as shown in Fig. 5, page 9 are generally not required with the 468 series units.

For relays with dual-rated control voltage, the control voltage selector plug located on the lower circuit board MUST be placed in the correct position for the system control voltage. This plug is accessible (left rear of lower circuit board) on the ITE-50H, -50D, -37H, -37D models; however, for the ITE-50B relay, it will be necessary to separate the lower board from the upper. See MAINTENANCE on the next page. For relays rated for 120Vac control, the plug should be placed in the 48Vdc position. The conversion from 120Vac to 48Vdc is accomplished on the upper board.

Catalog Series 468      High-Dropout Current Relays  
ITE-50B    ITE-50D    ITE-50H    ITE-37D    ITE-37H

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**TESTING**

Test connections are readily made to the drawout relay unit by means of standard banana plugs. Current connections are made to the vertical posts at the blade assemblies. Control power and output connections are made at the rear vertical printed circuit board. This rear board is marked for easier identification of the connection points. A typical acceptance test circuit is shown in Figure 6, page 11 of IB 7.2.1.7-3.

Note: when testing 468 series current relays, a jumper must be installed between terminals 9 and 10 on the rear circuit board to complete the torque control circuit for proper operation. The jumper must be removed before re-inserting the relay in its case.

**TEST PLUG**

A test plug assembly, catalog number 400X0001 is available for use with the 468 series units. This device plugs into the relay case on the switchboard and allows access to all external circuits wired to the case. See Instruction Book IB 7.7.1.7-8 for details on the use of this device.

**MAINTENANCE**

Should separation of the upper and lower circuit boards be necessary, remove (2) screws that attach the left and right handle assemblies to the upper printed circuit board. The lower board may then be withdrawn forward from the printed circuit connector. An 18 point extender board is available from the factory if access to the lower circuit board is required during testing or troubleshooting.

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 Brown Boveri.

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Rev. 0 (3/87)

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## PLACING THE RELAY INTO SERVICE

## 1. RECEIVING, HANDLING, STORAGE

Upon receipt of the relay (when not included as part of a switchboard) examine for shipping damage. If damage or loss is evident, file a claim at once and promptly notify the nearest District Office. Keep the relay clean and dry, and use normal care in handling to avoid mechanical damage.

## 2. INSTALLATION

## Mounting

The outline dimensions and panel drilling and cutout information is given in Figure 1.

## Connections

All I-T-E Protective Relays have metal front panels which are connected through printed circuit board runs and connector wiring to a terminal at the rear of the relay case. The terminal is marked "G" and is located as shown in Figure 1 below. In all applications this terminal should be wired to ground.

Special care must be taken to connect control power in the proper polarity. Reversing plus (+) and minus (-) will cause the relay to be inoperative. The rated control voltage is listed on the relay's nameplate. For relays with dual rated control voltage, withdraw the relay from the case and check that the movable link on the circuitboard is in the correct position for the system control voltage. For relays rated 120Vac, a conversion from 120Vac to 48Vdc is accomplished in the upper section of the case. The link on the drawout circuit board should be set for 48Vdc.

Units rated for use on 250Vdc control voltage include a voltage dropping resistor mounted on a metal plate off the rear terminal block of the relay. The plate may be temporarily removed to gain access to the rear terminals of the relay. Keep wiring away from the plate. CAUTION: since the plate also serves as a heat sink, the surface gets hot when the relay is in service.

Typical external connections are shown in Figure 3. Connections with external test switches are shown in Figure 5.

If the relay is to be "torque-controlled" by another relay, the shorting link between terminals 9 and 10 must be removed and these terminals connected to a suitable controlling relay, such as an ITE-32 Directional Relay. NOTE: for the ITE-37, the shorting link should be left on, since opening the connection between terminals 9 and 10 will look like an undercurrent condition and the relay will trip.

## 3. SETTINGS

## Pickup

The current pickup control is continuously adjustable from 1 to 10 times the current rating of the relay. The current rating is specified on the relay nameplate located on the lower left corner of the front panel.

