



IB 7.7.1.7-6
Issue D

INSTRUCTIONS

Solid-State Timing Relay

CIRCUIT SHIELD[®]

Type 62T
Catalog Series 217T
Catalog Series 417T

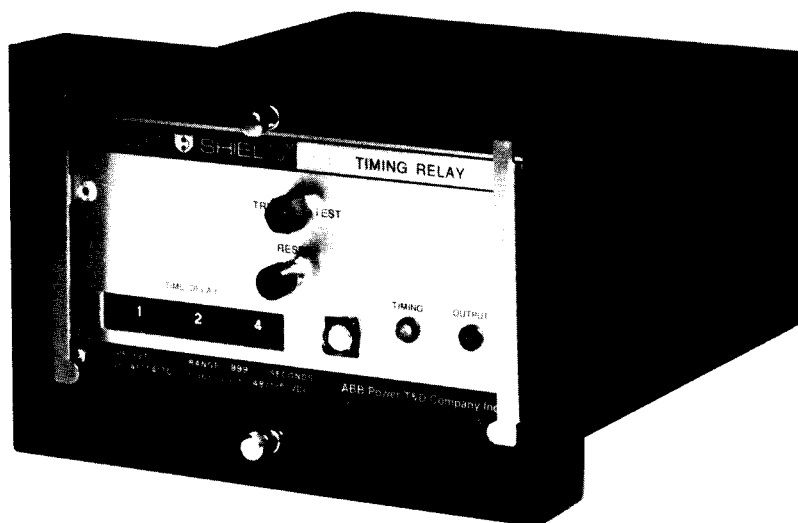


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INTRODUCTION

These instructions contain the information required to properly install, operate, and test the ABB Circuit-Shield™ Type 62T Timing Relay.

The relay is housed in a case suitable for conventional semi-flush panel mounting. all connections to the relay are made at terminals located on the rear of the case that are clearly numbered.

Settings are made by means of thumbwheel switches on the front Panel of the relay, behind a clear plastic cover. The target is reset by means of a pushbutton extending through the front cover.

Relays with catalog numbers starting with 417T are similar in function to relays of the 217T series. Both series provide totally drawout construction; however, the 417T series Provides integral test facilities. Note that the connections are different for the two series. Refer to the connection diagrams in this instruction book.

PRECAUTIONS

The following precautions should be taken when applying these relays:

1. Incorrect wiring may result in damage. Be sure wiring agrees with the connection diagram for the particular relay before energizing. *Note especially that the connections for the 417T series are different than for the 217T series.*
2. Apply only the rated voltage marked on the front panel. The proper polarity must be observed when the dc control power connections are made.
3. For relays with dual-rated control voltage, withdraw the relay from the case and check that the movable links on the printed circuit board are in the correct position for the system control voltage.
4. Movable links must be positioned to obtain the desired operating functions. See section on Connection for details.
5. High voltage insulation tests are not recommended. A hi-pot test was performed at the factory. See section on testing for additional information.
6. The entire circuit assembly of the relay is removable. The unit should insert smoothly. Do not use excessive force.
7. Follow test instructions to verify that the relay is in proper working order.

CAUTION: *since troubleshooting entails working with energized equipment, care should be taken to avoid personal shock. Only competent technicians familiar with good safety practices should service these devices.*

PLACING THE RELAY INTO SERVICE

1. RECEIVING. HANDLING. STORAGE

Upon receipt of the relay (when not included as part of a switchboard) examine for shipping damage. If damage or loss is evident, file a claim at once and promptly notify Asea Brown Boveri. Use normal care in handling to avoid mechanical damage. Keep clean and dry.

2. INSTALLATION

Mounting:

The outline dimensions and panel drilling and cutout information is given in Fig. 1.

Connections:

Internal connections are shown in Figure 2. Typical external connections are shown in Figure 3. Note the difference in connections between 217T and 417T series units. *Be sure to use the correct diagram for the unit you have selected.*

Control power must be connected in the proper polarity.

These relays have metal front panels which are connected through printed circuit board runs and connector wiring to a terminal at the rear of the relay case. The terminal is marked "G". In all applications this terminal should be wired to ground.

Internal Selector Plugs:

The Type 62T Timing Relay has up to FIVE movable plugs on the printed circuit board. Each of these must be placed in the correct position to obtain the desired mode of operation of the relay. See Figure 4 for the printed circuit board layout showing the location of the selector plug.

Voltage Selector Plugs (VSP1, VSP2) – These two plugs set the relay up for the system dc control voltage. Only the voltages stamped on the front panel apply. VSP1 must be placed in the position corresponding to the control voltage applied to the relay terminals 7 and 8. VSP2 must be placed in the position corresponding to the voltage level of the input (initiating) signal. In most applications VSP1 and VSP2 will be set to the same voltage.

Exceptions:

Relays with a nameplate rating of 110vdc use the positions marked 125vdc. Relays with a nameplate rating of 220vdc or 250vdc do not use VSP1 and VSP2.

Delay on Pickup/Dropout Selector Plugs (J2, J3) – These two plugs set the relay up for delay-on-pickup (PU) OR delay-on-dropout (DO) operation. Both plugs must be set in the same position.

Target Operation Selector Plug (J1) – This plug sets the operating mode for the target indicator. With the plug in the internal (INT) position, target operation is obtained electronically at the same time that the output relay is energized. With the plug in the external (EXT) position, a series current of 1 ampere or higher is required through the coil labeled "TAR" on the internal connection diagrams, to obtain the target.

