INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE TT-21 AUXILIARY RELAY

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 TT-21 is an auxiliary relay used in the K-DAR directional comparison tripping scheme (overreaching transfer trip). The TT-21 relay provides a circuit for supplying necessary coordination during a sudden reversal in power flow for an external fault.

The TT-21 relay works with TCF carrier channels or with any comparable equipment that contains receiver trip relay contacts.

CONSTRUCTION

The type TT-21 relay consists of a telephone type relay, avalanche diodes, and an indicating contactor switch.

Auxiliary Unit X

The auxiliary unit X is a telephone type relay. In this relay, an electromagnet attracts a right angle iron bracket which in turn operates a set of make or break contacts.

Blocking Diodes D1 To D4 and Tripping Diodes D5 to D8.

These diodes are controlled avalanche type diodes with a 600 volt, 12 ampere rating (JEDEC No. IN4508).

Indicating Contactor Switch Unit (ICS)

The d-c indicating contactor switch is a small clapper type device. A magnetic armature, to which leaf-spring mounted contacts are attached, is attracted to the magnetic core upon energization of the switch. When the switch closes the moving contacts bridge two stationary contacts, completing the trip circuit. Also, during this operation, two fingers on the armature deflect a spring located on the front of the switch, which allows the operation indicator to drop.

The front spring, in addition to holding the target, provides restraint for the armature and thus controls the pickup value of the switch.

OPERATION

The type TT-21 relay is used with a TCF carrier channel in a directional transfer trip relay scheme for power line protection. High-speed tripping is obtained for two-terminal or multi-terminal line applications for faults anywhere on the protected line. See Fig. 3.

The protective relays and the relay settings used in the TT-21 scheme are the same as used in directional comparison carrier schemes with the relay set to reach beyond the remote line terminals, so that end zone faults will appear well within the relay characteristic for fast relay operation.

Auxiliary Unit X

The X-unit is used to provide a coordinating delay, if a sudden reversal occurs in the direction of fault power flow in the protected line. For an internal fault, the X-relay is preclosed and is kept closed by fault detecting relays (PR). These consist of the KRD directional overcurrent ground relay and the KD zone 2 phase distance relay.

SETTINGS

There are no settings to be made on the relay.

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 four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay.

The electrical connections may be made directly to the terminals by means of screws for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory. Upon receipt of the relay, no customer adjustments should be required.

Acceptance Check

The following check is recommended to insure that the relay is in proper working order:

Auxiliary Unit X

Energize the auxiliary unit with rated voltage and check contact action. If desired, the timing of the operation can be checked as outlined under calibration procedure.

Avalanche Diode

Reverse Characteristic:

Apply 600 volts D.C. The reverse current should be .5 milliamperes or less. The avalanche voltage is determined by slowly increasing the voltage until reverse current starts to increase rapidly. A safety resistor should be used to prevent shorting the D.C. source.

Routing Maintenance

All relays should be inspected periodically and the operation should be checked at least once every year or at such other time intervals as may be dictated by experience to be suitable to the particular application.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 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.

NOTE: When making a dielectric test on the relay, the high voltage may be applied at the relay terminal, from all circuits to ground between coil and contact circuits, and between isolated coil circuits. However, the test voltage should not be applied across relay contacts, relay coils, or rectifier circuits.

CALIBRATION

Use the following procedure for calibrating the relay, if the relay has been taken apart for repairs or if the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order.

Auxiliary Unit X

The operating time of unit X should be checked with an electronic timer.

The residual air gap should not be less than .002" and the contact gaps should be between .020" to .035".

The X relay is located at the left (FV) and is * energized between terminals 5 and 13. The closing time should be set for approximately one cycle. The approximate setting of the adjusting resistor is 5000 ohms for the 125 volt relays. The 48 V relays do not use an adjusting resistor. The operating time for a variation of 85% and 115% of rated voltage is between 10 and 27 milliseconds. If necessary, adjustment to achieve timing may be made using adjustment resistor. Since there is no adjustment for the 48 volts relay, the 42 volts check limit is 32 m.s.