For the ITE-50B fault detector relay, 2 separate pickup adjustments are provided: one labeled PHASE, the other labeled GROUND. The 2 ratings are specified on the nameplate.

## Time Delay

The ITE-50D and ITE-37D relays include a timer to provide a definite time delay. The control for this timer is labeled in SECONDS and is continuously adjustable.

## 4. OPERATION INDICATORS

All units include a target that changes from black to orange when the relay goes into its tripping state. The target retains its indication until manually reset. Control power must be present to reset the target.

The ITE-50D, ITE-50H, ITE-37D, ITE-37H units of catalog series 268 include a yellow LED indicator that shows when the pickup (ITE-50D/H) or dropout (ITE-37D/H) condition is reached.

APPLICATION DATA

These current relays find application in backup protection, overload alarm, load loss, and other schemes where the overcurrent relay must be self-resetting and have a high dropout-to-pickup ratio.

The ITE-50H is an instantaneous overcurrent relay designed with solid-state measuring circuitry, but with electromechanical output.

The ITE-50D consists of the same current measuring circuitry, but also includes a solid-state timer to provide a definite time delay characteristic.

The ITE-50B is an instantaneous fault detector overcurrent relay with 2 adjustable pickup ranges for use in a 2 phase and ground arrangement.

The ITE-37H is an instantaneous undercurrent relay. The ITE-37D provides a definite time delay.

All types have a 98% dropout-to-pickup ratio, and a 10 to 1 continuous range of adjustment.

"Torque control" is provided on all overcurrent types as a standard feature. To control the relay, remove the link between terminals 9 and 10. Connect the controlling contact across terminals 9 and 10 in place of the link. The relay is operable when the contact is closed. For units with time delay, the full time delay will occur upon contact closure, assuming an overcurrent condition exists.

The ITE-50H and ITE-50D are available as single phase or three phase models. The ITE-37H and ITE-37D are available only as single phase units.

The ITE-62B Timing Relay is designed specifically for use with the ITE-50B or ITE-50H in breaker failure schemes. Refer to IB 7.7.1.7-5 for additional information.

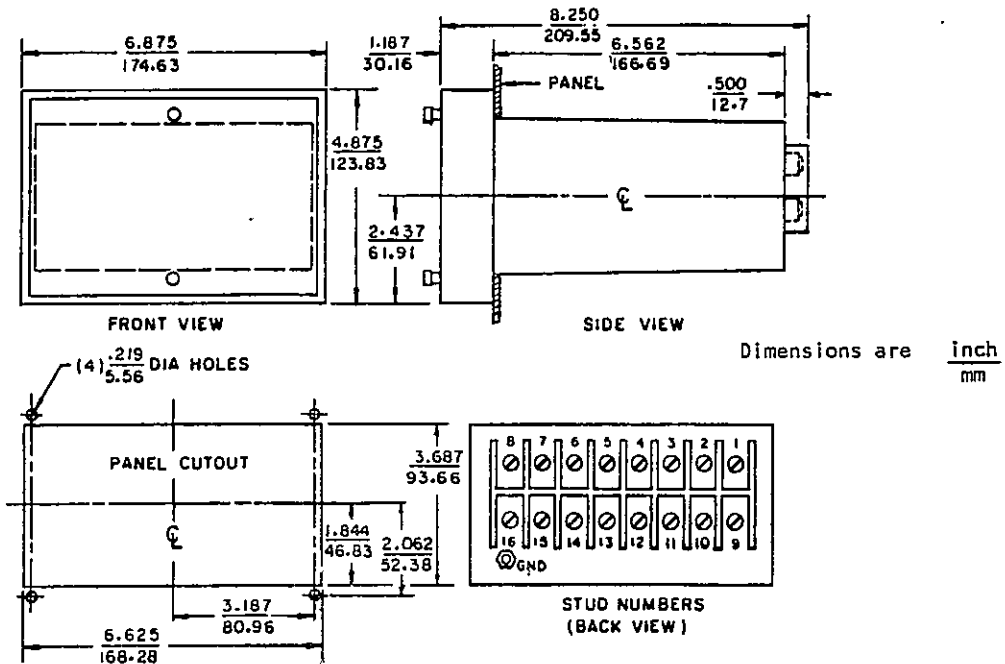


Figure 1: Relay Outline and Panel Drilling

Note: Relays rated for use with 250 V. control voltage include a dropping resistor on a metal plate mounted off the rear terminal block of the relay. This arrangement adds approximately 1.5" (38mm) to the depth of the unit.



