Type KC-2 High Speed Overcurrent Relay

Effective: February 1991
This Addendum Supersedes
All Previous Addenda

A - Add New Information • C - Change Existing Information • D - Delete Information

C

Page 2

4.1 Overcurrent Unit (I); change paragraphs 2 and 3 to read:

CAUTION

Since the tap block screw carries operating current, be sure that the screws are turned tight.

In order to avoid opening current transformer circuits when changing taps under load, the relay must be first removed from the case. Chassis operating shorting switches on the case will short the secondary of the current transformer. The taps should then be changed with the relay outside of the case and then reinserted into the case.

THIS PAGE RESERVED FOR NOTES

Instruction Leaflet
41-776.2G

Effective: September 1989
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★ Denotes Changed Since Previous Issue

Type KC-2 High Speed Overcurrent 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.

NOTE: These instructions apply to 50 and 60 Hz Relays

1. APPLICATION

The type KC-2 relay is a two unit high speed overcurrent level detector. As an example, it may be used as a fault detector for KD-10 distance relays. It may be operated continuously picked up, if the application requires, without experiencing excessive wear.

2. CONSTRUCTION AND OPERATION

The type KC-2 relay consists of two high speed overcurrent cylinder units and an indicating contactor switch.

2.1 Overcurrent Unit (I)

The overcurrent unit is a product induction cylinder type unit. The time phase relationship of the two air gap fluxes necessary for the development of torque is achieved by means of a capacitor connected in series with one pair of pole windings.

Mechanically, the overcurrent unit is composed of four basic components: a die-cast aluminum frame, an electromagnet, a moving element assembly and a molded bridge.

The frame serves as the mounting structure for the magnetic core. The magnetic core, which houses the lower pin bearing, is secured to the frame by locking nut. The bearing can be replaced, if necessary, without having to remove the magnetic core from the frame.

The electromagnet has two pairs of coils. The coils of each pair are mounted diametrically opposite one another. In addition there are 2 locating pins. The locating pins are used to accurately position the lower pin bearing, which is mounted on the frame, with respect to the upper pin bearing, which is threaded into the bridge. The electromagnet is secured to the frame by four mounting screws.

The moving element assembly consists of a spiral spring, contact carrying member, and an aluminum cylinder assembled to a molded hub which holds the shaft. The shaft has removable top and bottom jewel bearings. The shaft rides between the bottom pin bearing and the upper pin bearing with the cylinder rotating in an air gap formed by the electromagnet and the magnetic core.

The bridge is secured to the electromagnet and frame by two mounting screws. In addition to holding the upper pin bearing, the bridge is used for mounting the adjustable stationary contact housing. The stationary contact housing is held in position by a spring type clamp. The spring adjuster is located on the underside of the bridge and is attached to the moving contact arm by spiral spring. The spring adjuster is also held in place by a spring type clamp.

With the normally open contacts closed, the electrical connection is made through the stationary contact housing clamp, to the moving contact, through the spiral spring out to the spring adjuster clamp.

All possible contingencies which may arise during installation, operation or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding this particular installation, operation or maintenance of this equipment, the local ABB representative should be contacted.

A transformer and varistor assembly is used in conjunction with the overcurrent unit. The transformer is of the saturating type which limits the energy to the overcurrent unit and reduces the burden on the operating ct.

The primary of the transformer is tapped and brought out a tap connector block for ease in changing the pickup current of the relay. The use of a tapped transformer provides approximately the same energy level at a given multiple of pickup current for any tap setting, resulting in one time curve throughout the range of the relay.

Across the secondary is connected a non-linear resistor known as a varistor. The effect of the varistor is to reduce the voltage peaks applied to the overcurrent unit and phase capacitor.

2.2 Indicating Contactor Switch Unit (ICS)

The indicating contactor switch is a small dc 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 indicator target to drop. The target is reset from the outside of the case by 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.

3. CHARACTERISTICS

The relay is available in the following current ranges:

Range	Taps					
0.5 - 2 amps	0.5	0.75	1.0	1.25	1.5	2
1 - 4	1.0	1.5	2.0	2.5	3.0	4.0
2 - 8	2	3	4	5	6	8
4 - 16	4	6	8	9	12	16
10 - 40	10	15	20	24	30	40

The tap value is the minimum current required to just close the overcurrent relay contacts. For pickup settings in between taps refer to the section under adjustments.