The dropout time should be approximately 25 milliseconds. If necessary, the dropout time can be adjusted using the residual screw and changing the armature gap. After final adjustment, the armature gap should not be less than .002".

Indicating Contactor Switch (ICS)

Close the main relay contacts and pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should not be greater than 1.0 ampere for the 1 ampere unit or .2/2 amperes for the tapped unit. To increase the pickup current, bend the springs out, or away from cover. Make sure that the target drops freely when energized.

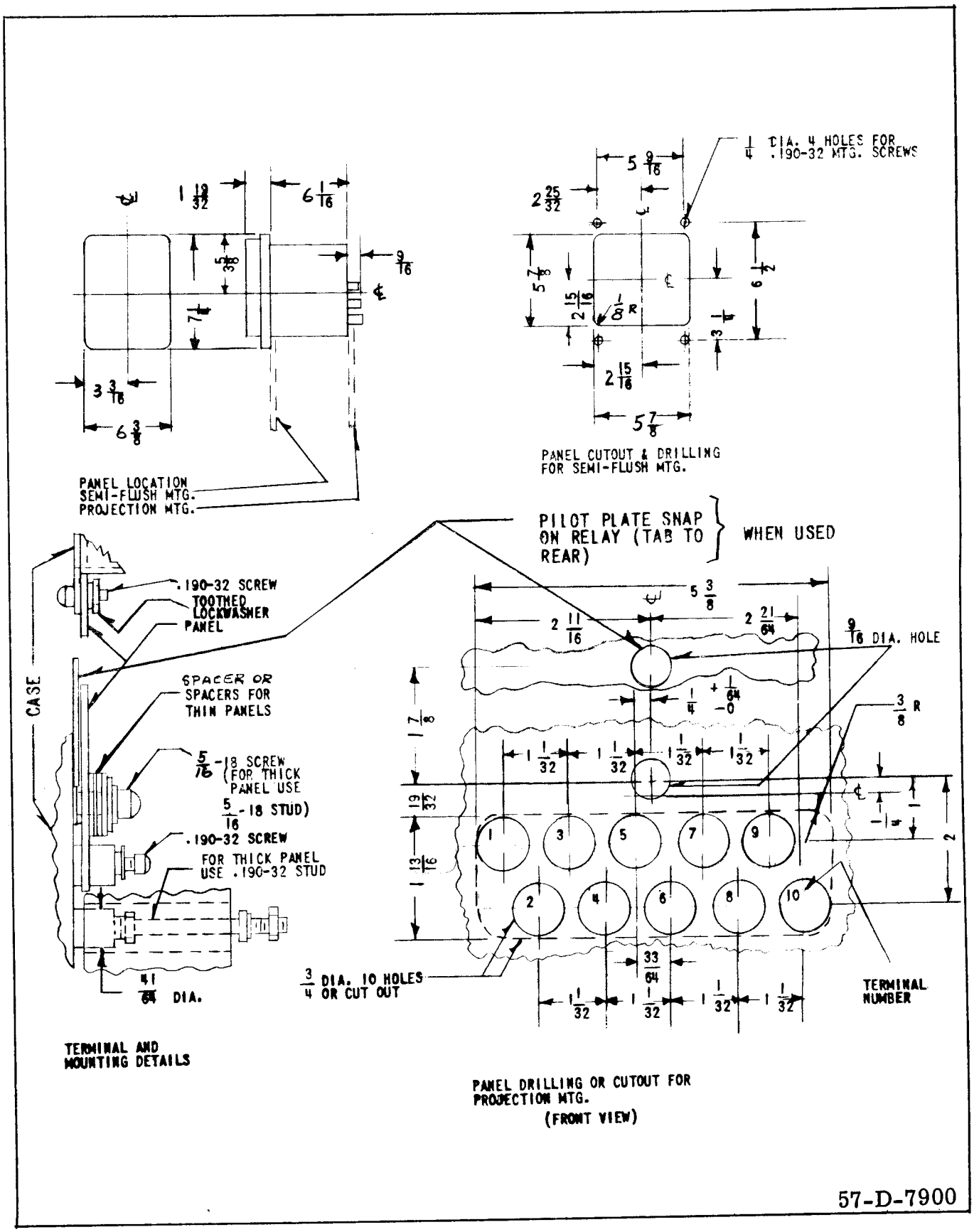
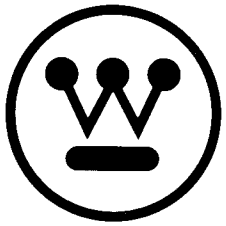


Fig. 4. Outline and Drilling Plan For The Type TT-21 Relay in the Type FT-11 Case.



WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION

NEWARK, N. J.

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INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE TT-21 AUXILIARY RELAY

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 TT-21 is an auxiliary relay used in the K-DAR directional comparison tripping scheme (overreaching transfer trip). The TT-21 relay provides a circuit for supplying necessary coordination during a sudden reversal in power flow for an external fault.

The TT-21 relay works with TCF carrier channels or with any comparable equipment that contains receiver trip relay contacts.

CONSTRUCTION

The type TT-21 relay consists of a telephone type relay, avalanche diodes, and an indicating contactor switch.

Auxiliary Unit X

The auxiliary unit X is a telephone type relay. In this relay, an electromagnet attracts a right angle iron bracket which in turn operates a set of make or break contacts.

Blocking Diodes D1 To D4 and Tripping Diodes D5 to D8.

These diodes are controlled avalanche type diodes with a 600 volt, 12 ampere rating (JEDEC No. IN4508).

Indicating Contactor Switch Unit (ICS)

The d-c indicating contactor switch is a small clapper type device. A magnetic armature, to which leaf-spring mounted contacts are attached, is attracted to the magnetic core upon energization of the switch. When the switch closes the moving contacts bridge two stationary contacts, completing the trip circuit. Also, during this operation, two fingers on the armature deflect a spring located on the front of the switch, which allows the operation indicator to drop.

The front spring, in addition to holding the target, provides restraint for the armature and thus controls the pickup value of the switch.

OPERATION

The type TT-21 relay is used with a TCF carrier channel in a directional transfer trip relay scheme for power line protection. High-speed tripping is obtained for two-terminal or multi-terminal line applications for faults anywhere on the protected line. See Fig. 3.

The protective relays and the relay settings used in the TT-21 scheme are the same as used in directional comparison carrier schemes with the relay set to reach beyond the remote line terminals, so that end zone faults will appear well within the relay characteristic for fast relay operation.

Auxiliary Unit X

The X-unit is used to provide a coordinating delay, if a sudden reversal occurs in the direction of fault power flow in the protected line. For an internal fault, the X-relay is preclosed and is kept closed by fault detecting relays (PR). These consist of the KRD directional overcurrent ground relay and the KD zone 2 phase distance relay.

SETTINGS

There are no settings to be made on the relay.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from

SUPERSEDES I.L. 41-958.6
*Denotes change from superseded issue.

EFFECTIVE AUGUST 1968

dirt, moisture, excessive vibration, and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay.

The electrical connections may be made directly to the terminals by means of screws for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory. Upon receipt of the relay, no customer adjustments should be required.

Acceptance Check

The following check is recommended to insure that the relay is in proper working order:

Auxiliary Unit X

Energize the auxiliary unit with rated voltage and check contact action. If desired, the timing of the operation can be checked as outlined under calibration procedure.

Avalanche Diode

Reverse Characteristic:

Apply 600 volts D.C. The reverse current should be .5 milliamperes or less. The avalanche voltage is determined by slowly increasing the voltage until reverse current starts to increase rapidly. A safety resistor should be used to prevent shorting the D.C. source.

Routing Maintenance

All relays should be inspected periodically and the operation should be checked at least once every year or at such other time intervals as may be dictated by experience to be suitable to the particular application.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 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.

NOTE: When making a dielectric test on the relay, the high voltage may be applied at the relay terminal, from all circuits to ground between coil and contact circuits, and between isolated coil circuits. However, the test voltage should not be applied across relay contacts, relay coils, or rectifier circuits.

CALIBRATION

Use the following procedure for calibrating the relay, if the relay has been taken apart for repairs or if the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order.

