

Westinghouse



## Universal Flexitest Cases

Type FT  
For Westinghouse Protective Relays

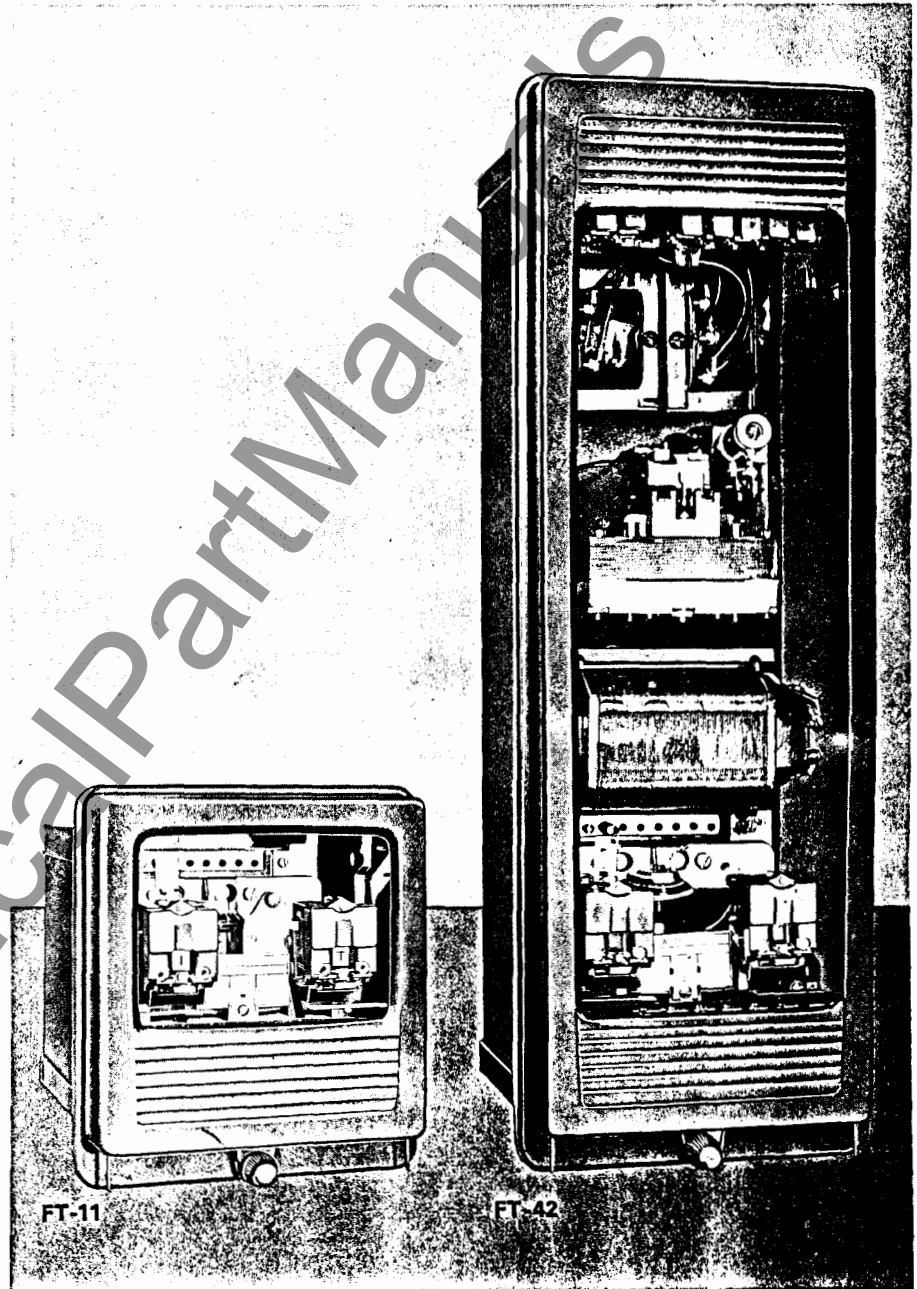
RECEIVED

MAY 5 - 1983

S.W.B.D. CO.

## Types Available

Case Size	1	2	3	4
With one 10 terminal block	FT-11	FT-21	FT-31	FT-41
With two 10 terminal blocks	...	FT-22	FT-32	FT-42



FT-11

FT-42

**Features**

Removable chassis permits rapid interchanging of similar relay units without requiring panel wiring change. Chassis units are easily removable for test and inspection purposes.

Current transformer secondaries automatically short-circuited when relay chassis is

removed from case, or when switch-blades are opened. Position of short-circuiting contacts are visible from front of relay even with chassis inserted in case.

Same case can be mounted projection or semi-flush.

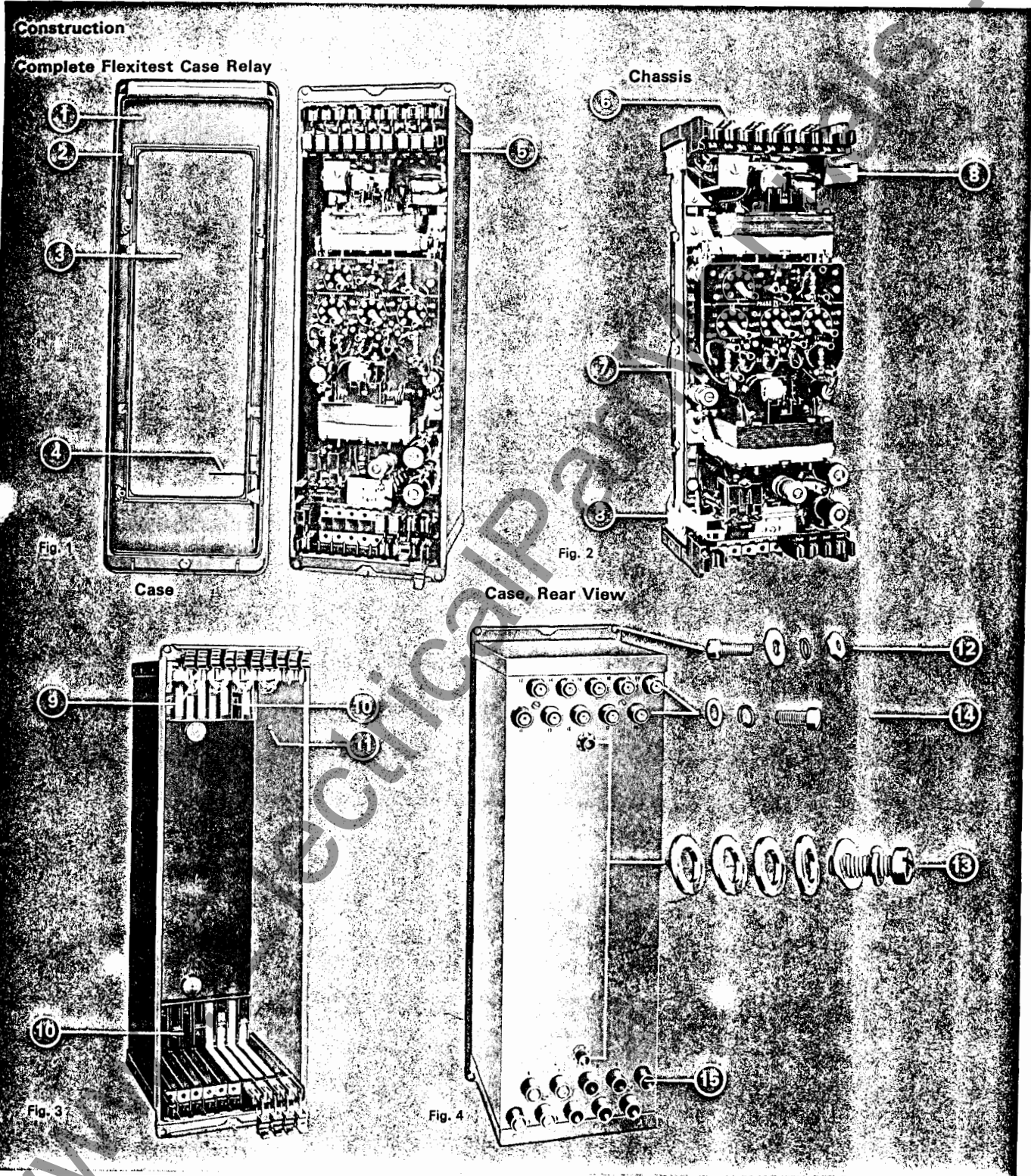
Rugged steel case with dust-tight removable cover.

