

INSTALLATION • OPERATION • MAINTENANCE I N S T R U C T I O N S

TYPE TR-1 AUXILIARY TRIPPING AND INDICATING RELAY

CAUTION: Before putting protective 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 TR-1 relay is an auxiliary relay energized by protective relays to trip two circuit breakers. Sufficient contacts are provided to seal in both trip circuits until the breaker auxiliary switches operate. Indication is provided by targets which drop whenever the switch units within the relay operate.

CONSTRUCTION

The type TR-1 relay consists of two direct current, doubletrip indicating contactor switch units (ICS). The ICS is a small clapper type device. A magnetic armature, to which leafspring 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 target to drop. The target is reset from the outside of the case by a push rod located at the bottom of the cover.

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 coils of the ICS units are normally connected in series and energized through the trip contacts of the protective relays. The contacts of one unit

seal in the trip circuit and trip one breaker. The contacts of the other switch are for tripping a second breaker.

It is necessary to add resistance in the ICS unit coil circuit to limit current in these coils. Normally these coils are connected in series with an external resistance. (See Fig. 3). For the 1 ampere ICS unit relay 22 ohms are used for a 125 volt d-c trip circuit and 44 ohms for a 250 volt d-c trip circuit. These values of resistance are obtained by using one or two 22 ohm resistors. For the 0.2/2.0 ampere ICS unit relay a 100 ohm mid-tap resistor is used for 0-125 volt d-c trip circuit and a 200 ohm mid-tap resistor for a 250 volt d-c trip circuit. With these resistance values, the relay operating time is approximately $\frac{3}{4}$ cycle (60 cycle basis).

CHARACTERISTICS

The ICS will trip at a current value between 1.0 and 1.2 amperes d.c. for the 1 ampere ICS unit. The current should not be greater than the particular ICS top setting being used for the 0.2/2.0 ampere ICS unit. The operation indicator target should drop freely. The trip circuit should draw at least $2\frac{1}{2}$ times rated value in order to keep the time of operation of the switch to a minimum and provide positive operation.

Trip Circuit Constants

1 ampere rating:	0.1 ohms d.c. resistance
0.2/2.0 ampere rating:	0.2 tap — 6.5 ohms
2	2 tap — 0.15 ohms

Coil Ratings

Tap Rating	Coil rating in amperes d.c.	
	1 second	continuous
1	140	5
0.2	11.5	0.4
2.0	88.0	3.2

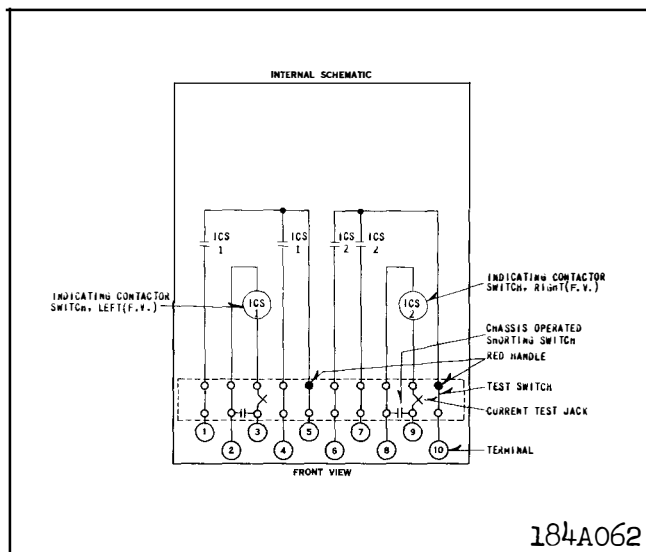


Fig. 1 Internal Schematic of Type TR-1 Relay with 1 ampere I.C.S. in Type FT 11 case.

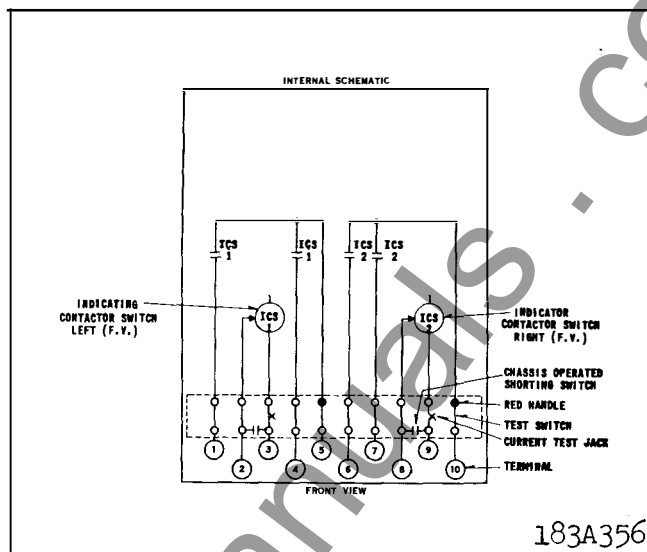


Fig. 2. Internal Schematic of Type TR-1 Relay with 0.2/2.0 ampere I.C.S. in Type FT 11 case.

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 steel panel mounting or to the terminal studs furnished with the relay 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.

For detailed FT case information refer to I.L. 41-076.

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.

1. Acceptance Tests

These tests are to be used for checking the prime characteristics to demonstrate that the relay

received meets specifications and is in serviceable condition.

Pass sufficient direct current through the ICS coils to operate the ICS unit. For the 1 ampere ICS unit the value should be between 1.0 and 1.2 amperes d.c. The current should not be greater than the particular ICS tap setting being used for the 0.2/2.0 ampere ICS unit.

2. Routine Maintenance

The relays should be inspected periodically, at such time intervals as may be dictated by experience, to insure that the relays have retained their calibration and are in proper operating condition.

All contacts should be cleaned periodically. A contact burnisher #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.

3. Calibration

Pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should be not less than 1.0 ampere nor greater than 1.2 amperes for the 1.0 ampere ICS. The current should not be greater than the particular ICS tap

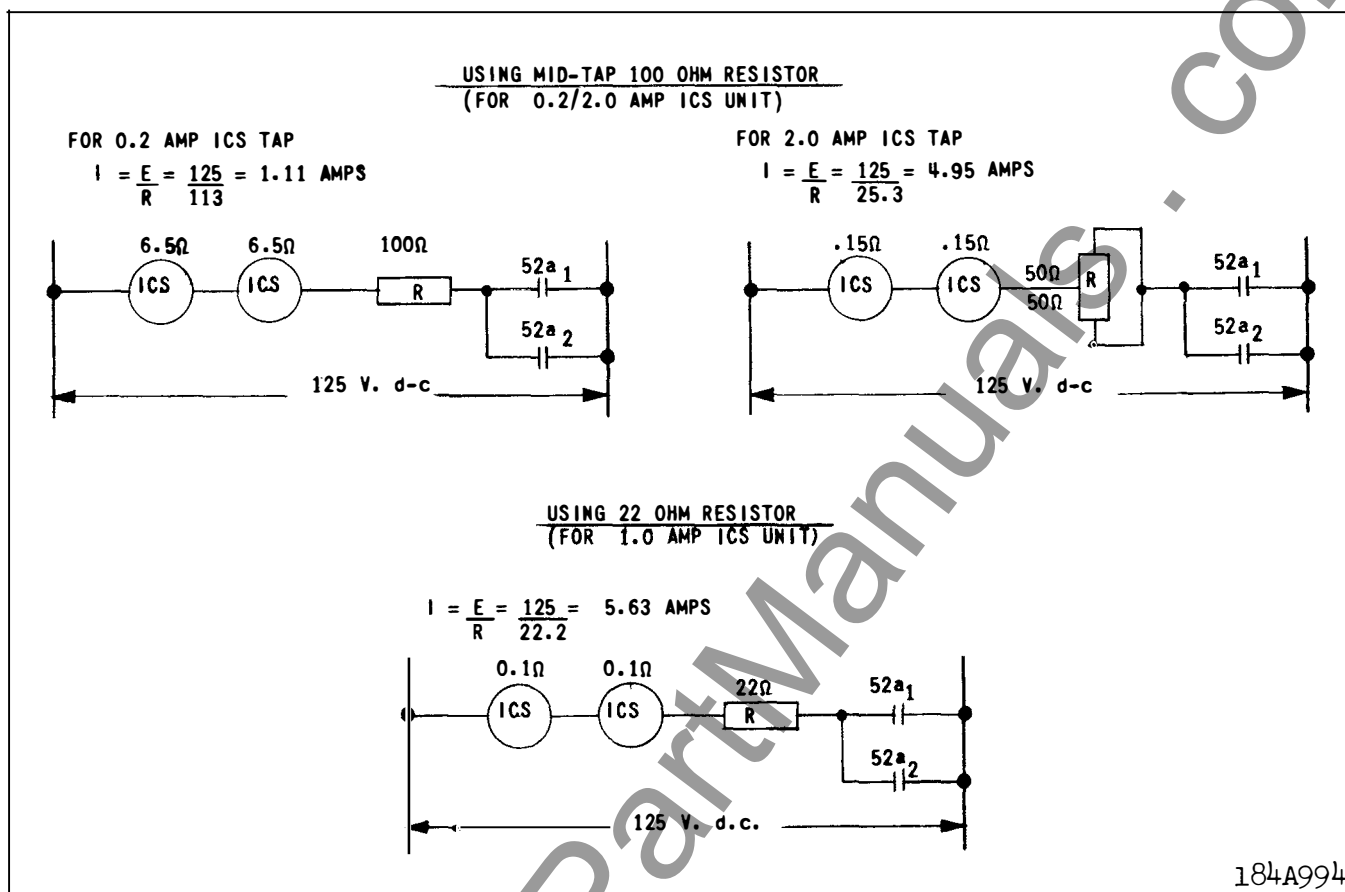
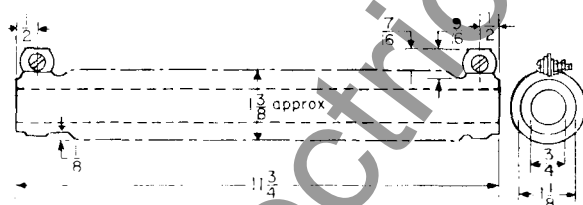


Fig. 3. Typical Schematic Diagrams for Type TR-1 Relay

style number 1164 990 (22 ohms)



style number 1955 870 (100 ohms) for 125 v d-c
 style number 1955 871 (200 ohms) for 250 v d-c

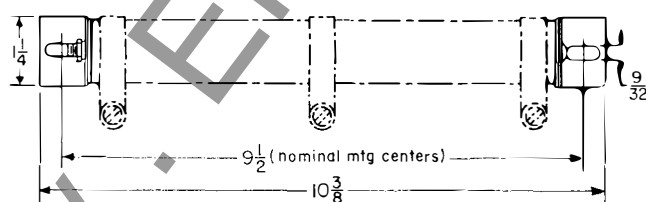


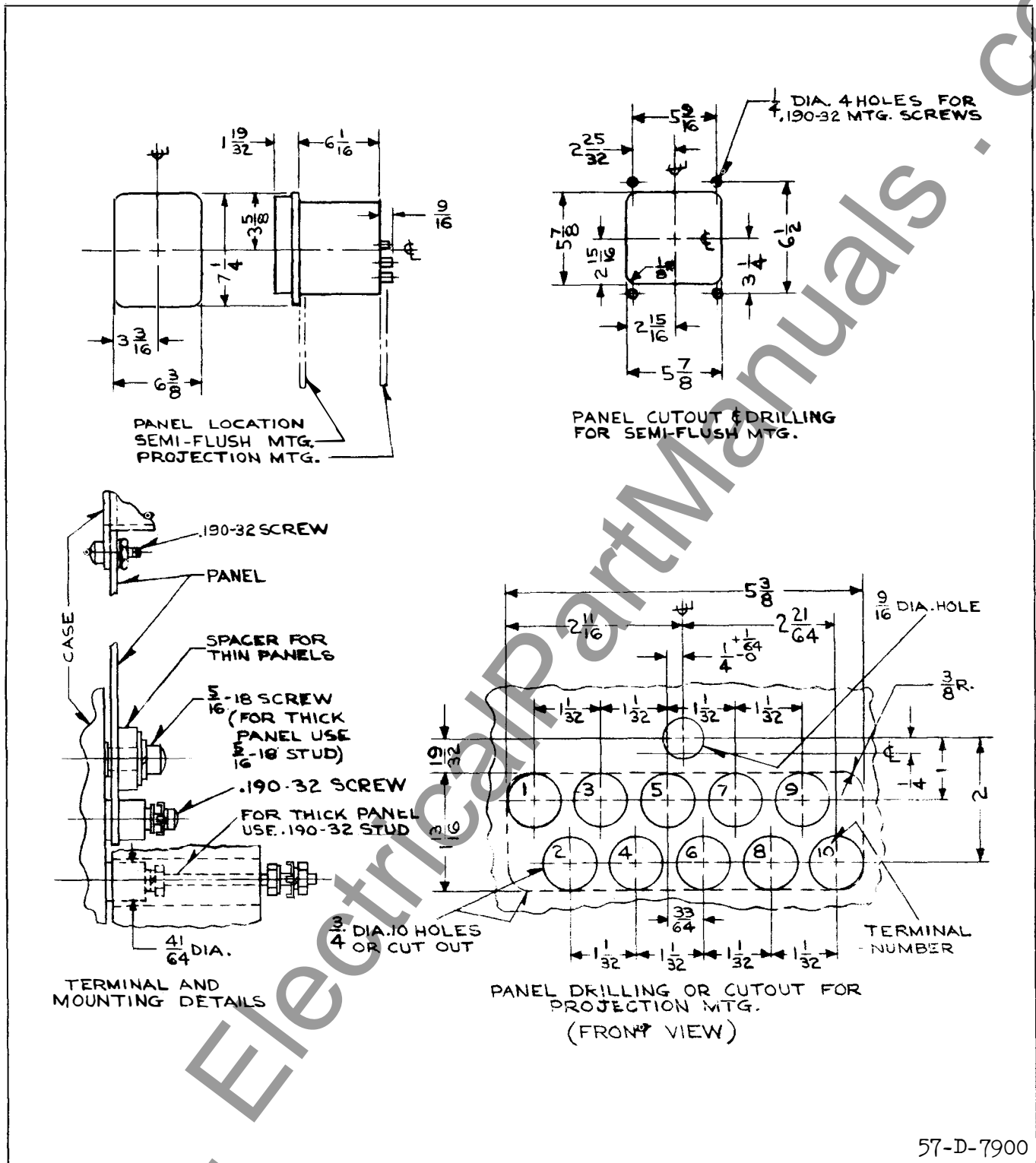
Fig. 4. Outlines of External Resistors used with Type TR-1 Relays

setting being used for the 0.2-2.0 ampere ICS. The operation indicator target should drop freely.