Auxiliary Unit X

The operating time of unit X should be checked with an electronic timer.

The residual air gap should not be less than .002'' and the contact gaps should be between .020'' to .035''.

The X relay is located at the left (FV) and is energized between terminals 5 and 13. The closing time should be set for approximately one cycle. The approximate setting of the adjusting resistor is 5000 ohms for the 125 volt relays. The operating time for a variation of 95% and 115% of rated voltage is between 10 and 27 milliseconds. If necessary, adjustment to achieve timing may be made using adjustment resistor.

The dropout time should be approximately 25 milliseconds. If necessary, the dropout time can be adjusted using the residual screw and changing the armature gap. After final adjustment, the armature gap should not be less than .002''.

Indicating Contactor Switch (ICS)

Close the main relay contacts and pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should not be greater than 1.0 ampere for the 1 ampere unit or .2/2 amperes for the tapped unit. To increase the pickup current, bend the springs out, or away from cover. Make sure that the target drops freely when energized.

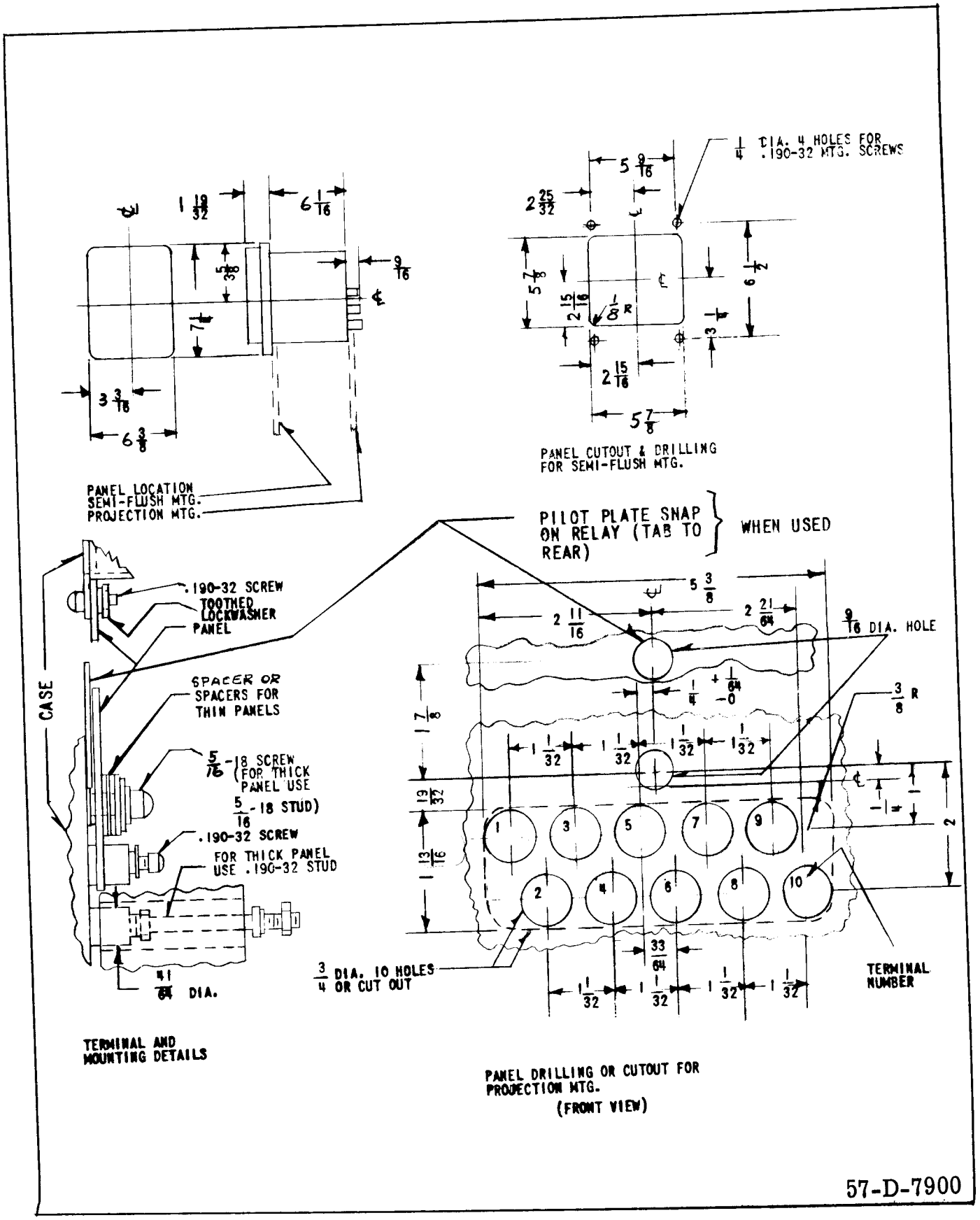
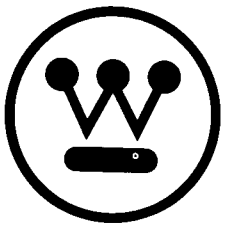