April, 1971  
Supersedes Descriptive Bulletin 41-075,  
dated July, 1961  
E. D. C/2012/DB

Westinghouse



com



## Universal Flexitest Cases

Type FT  
For Westinghouse Protective Relays

### 1 Cover

Of medium impact-resistant molded phenolic material. Design blends with covers of instruments, recorders and switchboard equipment on adjacent panels. Cover is attached to the case shell by a hinge at its upper end and is secured at the lower end by a single captive thumb nut.

### 2 Neoprene Gasket

Is durable, resilient and compressed by cover to assure dust-tight protection of relay units.

### 3 Clear Glass Window

Sealed into groove in cover to assure positive fit and prevent stress points on glass surface.

### 4 Reset Lever

Manually resets operation indicator external to the case.

### 5 Case

Rugged steel housing of welded construction, zinc plated, bonderized and coated with air dried lacquer.

### 6 Current Test Jaw

For individual current circuit test plug.

### 7 Chassis Frame

Easily removed from case, supports the relay operating units and one or two contact blocks housing the stationary contact jaws of the test switches. Single bar vertical construction of chassis permits maximum access to all elements of the relay for ease of inspection, adjustment and setting.

### 8 Latch

The self-locking, cam action latches attached to the chassis frame provide positive retention of the chassis within the case, operate without binding and also provide a means for removing the chassis without handling the relay operating units.

### 9 Current Test Jaw

For ammeter test plug.

### 10 Insulation Block

Lower and upper insulation block, as required. Blocks fasten to interior of case by binding head screws. Each block has ten molded terminal insulators with necessary metallic terminals extending out of the rear of the case for external wiring connections. A corresponding number of test switch blades are provided on front of case. Copper strap connectors complete the electrical circuit from terminals to switch blades.

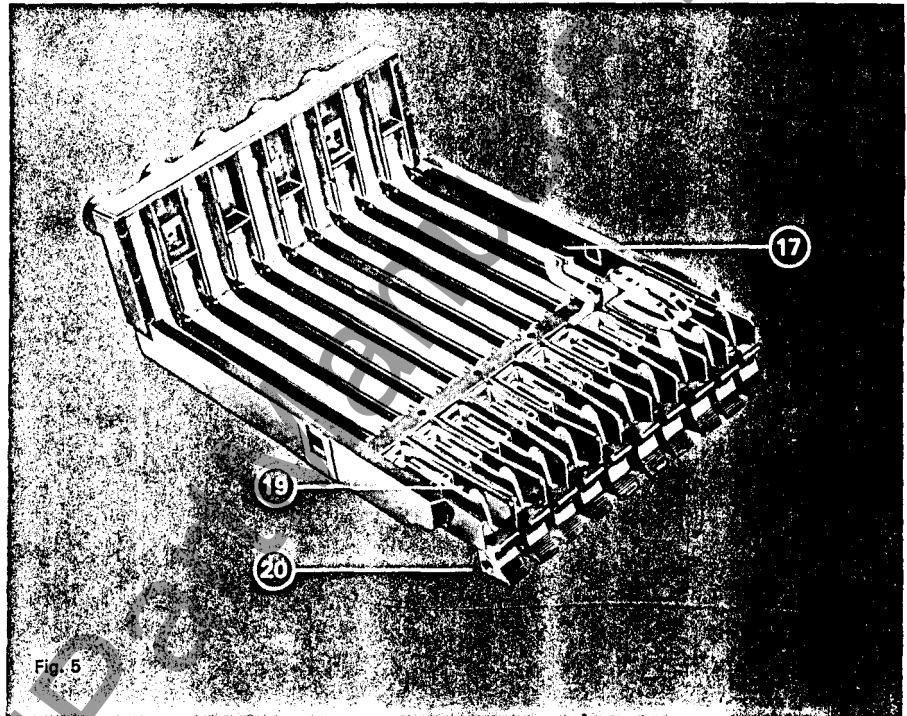


Fig. 5

### 11 Lug

For latching chassis to case.

### 12 Semi-Flush Hardware

### 13 Projection Hardware

Supplied with all Flexitest cases for mounting on panels up to 3/16" thick. Hardware available for thicker panel. See page 8.

### 14 Terminal Hardware

For electrical connections.

### 15 Spare Terminal Insulators

Spare insulator holes sealed but can be readily "knocked-out" when needed for wiring of additional auxiliary devices such as Indicating Instantaneous Trip units or studs for special wiring requirements.

### 16 Switch Blade Shorting Switch

When switch blades are opened, cam on blade makes contact with underlying copper strap connected to adjacent terminal thus shorting the current transformer and allowing relay to be tested without removal from case.

### 17 Chassis-Operated Shorting Switch

When chassis is removed from case the two contact arms of switch short-circuit the current transformer. This allows the test switches to be reset in normal position and cover of relay to be closed while chassis is out. Contacts of shorting switch readily visible from front of case, even with chassis in the case.

### 18 Test Switch Handle

With dovetail identification to hold circuit identification card.

### 19 Nylon Barriers

Are flexible, unbreakable and assure ample insulation between test terminals.

### 20 Interlocking Bar-Holes

Two, three, or four switches can be mechanically interlocked by inserting appropriate interlocking bar (Fig. 6).

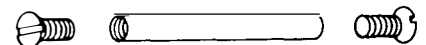


Fig. 6

Westinghouse



**Testing in Service**

The individual current circuit (ammeter) test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current through the relay, as shown in Fig. 11 and 12. This plug consists of two conducting strips separated by an insulating strip. The ammeter is connected to these strips by terminal screws and the leads are carried out through holes in the back of the insulated handle.

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaw.

**Test Plugs**

**Separate Source Test Plug**

Moldarta test plug fits into the stationary contact jaws of the knife blade switches for quick circuit testing. Each test plug connects to a top binding post for external test equipment connections. Binding posts are staggered for easy accessibility. T-shaped test blades assure quick, accurate alignment with test switch stationary contacts.

**Testing in Case**

With all blades in the full open position, the ten circuit test plug Fig. 9 and 10 can be inserted in the contact jaws. This connects the relay units to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts up and in the top test switch jaws with the binding posts down.

The external test circuits may be made to the relay units by #2 test clip leads instead of the test plug. When connecting an external test circuit to the current elements using clip leads, care should be taken to see that the current test jack jaws are open so that the relay is completely isolated from the external circuits.

**Characteristics**

**Dielectric Test**

Standard test voltage. Relay rated up to 600 volts will withstand for one minute a low frequency a-c voltage test of twice rated voltage plus 1000 volts, with a minimum of 1500 volts.

**Current Rating**

Existing case switch assemblies, strap connectors and case terminals will carry 30 amperes continuously.