The contact gap should be approximately 0.047" for the 0.2/2.0 ampere unit and 0.070" for the 1.0 ampere unit, between the bridging moving contact and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

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.



57-D-7900

Fig. 5. Outline and Drilling Plan for the Type TR-1 Relay in the Type FT 11 case



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TYPE TR-1 AUXILIARY TRIPPING AND INDICATING RELAY

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APPLICATION

The type TR-1 relay is an auxiliary relay energized by protective relays to trip two circuit breakers. Sufficient contacts are provided to seal in both trip circuits until the breaker auxiliary switches operate. Indication is provided by targets which drop whenever the switch units within the relay operate.

CONSTRUCTION

The type TR-1 relay consists of two direct current, doubletrip indicating contactor switch units (ICS). The ICS is a small clapper type device. A magnetic armature, to which leafspring 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 target to drop. The target is reset from the outside of the case by a push rod located at the bottom of the cover.

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 coils of the ICS units are normally connected in series and energized through the trip contacts of the protective relays. The contacts of one unit

seal in the trip circuit and trip one breaker. The contacts of the other switch are for tripping a second breaker.

It is necessary to add resistance in the ICS unit coil circuit to limit current in these coils. Normally these coils are connected in series with an external * resistance. (See Fig. 5). For the 1 ampere ICS unit relay 22 ohms are used for a 125 volt d-c trip circuit and 44 ohms for a 250 volt d-c trip circuit. These values of resistance are obtained by using one or two 22 ohm resistors. For the 0.2/2.0 ampere ICS unit relay a 100 ohm mid-tap resistor is used for 0-125 volt d-c trip circuit and a 200 ohm mid-tap resistor for a 250 volt d-c trip circuit. With these resistance values, the relay operating time is approximately $\frac{1}{4}$ cycle (60 cycle basis).

CHARACTERISTICS

The ICS will trip at a current value between 1.0 and 1.2 amperes d.c. for the 1 ampere ICS unit. The current should not be greater than the particular ICS top setting being used for the 0.2/2.0 ampere ICS unit. The operation indicator target should drop freely. The trip circuit should draw at least $2\frac{1}{2}$ times rated value in order to keep the time of operation of the switch to a minimum and provide positive operation.

Trip Circuit Constants

1 ampere rating:	0.1 ohms d.c. resistance
0.2/2.0 ampere rating:	0.2 tap — 6.5 ohms
2	2 tap — 0.15 ohms

Coil Ratings

Tap Rating	Coil rating in amperes d.c.	
	1 second	continuous
1	140	5
0.2	11.5	0.4
2.0	88.0	3.2

Supersedes I.L. 41-758.1A

*Denotes change from superseded issue

EFFECTIVE FEBRUARY 1966

TYPE TR-1 RELAY

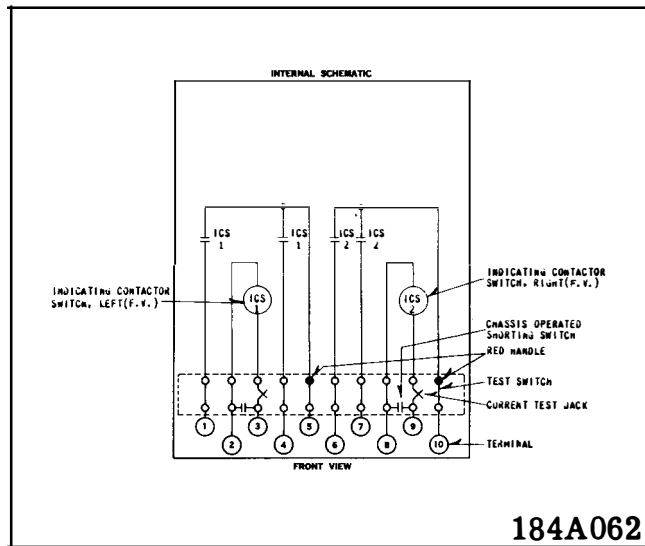


Fig. 1 Internal Schematic of Type TR-1 Relay with 1 ampere I.C.S. in Type FT 11 case.

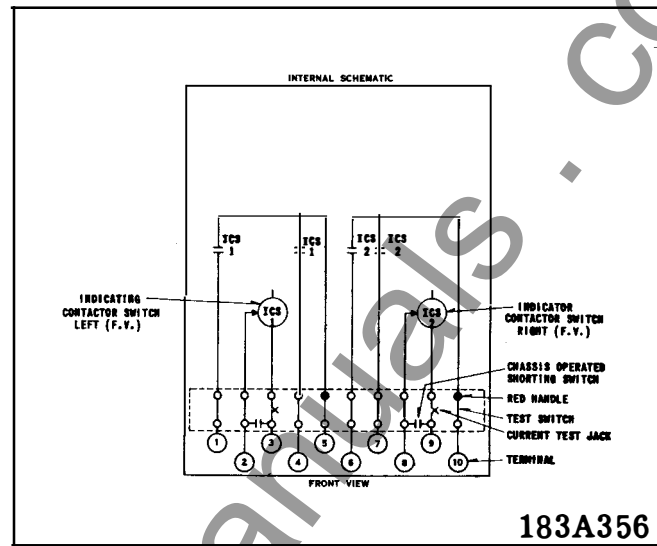
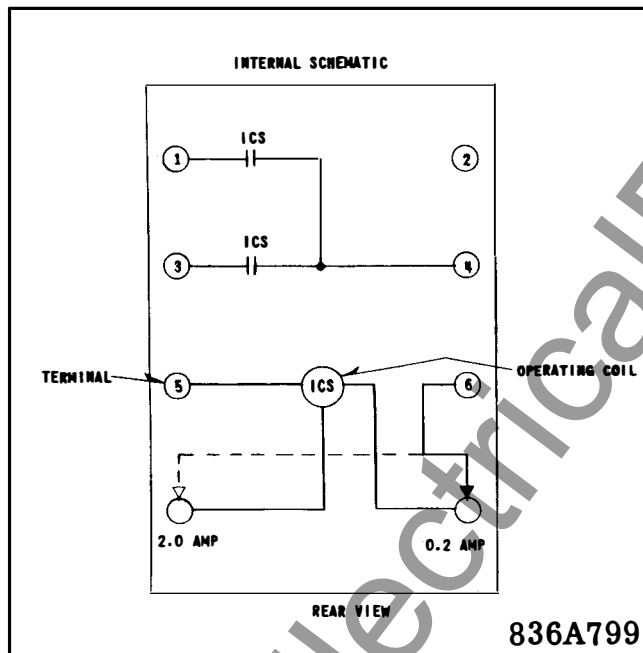
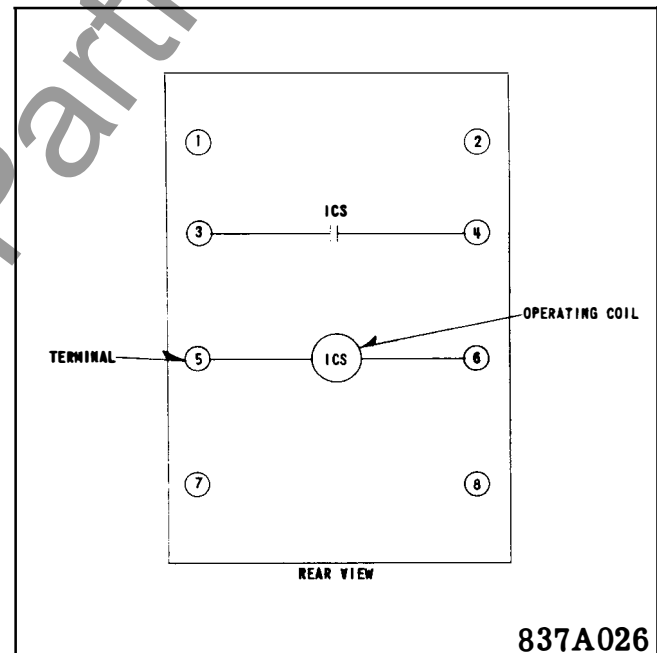


Fig. 2. Internal Schematic of Type TR-1 Relay with 0.2/2.0 ampere I.C.S. in Type FT 11 case.



* Fig. 3 Internal Schematic of Type TR-1 Relay with .2-2 ampere ICS in Semi-Flush Molded Case



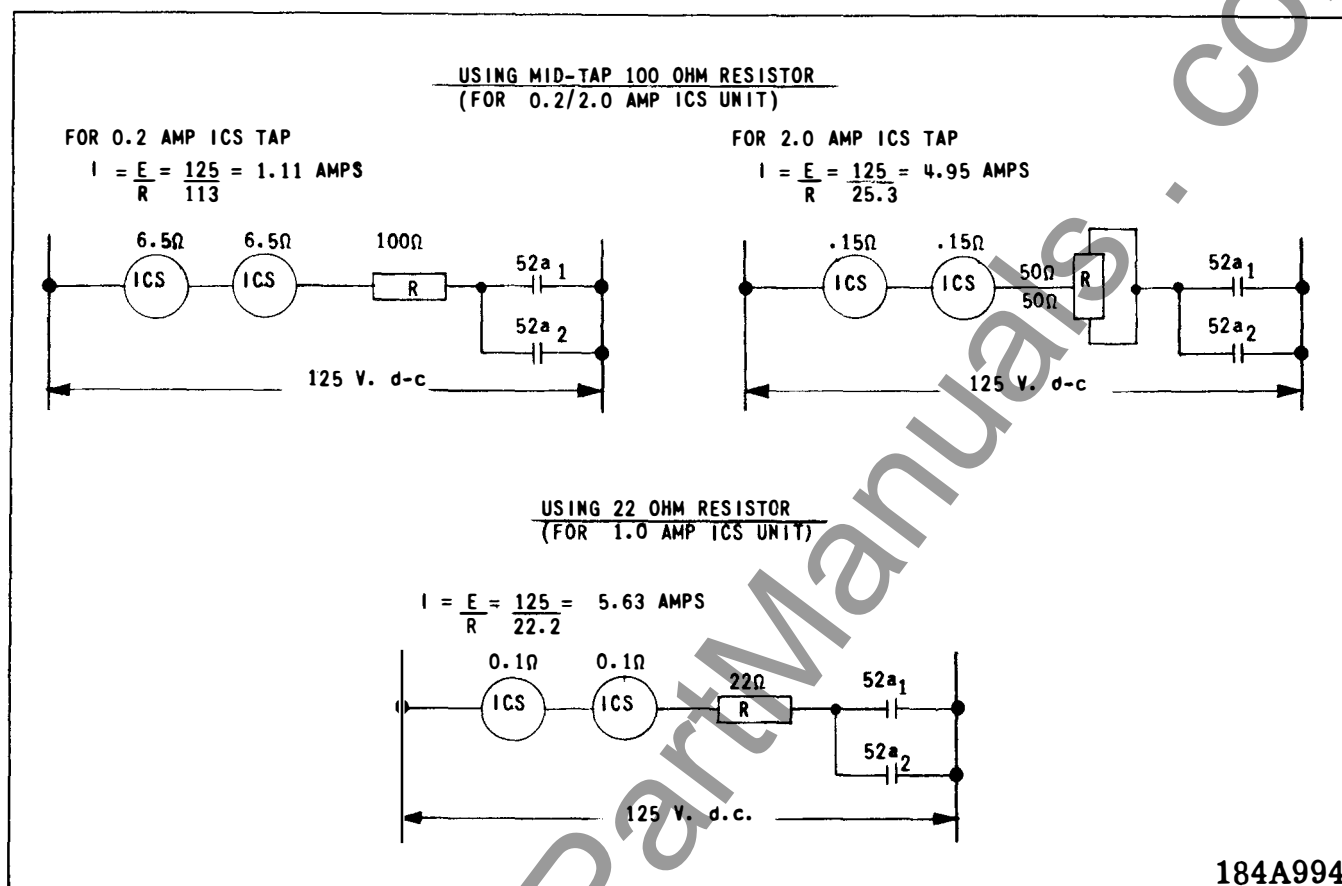
* Fig. 4 Internal Schematic of Type TR-1 Relay with 1 ampere ICS in Projection Molded Case

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 con-

nections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay 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.

For detailed FT case information refer to I.L. 41-076.



184A994

* Fig. 5 Typical Schematic Diagrams for Type TR-1 Relay

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.

1. Acceptance Tests

These tests are to be used for checking the prime characteristics to demonstrate that the relay received meets specifications and is in serviceable condition.

Pass sufficient direct current through the ICS coils to operate the ICS unit. For the 1 ampere ICS unit the value should be between 1.0 and 1.2 amperes d.c. The current should not be greater than the particular ICS tap setting being used for the 0.2/2.0 ampere ICS unit.

2. Routine Maintenance

The relays should be inspected periodically, at such time intervals as may be dictated by experience,

to insure that the relays have retained their calibration and are in proper operating condition.

All contacts should be cleaned periodically. A contact burnisher #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.

3. Calibration

Pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should be not less than 1.0 ampere nor greater than 1.2 amperes for the 1.0 ampere ICS. The current should not be greater than the particular ICS tap setting being used for the 0.2-2.0 ampere ICS. The operation indicator target should drop freely.

The contact gap should be approximately 0.047" for the 0.2/2.0 ampere unit and 0.070" for the 1.0 ampere unit, between the bridging moving contact

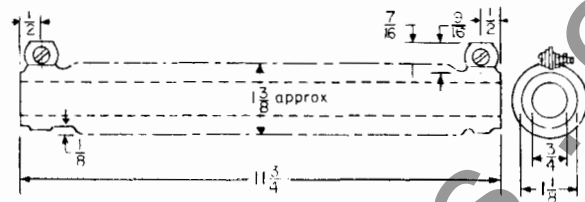
TYPE TR-1 RELAY

and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

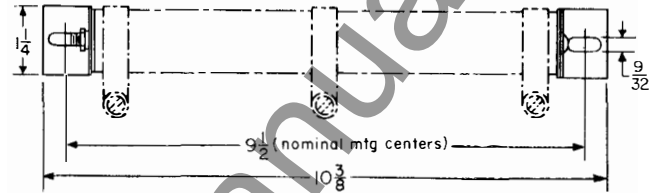
RENEWAL PARTS

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.

