Westinghouse

TYPE FFA FILAMENT FAILURE ALARM RELAY

INSTRUCTIONS

CAUTION

Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type FFA relay is a polar type auxiliary relay used in the carrier current relaying scheme to indicate failure of any of the filaments in the tubes of the carrier set. The coil of the relay is connected in series with the filament circuit. This relay is designed for use with the Type GO and JY Carrier Transmitter Receiver sets. By means of taps on the coil the relay may be connected to indicate failure when all tube filaments are connected in series, or when the tube filaments are connected in parallel groups. The tap marked ".25 amp" is used in a heater circuit drawing 0.3 amp. d-c (nominal value); the ".5 amp" tap can be used to supervise either one 0.6 amp. d-c circuit or two 0.3 amp. d-c heater circuits. The ".75 amp" tap can be used to supervise one 0.9 amp. d-c heater circuit, one 0.6 amp. d-c and one 0.3 amp. d-c circuit, or three 0.3 ampere d-c heater circuits.

CONSTRUCTION AND OPERATION

The type FFA relay consists of a polarized unit having three independent contact circuits (2 break and 1 make). The moving contacts and armature are mounted on a leaf spring supported symmeterically within a magnet frame. The armature rides in the front air gap of the frame with the contacts projecting outside. The poles of a permanent magnet clamp directly to each side of the frame. Two adjustable shunts are located across the rear air gaps. These change the reluctance of the magnetic path so as to force some of the flux thru the moving armature which is fastened to the frame midway between the two rear air gaps. Flux in the armature polarizes the armature and creates a magnetic bias, causing it to move towards either the left or the right, depending on the adjustment.

With positive as indicated in the internal schematics the armature travels to the right to close the single make contact. Either of the two left-hand contacts may be used to actuate alarm circuits to indicate a filament failure of the tubes in the carrier set.

RELAYS IN TYPE FT CASE

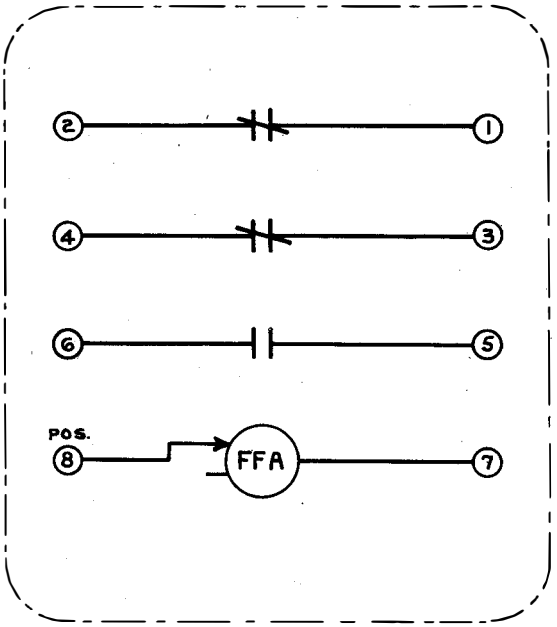
The type FT cases are dust-proof enclosures combining relay elements and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all welded steel housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a drawn steel frame with a clear window which fits over the front of the case with the switches closed. The chassis is a frame that houses the relay elements and supports the contact jaw half of the test switches. This slides in an out of the case. The electric connections between the base and chassis are completed through the closed knife-blades.

Removing Chassis:-To remove the chassis, first remove the cover by unscrewing the captive nuts at the four corners. There are two cover nuts on the S size case and four on the L and M size cases. This exposes the relay elements and all the test switches for inspection and testing. The next step is to open the test switches. Always open the elongated red handle switches first before any of the black handle switches or the cam action latches. This opens the trip circuit to prevent accidental trip out. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, grasp the two cam action latch arms and pull outward. This releases the chassis from the case. Using the latch arms as handles, pull the chassis out of the case. The chassis can be set on a test bench in a normal upright position as well as on its top, back or sides for easy inspection, maintenance and test.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis. The chassis operated shorting switch located behind the current test switch prevents open circuiting the current transformers when the current transformer type test switches are closed.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. The elongated red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.