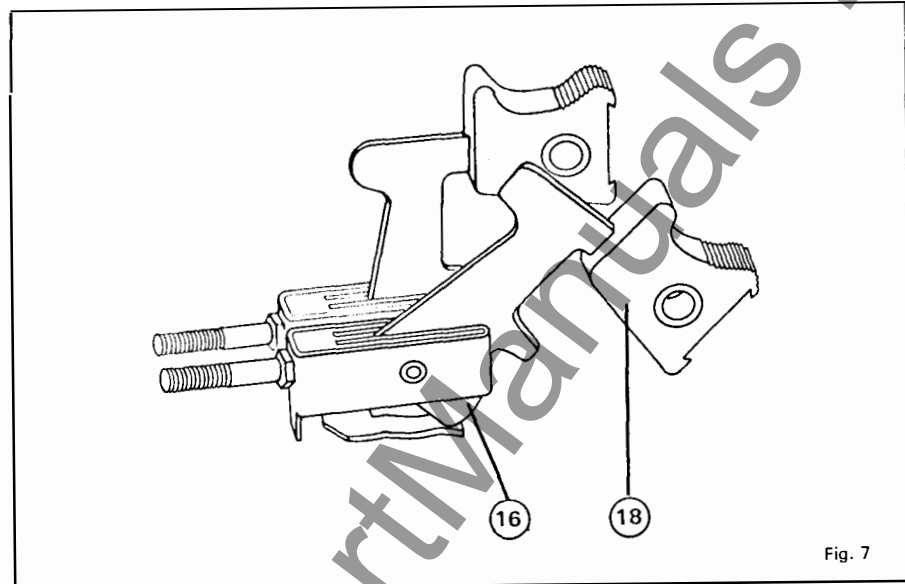


Fig. 7

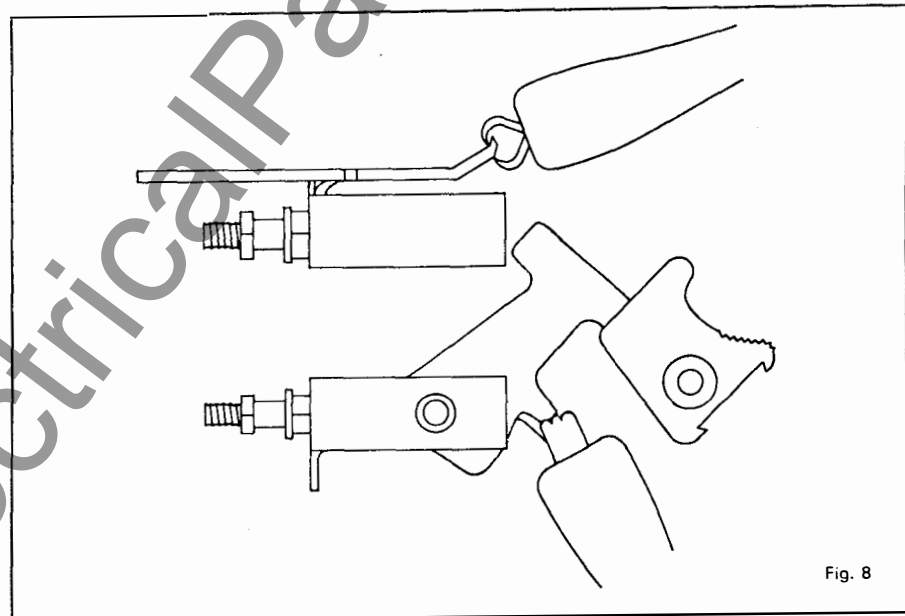


Fig. 8

**Testing Out of Case**

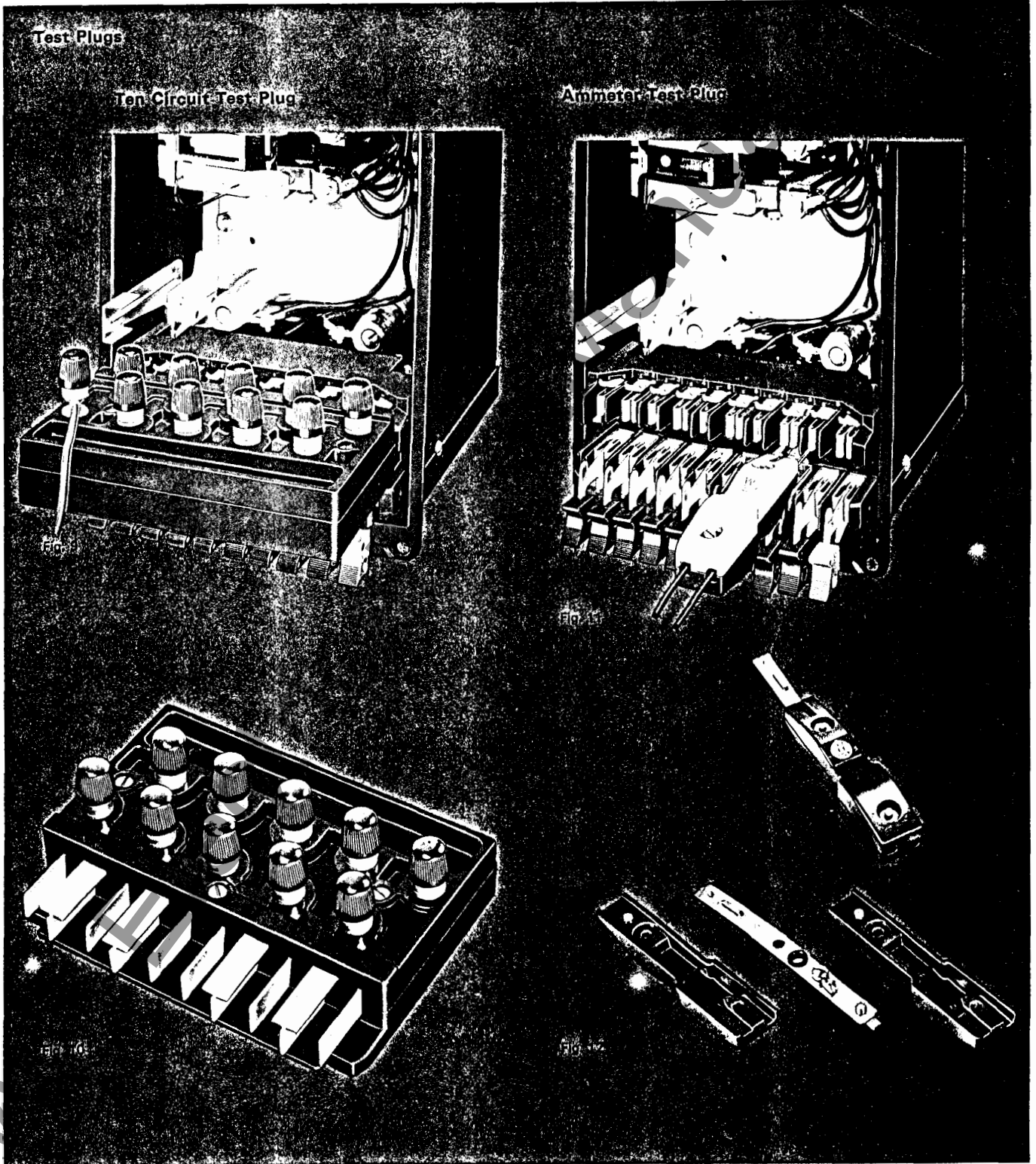
With the chassis removed from the case relay units may be tested by using the separate source test plug or by #2 test clip leads as described above. Any critical factory calibration is made with the chassis in the case

and removing the chassis from the case may change the calibration values of these relays.

An internal schematic is available for each individual relay showing the schematic internal wiring. The outlines of the various cases are shown on pages 6 and 7.

# Universal Flexitest Cases

Type FT  
For Westinghouse Protective Relays



Westinghouse



Dimensions in Inches (Mounting Hardware - See Page 8)

Case Type	Case Dimensions		Panel Cutout Dimensions (Front View)	
	Front View	Side View	Semi-flush	Projection
FT-11		<p>57D7900</p>		
FT-21		<p>57D7901</p>		
FT-22		<p>183A158</p>		
FT-31		<p>57D7902</p>		

### Universal Flexitest Cases

Type FT  
For Westinghouse Protective Relays

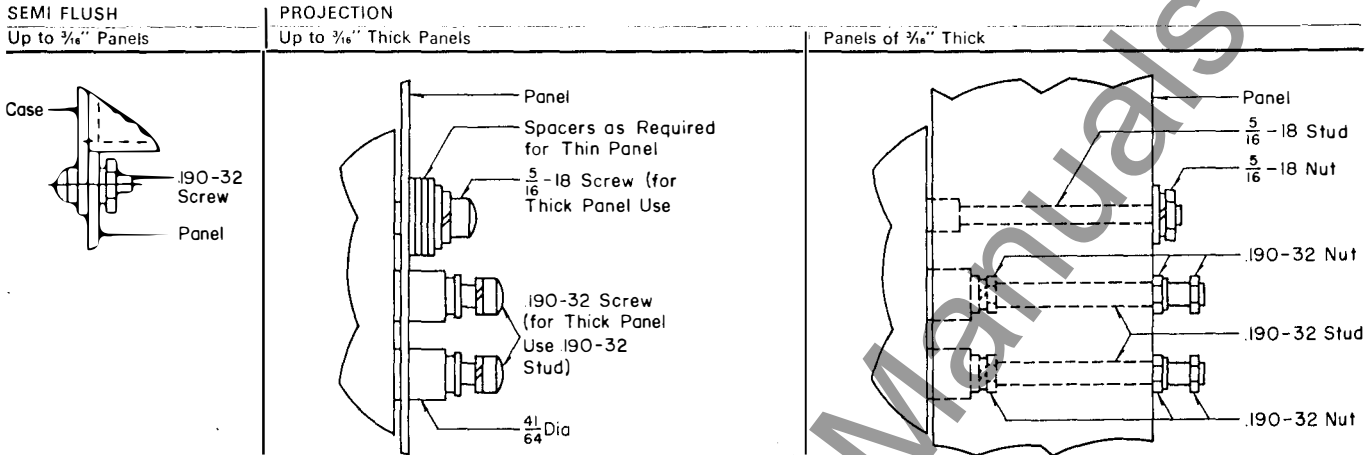
Case Type	Case Dimensions		Panel Cutout Dimensions (Front View)	
	Front View	Side View	Semi-flush	Projection
FT-32				
FT-41				
FT-42				

www.ElectricalPartManuals.com

## Universal Flexitest Cases

Type FT  
For Westinghouse Protective Relays

### Mounting Hardware



### Mounting Hardware

Mounting hardware furnished with all relays listed herein is for flush mounting on panels up to 3/16" thick. For projection mounting

on either thin (up to and including 3/16") or thick (from 3/16" to 2-1/2") panels, order hardware from listing below.