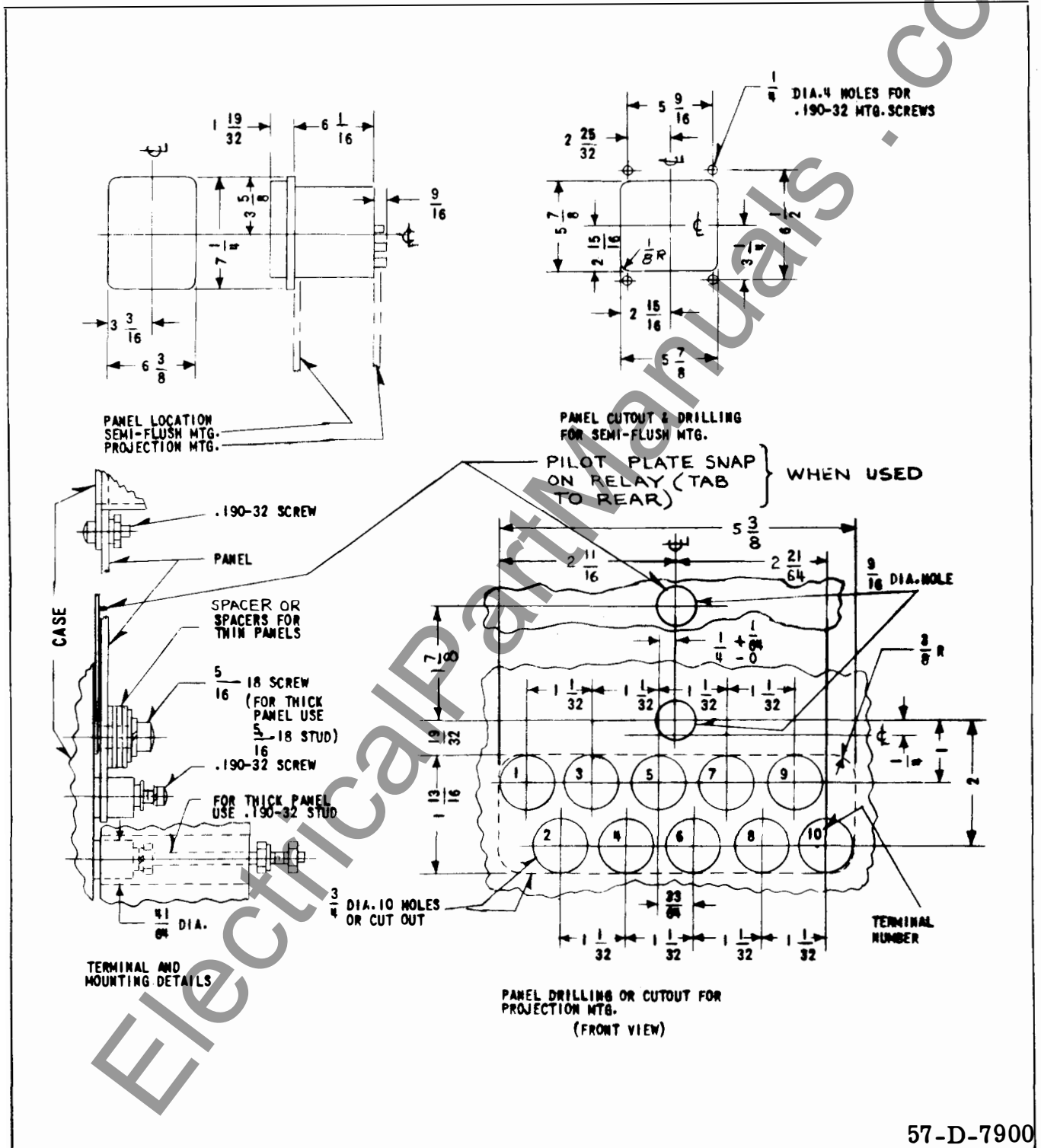
style number 1164 990 (22 ohms)



style number 1955 870 (100 ohms) for 125 v d-c
style number 1955 871 (200 ohms) for 250 v d-c

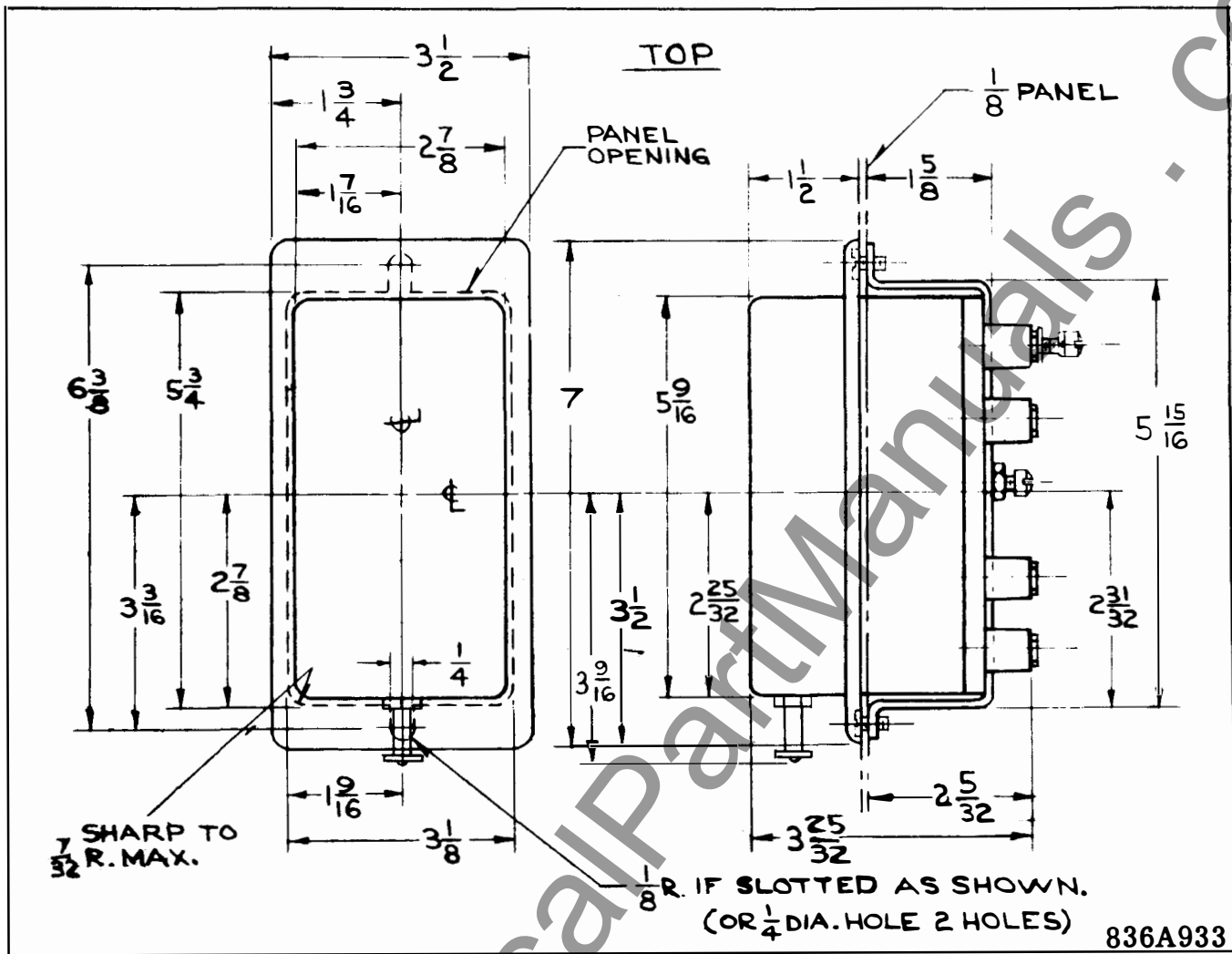


* Fig. 6 Outlines of External Resistors Used with Type TR-1 Relays



57-D-7900

* Fig. 7 Outline and Drilling Plan for the Type TR-1 Relay in the Type FT 11 case.



* Fig. 8 Outline and Drilling Plan for the Type TR-1 in Semi-Flush Molded Case.



* Fig. 9 Outline and Drilling Plan for the Type TR-1 in Projection Molded Case



WESTINGHOUSE ELECTRIC CORPORATION
RELAY-INSTRUMENT DIVISION

NEWARK, N. J.

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TYPE TR-1 AUXILIARY TRIPPING AND INDICATING RELAY

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APPLICATION

The type TR-1 relay is an auxiliary relay energized by protective relays to trip two circuit breakers. Sufficient contacts are provided to seal in both trip circuits until the breaker auxiliary switches operate. Indication is provided by targets which drop whenever the switch units within the relay operate.

CONSTRUCTION

The type TR-1 relay consists of two direct current, doubletrip indicating contactor switch units (ICS). The ICS is a small clapper type device. A magnetic armature, to which leafspring 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 target to drop. The target is reset from the outside of the case by a push rod located at the bottom of the cover.

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 coils of the ICS units are normally connected in series and energized through the trip contacts of the protective relays. The contacts of one unit

seal in the trip circuit and trip one breaker. The contacts of the other switch are for tripping a second breaker.

It is necessary to add resistance in the ICS unit coil circuit to limit current in these coils. Normally these coils are connected in series with an external resistance. (See Fig. 5). For the 1 ampere ICS unit relay 22 ohms are used for a 125 volt d-c trip circuit and 44 ohms for a 250 volt d-c trip circuit. These values of resistance are obtained by using one or two 22 ohm resistors. For the 0.2/2.0 ampere ICS unit relay a 100 ohm mid-tap resistor is used for a 125 volt d-c trip circuit and a 200 ohm mid-tap resistor for a 250 volt d-c trip circuit. With these resistance values, the relay operating time is approximately $\frac{1}{4}$ cycle (60 cycle basis).

CHARACTERISTICS

The ICS will trip at a current value between 1.0 and 1.2 amperes d.c. for the 1 ampere ICS unit. The current should not be greater than the particular ICS top setting being used for the 0.2/2.0 ampere ICS unit. The operation indicator target should drop freely. The trip circuit should draw at least $2\frac{1}{2}$ times rated value in order to keep the time of operation of the switch to a minimum and provide positive operation.

Trip Circuit Constants

1 ampere rating:	0.1 ohms d.c. resistance
0.2/2.0 ampere rating:	0.2 tap — 6.5 ohms
2	2 tap — 0.15 ohms

Coil Ratings

Tap Rating	Coil rating in amperes d.c.	
	1 second	continuous
1	140	5
0.2	11.5	0.4
2.0	88.0	3.2

SUPERSEDES I.L. 41-758.1B

*Denotes change from superseded issue.

EFFECTIVE MARCH 1968

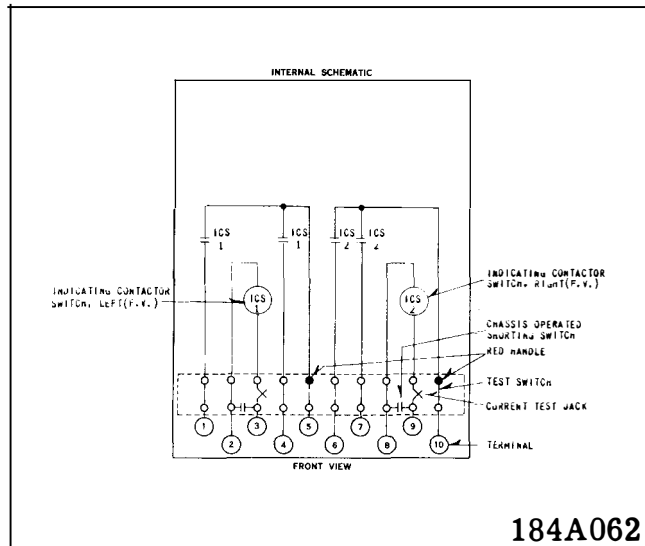


Fig. 1 Internal Schematic of Type TR-1 Relay with 1 ampere I.C.S. in Type FT 11 case.

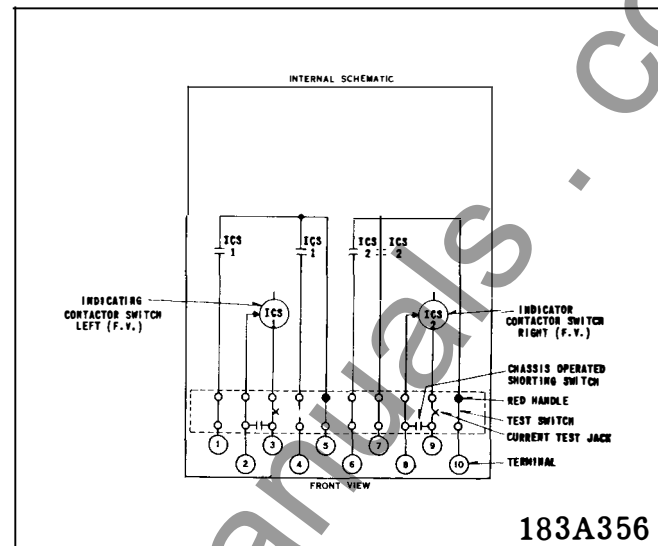


Fig. 2 Internal Schematic of Type TR-1 Relay with 0.2/2.0 ampere I.C.S. in Type FT 11 case.