**RATINGS**

<u>Input Circuits</u>	50/60 Hz		
Continuous:	20 Times nameplate rating or 20 amperes, whichever is smaller.		
One Second:	200 amperes		
Burden:	Input Rating	Burden:	Ohms
	0.1A		0.58
	0.2A		0.16
	0.8A		0.014
	2.0A		0.006
	8.0A		0.005
	20.0A		0.004

Operating Temperature Range

-30 to +75°C

Tolerances at 25°CPickup

Tolerance: + 10%

Repeatability: ± 1%

Time Delay

Tolerance + 10%

Repeatability: ± 1.5% or ± 10ms whichever is greater

Tolerances listed are based on the printed dial markings on the front of the relay. If the desired values of pickup and time delay are set by test, the repeatability will be excellent.

Add an additional + 5% to the above tolerances to account for temperature variation over the range -20°C to +55°C (nominal design temperature is 25°C).

Control Power

See relay front panel for control voltage rating. All units available for 48/125Vdc at 0.05A max. drain. ITE-50D, -50H, -37D, -37H available for 120Vac at 0.05A, 24/32Vdc at 0.08A, and 250Vdc at 0.05A max. ITE-50B available for 250Vdc at 0.05A max.

Control Voltage

Nominal Rating	Operating Range
24Vdc	19 - 29
32Vdc	26 - 38
48Vdc	38 - 58
125Vdc	100 - 142
250Vdc	200 - 280
120Vac	96 - 132

Output Contacts

	At 125Vdc	At 120Vac	At 250Vdc
Tripping Duty	30A	30A	30A
Continuous	5A	5A	5A
Opening, resistive	1A	3A	0.3A
Opening, inductive	0.3A	2A	0.1A

Dielectric

2000Vac rms, 60 seconds, all circuits to ground.

**INSTANTANEOUS OVERCURRENT RELAYS**

Type ITE-50H (High dropout with contact output)  
Suitable for 50/60 Hz

Type	Continuous Rating	Pickup Range	Output Contacts	Internal Connections	Catalog Number ③	
					Single Phase	Three Phase
ITE-50H	2A	.1-1A	2 Form C	16D238A	268S03X5	268T03X5
	4A	.2-2A			268S04X5	268T04X5
	16A	.8-8A			268S05X5	268T05X5
	20A	2-20A			268S06X5	268T06X5
					268S07X5	268T07X5
					268S08X5	268T08X5

**INSTANTANEOUS OVERCURRENT WITH TIMER (Definite Time)**

Type ITE-50D (High dropout with contact output)  
Suitable for 50/60 Hz

Type	Continuous Rating	Pickup Range	Timer Range	Output Contacts	Internal Connections	Catalog Number ③	
						Single Phase	Three Phase
ITE-50D	2A	.1-1A	.01-.3 sec.	2 Form C	16D238A	268S13X5	268T13X5
			.1-3 sec.			268S23X5	268T23X5
			1-30 sec.			268S33X5	268T33X5
			10-300 sec.			268S43X5	268T43X5
	4A	.2-2A	.01-.3 sec.			268S14X5	268T14X5
			.1-3 sec.			268S24X5	268T24X5
			1-30 sec.			268S34X5	268T34X5
			10-300 sec.			268S44X5	268T44X5
	16A	.8-8A	.01-.3 sec.			268S15X5	268T15X5
			.1-3 sec.			268S25X5	268T25X5
			1-30 sec.			268S35X5	268T35X5
			10-300 sec.			268S45X5	268T45X5
	20A	2-20A	.01-.3 sec.			268S16X5	268T16X5
			.1-3 sec.			268S26X5	268T26X5
			1-30 sec.			268S36X5	268T36X5
			10-300 sec.			268S46X5	268T46X5