### For Flexitest® Cases, Projection Mounting

Case Size	No. of Terminals on Relay	Hardware Style Number	
		For Thin Panel	For Thick Panel
FT-11	Up to 10	58C9121G24 <sup>Ⓢ</sup>	58C9121G28 <sup>Ⓢ</sup>
FT-21, 31, 41	Up to 10	58C9121G25 <sup>Ⓢ</sup>	1876 416 <sup>Ⓢ</sup>
FT-22, 32, 42	Up to 10	58C9121G25 <sup>Ⓢ</sup>	1877 809 <sup>Ⓢ</sup>
FT-22, 32, 42	17 to 20	58C9121G25 <sup>Ⓢ</sup>	1876 414 <sup>Ⓢ</sup>

### Devices

Description	Style Number
Separate source plug, for tests using separate supply source	1164 046 <sup>Ⓢ</sup>
Individual current circuit test plug, for test of one current circuit	07B4618G04 <sup>Ⓢ</sup>
Interlock bar: For 2 adjacent switch units	1270 547
For 3 adjacent switch units	1164 048
For 4 adjacent switch units	02C9834G03
For 5 adjacent switch units	02C9834G04
For 10 adjacent switch units	02C9834G05

### Panel Adapter Plates

Description	Style Number
S-10 FT case to FT-11	291B875H04 <sup>Ⓢ</sup>
M-10 FT case to FT-21	291B875H05 <sup>Ⓢ</sup>
S-20 FT case to FT-21	291B875H08
M-20 FT case to FT-32	291B875H06

<sup>Ⓢ</sup> Denotes item available from stock.

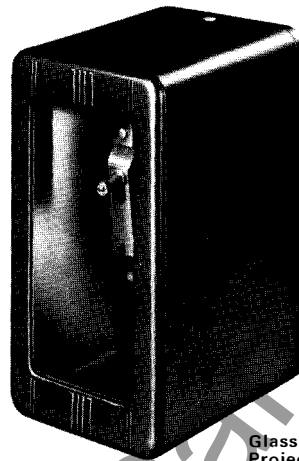




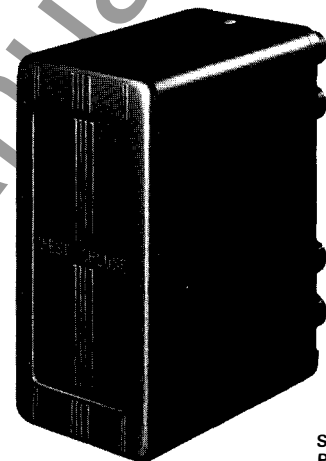
May, 1987  
Supersedes DB 41-075A D WE A  
dated April, 1975  
Mailed to: E, D, C/41-000A

For Westinghouse Protective Relays

## Miscellaneous Cases and Mountings

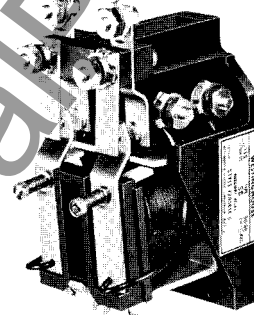
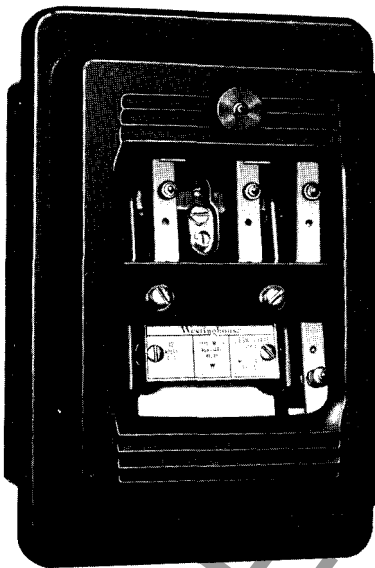


Glass Window Cover,  
Projection

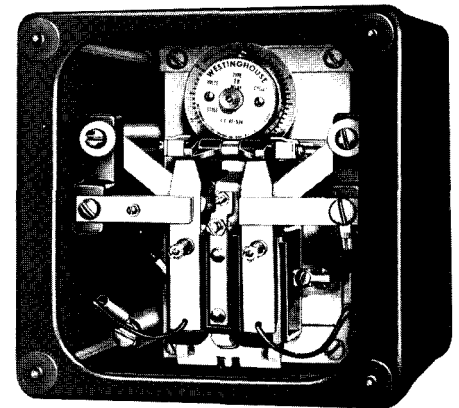


Solid Cover,  
Projection

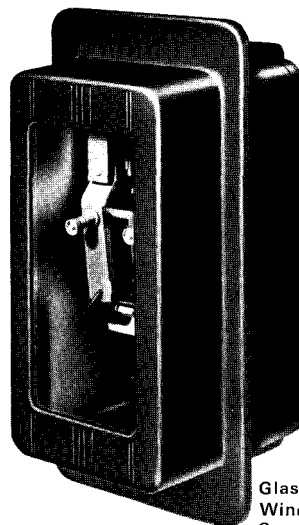
Molded  
Semi-Flush



Open, Projection



Square Metal



Glass  
Window Cover,  
Semi-Flush

WWW.ElectricalManuals.com





Outline and Drilling Dimensions in Inches (Centimeters)

Fig. 5: Glass Window Cover, Semi-Flush, Rear Connected

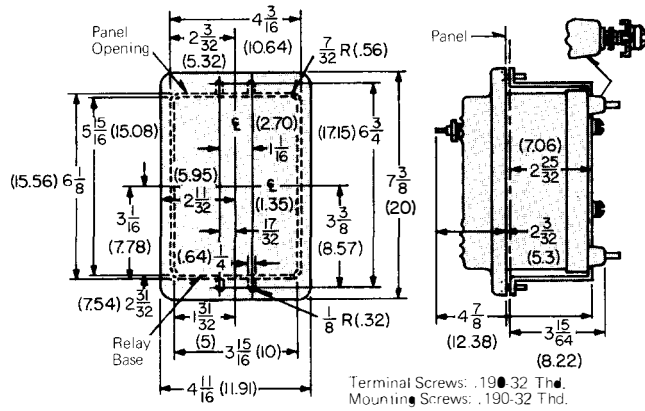


Fig. 8: Glass Window Cover, Semi-Flush, Rear Connected  
Supplied with hardware for 1/8-inch thick panel.