3. SETTINGS

Time Delay: This set of three thumbwheel switches selects the delay time of the digital timer circuit. The switches are read directly from 001 to 999. The maximum setting in seconds is stamped at the bottom of the front panel, and gives the user the correct placement of the decimal point. For example: for a relay with a range of 9.99 seconds, a setting of 293 corresponds to 2.93 seconds delay. Similarly, for a relay with a 99.9 second range, 293 corresponds to a setting of 29.3 seconds. (The timer stage also has a fixed delay of approximately 1/2 the minimum setting increment; i.e. in the last example, a setting of 293 is actually 29.35 seconds.)

Output Stage Delay: for models with the shorter time ranges, the delay of the output stage can be significant compared to the total time set. The output stage adds approximately 7 milliseconds (.007 sec) to the timer setting. The timer setting can be reduced accordingly, or the total delay can be set by test.

4. INDICATORS

Two light emitting diodes and a target indicator are provided to assist in testing and to provide operating personnel with information on the status of the relay. The yellow led labelled "TIMING" lights when the initiating contact starts the timer. The red led labelled "OUTPUT" lights when the time delay period has been completed and the output contacts transfer.

A manually reset operation target is also provided. The target may be actuated from external trip circuit current, or internally by electronic means. To reset the target depress the RESET pushbutton. In order to be able to reset the target, control voltage must be present, and the relay must be in the reset state (as opposed to the "timed-out" condition).

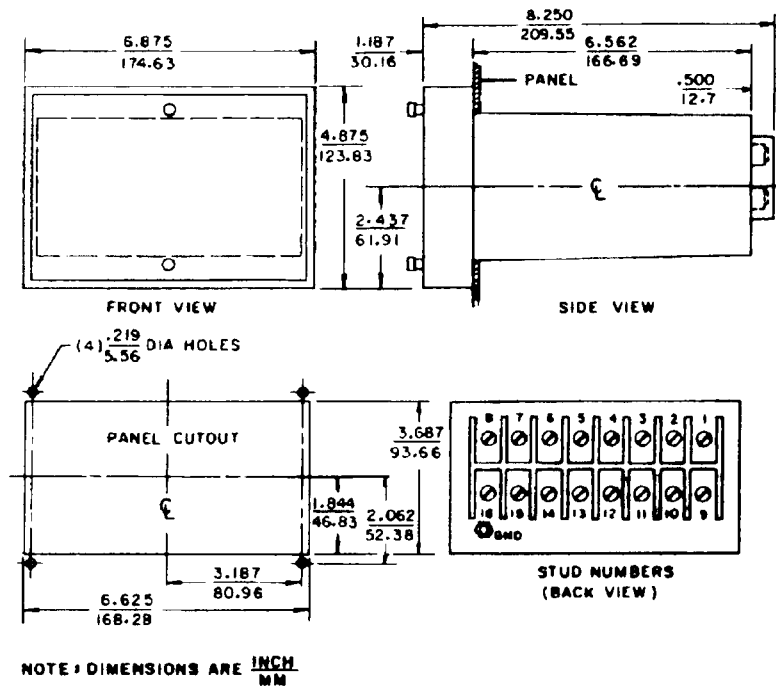


Figure 1: Relay Outline and Drilling

APPLICATION DATA

The ABB Circuit-Shield™ Type 62T is a general purpose, dc operated timing relay that provides excellent accuracy and repeatability despite wide variations in ambient temperature and control voltage conditions. It is suitable for transfer schemes, zone timing, alarm schemes, and for breaker failure schemes. (Note that for breaker failure schemes the ABB Type 62B timer relay which includes additional logic may be more suitable. See IB 7.7.1.7-6 for a detailed description of Type 62B.)

The Type 62T is a solid-state relay that uses digital counting techniques to obtain accuracy and a wide range of settings. Thumbwheel switches make it easy to set the relay.

The relay may be set up during installation to provide either time-delay-on-pickup, or time-delay-on-dropout operation.

The mode of target indicator operation is also user selectable between internal electronic operation, or actuation by the flow of current in the external tripping circuit.

Light emitting diode indicators are provided for additional operator information, and for ease of testing.

The initiating signal is isolated from the relay's internal circuitry by means of an optocoupler. This allows the initiating signal to be derived from a different control voltage source than that from which the relay is powered. (Different voltage levels are also possible for unusual applications. Consult the factory.)

CHARACTERISTICS OF COMMON UNITS

Timer Range	Control Voltage	Catalog Numbers	
		Std Case	Test Case
.001 – .999 sec	48/125 vdc	217T1175	417T1170
	48/110 vdc	217T1105	417T1100
	24/ 32 vdc	217T1195	417T1190
	220 vdc	217T1125	417T1120
	250 vdc	217T1155	417T1150
0.01 – 9.99 sec	48/125 vdc	217T2175	417T2170
	48/110 vdc	217T2105	417T2100
	24/ 32 vdc	217T2195	417T2190
	220 vdc	217T2125	417T2120
	250 vdc	217T2155	417T2150
00.1 – 99.9 sec	48/125 vdc	217T3175	417T3170
	48/110 vdc	217T3105	417T3100
	24/ 32 vdc	217T3195	417T3190
	220 vdc	217T3125	417T3120
	250 vdc	217T3105	417T3150
001 – 999 sec	48/125 vdc	217T4175	417T4170
	48/110 vdc	217T4105	417T4100
	24/32 vdc	217T4195	417T4190
	220 vdc	217T4125	417T4120
	250 vdc	217T4155	417T4150

Note: "Test Case" units preferred for new application, due to their improved test features.