Fig. 4. Outline and Drilling Plan For The Type TT-21 Relay in the Type FT-11 Case.



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INSTRUCTIONS

TYPE TT-21 AUXILIARY RELAY

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 TT-21 is an auxiliary relay used in the K-DAR directional comparison tripping scheme (overreaching transfer trip). The TT-21 relay provides a circuit for supplying necessary coordination during a sudden reversal in power flow for an external fault.

The TT-21 relay works with TCF carrier channels or with any comparable equipment that contains receiver trip relay contacts.

CONSTRUCTION

The type TT-21 relay consists of a telephone type relay, avalanche diodes, and an indicating contactor switch.

Auxiliary Unit X

The auxiliary unit X is a telephone type relay. In this relay, an electromagnet attracts a right angle iron bracket which in turn operates a set of make or break contacts.

Blocking Diodes D_1 to D_4 and Tripping Diodes D_5 to D_8

These diodes are controlled avalanche type diodes with a 600 volt, 12 ampere rating (JEDEC No. IN4508).

Indicating Contactor Switch Unit (ICS)

The d-c indicating contactor switch is a small clapper type device. A magnetic armature, to which leaf-spring mounted contacts are attached, is attracted to the magnetic core upon energization of the switch. When the switch closes the moving contacts bridge two stationary contacts, completing the trip circuit. Also, during this operation, two fingers on the armature deflect a spring located on the front of the switch, which allows the operation indicator to drop.

The front spring, in addition to holding the target, provides restraint for the armature and thus controls the pickup value of the switch.

OPERATION

The type TT-21 relay is used with a TCF carrier channel in a directional transfer trip relay scheme for power line protection. High-speed tripping is obtained for two-terminal or multi-terminal line applications for faults anywhere on the protected line. See Fig. 2.

The protective relays and the relay settings used in the TT-21 scheme are the same as used in directional comparison carrier schemes with the relay set to reach beyond the remote line terminals, so that end zone faults will appear well within the relay characteristic for fast relay operation.

Auxiliary Unit X

The X-unit is used to provide a coordinating delay, if a sudden reversal occurs in the direction of fault power flow in the protected line. For an internal fault, the X-relay is preclosed and is kept closed by fault detecting relays (PR). These consist of the KRD directional overcurrent ground relay and the KD zone 2 phase distance relay.

SETTINGS

There are no settings to be made on the relay.

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 four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay.

The electrical connections may be made directly to the terminals by means of screws for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory. Upon receipt of the relay, no customer adjustments should be required.

Acceptance Check

The following check is recommended to insure that the relay is in proper working order:

Auxiliary Unit X

Energize the auxiliary unit with rated voltage and check contact action. If desired, the timing of the operation can be checked as outlined under calibration procedure.

Avalanche Diode

Reverse Characteristic:

Apply 600 volts D.C. The reverse current should be .5 milliamperes or less. The avalanche voltage is determined by slowly increasing the voltage until reverse current starts to increase rapidly. A safety resistor should be used to prevent shorting the D.C. source.