Each of the listed catalog numbers contains an X for the control voltage designation.  
To complete the catalog number replace the X with the proper control voltage code digit:  
48/125Vdc.....7  
24/32Vdc.....9  
120Vac.....6  
250Vdc.....5

ITE-37H, ITE-37D Undercurrent Relays

For ITE-37H, Instantaneous Undercurrent Relay, select characteristics from ITE-50H listing, then change letter in catalog number from "S" to "U". For example, unit with 0.8-8.0A range, 48/125Vdc control would be 268U0575

For ITE-37D, Definite Time Undercurrent Relay, select characteristics from ITE-50D listing, then change letter in catalog number from "S" to "U". For example, unit with 0.8-8.0A range, 0.1-3 second delay, 49/125Vdc control would be 268U2575.

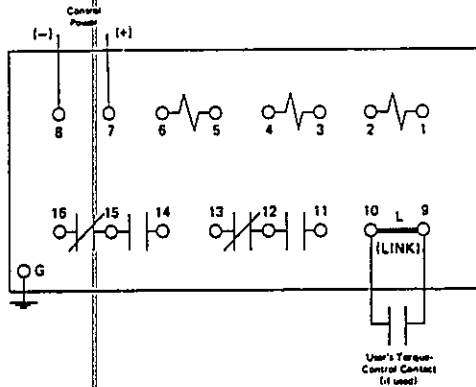
**Fault Current Detector Relay**

Type ITE-50B  
Suitable for 50/60 Hz. Internal connection diagram 16D238B

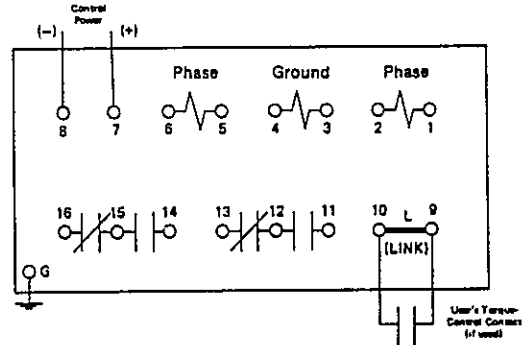
Type	Continuous Rating Amperes		Phase Unit	Ground Unit	Control Voltage	Catalog Number
	Phase Unit	Ground Unit	Pickup Range (amperes)	Pickup Range (amperes)		
ITE-50B	20	4	2-20	0.2-2.0	48/125 Vdc	268D5675
	16	4	0.8-8.0	0.2-2.0		268D5575

FIGURE 2: Internal Connection Diagrams

16D238A  
Overcurrent Relays Types ITE-50D, ITE-50H  
Undercurrent Relays Types ITE-37D, ITE-37H



16D238B  
Fault Current Detector Relay  
ITE-50B ( Two Phase and Ground )



Notes:

1. Omit coils 1 - 2 and 5 - 6 for ITE-37D, ITE-37H and single phase models of ITE-50D, ITE-50H.
2. User to remove link L only if torque-control contact is to be used.
3. For units with 120Vac Control Power Rating, control power polarity need not be observed.

OUTPUT CONTACT LOGIC

The following tables define the output contact states in various conditions of the measured input current and the control power supply. AS SHOWN means the contacts are in the state shown on the internal connection diagram for the relay being considered. TRANSFERRED means the contacts are in the opposite state to that shown on the internal connection diagram.