Internal Connection Diagrams (see page 6)

Standard Case: 16D217E

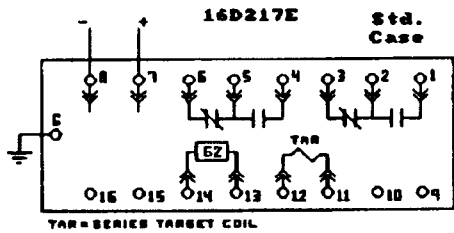
Test Case with catalog number ending with digit "5"

Units rated 220vdc and 250vdc: 16D417G

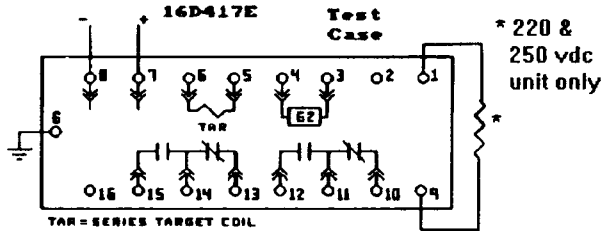
Units rated 125vdc and below: 16D417E

Test Case with catalog numbers ending with digit "0" All units: 16D417G

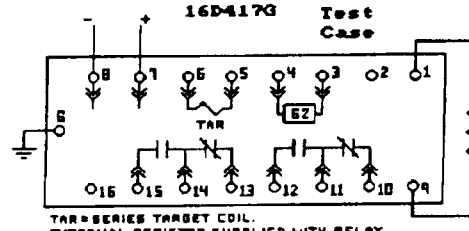
FIGURE 2: INTERNAL CONNECTIONS AND OUTPUT CONTACT LOGIC



TAR = SERIES TARGET COIL



TAR = SERIES TARGET COIL



TAR = SERIES TARGET COIL. EXTERNAL RESISTOR SUPPLIED WITH RELAY.

CATALOG NUMBERS ENDING WITH DIGIT "5"

Notes:

1. Use of the target coil (TAR) is optional; see page 3 for details.
2. For units with connection diagram 16D417G, the external resistor is supplied with the relay, and must be in place for proper operation.

CATALOG NUMBERS ENDING WITH DIGIT "0"

The following table defines the OUTPUT CONTACT STATES for all possible conditions of the input signal and the dc control power. AS SHOWN means the contacts are in the state shown on the internal connection diagrams. TRANSFERRED means the contacts are in the opposite state to that shown.

RELAY SET FOR DELAY ON PICKUP:

CONDITION	INDICATORS		CONTACT STATE
	Yel	Red	
DC Control Voltage Applied, and Initiating Contact Open	Off	Off	As Shown
DC control Voltage Applied, and Initiating Contact Closes:			
a) Initial State	On	Off	As Shown
b) State at End of Time Delay Period	On	On	Transferred
No DC Control Voltage Applied, Initiating Contact Open or Closed	Off	Off	As Shown

RELAY SET FOR DELAY ON DROPOUT:

CONDITION	INDICATORS		CONTACT STATE
	Yel	Red	
DC Control Voltage Applied, and Initiating Contact closed	Off	Off	As Shown
DC Control Voltage Applied, and Initiating Contact Opens:			
a) Initial State	On	Off	As Shown
b) State at End of Time Delay Period	On	On	Transferred
No DC Control Voltage Applied, Initiating Contact Open or Closed	Off	Off	As Shown