Routine Maintenance

All relays should be inspected periodically and the operation should be checked at least once every year or at such other time intervals as may be dictated by experience to be suitable to the particular application.

All contacts should be periodically cleaned. A contact burnisher S#182A836 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.

NOTE: When making a dielectric test on the relay, the high voltage may be applied at the relay terminal, from all circuits to ground, between coil and contact circuits, and between isolated coil circuits. However, the test voltage should not be applied across relay contacts, relay coils, or rectifier circuits.

CALIBRATION

Use the following procedure for calibrating the relay, if the relay has been taken apart for repairs or if the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order.

Auxiliary Unit X

The operating time of unit X should be checked with an electronic timer.

The residual air gap should not be less than .002" and the contact gaps should be between .020" to .035".

The X relay is located at the left (FV) and is energized between terminals 5 and 13. The closing time should be set for approximately one cycle. The approximate setting of the adjusting resistor is 3000 ohms for the 125 volt relays. The operating time for

a variation of 95% and 115% of rated voltage is between 10 and 27 milliseconds. If necessary, adjustment to achieve timing may be made using adjustment resistor.

The dropout time should be approximately 25 milliseconds. If necessary, the dropout time can be adjusted using the residual screw and changing the armature gap. After final adjustment, the armature gap should not be less than .002".

Indicating Contactor Switch (ICS)

Close the main relay contacts and pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should not be greater than 1.0 ampere. To increase the pickup current, bend the springs out, or away from cover. To decrease the pickup, bend the springs in toward the cover. Make sure that the target drops freely when energized.

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.