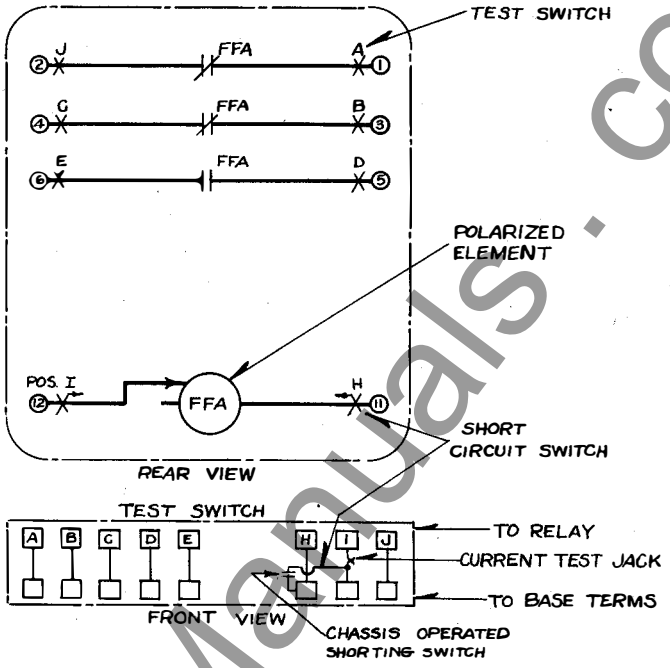
Electrical Circuits:-Each terminal in the base connects thru a test switch to the relay elements in the chassis as shown on the internal schematic diagrams. The relay terminal is identified by numbers marked on both the inside and outside of the base. The test switch positions are identified by letters marked on the top and bottom surface of the moulded blocks. These



REAR VIEW

WITH POSITIVE ON TERMINAL #8, THE MAKE CONTACT CLOSES TO THE RIGHT (FRONT VIEW)

Figure 1
Internal Schematic of the Type FFA Relay In The Standard Case of Figure 3.



WITH POSITIVE ON TERMINAL 12, THE MAKE CONTACT CLOSES TO THE RIGHT (FRONT VIEW)

Figure 2
Internal Schematic of the Type FFA Relay In The Type FT Cases.

letters can be seen when the chassis is removed from the case.

The potential and control circuits thru the relay are disconnected from the external circuit by opening the associated test switches. Opening the current test switch short-circuits the current transformer secondary and disconnects one side of the relay coil but leaves the other side of the coil connected to the external circuit thru the current test jack jaws. This circuit can be isolated by inserting the current test plug (without external connections), by inserting the ten circuit test plug, or by inserting a piece of insulating material approximately 1/32" thick into the current test jack jaws. Both switches of the current test switch pair must be open when using the current test plug or insulating material in this manner to short-circuit the current transformer secondary.

A cover operated switch can be supplied with its contacts wired in series with the trip circuit. This switch opens the trip circuit when the cover is removed. This switch can be added to the existing type FT cases at any time.

Testing:-The relays can be tested in service, in the case but with the external circuits isolated or out of the case as follows:

Testing In Service:-The ammeter test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current thru the relay. 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 thru 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.

Testing In Case:-With all blades in the full open position, the ten circuit test plug can be inserted in the contact jaws. This connects the relay elements 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 elements 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. Suggested means for isolating this circuit are outlined above, under "Electrical Circuits".

Testing Out of Case:-With the chassis removed from the base, relay elements may be tested by using the ten circuit test plug or by #2 test clip leads as described above. The factory calibration is made with the chassis in the case and removing the chassis from the case will change the calibration values by less than 1% or 2%. It is recommended that the relay be checked in position as a final check on the calibration.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration and heat. Mount the relay vertically by means of the two mounting studs for the standard cases and the type FT projection case or by means of the four mounting holes on the flange for the semi-flush type fFT case. Either of the

studs or the mounting screws may be utilized for grounding the relay. The electrical connections may be made direct to the terminals by means of screws for steel panel mounting or to terminal studs furnished with the relay for ebony asbestos or slate panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the studs and then turning the proper nut with a wrench.