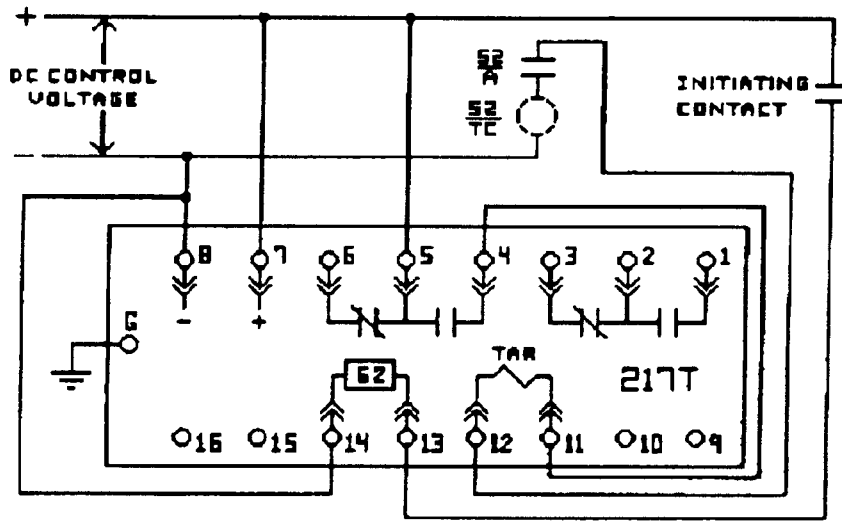


Figure 3A: Typical External Connections - Catalog Series 217T

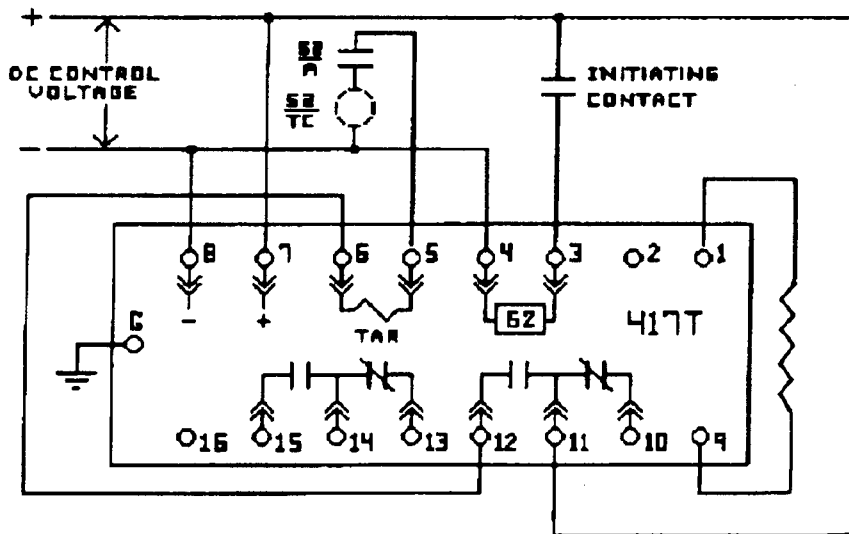


Figure 3B: Typical External Connections - Catalog Series 417T

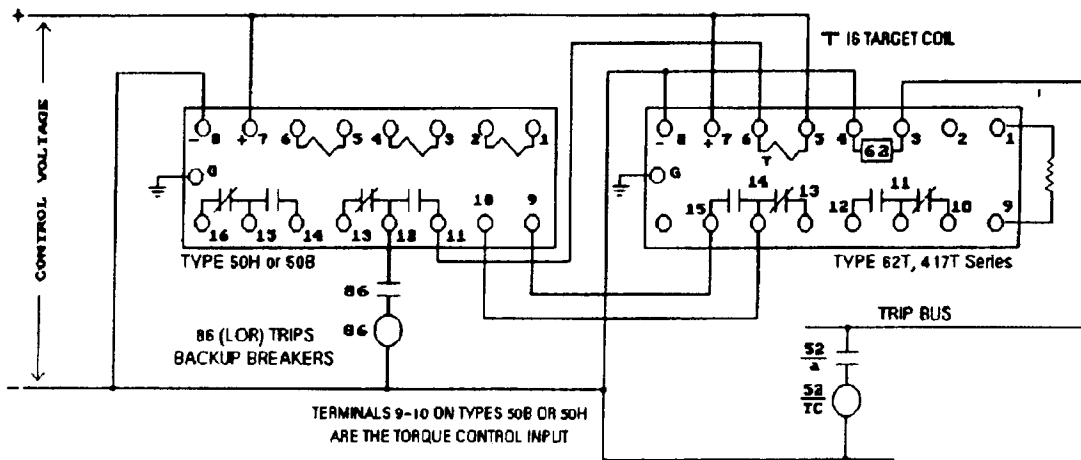


Figure 3C: Typical Control Connections, Breaker Failure Scheme Using Type 62T Timing Relay and Type 50H or 50B Fault Detector

SPECIFICATIONS

Delay Setting Range: models available for
 .001 - .999 seconds 0.01 - 9.99 seconds 00.1 - 99.9 seconds 1 - 999 seconds

Fixed delays: Timer Stage = 0.5x the least significant digit.
 Output Stage = 5-16 milliseconds (typical 7ms.)

Repeatability: +/- 0.5%, or +/- 15 milliseconds, or +/- 1 digit, whichever is greater.

Variation in Timing with Change in Ambient Temperature: for -20 to +70 degrees C, +/- 2%, or +/- 20 milliseconds, or +/- 1 digit, whichever is greater.

Variation in Timing with Change in Control Voltage: for -20%, +10% voltage variation, +/- 2%, or +/- 15 milliseconds, or +/- 1 digit, whichever is greater.

Reset Time: approximately 10 milliseconds.

Control Voltage: **models available for:**

- 48/125vdc nominal @ 0.04A max.
- 48/110vdc nominal @ 0.04A max.
- 24/ 32vdc nominal @ 0.06A max.
- 220vdc nominal @ 0.04A max.
- 250vdc nominal @ 0.04A max.

allowable variations:

- 24v rating: 19- 29vdc
- 32v rating: 26- 38vdc
- 48v rating: 38- 58vdc
- 110v rating: 88-125vdc
- 125v rating: 100-140vdc
- 220v rating: 175-246vdc
- 250v rating: 200-280vdc

Input Burden: approximately 0.5 Watt for units rated 125vdc and below, 1 Watt for units rated 250 or 220vdc.

Output contacts: @ 125vdc @250vdc

30A	30A	Tripping
5A	5A	Continuous
0.3A	0.1A	Break

Output Contact Logic: the tables on page 6 define the output contact states for various conditions of the input signal and the dc control power supply.

Operating Temperature: -30 to +70 degrees C.

Series Target Coil: 1 ampere minimum trip current required to insure target operation. Rated 30 amperes tripping circuit duty.

Dielectric Strength: 2000vac rms 50/60 Hz., 60 seconds, all circuits to ground.

