ABB Automation Inc.
Substation Automation and Protection Division
Coral Springs, FL 33065

Instruction Leaflet

41-112C

Effective: December 1990
Supersedes I.L. 41-112B, Dated May 1971

Type COD
Current Sensing Relay

(|) Denotes Change Since Previous Issue.

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.

1.0 APPLICATION

These relays are used to initiate switching or control operations when the line current rises above a preset value, or falls below a preset value. Thus the relay is a current sensing device with high and low current settings.

2.0 CONSTRUCTION

The relay consists of an induction disc type current sensing unit.

2.1 CURRENT SENSING UNIT

The electromagnet is an "E" type laminated structure with a current coil, which may be tapped, mounted on the center leg that produces a flux which divides and returns through the outer legs. A shading coil on the right leg, front view, causes the flux to lag the main pole flux. The out-of-phase fluxes, thus produced in the air gap cause torque on the disc.

When the current sensing unit contact closes to the right this indicates that the line current is at or above the value of current desired. Conversely when the current sensing unit contact closes to the left this indicates that the line current is at or below value of current desired.

2.2 INDICATING CONTACTOR SWITCH UNIT (ICS) (OPTIONAL)

The dc 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 target 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.

3.0 CHARACTERISTICS

The type COD current sensing relay has adjustable "High" and "Low" current contacts that can be set around a 150° arc which is calibrated in amperes on non-tapped relays, or in percent of tap value current on tapped relays. These values represent the tripping position of the moving contacts when that value of current is applied to the relay.

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 Asea Brown Boveri representative should be contacted.

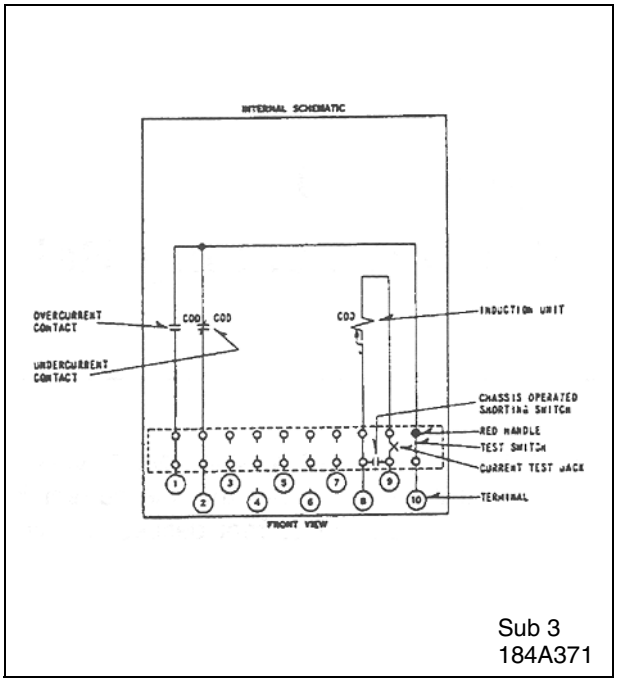

Figure 1. Internal Schematic of The Tapped Type COD Relay in the Type FT-11 Case.

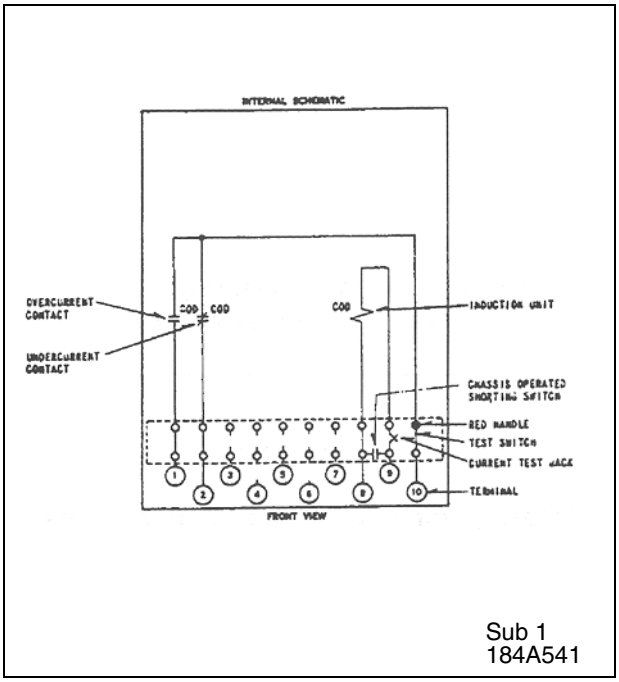

Figure 2. Internal Schematic of The Non-Tapped Type COD Relay in the Type FT-11 Case.