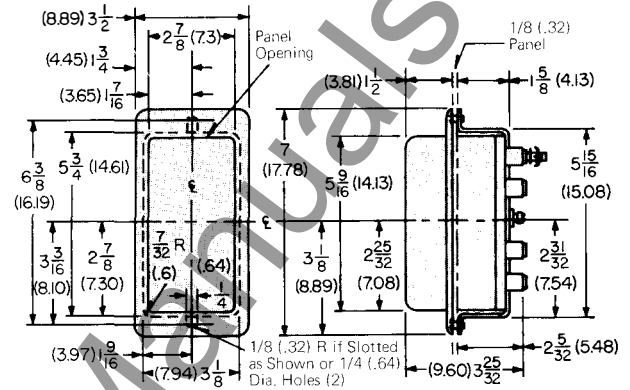


Fig. 6: Small Glass Projection, Rear Connected

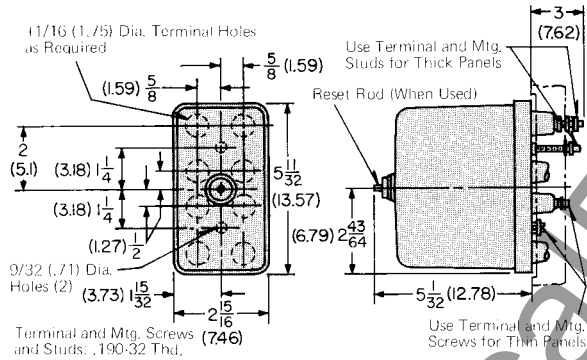


Fig. 9: Solid Cover, Projection, Rear Connected

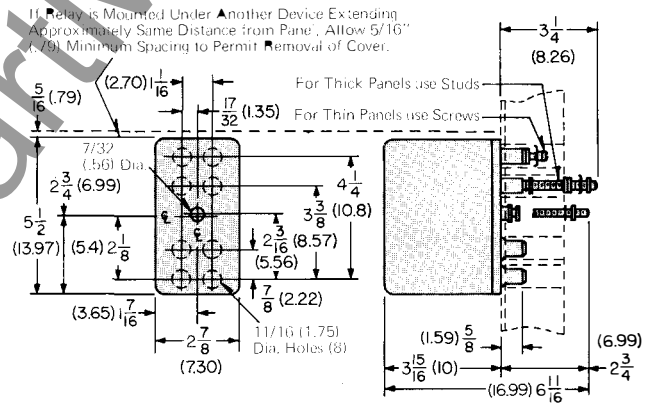


Fig. 7: Open Projection, Dpdt, Front Connected

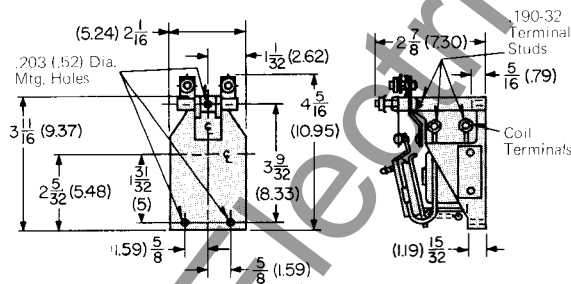


Fig. 10: Open Projection, Dpdt, Front Connected

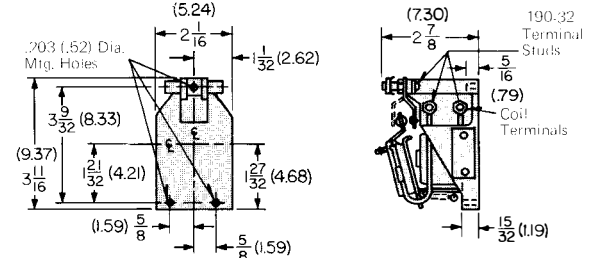
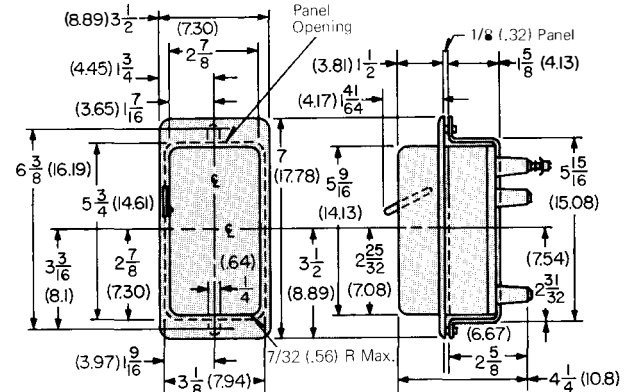


Fig. 11: Glass Window Cover, Semi-Flush, Rear Connected







**universal Flexitest<sup>®</sup> cases**  
type FT

for Westinghouse protective relays

descriptive  
bulletin

**41-075**

page 1



... combine relay operating units and test  
switch assemblies in one compact, dust-tight case

**features**

- Removable chassis permits rapid interchanging of similar relay units without requiring panel wiring change. Chassis units easily removable for test and inspection purposes.
- Current transformer secondaries automatically short-circuited when relay chassis is removed from case, or when switch blades are opened. Position of short-circuiting contacts visible from front of relay even with chassis inserted in case.
- Same case can be mounted projection or semi-flush.
- Rugged steel case with dust-tight removable cover.

**types available**

case size	1	2	3	4
with <b>one</b> 10 terminal block	FT-11	FT-21	FT-31	FT-41
with <b>two</b> 10 terminal blocks	..	FT-22	FT-32	FT-42

**July, 1961**

supersedes descriptive bulletin 41-075 dated April, 1957  
mailed to: E/319/DB; D/821/DB; C/370/DB



## construction

### complete Flexitest case relay

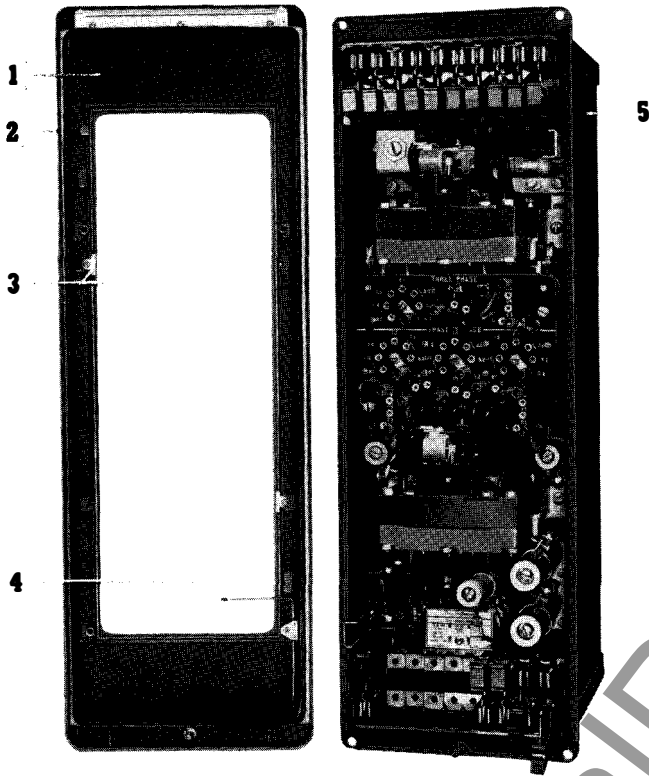


fig. 1

- 1 cover:** Of medium impact-resistant molded phenolic material. Modern design blends with covers of instruments, recorders and switchboard equipment on adjacent panels. Cover is attached to the case shell by a hinge at its upper end and is secured at the lower end by a single captive thumb nut.
- 2 gasket:** Of neoprene is durable, resilient and is compressed by cover to assure dust-tight protection of relay units.
- 3 clear glass window:** Sealed into groove in cover to assure positive fit and prevent stress points on glass surface.
- 4 reset lever:** Manually resets operation indicator external to the case.

### chassis

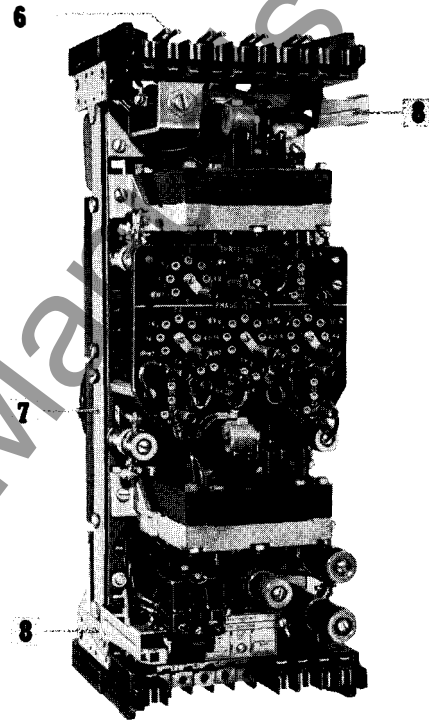


fig. 2

- 5 case:** Rugged steel housing of welded construction, zinc plated, bonderized and coated with air dried lacquer.
- 6 current test jaw:** For ammeter test plug.
- 7 chassis frame:** Easily removed from case, supports the relay operating units and one or two contact blocks housing the stationary contact jaws of the test switches. Single bar vertical construction of chassis permits maximum access to all elements of the relay for ease of inspection, adjustment and setting.
- 8 latch:** The self-locking, cam action latches attached to the chassis frame provide positive retention of the chassis within the case, operate without binding and also provide a means for removing the chassis without handling the relay operating units.