UL Recognized: UL File No. E103204

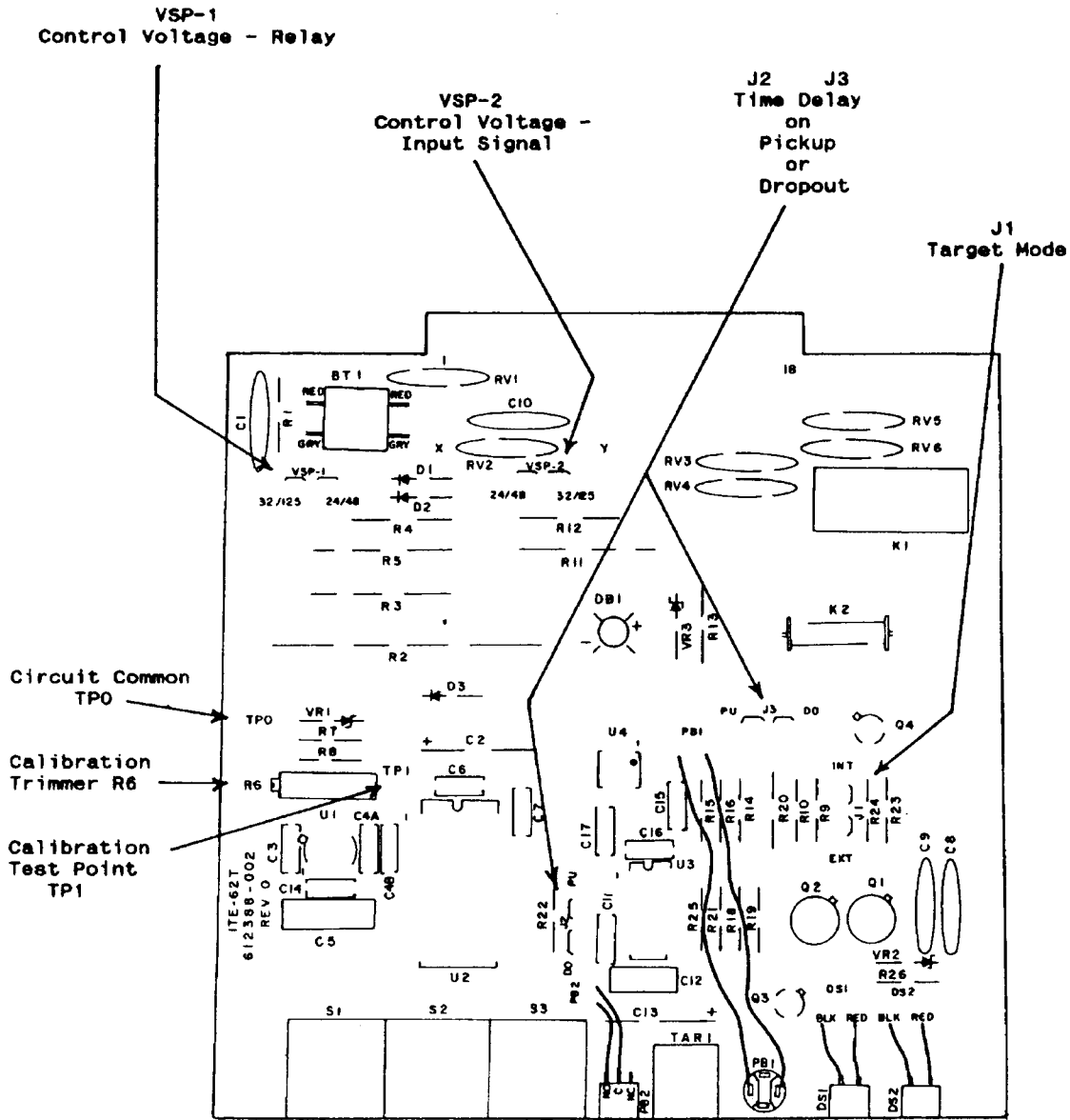


Figure 4: Typical Circuit Board Layout Showing Location of Plug Selectors.

- Notes:
1. VSP1 and VSP2 not used on units rated for 220vdc and 250 vdc control voltage.
 2. Circuit board layouts are shown for reference only. Variations may exist on boards in service.

TESTING

1. MAINTENANCE AND RENEWAL PARTS

No routine maintenance is required on the ABB Circuit-Shield™ Type 62T relay. Follow test instructions to verify that the relay is in proper working order. We recommend that an inoperative relay be returned to the factory for repair; however, a schematic diagram will be provided on request (typical schematic shown on page 13). Renewal parts will be quoted by the factory on request.

Caution: since troubleshooting entails working with energized equipment, care should be taken to avoid personal shock. Only competent technicians familiar with good safety practices should service these devices.

217T Series Units:

Drawout circuit boards of the same catalog number are interchangeable. A unit is identified by the catalog number stamped on the front panel and the serial number stamped on the bottom side of the drawout circuit board.

The board is removed by using the metal pull knobs on the front panel. Removing the board in service may cause an undesired operation.

An 18 point extender board (cat 200X0018) is available for use in troubleshooting and calibration.

417T Series Units:

Metal handles provide leverage to withdraw the relay assembly from the case. Removing the unit in an application that uses the normally-closed contact will cause an operation. The assembly is identified by a catalog number stamped on the front of the unit and a serial number stamped on the bottom of the board.

Test connections are readily made to the drawout relay unit by using standard banana plug leads at the rear vertical circuit board. This rear board is marked for easier identification of the connection points.

Important: units which follow internal connection diagram 16D417G have an external resistor connected between terminals 1 and 9. In order to test the drawout unit, an equivalent resistor must be connected temporarily between these terminals on the vertical rear circuit board. The value of this resistor depends on the control voltage rating of the relay, and can be read on the resistor mounted on the rear terminals. A 25 watt resistor is sufficient for testing. If no resistor is available, the resistor assembly mounted on the rear of the case could be removed and used. *If the resistor from the case is used, be sure to remount it on the case at the conclusion of testing.*

Resistor Value For:	250vdc rating: 10000 ohms
	125vdc rating: 6,000 ohms

Test Plug:

A test plug assembly, catalog 400X0002 is available for use with the 417T series units. This device plugs into the relay case on the switchboard and allows access to all external circuits wired to the case. See Instruction Book IB 7.7.1.7-8 for details on the use of this device.