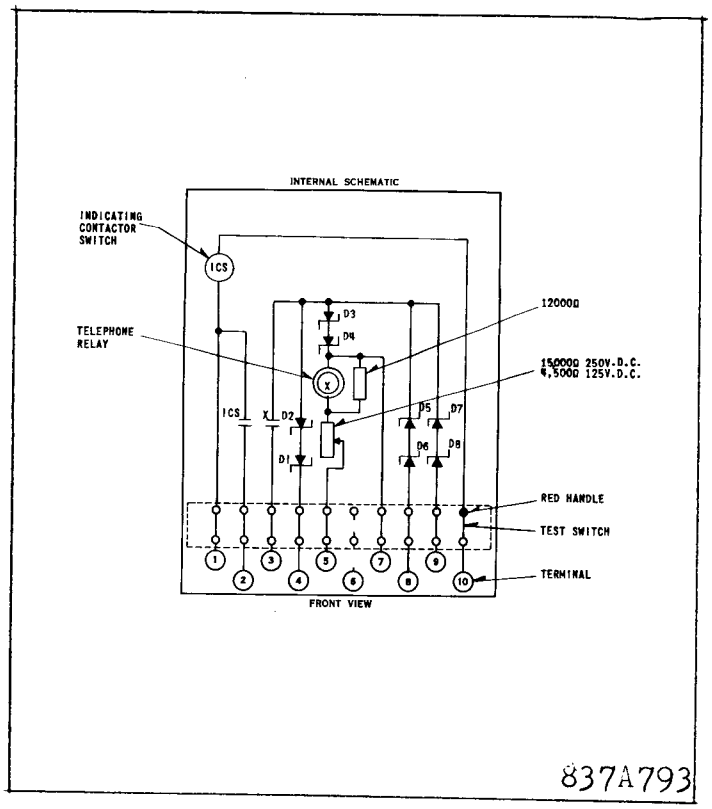


Fig. 1 Internal Schematic of the Type TT-21 Relay in the Type FT-11 Case

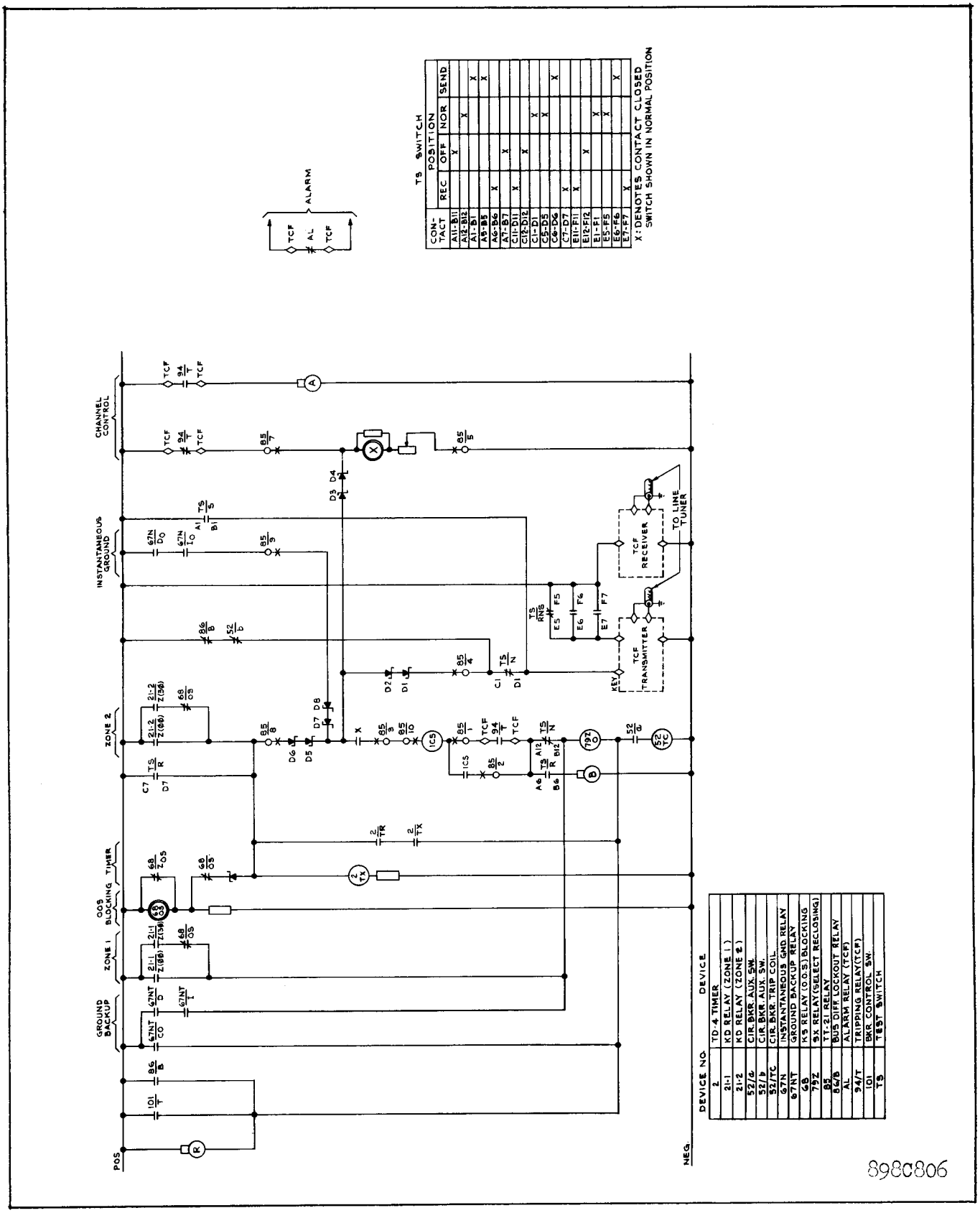


Fig. 2 K-DAR/TT-21 Transfer Trip Scheme (Two-terminal Line)