For the tapped relays the percent scale markings are 80, 85, 90, 95, 100, 105 and 110. The relays are available in the following ranges:

Range	Taps						
.5 - 2.5	0.6	0.6	0.8	1.0	1.5	2.0	2.5
2 - 5	2	2.5	3	3.5	4	5	6
4 - 12	4	5	6	7	8	10	12
.2 - .8				none			
.5 - 2				none			
1.5 - 6				none			

The moving contacts will assume a position corresponding to the current applied to the relay and will stay in that position until current changes. If the current changes either gradually or suddenly, the contact will assume a new position corresponding to the change unless the travel is limited by the setting of the adjustable contacts. If the contacts are set to close for a particular value of current, and if a current of that exact amount is applied, then the relay is operating at its minimum trip point and the times on repeated operations are not repetitive within close tolerances. However, currents appreciably greater than the overcurrent setting, or appreciably less than the undercurrent setting, result in relay timing operations which are consistent for repeated trials.

The induction unit has inverse timing; that is, the greater the change in current the faster the relay contact will travel.

4.0 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 connection 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 Instruction Leaflet 41-076. See Figure 4 for Outline & Drilling Plan.

5.0 SETTINGS

The current sensing unit settings can be defined either by contact settings or tap setting. The high and low current contact settings are described under Section 3, CHARACTERISTICS.

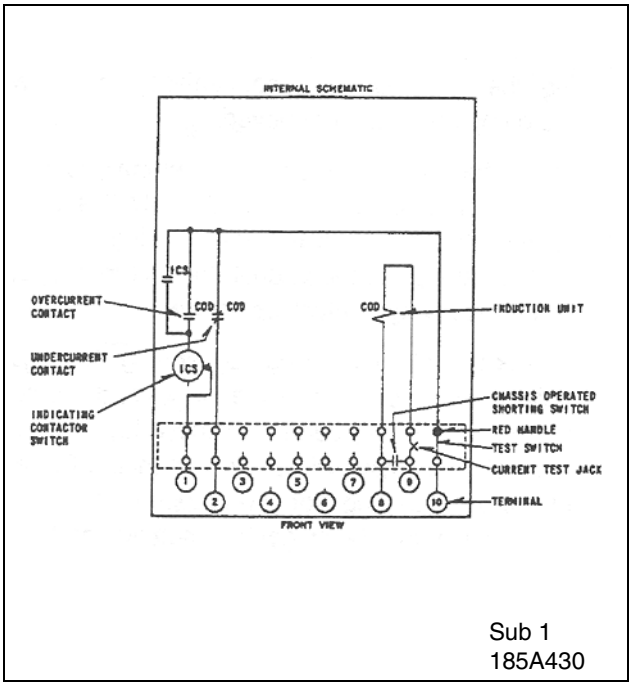

Figure 3. Internal Schematic of The Non-Tapped Type COD Relay with ICS Unit in Overcurrent Circuit in the Type FT-11 Case.

Relays which are tapped have a connector screw on the terminal plate above the scale which makes connections to various turns on the operating coil. The tap setting is made by placing this screw in the desired tap as marked on the terminal plate.

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.

6.0 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, other than those covered under Section 5, SETTINGS, should be required.

6.1 PERFORMANCE CHECK

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

6.1.1 Current Sensing Unit

a. Contact Adjustment Check
Set the left-hand contact in the center of the scale and adjust the current until the moving contact just makes. Move the left hand contact out of the way and bring the right hand contact up until the contacts just make. The right pointer should be within ±1/32” of where the left hand pointer was.

b. Calibration Check
Check the scale markings by setting either of the two contacts at a value marked on the scale then alternately apply this current plus 0.1 amp and minus 0.1 amp for non-tapped relays, and plus and minus 3% for taped relays. The undercurrent contact should make at the lower current and break at the higher current. For the overcurrent contact check, the contact will make for the higher current and break at the lower current.