2. HIGH POTENTIAL TESTS

High potential tests are not recommended. A hi-pot test was performed at the factory before shipping. If a control wiring insulation test is required, partially withdraw the relay unit from the case sufficient to break the rear connections before applying the test voltage.

3. BUILT-IN TEST FUNCTION

Tests should be made with the main circuit de-energized.

The built-in test is provided as a convenient functional test of the relay and associated circuits. When you depress the button labeled TRIP, the timing circuit of the relay is actuated. The relay then times out, the output contacts operate to trip the circuit breaker, or other associated circuitry, and the target is displayed. The test button must be held down continuously for the operating time set on the relay in order to obtain an operation.

4. ACCEPTANCE TESTS

Typical test connection for checking delay-on-pickup for both the 217T and 417T series units are shown in Figure 5. (To check a unit set for the delay-on-dropout mode change the initiating switch (SIA) to a normally-closed contact.) The dc control voltage source must match the relay's rating and should have less than +/- 6% ripple.

Set the (5) circuit board plugs to the correct positions for the control voltage and desired mode of operation – see pages 3 and 7. If the external target operating mode is selected, a load which will draw more than 1 ampere (such as a lockout relay) must be connected to the series target coil.

Set the thumbwheel switches for 999. Actuate the initiating contact. The yellow led should light. At the end of the delay period the red led should come on and the output contacts should stop the external timer. Timing should be within +/-3% of the setting.

If the setting to be used in the application is known, it can be verified by setting the thumbwheel switches to the desired values and repeating the test. The thumbwheel switches can be readjusted as necessary to obtain the exact operating time desired.

If a very fast operating time is to be used, the approximately 7 millisecond fixed delay of the output stage will be significant, and the timer setting will have to be reduced to compensate. Again, the final setting can be verified by test. Be sure the external timer used to make these measurements has sufficient accuracy and resolution.

5. CALIBRATION

If the acceptance tests indicate a need for recalibration of the relay the following procedure may be used.

For a 217T series unit, the 18 point extender board will be needed to gain access to the circuit board.

Connect a frequency counter from test point TP to circuit common (see Figure 4). Apply rated dc control voltage to the relay (be sure the selector plugs are in the correct position). Allow the unit to stabilize for 5 minutes. Adjust trimmer R6 to obtain the frequency as shown:

Relay Timing Range	Frequency (Hertz)
.999 sec	9995 – 10005
9.99 sec.	999.5 – 1000.5
99.9 sec	99.95 – 100.05
999 sec	9.995 – 10.005

6. IN CASE OF DIFFICULTY

Check that all internal selector plugs have been properly positioned for the application per the information on pages 3 and 9. Check relay wiring per the diagrams in this instruction book. Check your contact logic per the information on page 6. Do not use unfiltered full-wave rectified dc to test these relays. The dc source must be moderately filtered (+/- 6% ripple is acceptable).