3.1 Contacts

The moving contact assembly in the overcurrent unit has been factory adjusted for low contact bounce performance and should not be disturbed.

3.2 Trip Circuit

The main contacts will safely close 30 amperes at 250 volts dc and the seal-in contacts of the indicating contactor switch will safely carry this current long enough to trip a circuit breaker.

3.3 Trip Circuit Constant

Indicating Contactor Switch (ICS)

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

4. SETTINGS

4.1 Overcurrent Unit (I)

The only setting required is the pickup current setting which is made by means of the connector screw located on the tap plate. By placing the connector screw in the desired tap, the relay will just close its contacts at the tap value current.

CAUTION: Since the tap block connector screw carried operating current be sure that the screw is turned tight.

In order to avoid opening the current transformer circuits when changing taps under load, connect the spare tap screw in the desired tap position before removing the other tap screw from the original tap position.

4.2 Indicating Contactor Switch (ICS)

No setting is required for relays with a 1.0 ampere unit. For relays with a 0.2/2.0 ampere unit, connect the lead located in front of th the tap block to the desired setting by means of the connecting screw. When the relay energizes a 125 or 250 volt dc type WL relay switch, or equivalent, use the 0.2 ampere tap; for 48-volt dc applications set the unit in the 2.0 tap and use a Type WL relay with a S#304C209G01 coil, or equivalent.

5. 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 projection mounting or by means of the four mounting holes on the flange for the semi-flush mounting. Either the 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 detail information on the FT Case refer to I.L. 41-076.

6. ADJUSTMENTS & MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory. Upon receipt of the relay no customer adjustment other than those covered under SETTINGS should be required.

6.1 Acceptance Check

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

6.2 Overcurrent Unit (I)

Contact Gap - The gap between the stationary and moving contact with the relay in the de-energized position should be approximately .020".

The pickup of the overcurrent unit can be checked by inserting the tap screw in the desired tap hole and applying rated tap value current. The contact should close within ± 5% of tap value current.

6.3 Indicating Contactor Switch (ICS)

Close the main relay contacts and 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 amperes nor greater than 1.2 amperes for the 1 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 follow should be approximately 1/64" to 3/64".

7. 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 and back stops 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.

7.1 Calibration

Use the following procedure for calibrating the relay when taken apart or the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order. (See "Acceptance Check").

7.2 Overcurrent Unit (I)

a. The upper pin bearing should be screwed down until there is approximately 1/64" clearance between it and the top of shaft bearing. The upper pin bearing should then be securely locked in position with the lock nut. The lower bearing position is fixed and cannot be adjusted.

b. The contact gap adjustment for the overcurrent unit is made with the moving contact in the reset position, i.e. against the right side of the bridge.

   Move in the left-hand stationary contact until it just touches the moving contact. The back off the stationary contact 2/3 of one turn for a contact gap of approximately .020".

   The clamp holding the stationary contact need not be loosened for the adjustment since the clamp utilizes a spring - type action in holding the stationary contact in position.

   With the tap screw in the desired tap hole, pass rated ac current through the relay terminals.

   The sensitivity adjustment is made by varying the tension of the spiral spring attached to the moving element assembly. The spring is adjusted by placing a screwdriver or similar tool into one of the notches located on the periphery of the spring

adjuster and rotating it. The spring adjuster is located on the underside of the bridge and is held in place by a spring type clamp that does not have to be loosened prior to making the necessary adjustments.

Adjust this spring until the contacts close. With adjustment, pickup of the relay for any other tap setting should be within ±5% of tap value.

If settings in between taps are desired, place the tap screw in the next lower tap hole and adjust the spring until the contacts just close at the desired pick-up current.

7.3 Indicating Contactor Switch (ICS)

Close the main relay contacts and 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 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 indicator target should drop freely.

For proper contact adjustment, insert a .030" feeler gauge between the core pin and the armature. Hold th armature closed against the core pin and guage and adjust the stationary contacts such that they just make with the moving contact. Both stationary contacts should make at approximately the same time. The contact follow will be approximately 1/64" to 3/64".

8. 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.