6.1.2 Indicating Contactor Switch (Ics) (Optional)

Close the main relay contacts in the over current circuit and pass sufficient dc current through the trip circuit to close the contacts of the ICS. This value of current should be not greater than the particular ICS tap setting being used. The operation indicator target should drop freely.

6.2 ROUTINE MAINTENANCE

All relays should be inspected periodically and the time of operation should be checked at least once every year or at such time intervals as may be dictated by experience to be suitable to the particular application. The use of phantom loads, in testing induction-type relays, should be avoided, since the resulting distorted wave-form will produce an error in operation.

All contacts should be periodically cleaned. 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.

7.0 CALIBRATION

Use the following procedure for calibrating the relay if the relay has been taken apart for repairs or the adjustments disturbed. This procedure should not be used until it is apparent that the relay is not in proper working order. (See Section 6.1, Performance Check).

7.1 CURRENT SENSING UNIT

a. Contacts

Apply sufficient current to the relay, to make the disc float in the center of its travel. Move both of the adjustable contacts until they just make with the moving contact. If the two contact pointers do not meet at the same point on the scale (±1/32”), adjust the follow on both adjustable contacts. Approximately the same follow should be in each of the adjustable stationary contacts.

b. Calibration Check

The adjustment of the spring tension in calibrating the relay is most conveniently made with the damping magnet removed.

Set either of the adjustable stationary contacts in the center of its travel and apply this current to the relay. Wind up the spiral spring by means of the spring adjuster until the stationary contact and moving contact just make.

Check the other markings by setting the adjustable contact on these markings and applying the corresponding current to the relay. The contacts should make within plus or minus 0.1 amp of contact setting for non-tapped relays and plus or minus 3% of contact setting for tapped relays.

7.2 INDICATING CONTACTOR SWITCH (ICS) (OPTIONAL)

Close the main relay contacts in overcurrent circuit and pass sufficient dc current through the trip circuit to close the contacts of the ICS. This value of current should be not greater than the particular ICS setting being used. The operation indicator target should drop freely.

For proper contact adjustment, insert a .030" feeler gauge between the core pin and the armature. Hold the armature closed against the core pin and gauge 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”.

8.0 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.

ENERGY REQUIREMENTS

† 60 Hertz Burdens for the COD Relay

Tapped Relays

AMPERE RANGE	TAP	CONTINUOUS RATING (AMPERES)	ONE SECOND RATING† (AMPERES)	POWER FACTOR ANGLEϕ	VOLT AMPERES †† AT TAP VALUE CURRENT	AT 3 TIMES TAP VALUE CURRENT	AT 10 TIMES TAP VALUE CURRENT	AT 20 TIMES TAP VALUE CURRENT
	0.5	2.7	88	72	2.38	21	132	350
	0.6	3.1	88	71	2.38	21	134	365
	0.8	3.7	88	69	2.40	21.1	142	400
0.5/2.5	1.0	4.1	88	67	2.42	21.2	150	440
	1.5	5.7	88	62	2.51	22	170	530
	2.0	6.8	88	57	2.65	23.5	200	675
	2.5	7.7	88	53	2.74	24.8	228	800
	2	8	230	70	2.38	21	136	360
	2.5	8.8	230	66	2.40	21.1	142	395
	3	9.7	230	64	2.42	21.5	149	430
2/6	3.5	10.4	230	62	2.48	22	157	470
	4	11.2	230	60	2.53	22.7	164	500
	5	12.5	230	58	2.64	24	180	580
	6	13.7	230	56	2.75	25.2	198	660
	4	16	460	68	2.38	21.3	146	420
	5	18.8	460	63	2.46	21.8	158	480
	6	19.3	460	60	2.54	22.6	172	550
4/12	7	20.8	460	57	2.62	23.6	190	620
	8	22.5	460	54	2.73	24.8	207	700
	10	25	460	48	3.00	27.8	248	850
	12	28	460	45	3.46	31.4	292	1020

Non-Tapped Relays

AMPERE RANGE	CONTINUOUS RATING (AMPERES)	POWER FACTOR ANGLEϕ	VOLT AMPERES †† AT MINIMUM SETTING	AT MAXIMUM SETTING	AT 5 AMPERES
0.5/2 5	76	0.48	7.6	42.5	
1.5/6 12	74	0.48	7.6	4.7	

† Thermal capacities for short times other than one second may be calculated on the basis of time being inversely proportional to the square of the current.