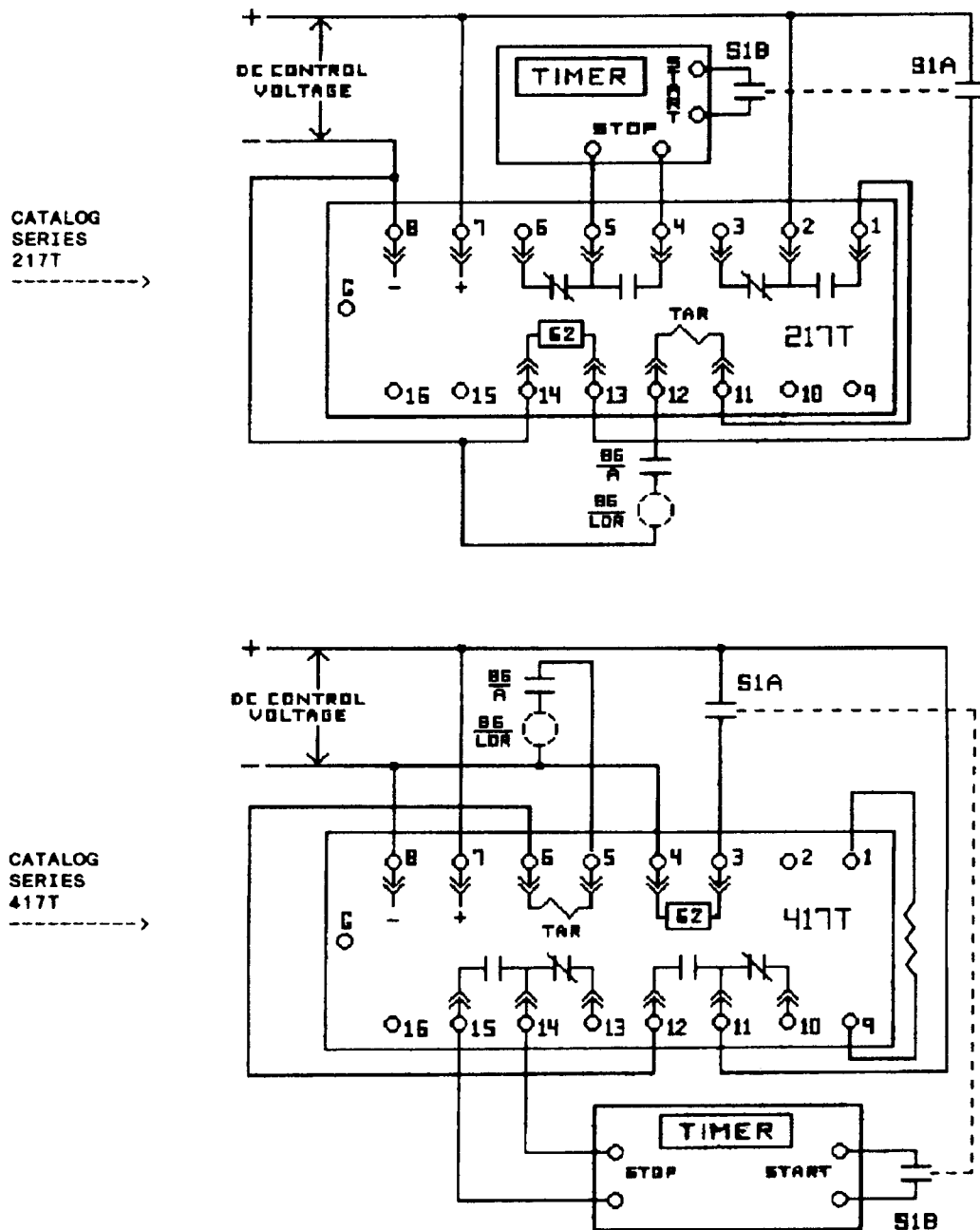


Figure 5: Typical Test Circuit Connections

Notes:

1. Connect proper source of dc control power
2. Lockout relay or similar load required only if checking operation of target when set for "external" mode of operation. (see page 3)
3. Test circuit shown for checking relay set in delay-on-pickup mode.
Change S1A to normally-closed to check relay set for delay-on-dropout.

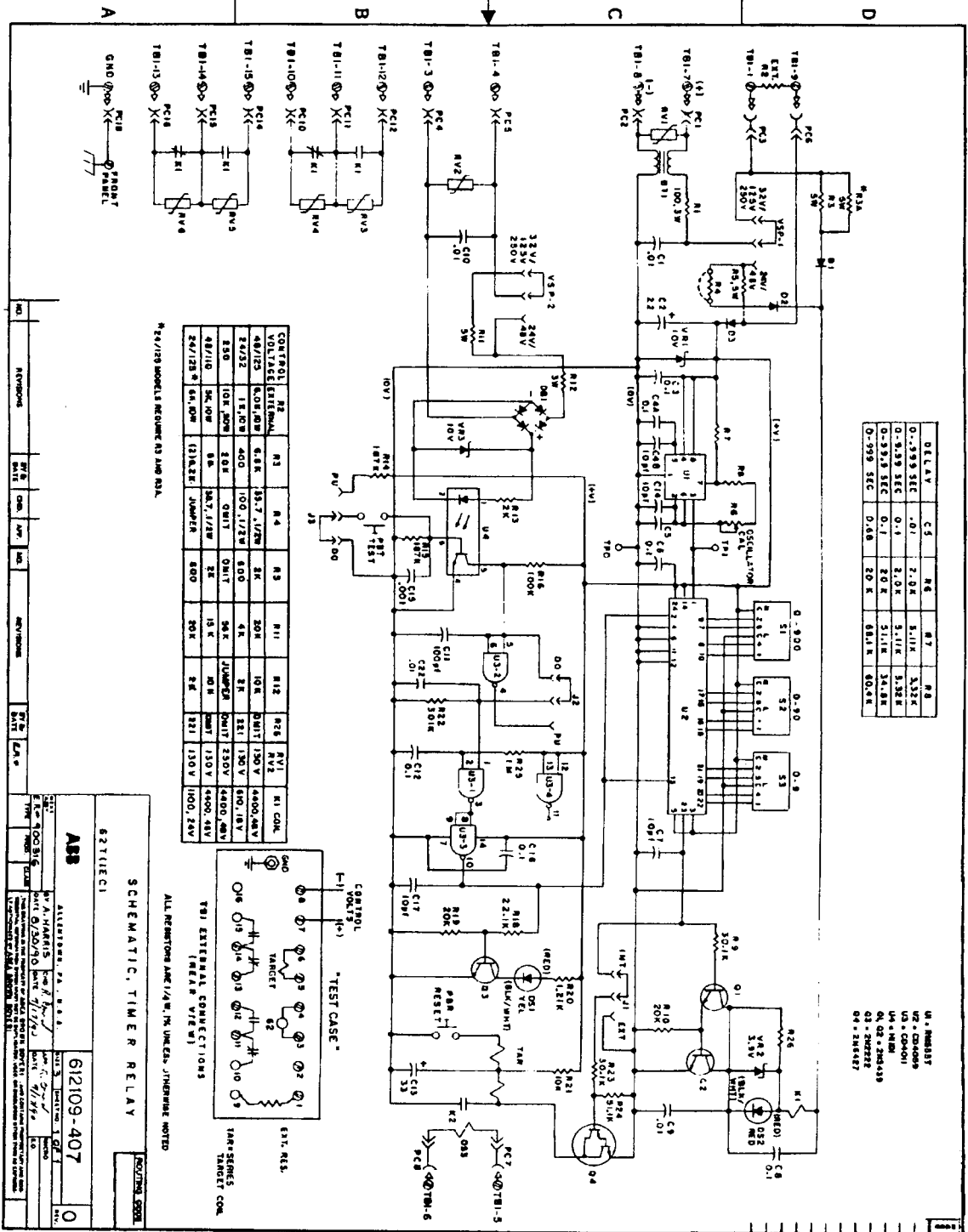


Figure 6: Type 62T Schematic Diagram (typical)