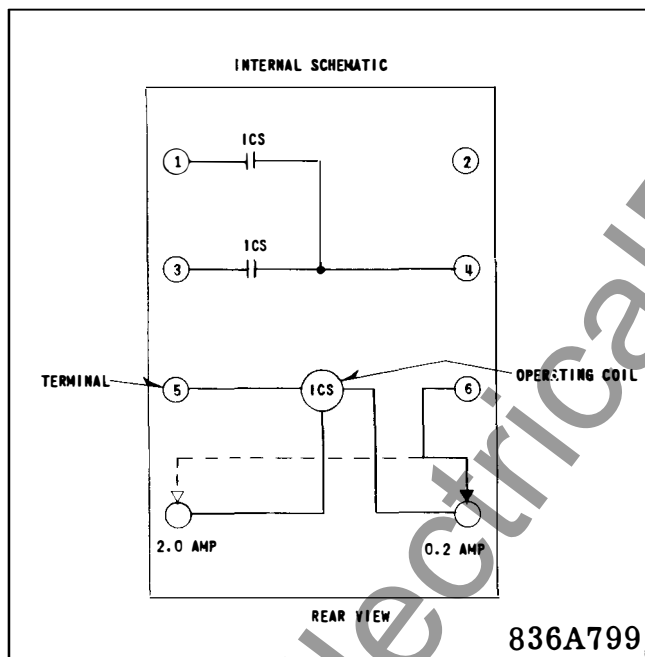


Fig. 3 Internal Schematic of Type TR-1 Relay with .2-2 ampere ICS in Semi-Flush Molded Case

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 con-

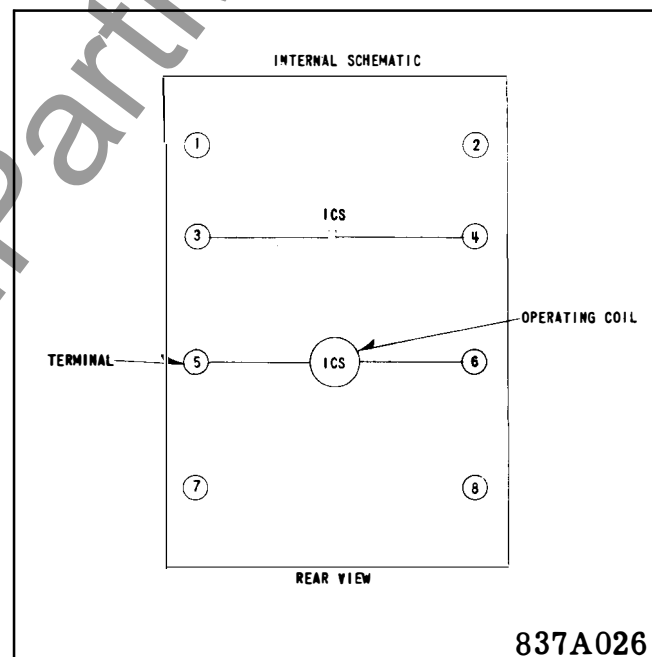
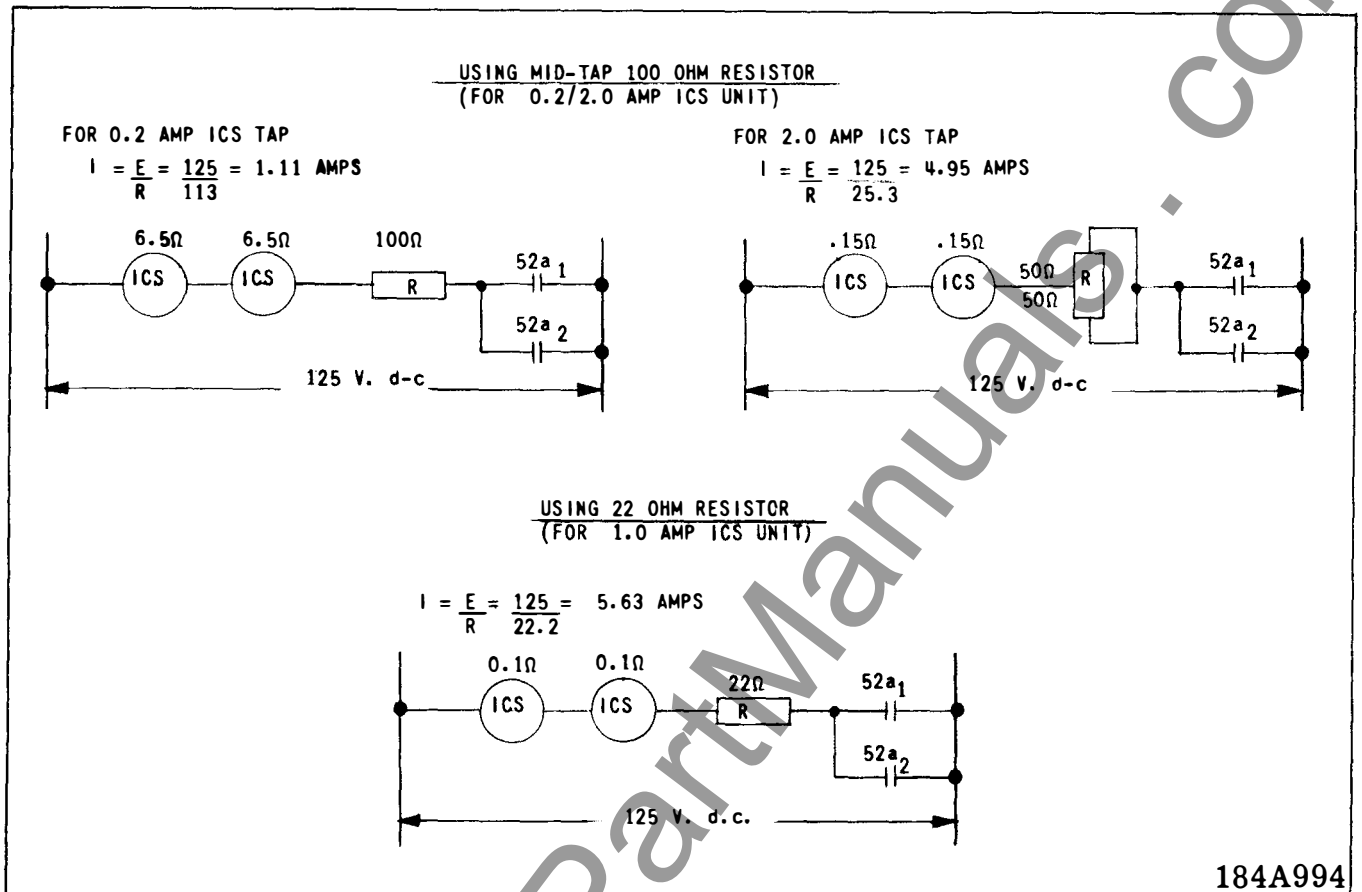


Fig. 4 Internal Schematic of Type TR-1 Relay with 1 ampere ICS in Projection Molded Case

nections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay 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.

For detailed FT case information refer to I.L. 41-076.



184A994

Fig. 5 Typical Schematic Diagrams for Type TR-1 Relay

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2. Routine Maintenance

The relays should be inspected periodically, at such time intervals as may be dictated by experience,

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The contact gap should be approximately 0.047" for the 0.2/2.0 ampere unit and 0.070" for the 1.0 ampere unit, between the bridging moving contact

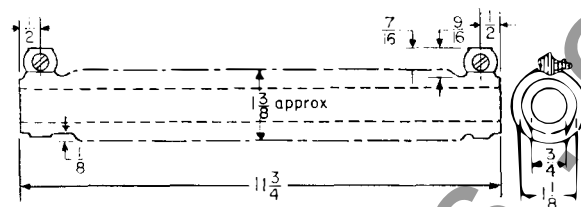
TYPE TR-1 RELAY

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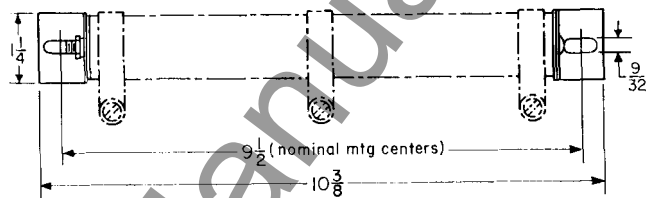
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* Fig. 6 Outlines of External Resistors Used with Type TR-1 Relays

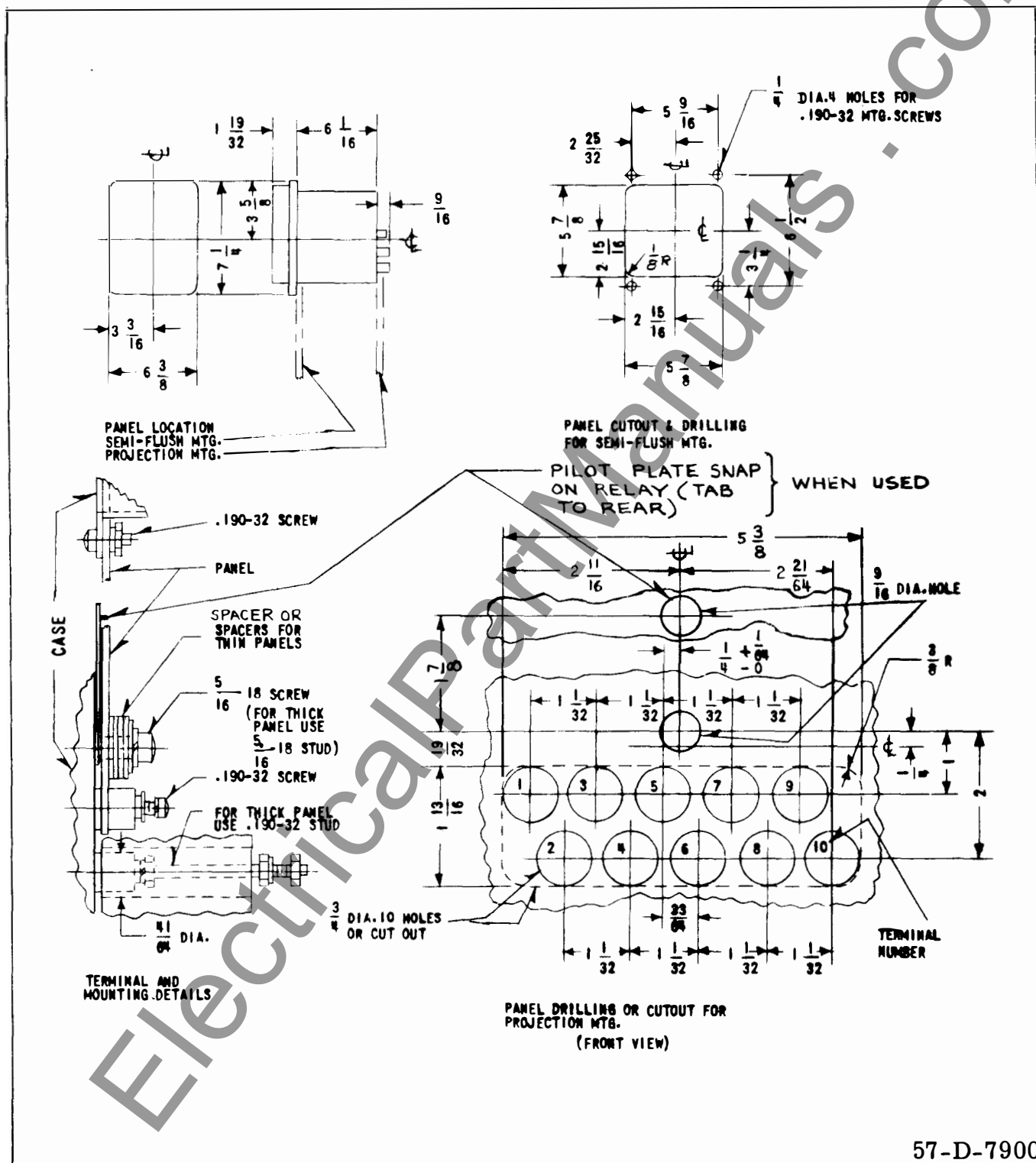
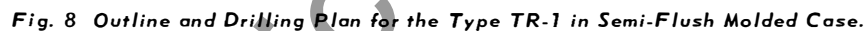


Fig. 7 Outline and Drilling Plan for the Type TR-1 Relay in the Type FT 11 case.



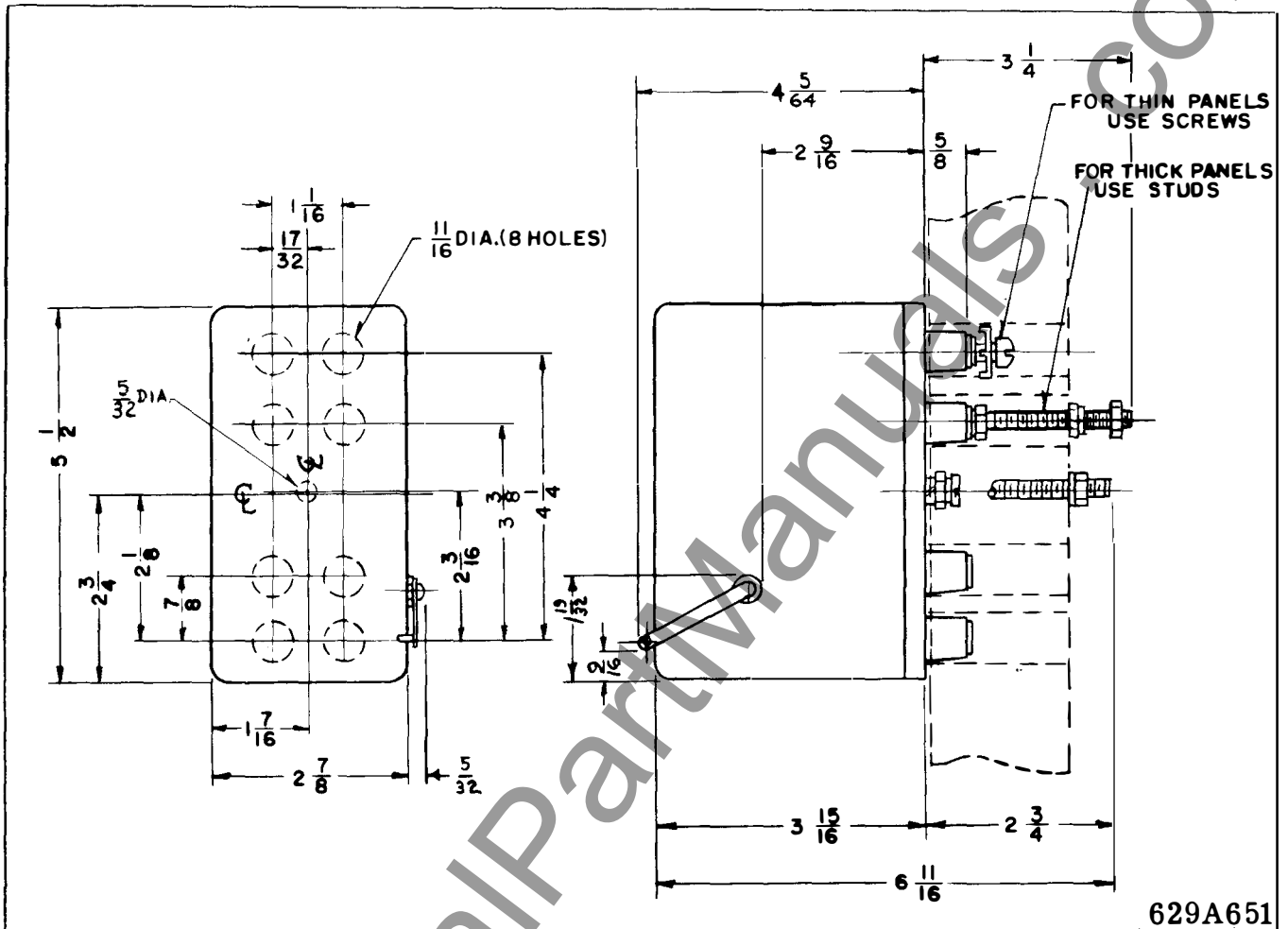


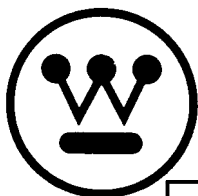
Fig. 9 Outline and Drilling Plan for the Type TR-1 in Projection Molded Case



WESTINGHOUSE ELECTRIC CORPORATION
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It is necessary to add resistance in the ICS unit coil circuit to limit current in these coils. Normally these coils are connected in series with an external resistance. (See Fig. 5). For the 1 ampere ICS unit relay 22 ohms are used for a 125 volt d-c trip circuit and 44 ohms for a 250 volt d-c trip circuit. These values of resistance are obtained by using one or two 22 ohm resistors. For the 0.2/2.0 ampere ICS unit relay a 100 ohm mid-tap resistor is used for a 125 volt d-c trip circuit and a 200 ohm mid-tap resistor for a 250 volt d-c trip circuit. With these resistance values, the relay operating time is approximately $\frac{3}{4}$ cycle (60 cycle basis).