**universal Flexitest cases  
type FT**

descriptive  
bulletin

**41-075**

for Westinghouse protective relays

page 3

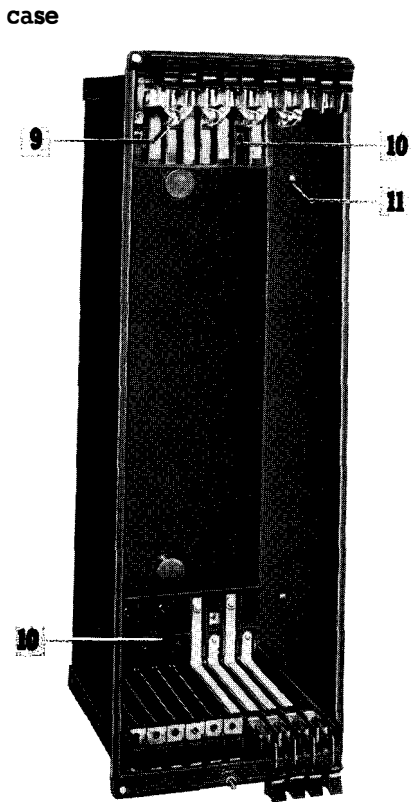
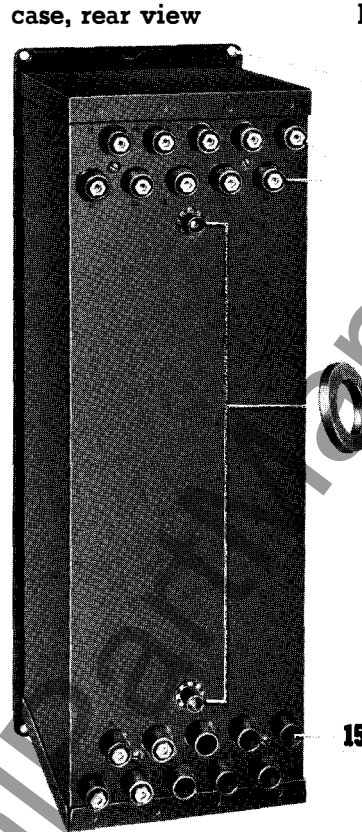


fig. 3



hardware

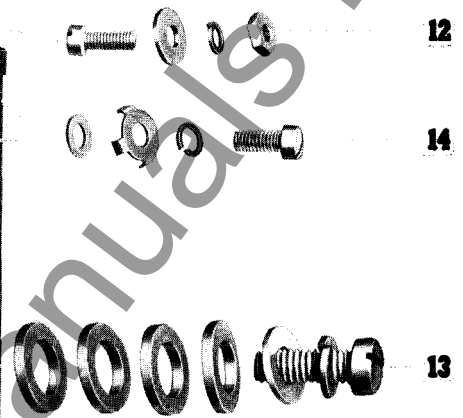


fig. 4

- 9 current test jaw:** For ammeter test plug.
- 10 insulation block:** Lower and upper insulation block, as required. Blocks fasten to interior of case by binding head screws. Each block has ten molded terminal insulators with necessary metallic terminals extending out of the rear of the case for external wiring connections. A corresponding number of test switch blades are provided on front of case. Copper strap connectors complete the electrical circuit from terminals to switch blades.
- 11 lug:** For latching chassis to case.

- 12 semi-flush hardware**
- 13 projection hardware**  
Supplied with all Flexitest cases for mounting on panels up to  $\frac{3}{16}$ " thick. Hardware available for thicker panel. See page 8.
- 14 terminal hardware:** For electrical connections.
- 15 spare terminal insulators:** Spare insulator holes sealed but can be readily "knocked-out" when needed for wiring of additional auxiliary devices such as Indicating Instantaneous Trip units or studs for special wiring requirements.

**characteristics**

**dielectric test**

Standard test voltage. Relay rated up to 600 volts will withstand for one minute a low frequency a-c voltage test of twice rated voltage plus 1000 volts, with a minimum of 1500 volts.

**current rating**

Flexitest case switch assemblies, strap connectors and case terminals will carry 30 amperes continuously.

*continued*



**construction** continued

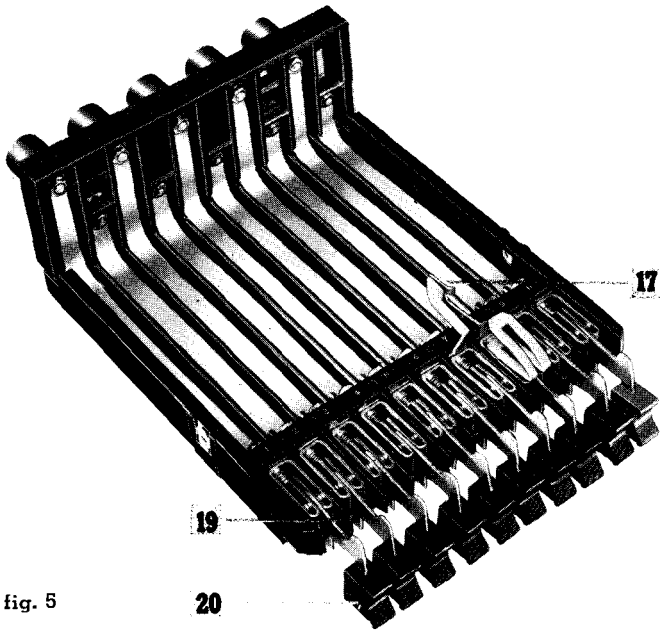


fig. 5

**interlocking bar**

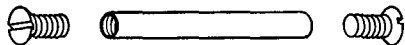


fig. 6

- 16 switch blade shorting switch:** When switch blades are opened, cam on blade makes contact with underlying copper strap connected to adjacent terminal thus shorting the current transformer and allowing relay to be tested without removal from case.
- 17 chassis-operated shorting switch:** When chassis is removed from case the two contact arms of switch short-circuit the current transformer. This allows the test switches to be reset in normal position and cover of relay to be closed while chassis is out. Contacts of shorting switch readily visible from front of case, even with chassis in the case.
- 18 test switch handle:** With dovetail indentation to hold circuit identification card.
- 19 nylon barriers:** Are flexible, unbreakable and assure ample insulation between test terminals.
- 20 interlocking bar-holes:** Two, three, or four switches can be mechanically interlocked by inserting appropriate interlocking bar. (Fig. 6).

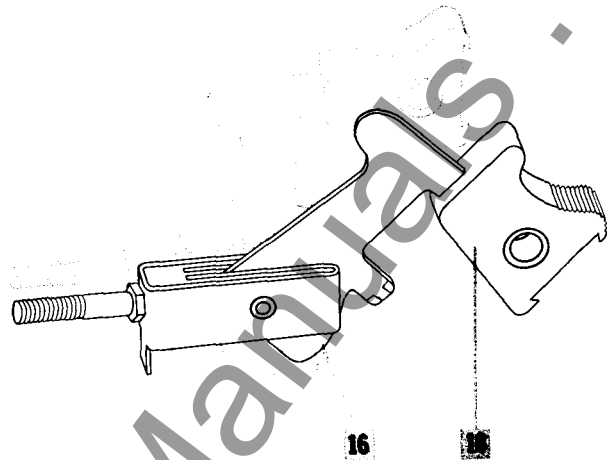


fig. 7

**test clip connections**

The external test circuits may be connected to the relay units by use of #2 test clips.

When using test clips, care should be taken to make sure that switch blade jaws are open so that the relay is completely isolated from the external circuits.

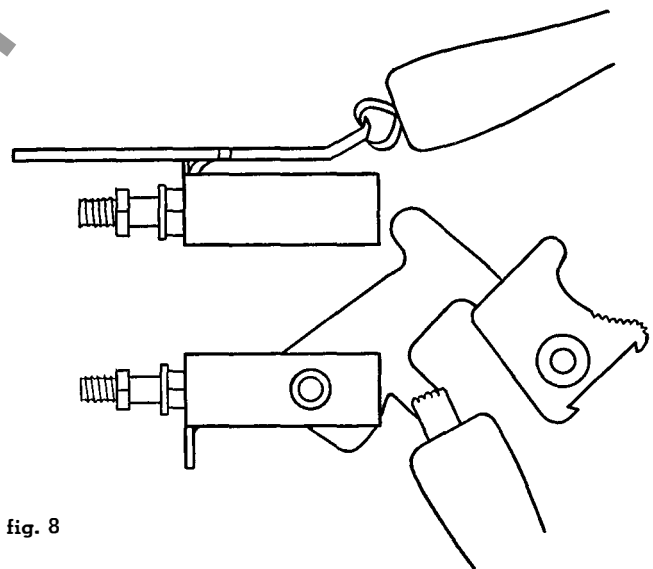


fig. 8

**auxiliary devices**

device	figure number	style number
ten circuit test plug . . . . .	10	1164 046
ammeter test plug . . . . .	12	07B4618G04
2 switch interlocking bar . . . . .	6	1270 537
3 switch interlocking bar . . . . .	6	1270 538
4 switch interlocking bar . . . . .	6	1340 225
screw (2 required per bar) . . . . .	6	

‡ 112-40 x 1/4 flat head steel machine screw. Finish 46AE03. Order by description.