RATINGS OF OVERCURRENT UNIT
50 & 60 Hz

RANGE	CONTINUOUS RATING AMPS	ONE SECOND RATING AMPS
.5 - 2	5	100
1 - 4	8	140
2 - 8	8	140
4 - 16	10	200
10 - 40	10	200

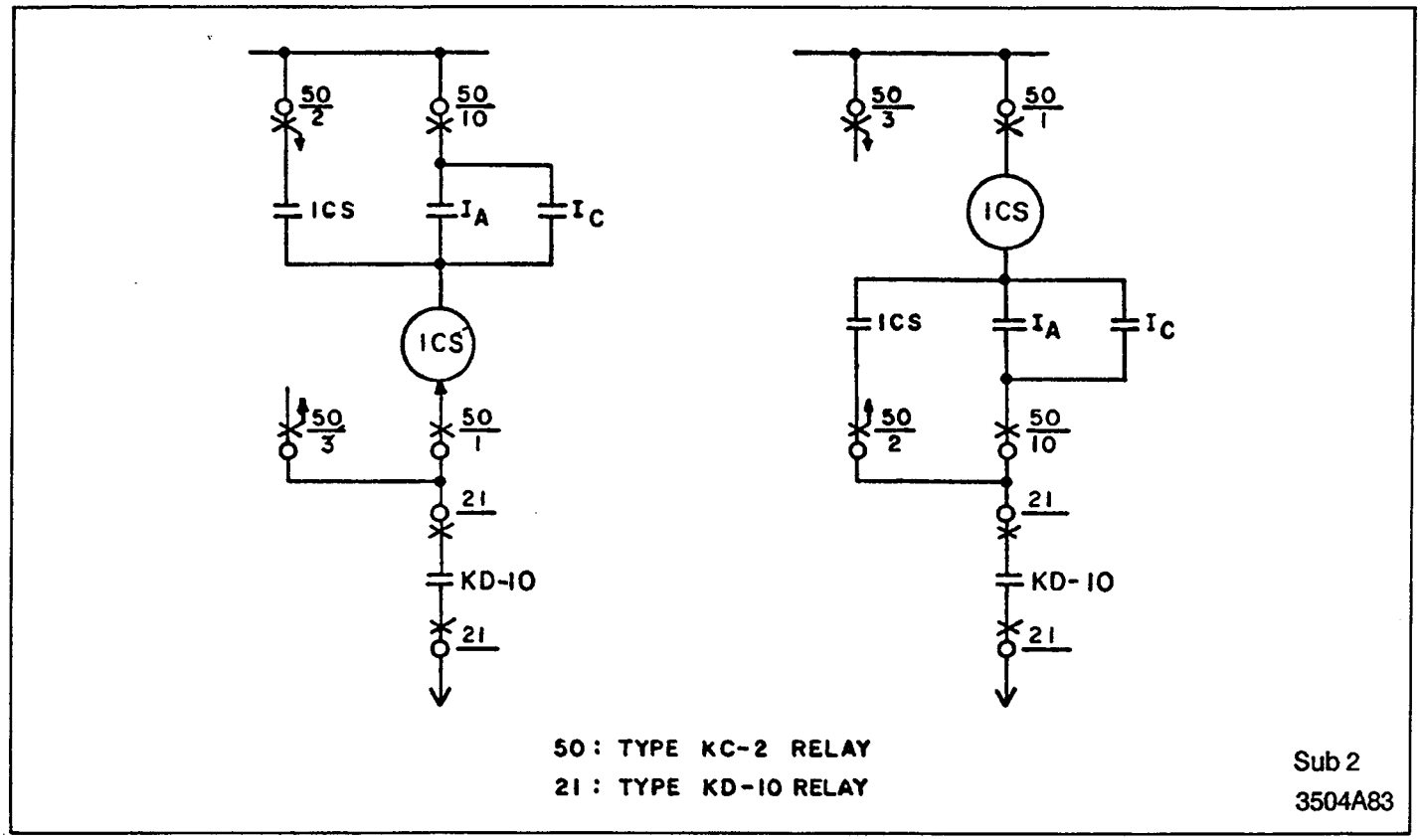

Fig. 1. External Connection of KC-2 Relay for Supervising the Distance Phase Relay