CHARACTERISTICS

The ICS will trip at a current value between 1.0 and 1.2 amperes d.c. for the 1 ampere ICS unit. The current should not be greater than the particular ICS top setting being used for the 0.2/2.0 ampere ICS unit. The operation indicator target should drop freely. The trip circuit should draw at least $2\frac{1}{2}$ times rated value in order to keep the time of operation of the switch to a minimum and provide positive operation.

Trip Circuit Constants

1 ampere rating:	0.1 ohms d.c. resistance
0.2/2.0 ampere rating:	0.2 tap — 6.5 ohms
2	2 tap — 0.15 ohms

Coil Ratings

Tap Rating	Coil rating in amperes d.c.	
	1 second	continuous
1	140	5
0.2	11.5	0.4
2.0	88.0	3.2

SUPERSEDES I.L. 41-758.1C

*Denotes change from superseded issue.

EFFECTIVE JUNE 1969

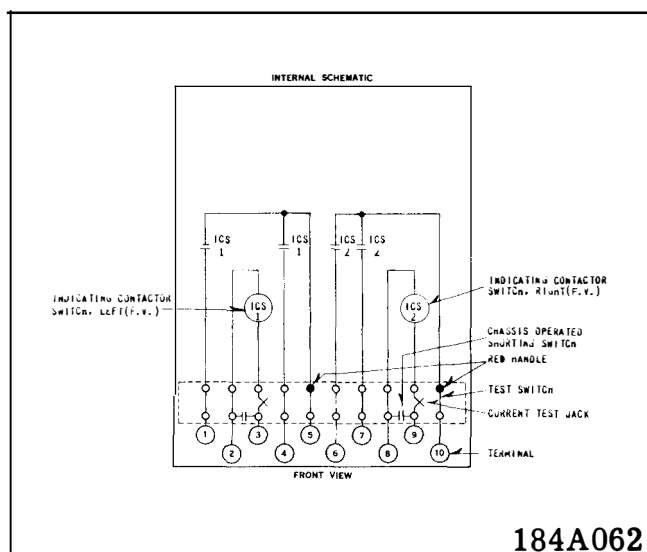


Fig. 1 Internal Schematic of Type TR-1 Relay with 1 ampere I.C.S. in Type FT 11 case.

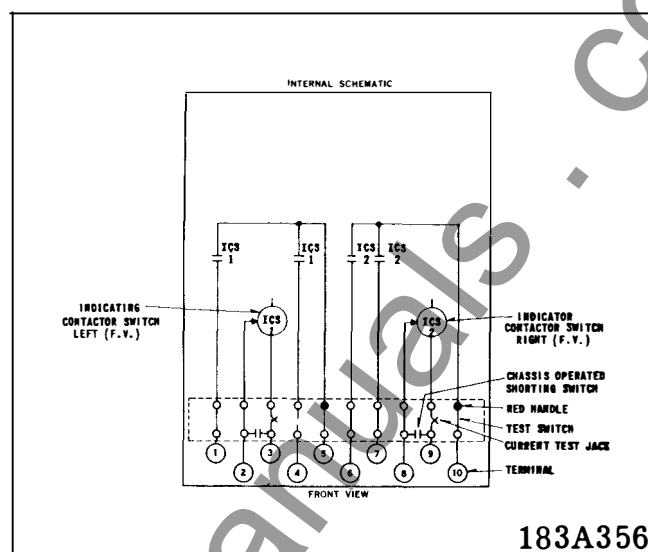


Fig. 2 Internal Schematic of Type TR-1 Relay with 0.2/2.0 ampere I.C.S. in Type FT 11 case.

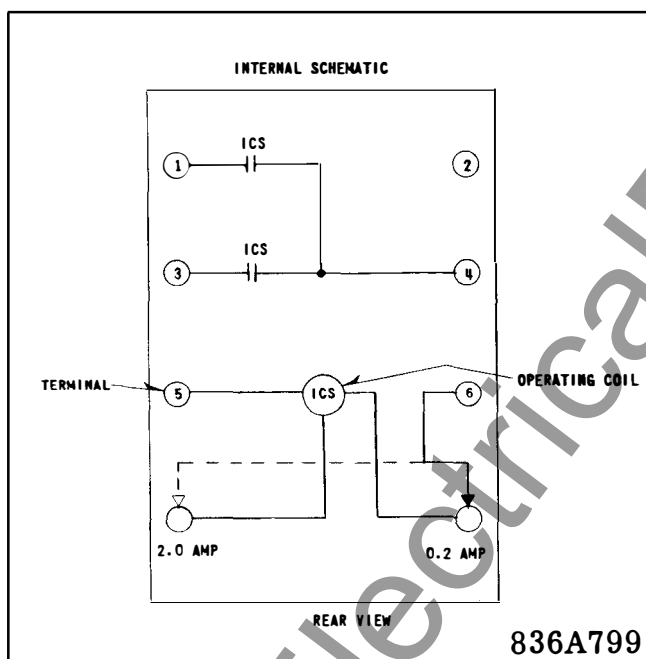


Fig. 3 Internal Schematic of Type TR-1 Relay with .2-2 ampere ICS in Semi-Flush Molded Case

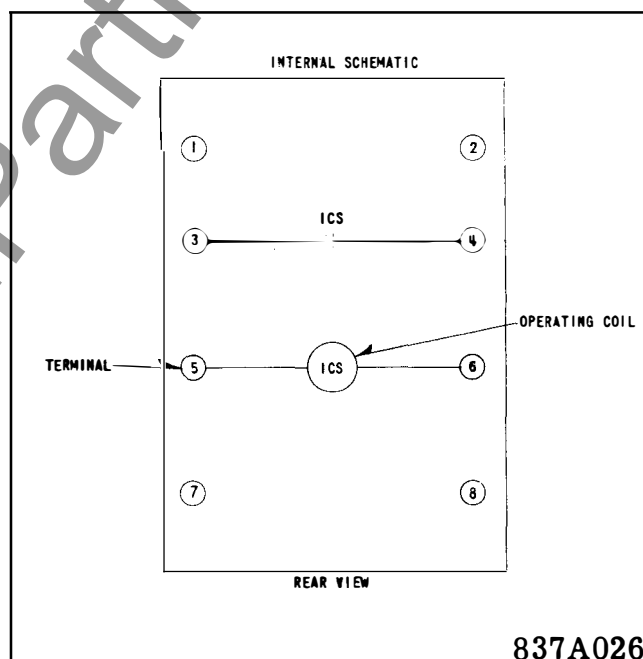


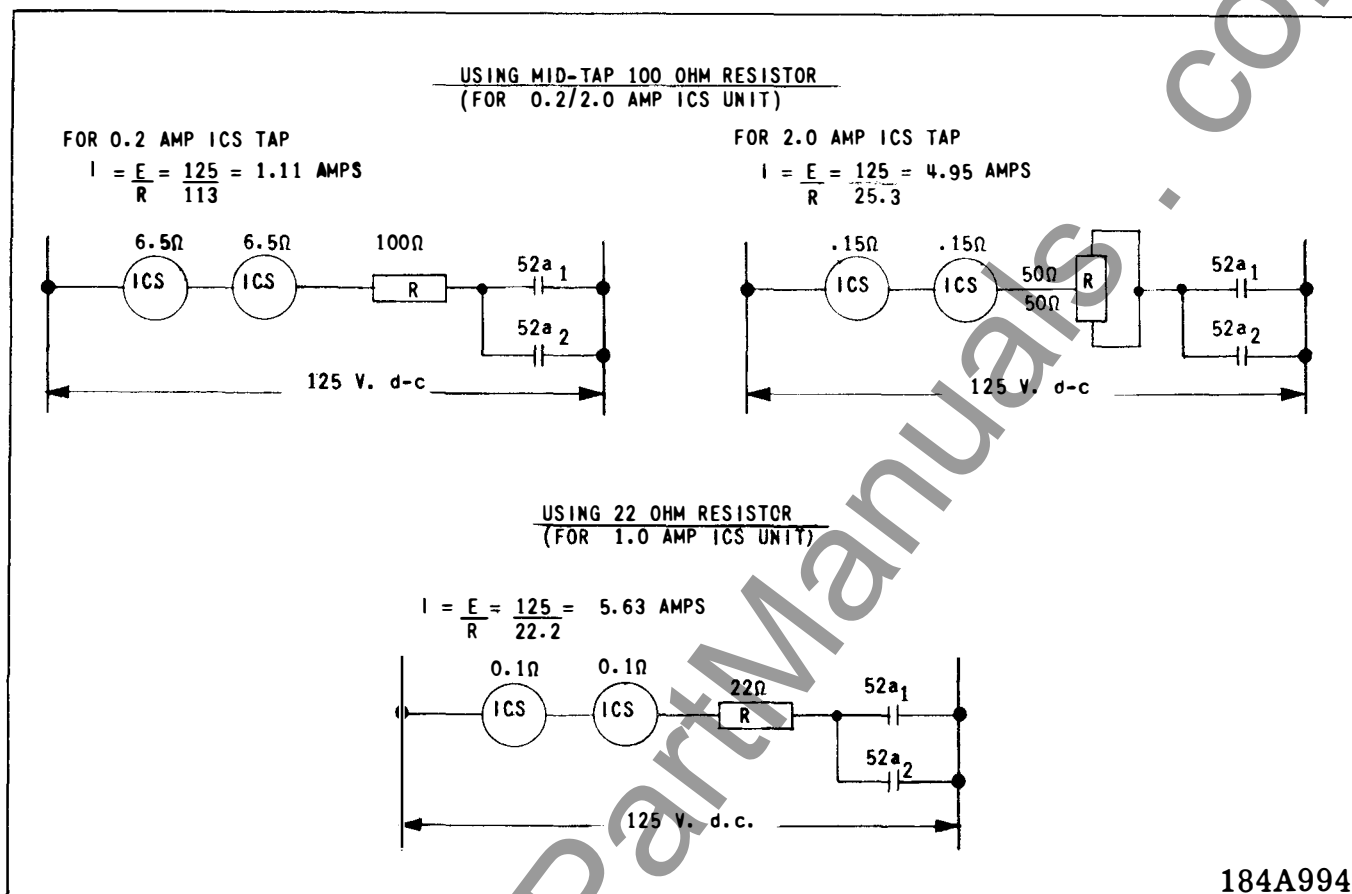
Fig. 4 Internal Schematic of Type TR-1 Relay with 1 ampere ICS in Projection Molded Case

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 con-

nections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay 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.

For detailed FT case information refer to I.L. 41-076.



184A994

Fig. 5 Typical Schematic Diagrams for Type TR-1 Relay

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.

1. Acceptance Tests

These tests are to be used for checking the prime characteristics to demonstrate that the relay received meets specifications and is in serviceable condition.

Pass sufficient direct current through the ICS coils to operate the ICS unit. For the 1 ampere ICS unit the value should be between 1.0 and 1.2 amperes d.c. The current should not be greater than the particular ICS tap setting being used for the 0.2/2.0 ampere ICS unit.

2. Routine Maintenance

The relays should be inspected periodically, at such time intervals as may be dictated by experience,

to insure that the relays have retained their calibration and are in proper operating condition.

All contacts should be cleaned periodically. A contact burnisher #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.

3. Calibration

Pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should be not less than 1.0 ampere nor greater than 1.2 amperes for the 1.0 ampere ICS. The current should not be greater than the particular ICS tap setting being used for the 0.2-2.0 ampere ICS. The operation indicator target should drop freely.

The contact gap should be approximately 0.047" for the 0.2/2.0 ampere unit and 0.070" for the 1.0 ampere unit, between the bridging moving contact

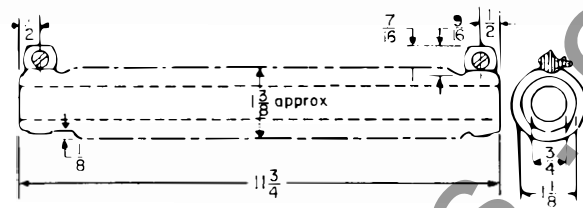
TYPE TR-1 RELAY

and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

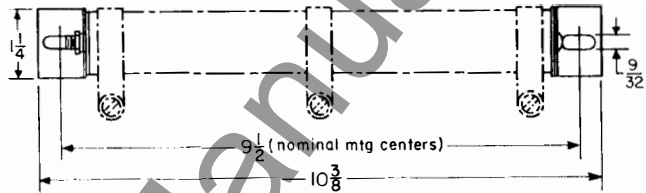
RENEWAL PARTS

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.