### test plugs

#### ten circuit test plug

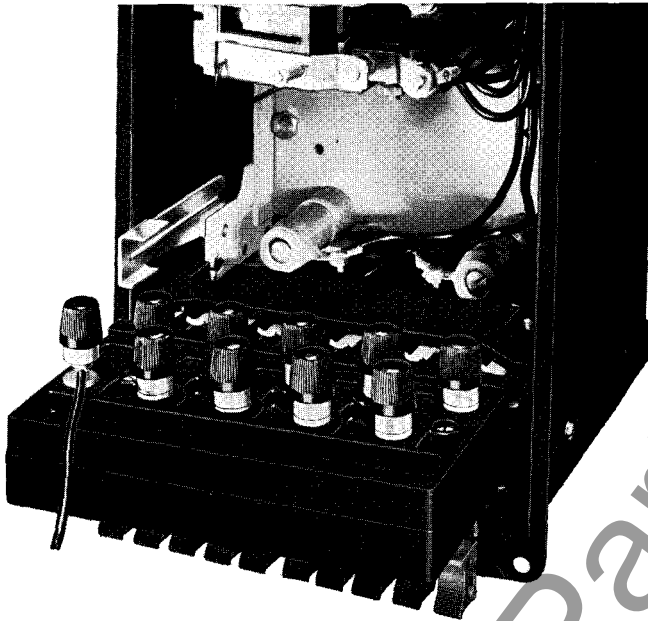


fig. 9

#### ammeter test plug

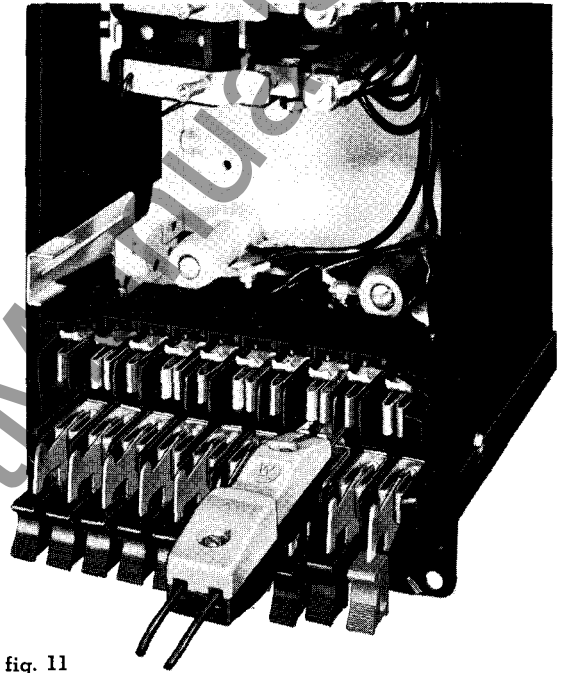


fig. 11

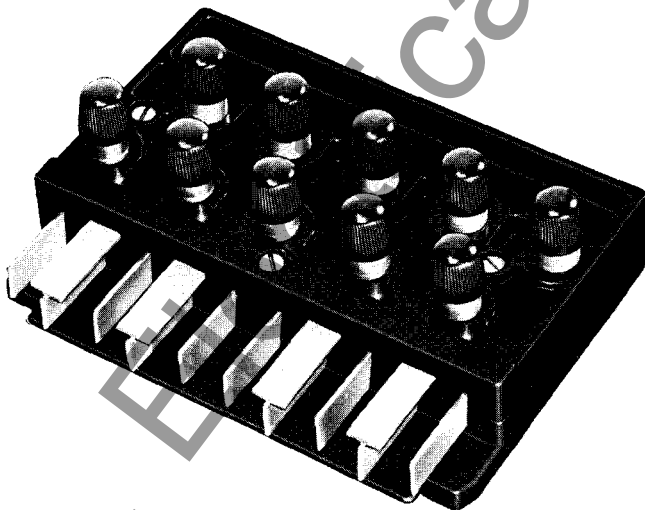


fig. 10

**ten circuit test plug** Moldarta test plug fits into the stationary contact jaws of the knife blade switches for quick circuit testing. Each test plug blade connects to a top binding post for external test equipment connections. Binding posts are staggered for easy accessibility. T shaped test blades assure quick, accurate alignment with test switch stationary contacts.

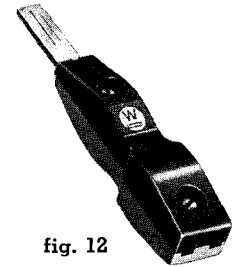
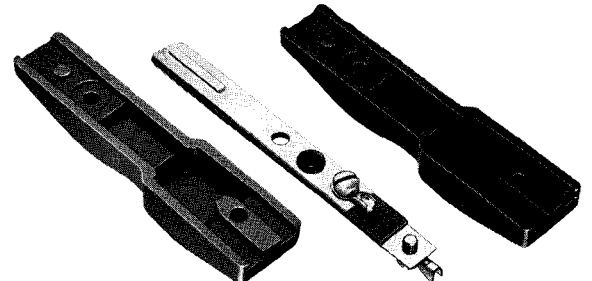


fig. 12

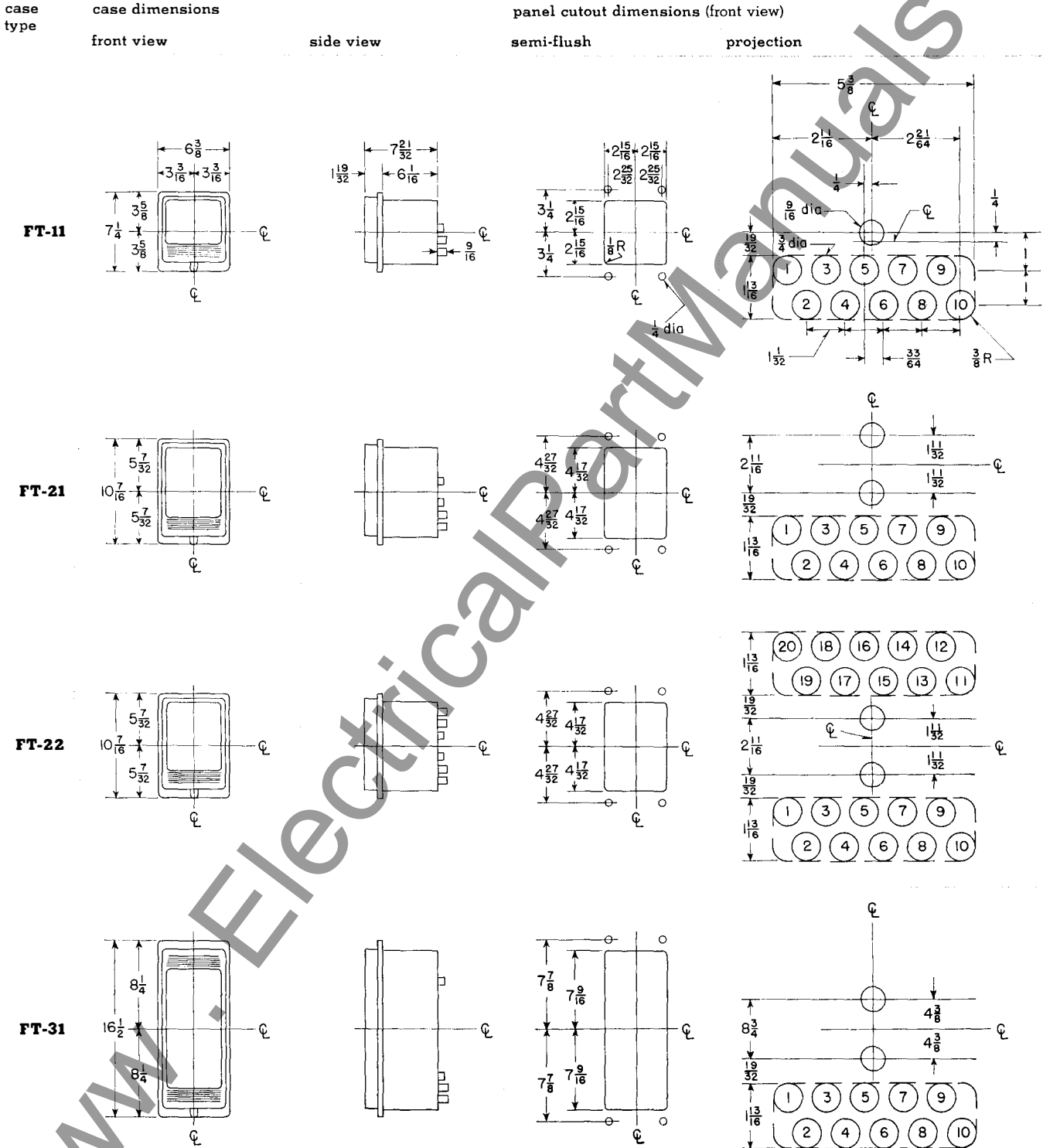


**ammeter test plug** Test plug consists of two conducting straps separated by an insulating strip and mounted within an insulated handle. Leads are connected to the conducting straps by terminal screws and are brought out through holes in the back of the handle.