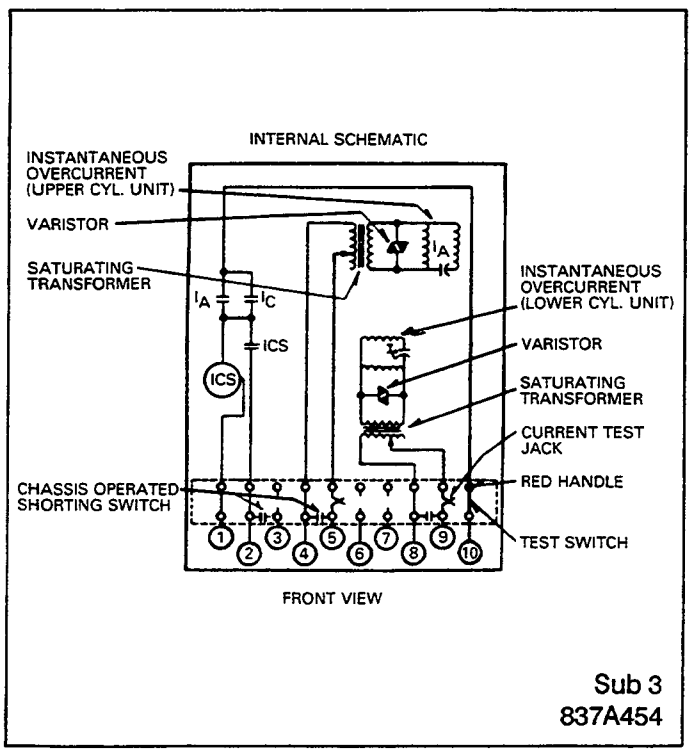

Fig. 2. Internal Schematic of KC-2 with Tapped ICS.

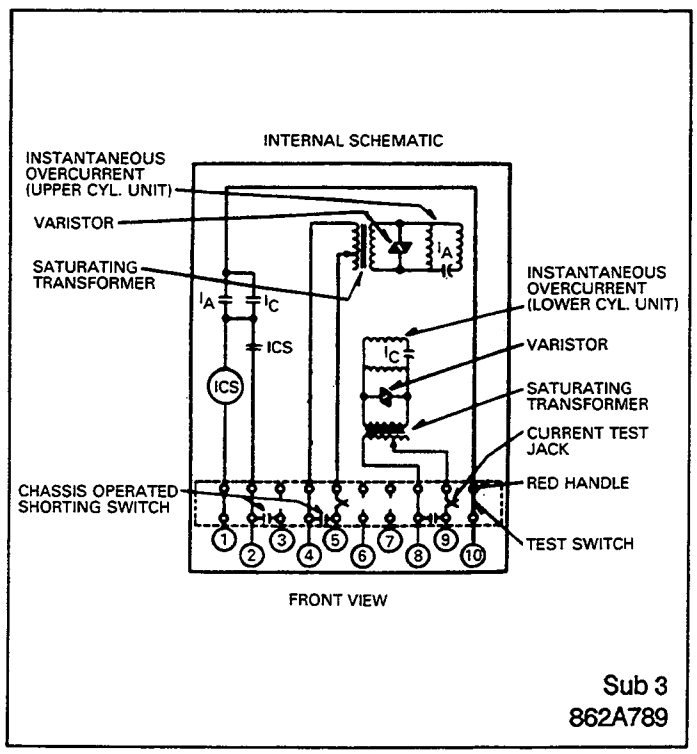

Fig. 3. Internal Schematic of KC-2 Relay with 1 Amp ICS Unit.