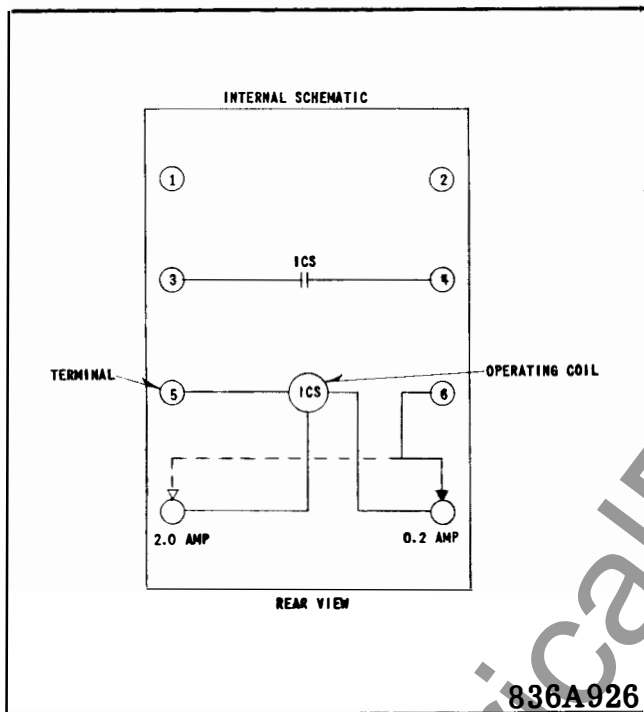
style number 1164 990 (22 ohms)



style number 290B664G48 (40 ohms) for 48 v d-c
style number 1955 870 (100 ohms) for 125 v d-c
style number 1955 871 (200 ohms) for 250 v d-c

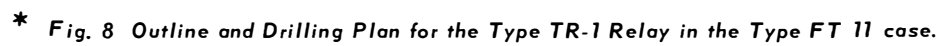


* Fig. 7 Outlines of External Resistors Used with Type TR-1 Relays



836A926

* Fig. 6 Internal Schematic of Type TR-1 Relay with .2-.2. ampere ICS in Semi-flush Case



* Fig. 9 Outline and Drilling Plan for the Type TR-1 in Semi-Flush Molded Case.



* Fig. 10 Outline and Drilling Plan for the Type TR-1 in Projection Molded Case



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RELAY-INSTRUMENT DIVISION

NEWARK, N. J.

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INSTALLATION • OPERATION • MAINTENANCE I N S T R U C T I O N S

TYPE TR-1 AUXILIARY TRIPPING AND INDICATING RELAY

CAUTION

Before putting protective 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 TR-1 relay is an auxiliary relay energized by protective relays to trip two circuit breakers. Sufficient contacts are provided to seal in both trip circuits until the breaker auxiliary switches operate. Indication is provided by targets which drop whenever the switch units within the relay operate.

CONSTRUCTION

- ✱ The type TR-1 consists of one or two direct current, doubletrip indicating contactor switch units (ICS). The ICS is a small clapper type device. A magnetic armature, to which leafspring 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 target to drop. The target is reset from the outside of the case
- ✱ by a push rod located at the bottom of the case cover.

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 coils of the ICS units are normally connected in series and energized through the trip contacts of the protective relays. The contacts of one unit seal in the trip circuit and trip

one breaker. The contacts of the other switch are for tripping a second breaker.

- ✱ It is necessary to add resistance in the ICS unit coil circuit to limit current in these coils. Normally these coils are connected in series with an external resistance. (See Fig. 5). For the 1 ampere ICS unit relay 22 ohms are used for a 125 volt dc trip circuit and 44 ohms for a 250 volt dc trip circuit (Fig. 5c). These values of resistance are obtained by using one or two 22 ohm resistors. For the 0.2/2.0 ampere ICS unit relay set on 0.2 tap (Fig. 5a) a 100 ohm mid-tap resistor is used for a 125 volt dc trip circuit and a 200 ohm mid-tap resistor for a 250 volt dc trip circuit. For 2 ampere setting a 25 ohm resistor (100 ohm mid-tap) is used for a 125 volt dc trip circuit (Fig. 5b). With these resistance values, the relay operating time is approximately $\frac{1}{4}$ cycle (60 hertz basis).

CHARACTERISTICS

The ICS will trip at a current value between 1.0 and 1.2 amperes dc for the 1 ampere ICS unit. The current should not be greater than the particular ICS top setting being used for the 0.2/2.0 ampere ICS unit. The operation indicator target should drop freely. The trip circuit should draw at least $2\frac{1}{2}$ times rated value in order to keep the time of operation of the switch to a minimum and provide positive operation.

TRIP CIRCUIT CONSTANTS

1 ampere rating:	0.1 ohms dc resistance
0.2/2.0 ampere rating: 0.2 tap	— 6.5 ohms
2	2 tap — 0.15 ohms

COIL RATINGS

Tap Rating	Coil rating in amperes dc	
	1 second	continuous
1	140	5
0.2	11.5	0.4
2.0	88.0	3.2

TYPE TR-1 RELAY

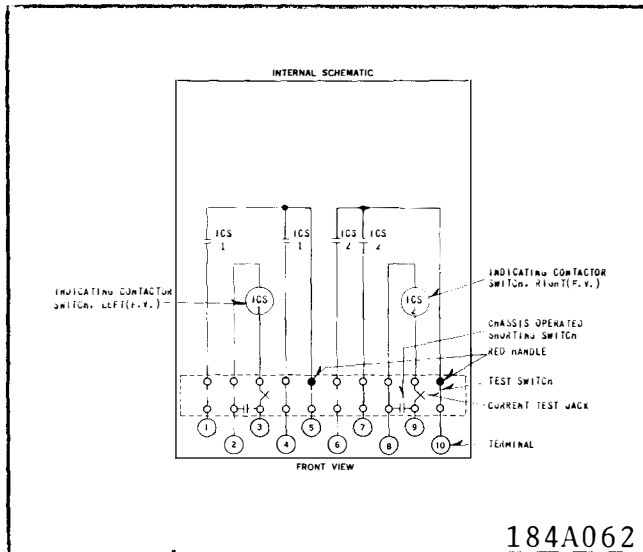


Fig. 1. Internal Schematic of Type TR-1 Relay with two 1 ampere ICS units in Type FT 11 case.

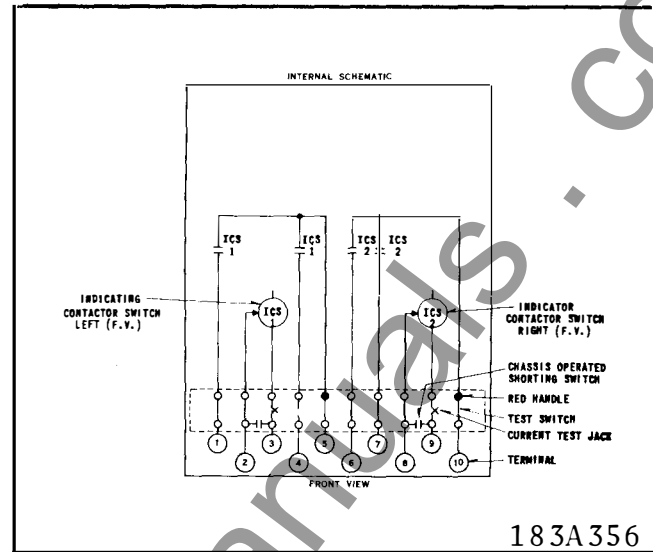


Fig. 2. Internal Schematic of Type TR-1 Relay with two 0.2/2.0 ampere ICS units in Type FT11 case.

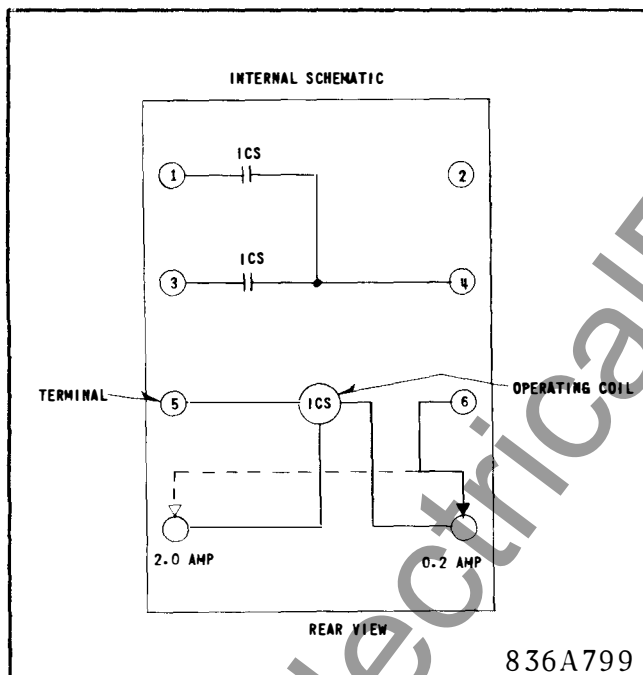


Fig. 3. Internal Schematic of Type TR-1 Relay with one 0.2-2.0 ampere ICS double contacts unit in molded base, glass window cover, case.

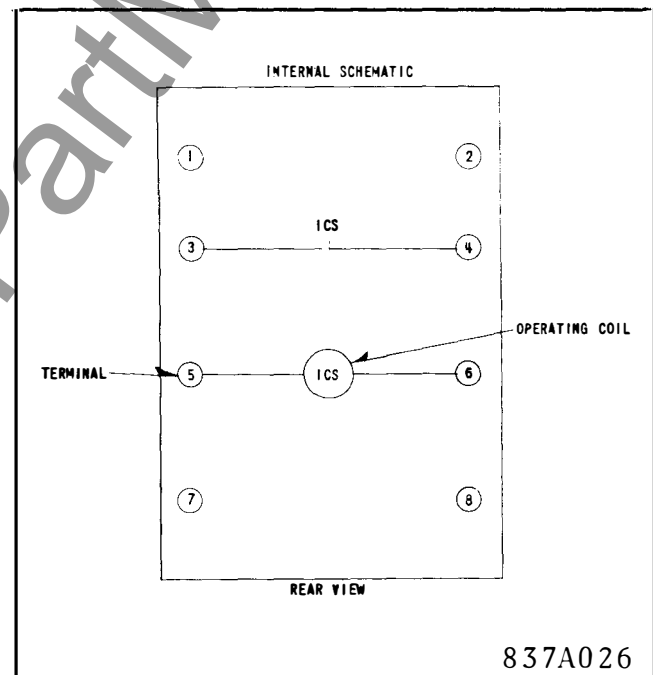


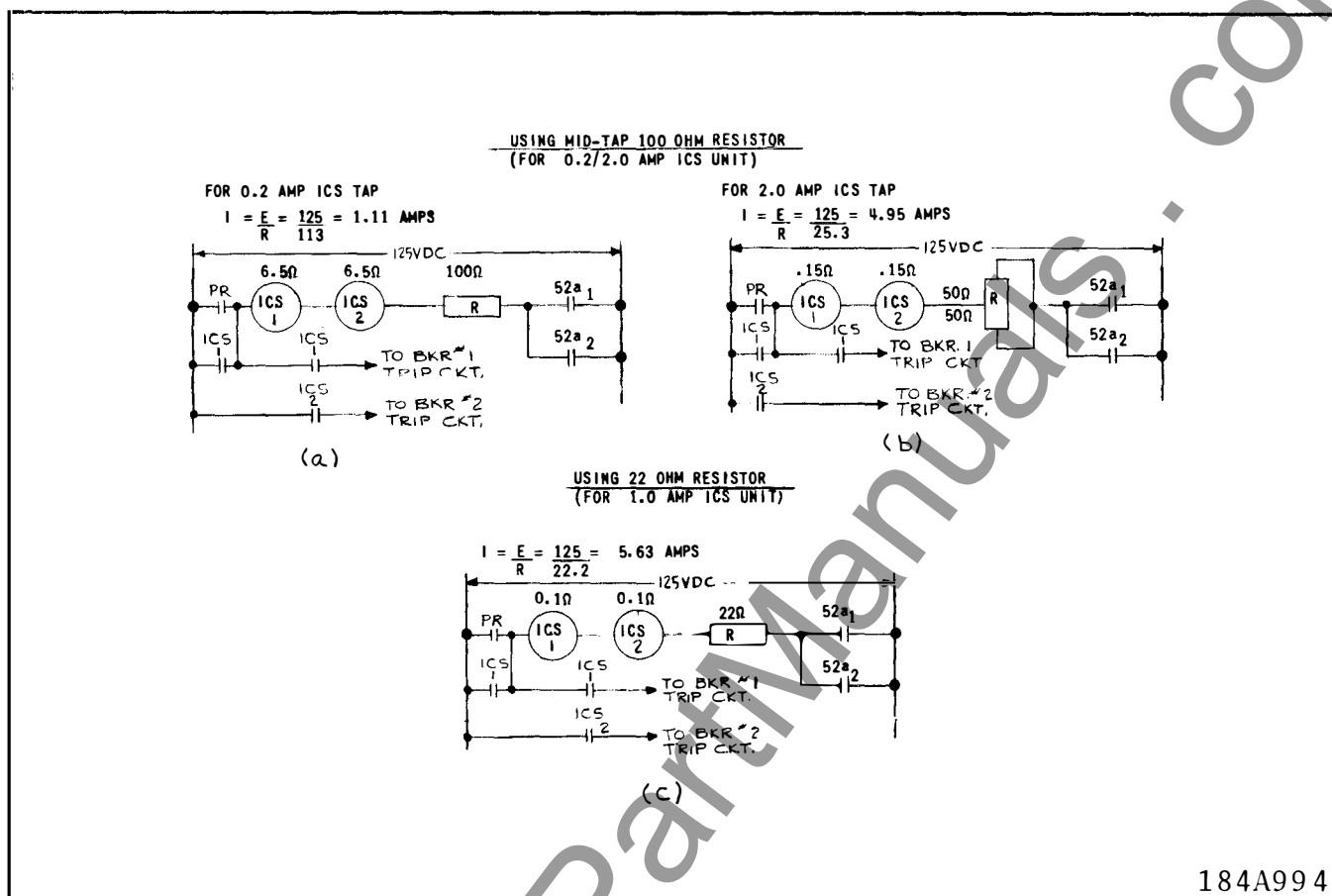
Fig. 4. Internal Schematic of Type TR-1 Relay with one 1 ampere ICS unit in molded base, glass window cover, case.