ϕ Degrees current lags voltage at tap value current.

†† Voltages taken with Rectox type voltmeter.

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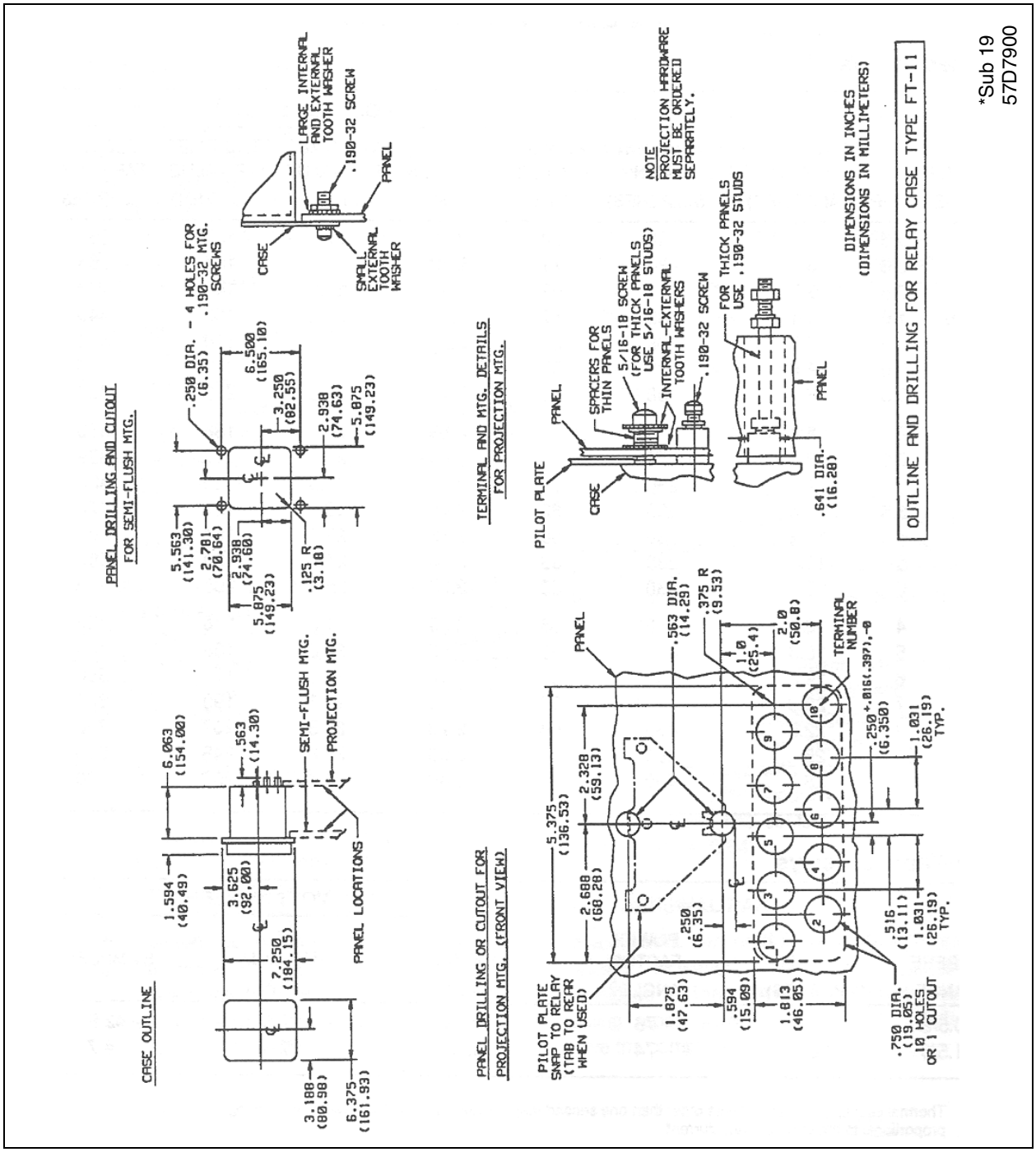

Figure 4. Outline and Drilling Plan for the Type COD Relay in the Type FT-11 Case

ABB Automation Inc.
4300 Coral Ridge Drive
Coral Springs Florida 33065
TEL: 954-752-6700
FAX: 954-345-5329

Printed in U.S.A.

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