Condition	Relay Type	Output Contacts
No Control Voltage	All	As Shown
Normal Control Voltage Current Below Setting	ITE-37D, -37H	Transferred
	ITE-50D, -50H, -50B	As Shown
Normal Control Voltage Current Above Setting	ITE-37D, -37H	As Shown
	ITE-50D, -50H, -50B	Transferred

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HIGH DROPOUT CURRENT RELAYS

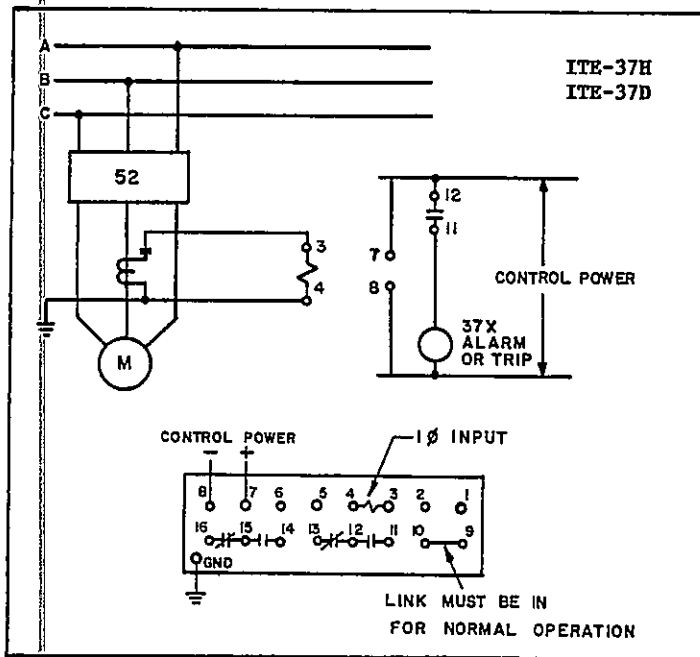
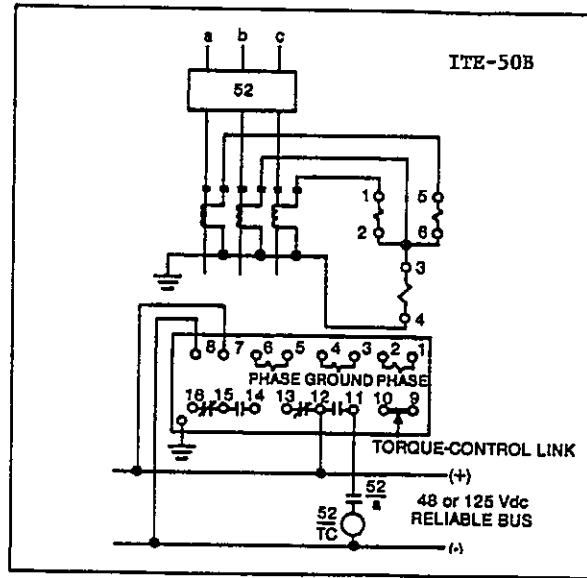
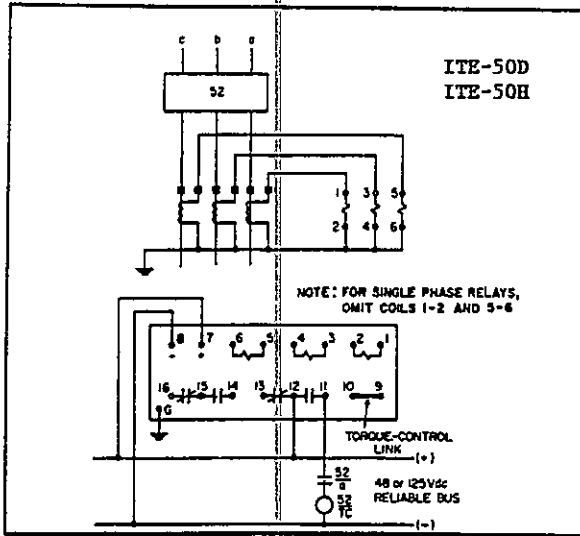