The external connections are shown in the Complete Carrier Current Relaying Schematic as supplied for each terminal.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory and should not be disturbed after receipt by the customer. If the adjustments have been changed, the relay taken apart for repairs, or if it is desired to check the adjustments at regular maintenance periods, the instructions below should be followed.

All contacts should be periodically cleaned with a fine file. S#1002110 file is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

Back off the contact screws so that they do not make contact. Screw the magnetic shunt on both sides of the element to the all-out position. The armature should remain against whichever side it is pushed with this adjustment.

Contact Adjustment:

Pass 2 amperes d-c. thru the full coil with positive on the terminal as shown in the internal schematic. The armature should move to the right. Adjust the single right-hand contact until it just barely makes a light circuit. A flickering light is permissible. Give the right-hand contact screw an additional 1/3 of a turn to secure the required 8 mil follow. Reverse the polarity of the current and adjust the two left-hand contacts in a like manner. In this last adjustment it is important to adjust both contacts to make the light circuit before either is given the proper follow. This will prevent the possibility of giving the armature a slight twist when the contacts are closed.

Calibration

With the 0.25 amp. tap connected, screw in the right-hand shunt until the top air gap is shunted. This increases the armature bias towards the left-hand contacts. Apply 0.25 ampere d-c to the coil with the positive on the terminal as shown in the internal schematics and screw in the left-hand contact. Reduce the current until the armature resets; this should occur at not less than 0.22 ampere. Lock the shunts in place and recheck the calibration several times.

With this adjustment the pick-up on the .5 ampere tap should be 0.5 ampere ± 2% and the drop-out approximately 0.44 ampere. The pickup on the .75 ampere tap should be 0.75 ampere ± 2% and the dropout approximately 0.66 ampere.

RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

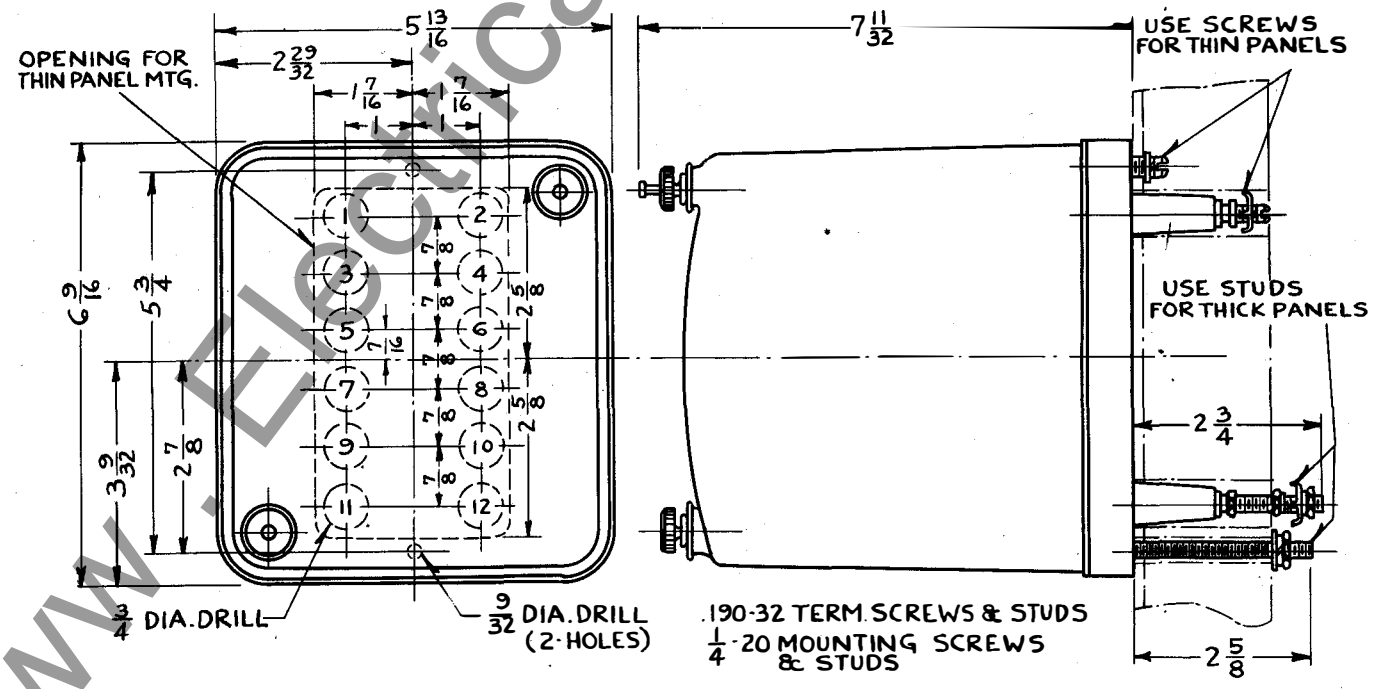


Figure 3
Outline and Drilling Plan of the Standard Projection Type Case (See Figure 1 for Terminals Supplied)