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 (or two) 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 steel panel mounting or to the terminal studs furnished with the relay 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.

For detailed FT case information refer to I.L. 41-076.



184A994

✱ Fig. 5. Typical Schematic Diagrams for Type TR-1 Relay.

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.

1. ACCEPTANCE TESTS

These tests are to be used for checking the prime characteristics to demonstrate that the relay received meets specifications and is in serviceable condition.

- ✱ Pass sufficient direct current through the ICS coils to operate the ICS unit. For the 1 ampere ICS unit the value should be between 1.0 and 1.2 amperes dc. For the 0.2/2.0 ampere ICS unit, the current should not be greater than the setting being used.

2. ROUTINE MAINTENANCE

The relays should be inspected periodically, at such time intervals as may be dictated by experience, to insure that the relays have retained their calibration and are in proper operating condition.

All contacts should be cleaned periodically. A contact burnisher #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.

3. CALIBRATION

Pass sufficient dc current through the trip circuit to close the contacts of the ICS. This value of current should be not less than 1.0 ampere nor greater than 1.2 amperes for the 1.0 ampere ICS. The current should not be greater than the particular ICS tap setting being used for the 0.2-2.0 ampere ICS. The operation indicator target should drop freely.

The contact gap should be approximately 0.047" for the 0.2/2.0 ampere unit and 0.070" for the 1.0 ampere unit, between the bridging moving contact and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

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.

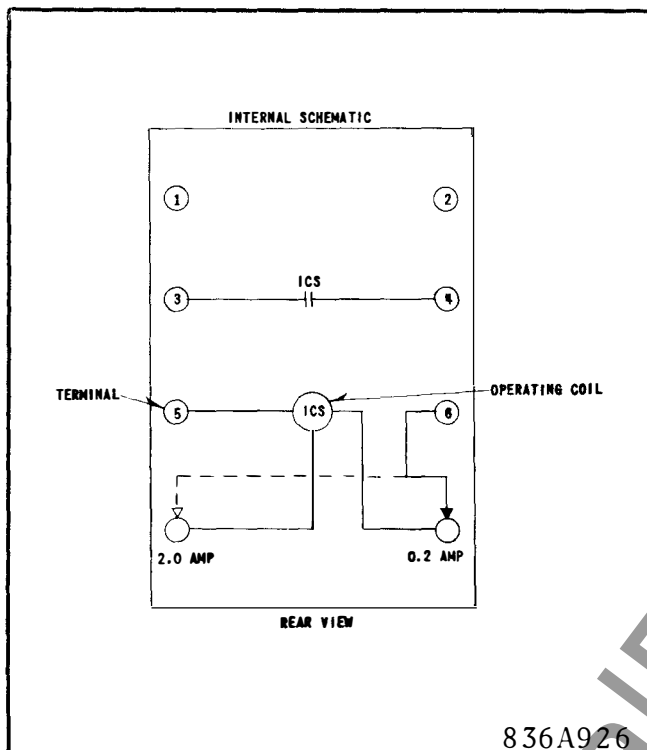
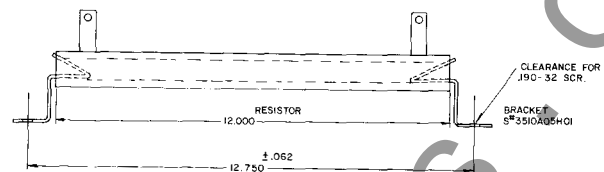
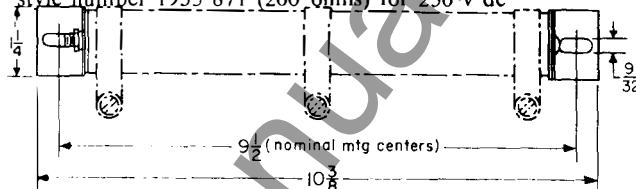


Fig. 6. Internal Schematic of Type TR-1 Relay with one 0.2-2.0 ampere ICS unit in molded base, glass window cover, case.

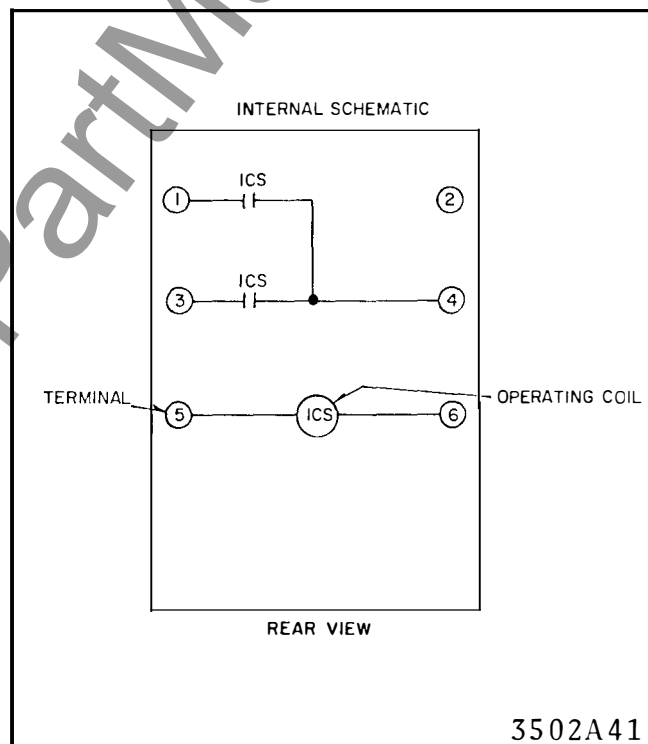
- style number 1164 990 (22 ohms)
- ✱ style number 3510A05H01 Mtg. Bracket, if used.
(2 Brackets are required for style number 1164990 Resistor.)



- style number 290B664G48 (40 ohms) for 48 v dc
- style number 1955 870 (100 ohms) for 125 v dc
- style number 1955 871 (200 ohms) for 250 v dc



✱ Fig. 7. Outlines of External Resistors Used with Type TR-1 Relays.



✱ Fig. 8. Internal Schematic of Type TR-1 Relay with one 1 ampere ICS double contacts unit in molded base, glass window cover, case.

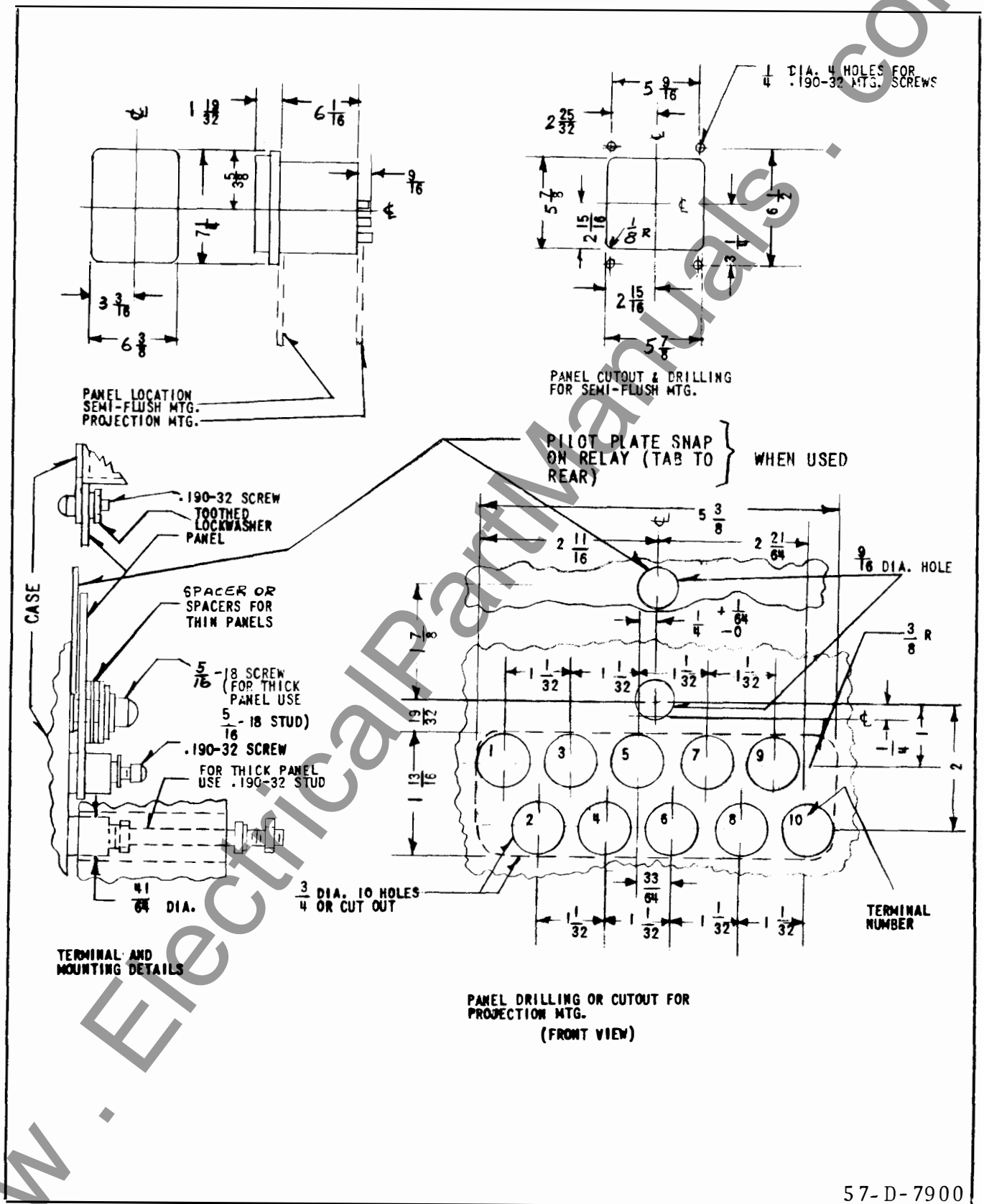


Fig. 9. Outline and Drilling Plan for the Type TR-1 Relay in the Type FT 11 case.

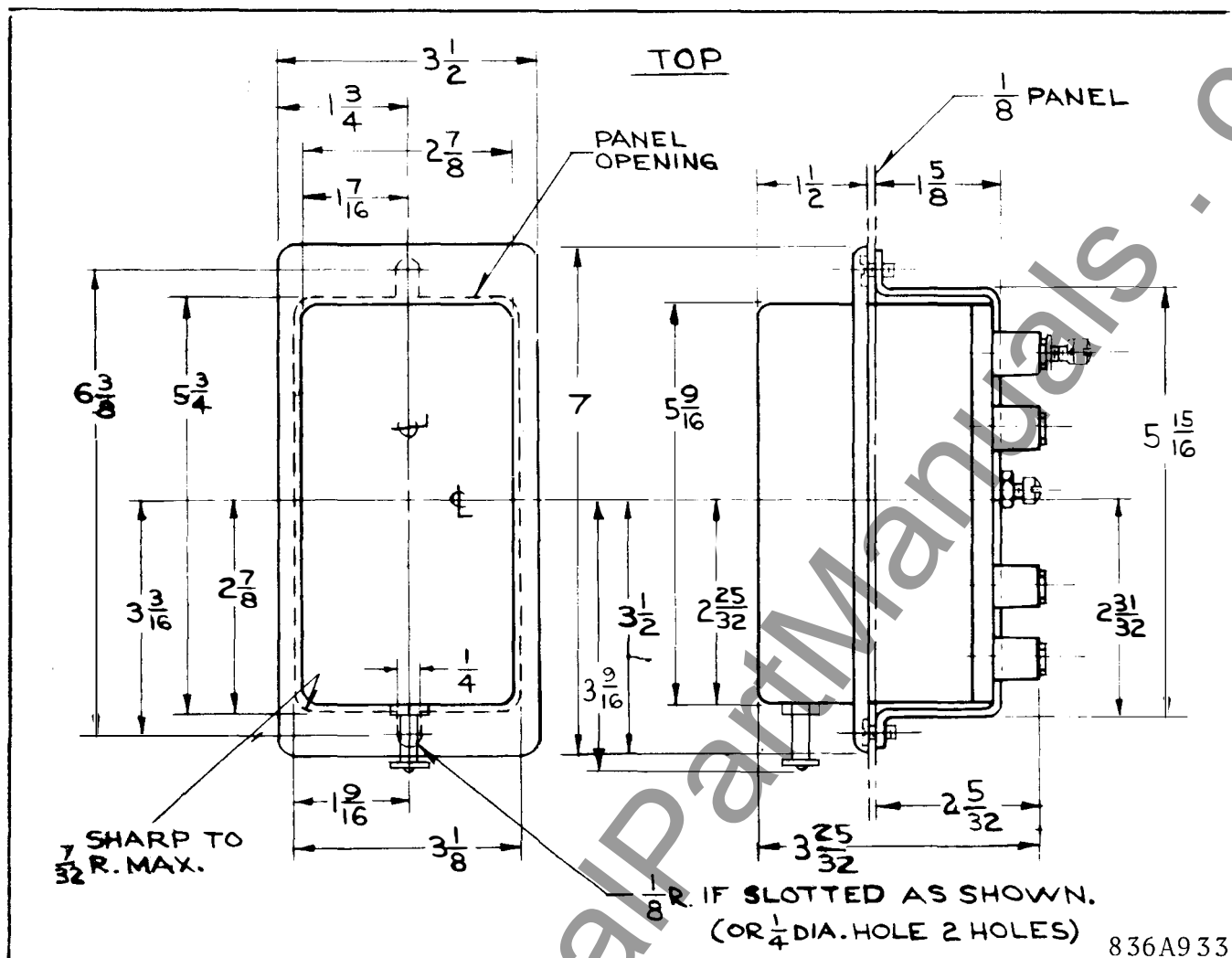


Fig. 10. Outline and Drilling Plan for the Type TR-1 in molded base, glass window cover, Semi-Flush Case.