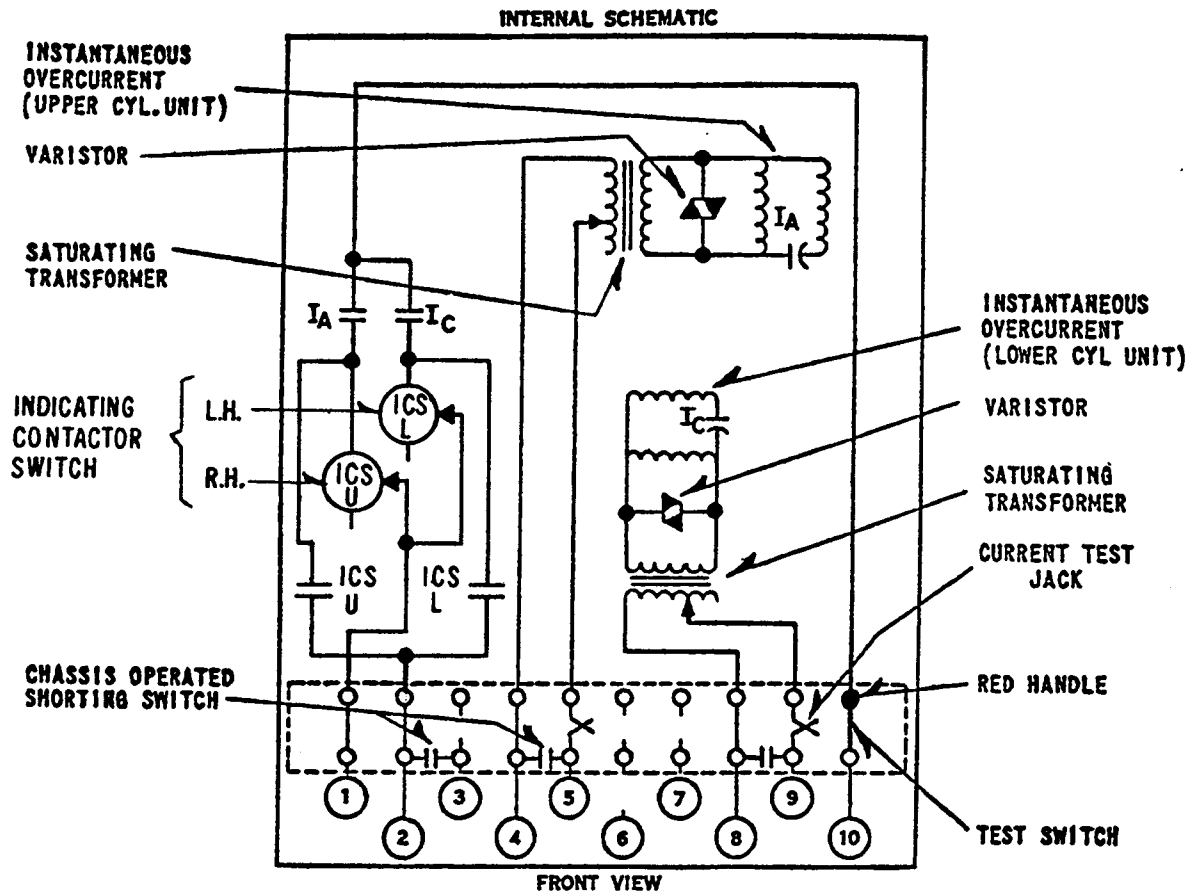

Fig. 4. Internal Schematic of KC-2 Relay with two Tapped ICS Units.

ENERGY REQUIREMENTS
BURDEN DATA OF OPERATING CURRENT CIRCUIT

KC-2 50 Hz

Ampere Range	TAP	VA AT TAP VALUE	PF ANGLE	VA AT 5 AMPS.	PF ANGLE
.5- 2	.5	.35	36	24	36
	.75	.36	33	13	32
	1	.37	32	8.0	31
	1.25	.39	31	5.5	30
	1.5	.41	29	4.5	28
	2	.43	27	2.8	26
1 - 4	1	.35	35	8.8	34
	1.5	.38	31	4.8	30
	2	.41	29	2.8	28
	2.5	.44	27	2.0	27
	3	.47	25	1.4	25
	4	.53	23	.92	23
2 - 8	2	1.04	45	6.2	45
	3	1.1	41	3.2	41
	4	1.2	36	2.0	36
	5	1.3	33	1.2	33
	6	1.4	31	1.0	31
	8	1.7	27	0.6	27
4 - 16	4	1.26	43	2.1	42
	6	1.5	40	0.9	40
	8	1.6	37	.5	37
	9	1.7	34	.4	34
	12	2.0	31	.35	31
	16	2.2	28	.20	28
10 - 40	10	1.9	39	.45	39
	15	3.6	36	.40	36
	20	5.8	34	.35	34
	24	7.8	31	.30	31
	30	10.5	29	.27	29
	40	17.5	27	.25	27