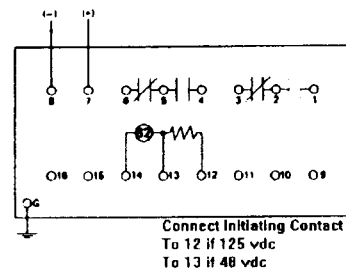
REPLACEMENT OF OBSOLETE MODEL. TYPE 62K

The Type 62T series timing relays with digital circuitry superseded the Type 62K timing relay which was based on analog circuitry. The following information is offered as a guide to the replacement of the Type 62K with the Type 62T should that be necessary. The Type 62T mounts in the same panel cutout and has the same overall dimensions as the Type 62K. The connections are different – see suggested rewiring instructions below.

Catalog Number	Control Voltage	Delay-on-	Range	Recommended Replacement
217K1075	48/125vdc	Pickup	.05-1 sec	417T1170
217K2075	"	"	.2-4 sec	417T2170
217K2095	24/ 32vdc	"	.2-4 sec	417T2190
217K4075	48/125vdc	"	0-10 sec	417T2170
217K5075	"	"	0-100 sec	417T3170
217K0175	48/125vdc	Dropout	.05-1 sec	417T1170
217K0275	"	"	.2-4 sec	417T2170
217K0475	"	"	0-10 sec	417T2170
217K0575	"	"	0-100 sec	417T3170

Delay-on-dropout models with suffix "D" at end of catalog number had slightly different output logic than standard models. Refer to original IB 7.7.1.7-1 for details. The same replacement unit is recommended in either case.

16D217D
Internal Connections
Type 62K Timing Relay



1. Contacts shown for initiating contact open for delay-on-pickup units.
2. Contacts shown for initiating contact closed and control power applied for delay-on-dropout units.

Replacement with the Type 62T, 417T series unit:

Referring to Figure 4, the 417T replacement unit should be set up for internal target operation and the control voltage to match the system. Also set the plugs for the proper delay mode.

The suggested rewiring is as follows:

Wire on 217K terminal-->	1	2	3	4	5	6	7	8	12	13	14	G
moves to												
Terminal on 417T unit-->	12	11	10	15	14	13	7	8	3	3	4	G

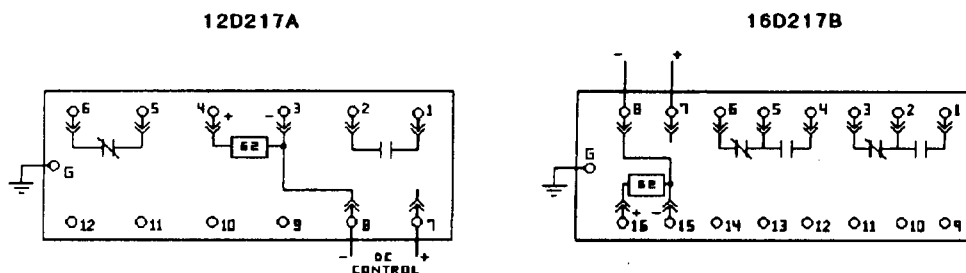
The above rewiring chart is offered as a guide. The overall scheme should be reviewed with reference to Figures 2 and 3 and functional checks run to verify proper operation of the scheme.

REPLACEMENT OF OBSOLETE MODEL, TYPE 62S

The Type 62T series timing relays with digital circuitry are recommended as replacements for the Type 62S timing relay which was based on analog circuitry. The following information is offered as a guide to the replacement of the Type 62S with the Type 62T should that be necessary. The Type 62T mounts in the same panel cutout and has the same overall dimensions as the Type 62S. The connections are different and a guide to rewiring is given below.

Catalog Number	Control Voltage	Delay-on-	Internal Connections	Range	Recommended Replacement
217S2042	48/125vdc	Pickup	12D217A	.2-4 sec	417T2170
217S1075	"	"	16D217B	.05-1 sec	417T1170
217S2075	"	"	16D217B	.2-4 sec	417T2170
217S0242	48/125vdc	Dropout	12D217A	.2-4 sec	417T2170
217S0175	"	"	16D217B	.05-1 sec	417T1170
217S0275	"	"	16D217B	.2-4 sec	417T2170

INTERNAL CONNECTIONS – obsolete Type 62S – for reference only:



Replacement with Type 62T, 417T series unit:

Referring to Figure 4, the 417T replacement unit should be set up for internal target operation and the control voltage to match the system. Also set the plugs for the proper delay mode.

For units with connection diagram 12D217A, the suggested rewiring is:

Wire on 217Sxx42 terminal -->	1	2	3	4	5	6	7	8	G
moves to									
Terminal on 417T unit----->	11	12	3	4	13	14	7	8	G

For units with connection diagram 16D217B, the suggested rewiring is:

Wire on 217Sxx75 terminal -->	1	2	3	4	5	6	7	8	15	16	G
moves to											
Terminal on 417T unit----->	12	11	10	15	14	13	7	8	4	3	G

The above rewiring charts are offered as a guide. The overall scheme should be reviewed with reference to Figures 2 and 3 and functional checks run to verify proper operation of the scheme.