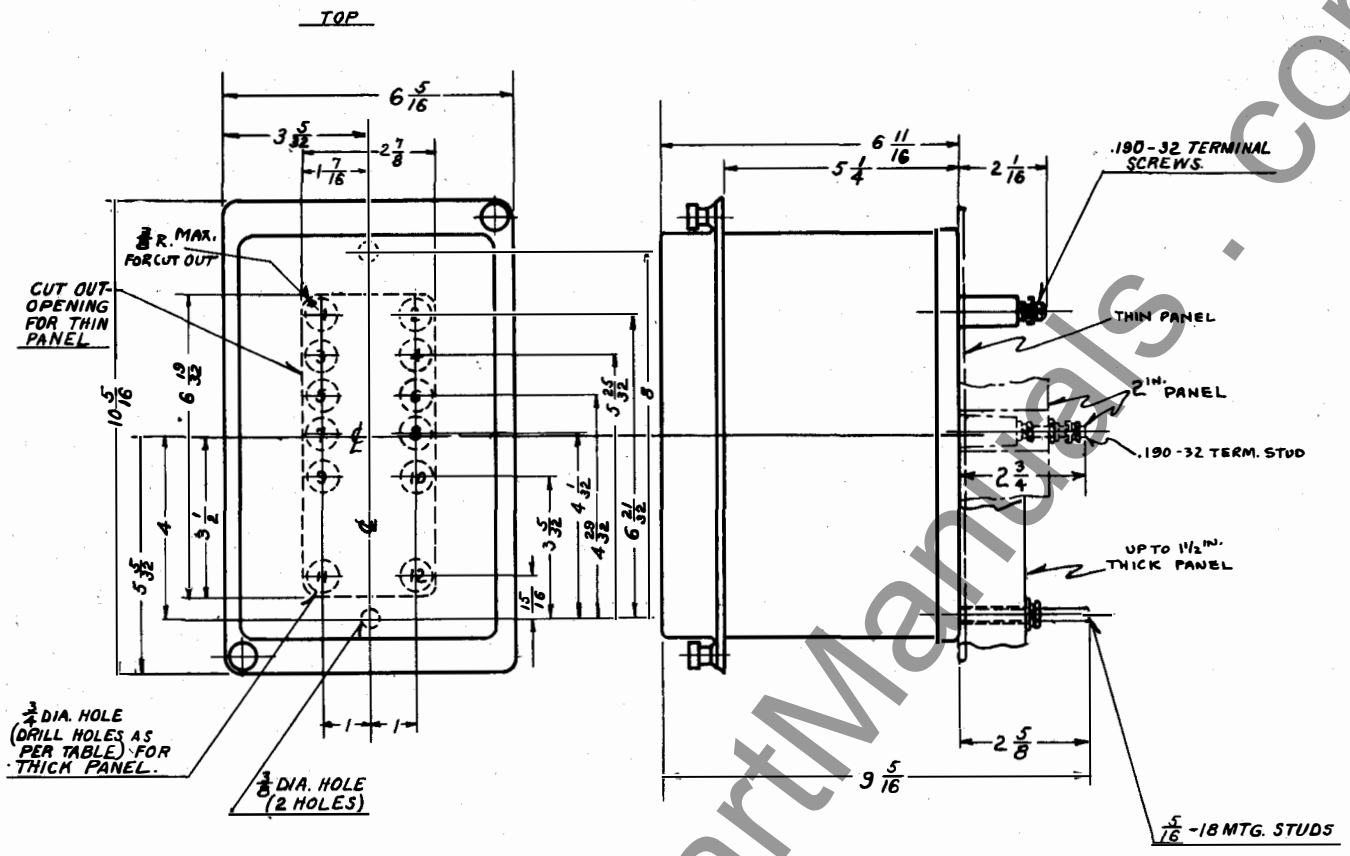


Figure 4
Outline and Drilling Plan for the S10 Projection Type FT Flexitest Case (See the Internal Schematic for the Terminals Supplied).

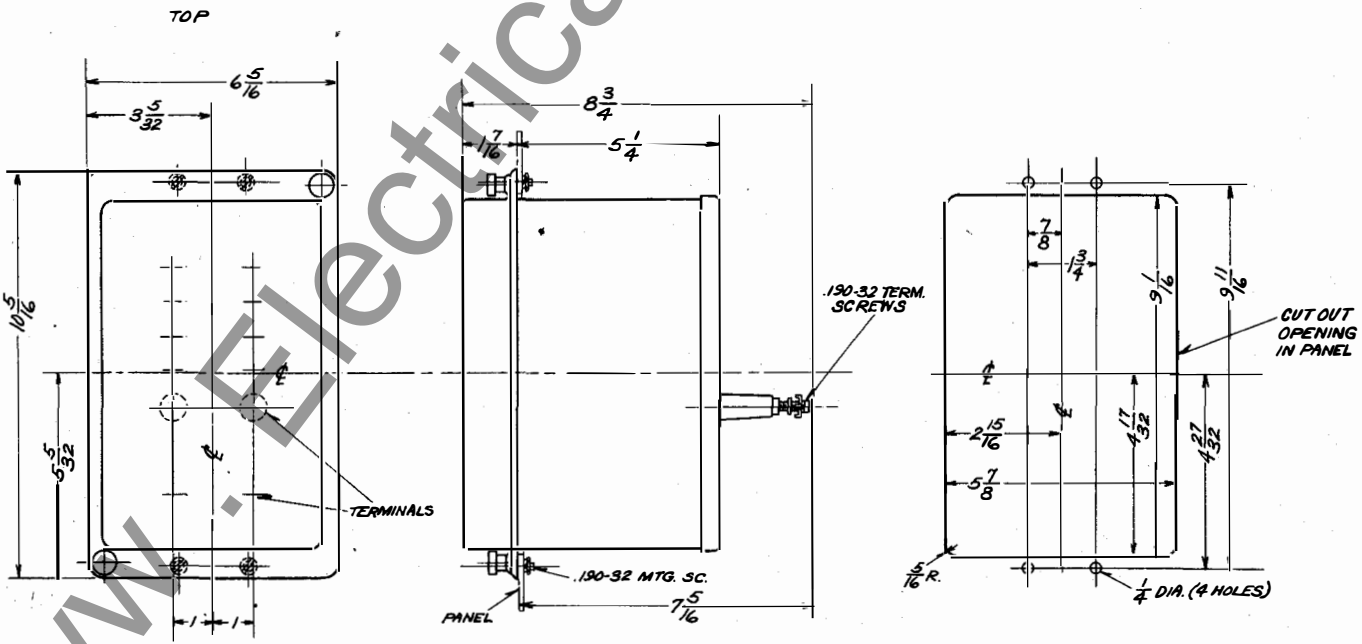


Figure 5
Outline and Drilling Plan for the S10 Semi-Flush Type FT Flexitest Case.