Fig. 5. Burden Data

ENERGY REQUIREMENTS
BURDEN OF OPERATING CURRENT CIRCUIT

KC-2 60 HZ

Ampere Range	TAPS	VOLT-AMPERES TAP VALUE CURRENT	POWER FACTOR ANGLE ϕ °	VOLT AMPERES AT 5 AMPERES	POWER FACTOR ANGLE ϕ °
.5 - 2	.5	.37	39	24	46
	.75	.38	36	13	37
	1	.39	35	8.5	34
	1.25	.41	34	6.0	32
	1.5	.43	32	4.6	31
	2	.45	30	2.9	28
1 - 4	1	.41	36	9.0	36
	1.5	.44	32	5.0	32
	2	.47	30	3.0	29
	2.5	.50	28	2.1	27
	3	.53	26	1.5	26
	4	.59	24	0.93	24
2 - 8	2	1.1	49	6.5	48
	3	1.2	43	3.3	42
	4	1.3	38	2.1	37
	5	1.4	35	1.4	35
	6	1.5	33	1.1	33
	8	1.8	29	0.7	29
4 - 16	4	1.5	51	2.4	51
	6	1.7	45	1.2	45
	8	1.8	40	0.7	40
	9	1.9	38	0.6	38
	12	2.2	34	0.37	34
	16	2.5	30	0.24	31
10 - 40	10	1.7	28	.43	28
	15	2.4	21	.27	21
	20	3.1	16	.20	17
	24	3.6	15	.15	15
	30	4.2	12	.11	13
	40	4.9	11	.08	12

Fig. 6. Burden Data

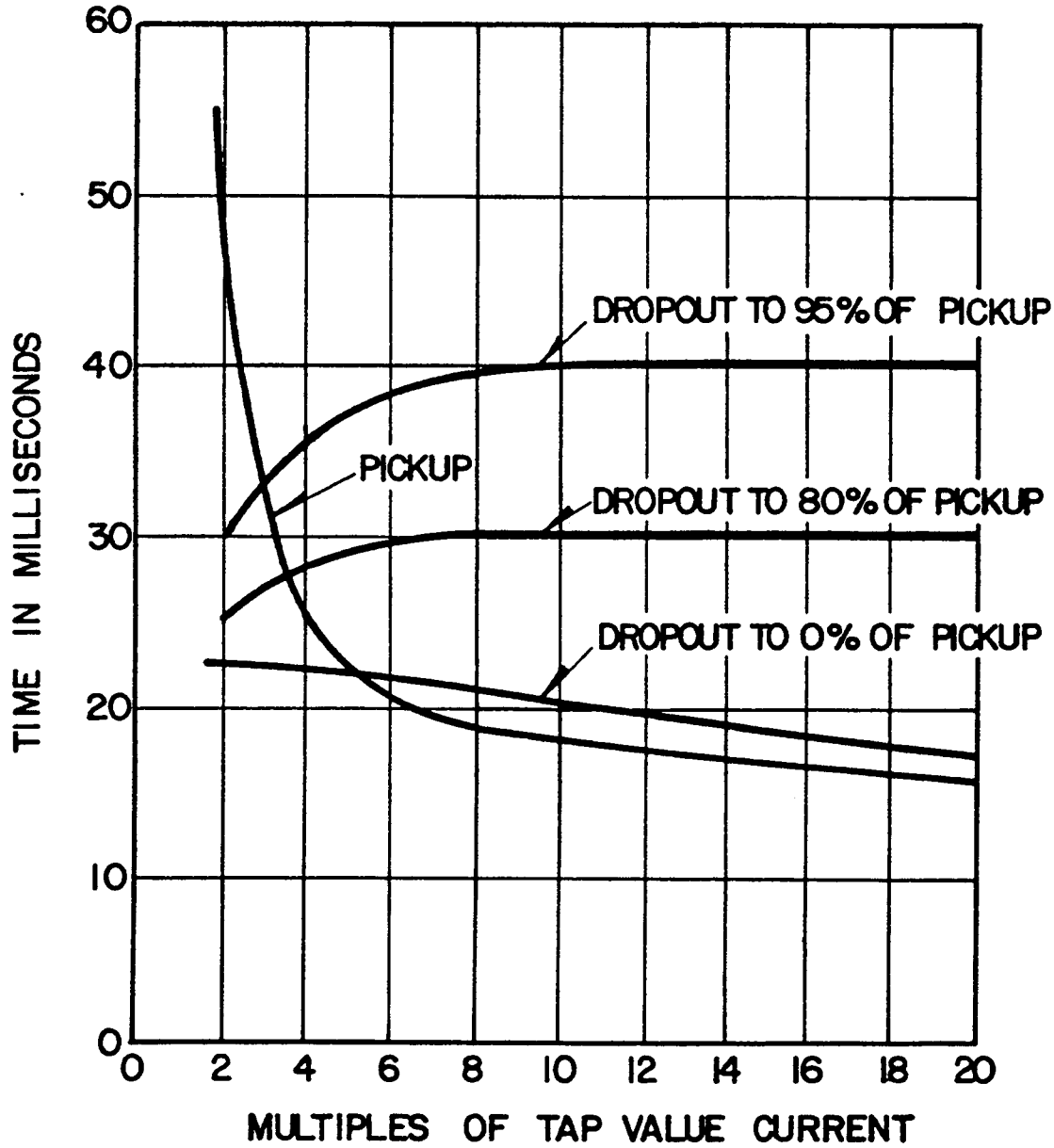

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Fig. 7. Maximum Pickup and Dropout Time Curves for the Phase and Ground Overcurrent Unit.