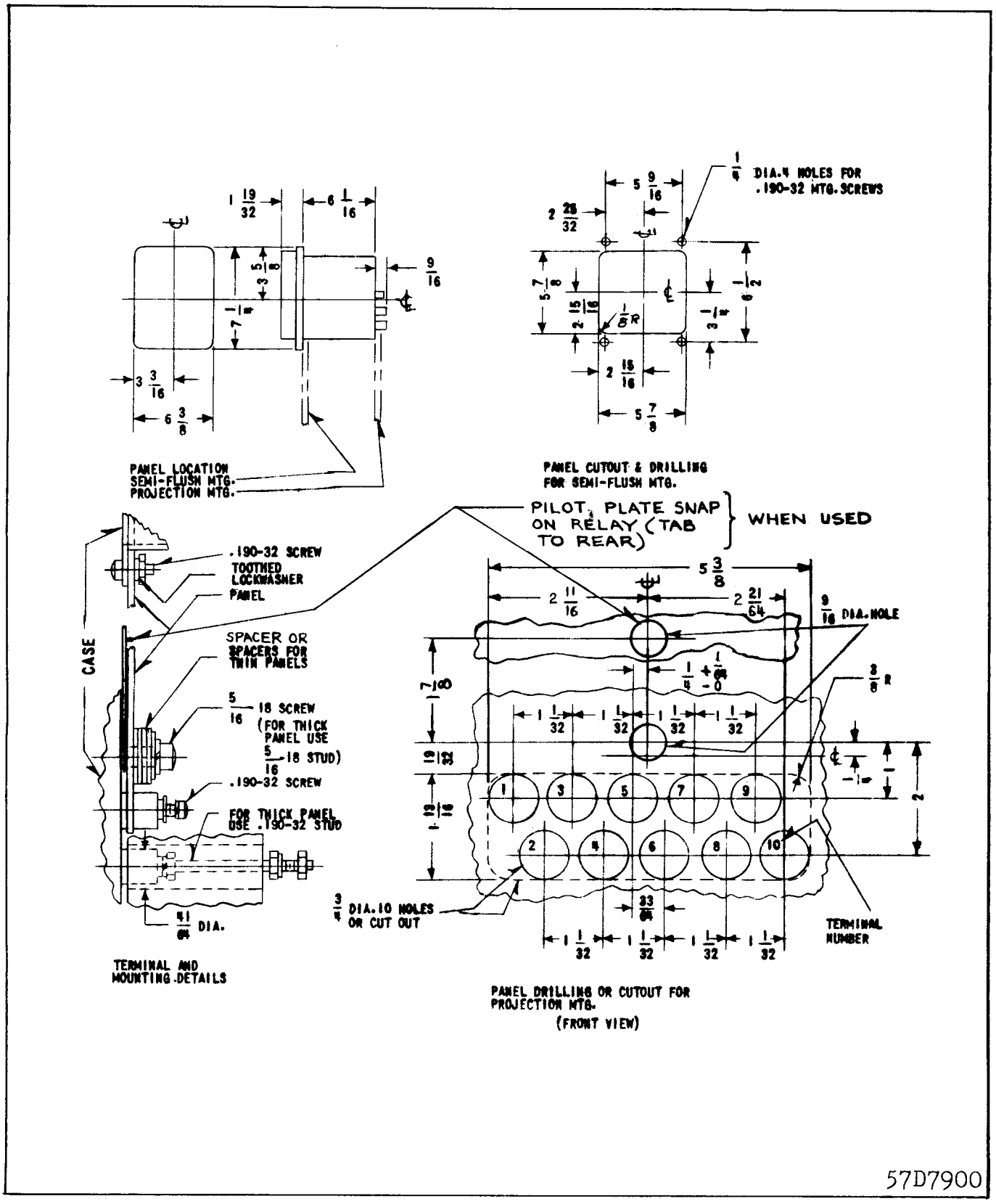
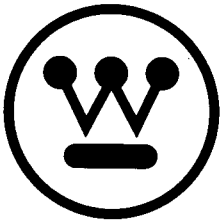


Fig. 3 Outline and Drilling Plan for the Type TT-21 Relay in the Type FT-11 Case



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OPERATION

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Auxiliary Unit X

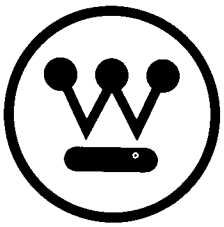
The X-unit is used to provide a coordinating delay, if a sudden reversal occurs in the direction of fault power flow in the protected line. For an internal fault, the X-relay is preclosed and is kept closed by fault detecting relays (PR). These consist of the KRD directional overcurrent ground relay and the KD zone 2 phase distance relay.

SETTINGS

There are no settings to be made on the relay.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from



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