**dimensions in inches** for reference only

mounting hardware: see page 8



www.ElectricalPartMaterials.com

universal Flexites.  
type FT

for Westinghouse protective relays

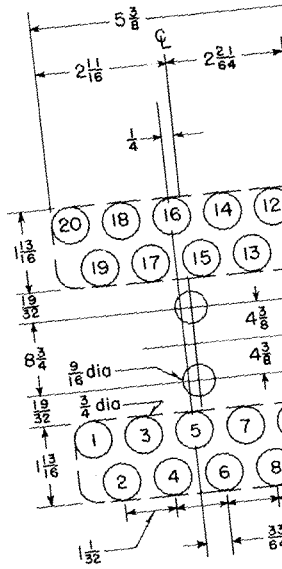
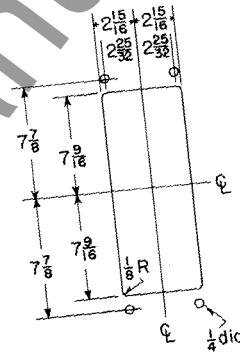
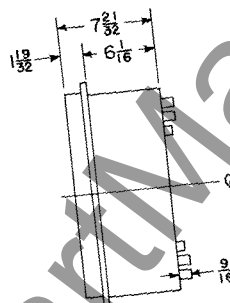
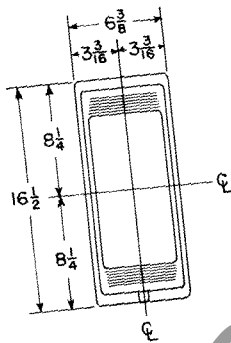
case  
type

case dimensions  
front view

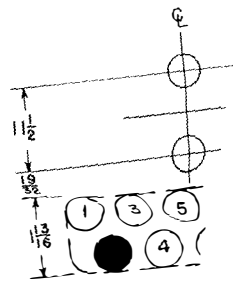
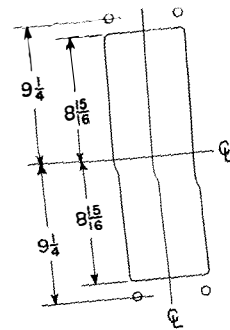
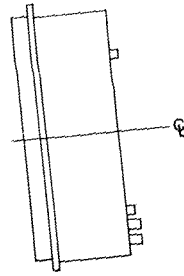
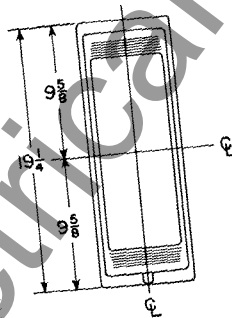
side view

panel cutout dimensions (front view)  
semi-flush projection

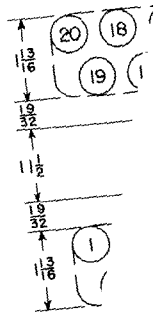
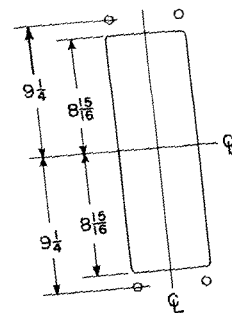
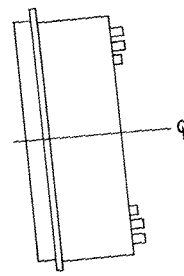
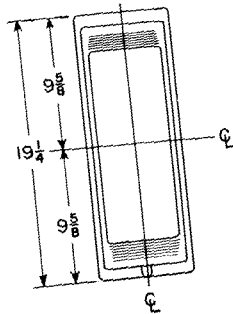
FT-32



FT-41



FT-42



www.ElectricalPartManuals.com

**universal Flexitest cases**  
type FT

**mounting hardware**

for all Flexitest case types

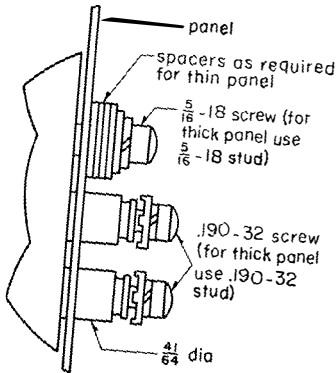
flush

panels

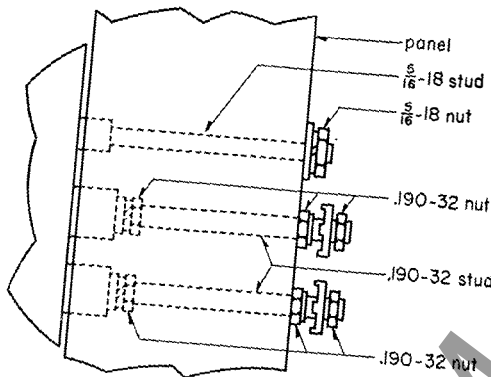
90-32  
crew

panel

**projection**  
up to 3/16" thick panel



panels above 3/16" thick



numbers of hardware for panels  
1/2" thick, projection mounting:

case size	FT-11	FT-21, FT-31, FT-41	FT-22, FT-32, FT-42
	1876 409	1876 415	
	1876 410	1876 416	
			1877 809
			1876 414

panels thicker than 3/16", enter two items on order for:  
type relay;  
necessary to mount on \_\_\_\_\_ inch panel.

**minimum vertical spacing between cases**

The following centerline to centerline spacing allows approximately 1/2-inch vertical spacing between relays.

type case	inches vertical: case centerline to centerline
FT-11	7 3/4
FT-21, FT-22	10 15/16
FT-31, FT-32	17
FT-41, FT-42	19 3/4

**Flexitest cases used with standard Westinghouse relays**

FT case size	relay type	FT case size	relay type	FT case size	relay type	FT case size
21	CWC	21	IRV	31	PMG-13	32
21	CWP	21	ITH	11	POQ	21
32	CWP-1	21	ITD	21	RC	32
31	D-3	21	ITL	21	RS	42
21	DGF	21	JM (6 unit)	11	RSN	42
32	DT-3	21	KA	32	SA	31
31	H-3	22	KA-1	32	SC (1 & 2 unit)	21
11	HA	42	KD	42	SC (3 & 4 unit)	32
21	HCB	31	KD-1	42	SCT	21
21	HKB	42	KLF	41	SG (1 unit)	11
11	HRC	21	KRC	31	SG (2 unit)	22
21	HRD	32	KRD	31	SGR-1	11
21	HRK	31	KRP	31	SGR-12	11
21	HRP	31	KRQ	42	SV (1 & 2 unit)	21
1	HU	31	KRV	31	SV (3 & 4 unit)	32
1	HU-1	31	KS	32	SVF	21
	HV-3	32	LC-1	11	SX	11 & 22
	HV-4	22	LC-2	21	TD	11
	HVS	31	MG-6	22	TD-2	22
	HZ	42	ND	21	TD-3	11
	HZ-1	21	PM-2	21	TD-4	21
	HZ-3	32	PM-3,5	11	TG-1	21
	HZ-4	42	PM-13	32	TK	21
	HZM	42	PM-23	21	TR-1	11
	IRC	31	PMA	31	TSI	42
	IRD	41	PMA-1	21	TSO-1	21
	IRP	31	PMD	21	TSO-2	31
	IRQ	42	PMD-1	11	TSO-4	32
					TSP	31

corporation

Newark plant • Newark, N. J.