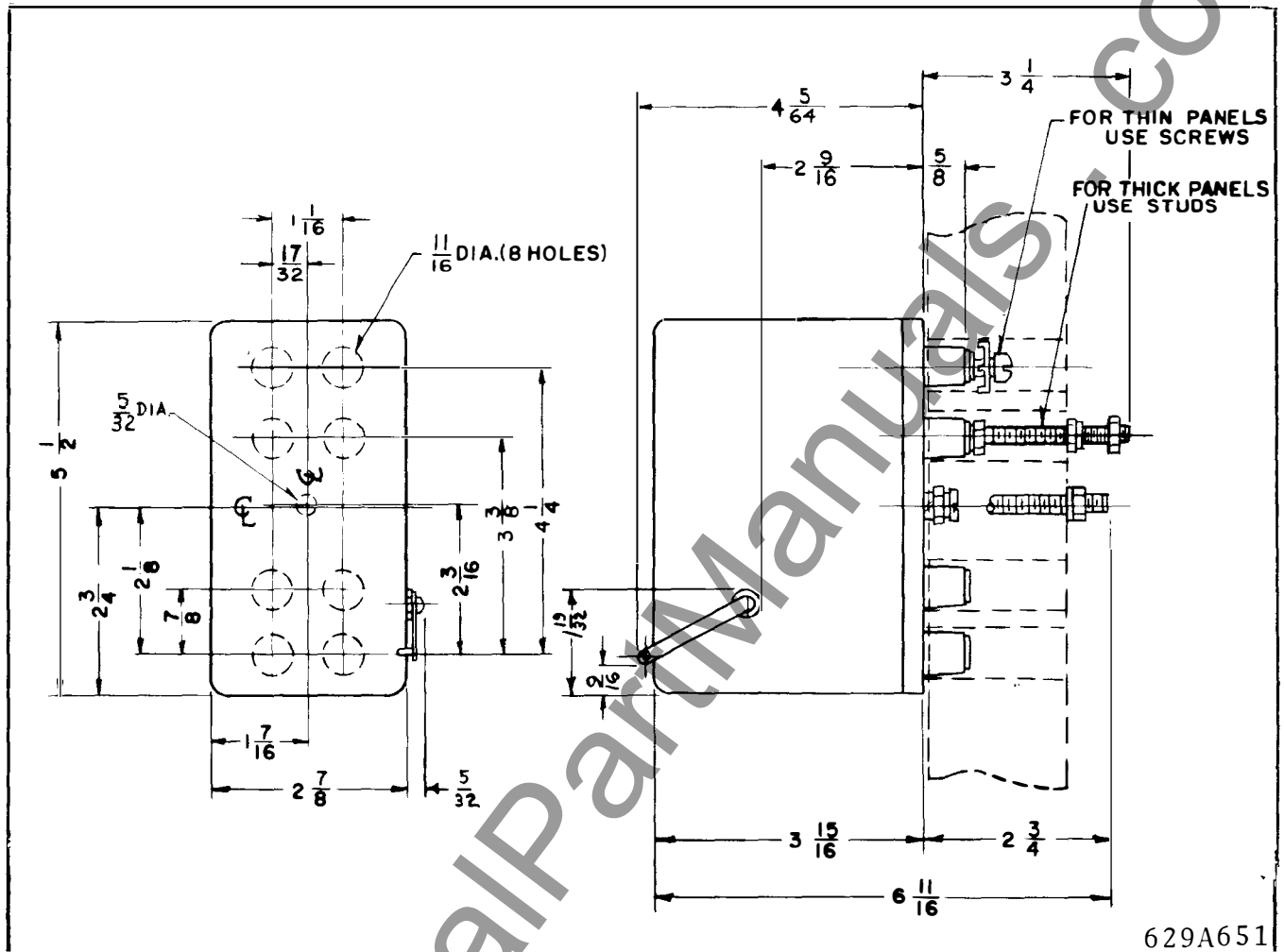


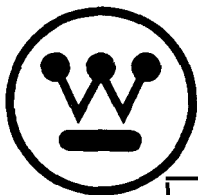
Fig. 11. Outline and Drilling Plan for the Type TR-1 in molded base, glass window cover, Projection Case.



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INSTALLATION • OPERATION • MAINTENANCE I N S T R U C T I O N S

TYPE TR-1 AUXILIARY TRIPPING AND INDICATING RELAY

CAUTION: Before putting protective 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 TR-1 relay is an auxiliary relay energized by protective relays to trip two circuit breakers. Sufficient contacts are provided to seal in both trip circuits until the breaker auxiliary switches operate. Indication is provided by targets which drop whenever the switch units within the relay operate.

CONSTRUCTION

The type TR-1 relay consists of two direct current, doubletrip indicating contactor switch units (ICS). The ICS is a small clapper type device. A magnetic armature, to which leafspring 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 target to drop. The target is reset from the outside of the case by a push rod located at the bottom of the cover.

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 coils of the ICS units are normally connected in series and energized through the trip contacts of the protective relays. The contacts of one unit

seal in the trip circuit and trip one breaker. The contacts of the other switch are for tripping a second breaker.

It is necessary to add resistance in the ICS unit coil circuit to limit current in these coils. Normally these coils are connected in series with an external resistance. (See Fig. 3). For the 1 ampere ICS unit relay 22 ohms are used for a 125 volt d-c trip circuit and 44 ohms for a 250 volt d-c trip circuit. These values of resistance are obtained by using one or two 22 ohm resistors. For the 0.2/2.0 ampere ICS unit relay a 100 ohm mid-tap resistor is used for 0-125 volt d-c trip circuit and a 200 ohm mid-tap resistor for a 250 volt d-c trip circuit. With these resistance values, the relay operating time is approximately $\frac{3}{4}$ cycle (60 cycle basis).

CHARACTERISTICS

The ICS will trip at a current value between 1.0 and 1.2 amperes d.c. for the 1 ampere ICS unit. The current should not be greater than the particular ICS top setting being used for the 0.2/2.0 ampere ICS unit. The operation indicator target should drop freely. The trip circuit should draw at least $2\frac{1}{2}$ times rated value in order to keep the time of operation of the switch to a minimum and provide positive operation.

Trip Circuit Constants

1 ampere rating:	0.1 ohms d.c. resistance
0.2/2.0 ampere rating:	0.2 tap — 6.5 ohms
2	2 tap — 0.15 ohms

Coil Ratings

Tap Rating	Coil rating in amperes d.c.	
	1 second	continuous
1	140	5
0.2	11.5	0.4
2.0	88.0	3.2

TYPE TR-1 RELAY

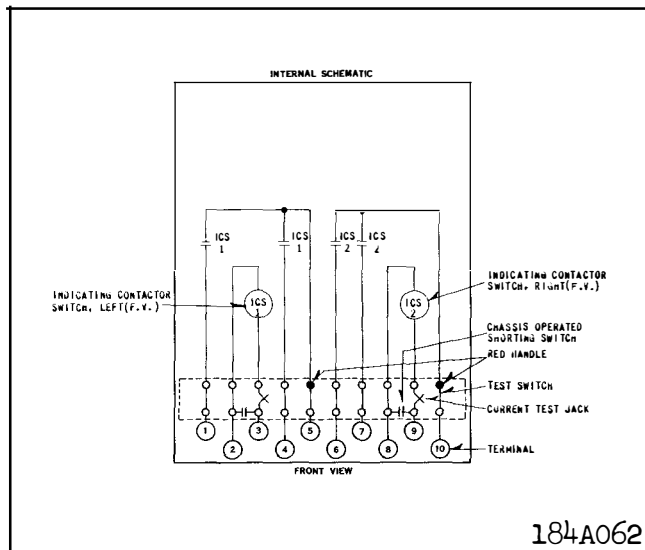


Fig. 1 Internal Schematic of Type TR-1 Relay with 1 ampere I.C.S. in Type FT 11 case.

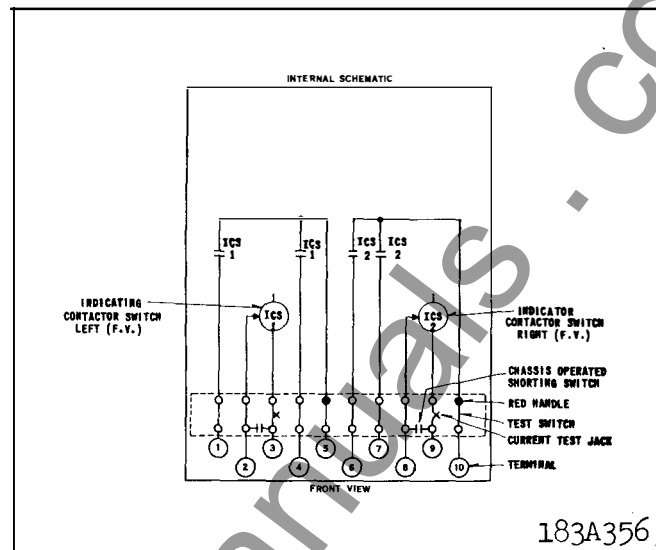


Fig. 2. Internal Schematic of Type TR-1 Relay with 0.2/2.0 ampere I.C.S. in Type FT 11 case.

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 steel panel mounting or to the terminal studs furnished with the relay 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.

For detailed FT case information refer to I.L. 41-076.

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.

1. Acceptance Tests

These tests are to be used for checking the prime characteristics to demonstrate that the relay

received meets specifications and is in serviceable condition.

Pass sufficient direct current through the ICS coils to operate the ICS unit. For the 1 ampere ICS unit the value should be between 1.0 and 1.2 amperes d.c. The current should not be greater than the particular ICS tap setting being used for the 0.2/2.0 ampere ICS unit.

2. Routine Maintenance

The relays should be inspected periodically, at such time intervals as may be dictated by experience, to insure that the relays have retained their calibration and are in proper operating condition.

All contacts should be cleaned periodically. A contact burnisher #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.

3. Calibration

Pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should be not less than 1.0 ampere nor greater than 1.2 amperes for the 1.0 ampere ICS. The current should not be greater than the particular ICS tap



The contact gap should be approximately 0.047" for the 0.2/2.0 ampere unit and 0.070" for the 1.0 ampere unit, between the bridging moving contact and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

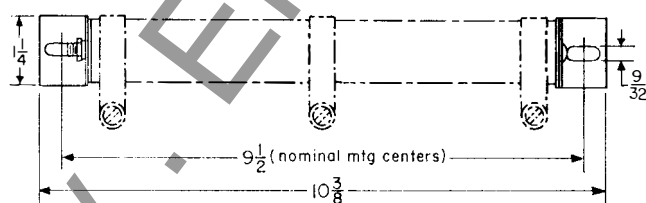


Fig. 4. Outlines of External Resistors used with Type TR-1 Relays

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.

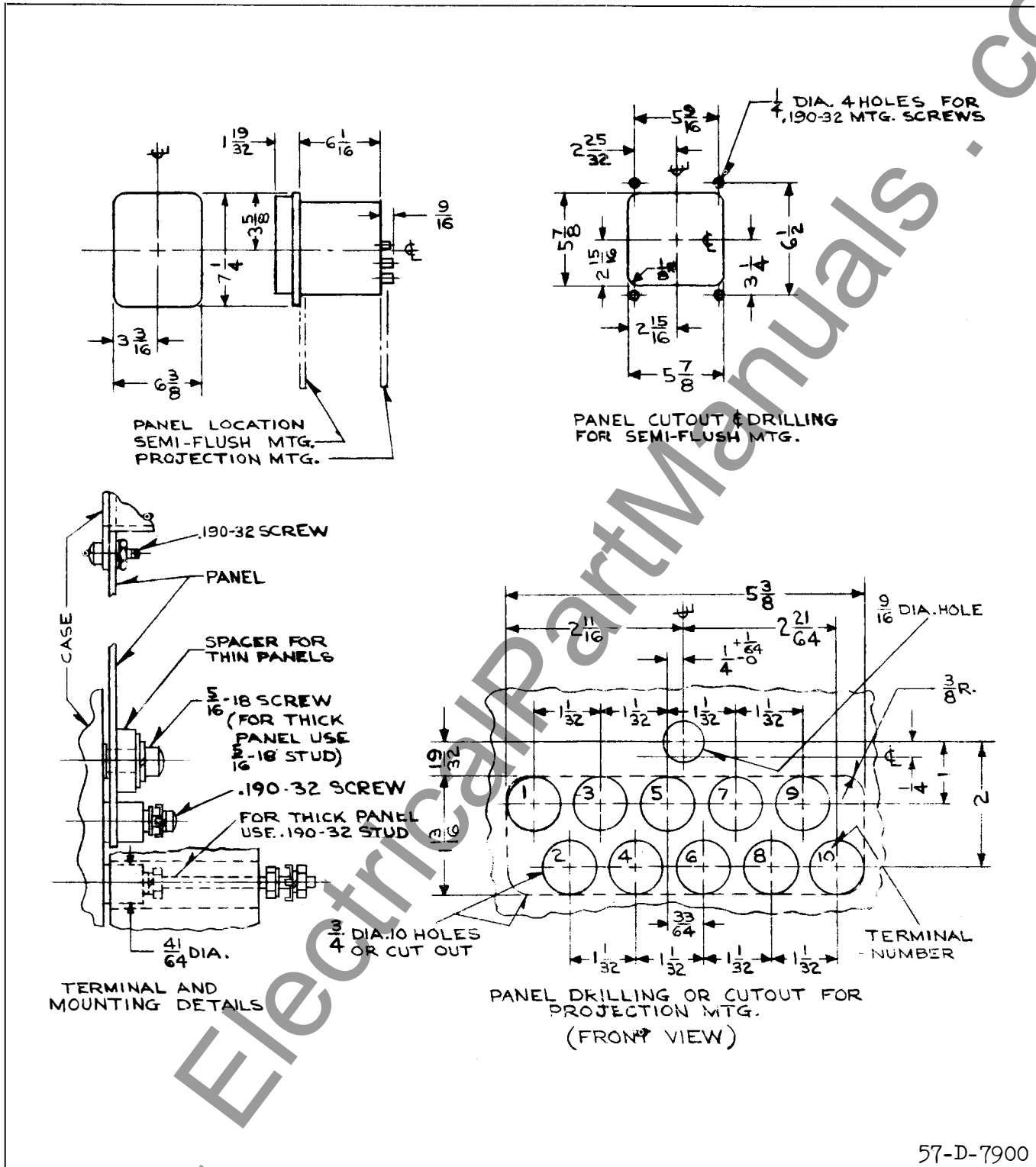


Fig. 5. Outline and Drilling Plan for the Type TR-1 Relay in the Type FT 11 case

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