FIGURE 3: Typical Connection Diagrams



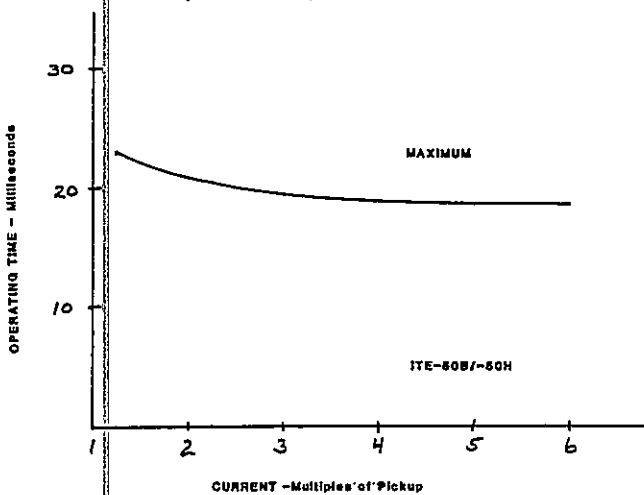


FIGURE 4a:  
Operating Time  
ITE-50H, ITE-50B

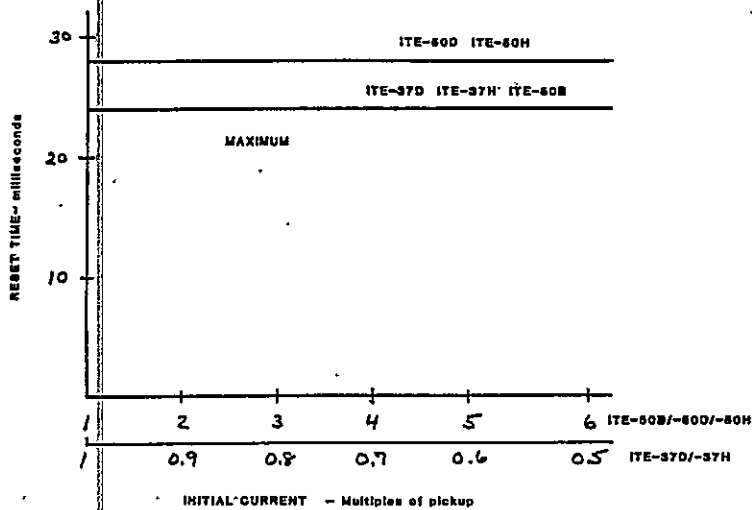


FIGURE 4b: Reset Time

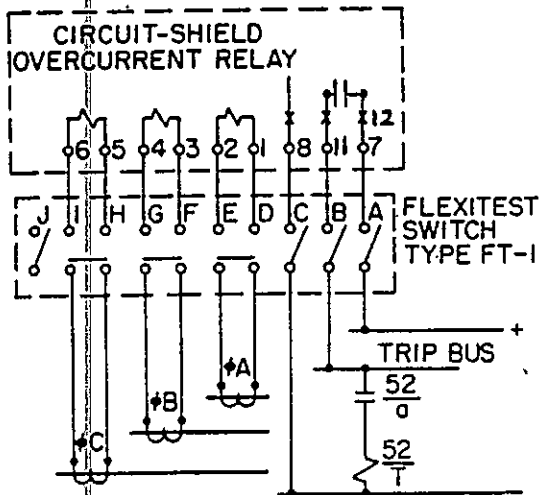


FIGURE 5: Typical arrangement for test facilities to be used by those wishing to maintain their conventional test procedures when checking ITE's solid-state overcurrent relays. This sketch shows Westinghouse's Flexitest Switch. However, G.E., States, Meter Devices, or other types can be used.

TESTING

1. MAINTENANCE AND RENEWAL PARTS

No routine maintenance is required on these relays. Follow test instructions to verify that the relay is in proper working order. We recommend that an inoperative relay be returned to the factory for repair; however, a schematic diagram will be provided on request for those who wish to attempt repairs.

Renewal parts, such as the output relay and the target head assembly are available from the factory. Contact your nearest sales office for quotations. Also available are circuit card extenders. These relays use the 18 point extender, catalog 200X0018.