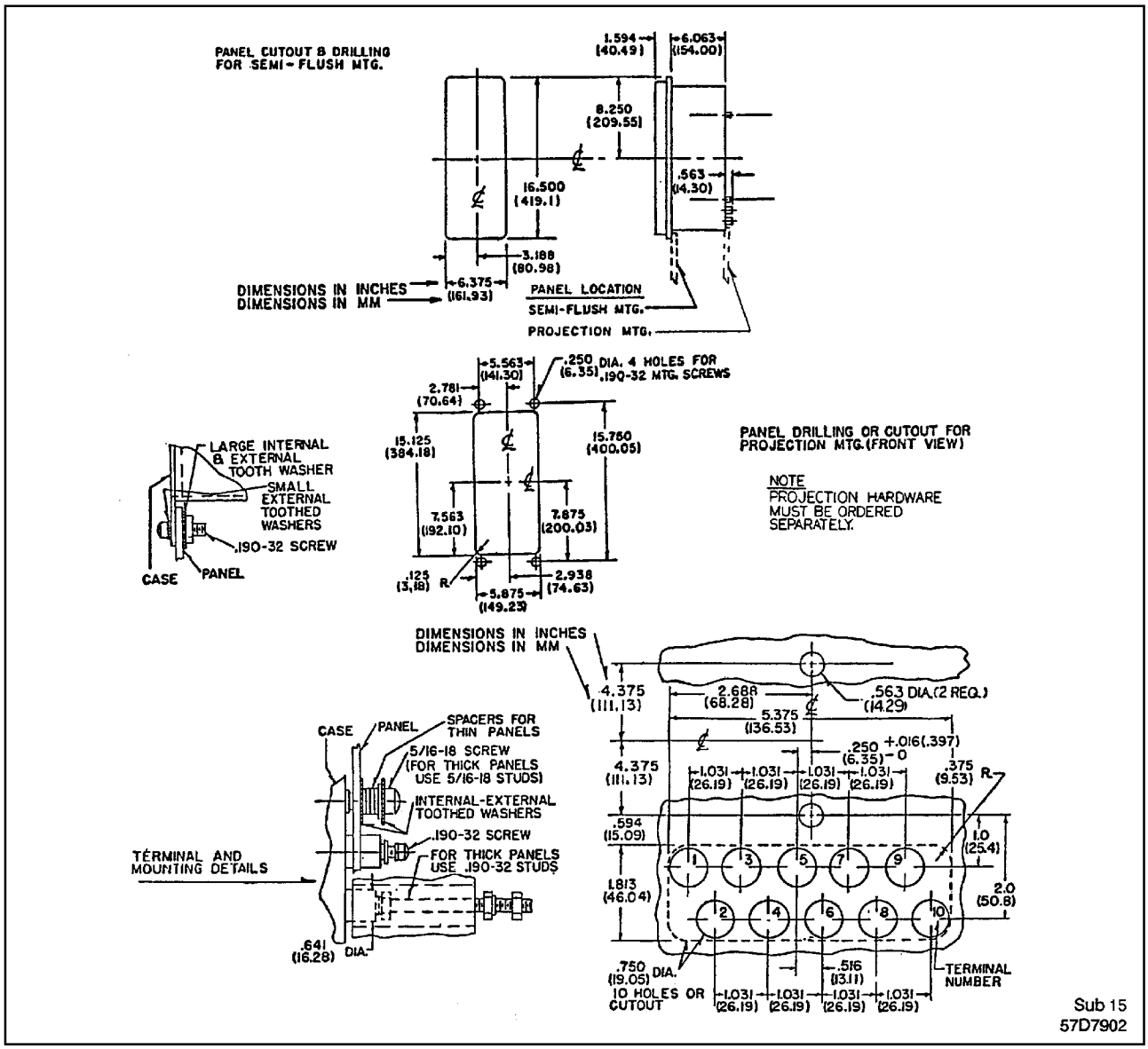

Fig. 8. Outline and Drilling (FT-31 Case).

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