Drawout circuit boards of the same catalog number are interchangeable. The board is removed by using the metal pull knobs on the front panel. The circuit board is identified by the catalog number on the front panel and a serial number stamped on the bottom of the circuit board. CAUTION: removing or installing a circuit board with the unit in service may result in an undesired operation depending on the way the contacts are used in the application.

Drawout circuit boards of catalog series 268-units are NOT directly interchangeable with the older 238-series units. To replace a 238-series unit with a 268-series unit, the entire relay including the case assembly must be changed. The case assemblies are mechanically interchangeable. External connections are identical for both series.

2. HIGH POTENTIAL TESTS

High voltage insulation tests are not recommended. These tests have been applied at the factory. If a control wiring insulation test is required, partially withdraw the relay from its case to break the connections before applying the test voltage.

3. BUILT-IN TEST FUNCTION

A built-in test function is provided for convenience in running a trip test on the relay and associated trip circuits.

CAUTION: tests should be made with the main circuit de-energized. If tests must be made on an energized circuit, take all necessary precautions.

The test button is labelled TRIP. For the ITE-50D or 50H an overcurrent condition is simulated when the button is depressed. The relay will time out and trip if the button is held for the duration of the time delay setting. For the ITE-37D and 37H an undercurrent condition is simulated. Again, the test button must be held for the time delay period to obtain an operation.

4. ACCEPTANCE TESTS

A typical test circuit is shown in Figure 6. A States resistance box No. 33560R or a G.E. reactor No. 6054975 could be used for the limiting impedance; or, a commercially available relay test set would be an appropriate source. The test circuit shows a storage oscilloscope arranged to measure contact operating time with respect to the input current. This will give the greatest accuracy in measuring the pickup and dropout times for the high speed relays: ITE-50H, ITE-50B, ITE-37H. Note that the point-on-the-wave where switching of the input current occurs will cause some timing variations. Where less accurate measurements are acceptable, and for the definite time units ITE-50D, ITE-37D, a conventional timer may be used instead of the oscilloscope.

As received from the factory, pickup and operating times should be within the tolerances shown on page 6. The relay may then be set for the operating point desired for the particular application.



ITE-37D, ITE-37H with Special Note on Catalog Suffix "-V" (eg: 268U1565-V)

Units with the -V suffix have been modified to provide an adjustable differential between the operate (low current) and reset (high current) points. The usable adjustment range is approximately:

$$0.70 \leq \frac{\text{operate current}}{\text{reset current}} \leq 0.88$$

The setting is made by test, using the multiturn internal calibration potentiometer R48 located near the left front of the circuit board. The use of an extender board will aid in this procedure.

Note: although the adjustment pot has additional range, settings below 70% should not be used.

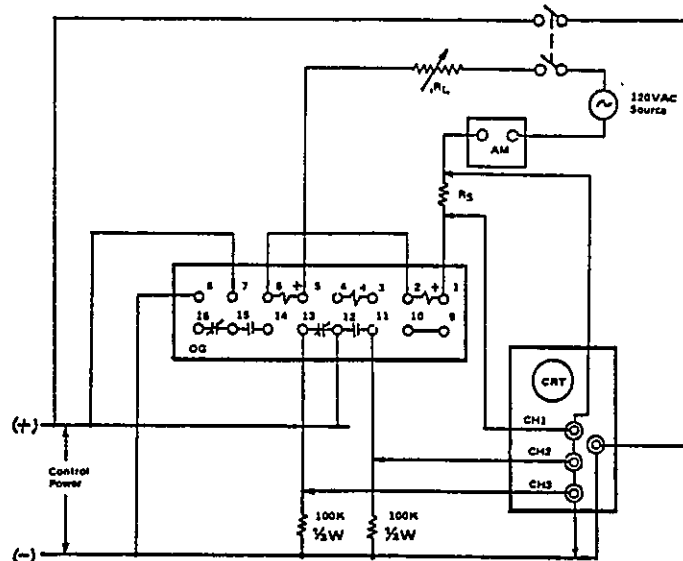


FIGURE 6: Typical Test Circuit



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