

## INSTRUCTIONS

### Single Phase Voltage Relays

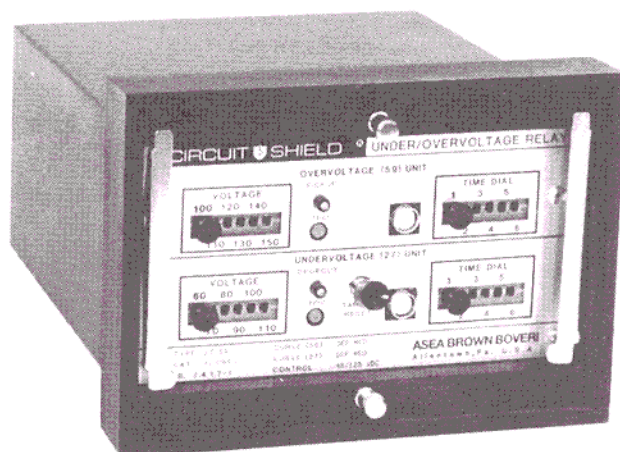
TYPE 27/59

UNDER/OVERVOLTAGE RELAYS

TYPE 59

OVERVOLTAGE RELAYS

|            |                     |               |
|------------|---------------------|---------------|
| Type 27/59 | Catalog Series 210D | Standard Case |
| Type 27/59 | Catalog Series 410D | Test Case     |
| Type 59    | Catalog Series 210C | Standard Case |
| Type 59    | Catalog Series 410C | Test Case     |



---

TABLE OF CONTENTS

|  |         |
|--|---------|
| Introduction.....                        | Page 2  |
| Precautions.....                         | Page 2  |
| Placing Relay into Service.....          | Page 2  |
| Application Data.....                    | Page 4  |
| Testing.....                             | Page 13 |
| Testing or Replacing Earlier Models..... | Page 15 |

INTRODUCTION

These instructions contain the information required to properly install, operate, and test certain ABB Circuit-Shield™ single-phase undervoltage and overvoltage relays, Types 27/59, catalog series 210D and 410D, and Type 59, catalog series 210C and 410C.

The relay is housed in a case suitable for conventional semiflush panel mounting. All connections to the relay are made at the rear of the case and are clearly numbered. Relays of the 410C and 410D catalog series are similar to relays of the 210C and 210D series. Both series provide the same basic functions and are of totally drawout construction; however, the 410C and 410D series relays provide integral test facilities. Also, sequenced disconnects on the 410 series prevent nuisance operation during withdrawal or insertion of the relay if the normally-open contacts are used in the application.

Most settings are made on the front panel of the relay, behind a removable clear plastic cover. The target is reset by means of a pushbutton extending through the relay cover.

Revisions in this issue of the instruction book compared to the previous issue are denoted by an \* in the margin.

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.
2. Apply only the rated control voltage marked on the relay 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 link on the printed circuit board is in the correct position for the system control voltage.
4. High voltage insulation tests are not recommended. See the section on testing for additional information.
5. The entire circuit assembly of the relay is removable. The unit should insert smoothly. Do not use excessive force.
6. 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 ABB. 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. 2.

### Connections:

Internal connections and contact logic are shown on page 6. Typical external connections are shown in Figures 3 and 4. Note that certain contacts are convertible between normally-open and normally-closed on Type 27/59 - see Figure 5.

For relays with dual-rated control power: before energizing, withdraw the relay from its case and inspect that the movable link on the lower printed circuit board is in the correct position for the system control voltage. (For units rated 110vdc, the link should be placed in the position marked 125vdc.)

Relays rated for use with 120vac control power have an internal isolation transformer connected to relay terminals 7 and 8. Polarity of the ac control power to these terminals need not be observed.

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.

## 3. SETTINGS

### OPERATING VOLTAGE TAP

The operating voltage taps are labelled by the actual value of ac input voltage which will cause the relay to operate (after the appropriate time delay). Note: operating voltage values other than the specific values provided by the taps can be obtained by means of an internal adjustment potentiometer. See section on testing for setting procedure.

On the Type 59 there is no adjustment for the differential between the operate and reset voltage values. On the Type 27/59 an internal adjustment is provided (see section on testing for details).

### TIME DIAL

The time dial taps are labelled as 1,2,3,4,5,6. You *must* refer to the time-voltage characteristic curves in the Application section to determine the nominal operating time. Time dial selection is not provided on relays with an Instantaneous operating characteristic.

## 4. INDICATORS

### Pickup/Dropout Indicators (Type 27/59):

The Type 27/59 provides an led indicator for each function. The indicator labelled DROPOUT lights when the input voltage falls below the voltage setting of the under-voltage (27) unit. The indicator labelled PICKUP lights when the input voltage rises above the voltage setting of the overvoltage (59) unit. Both led indicators are self-resetting when the voltage returns to "normal". The definition of pickup and dropout as used in this book and the action of the indicators is illustrated in Figure 1.

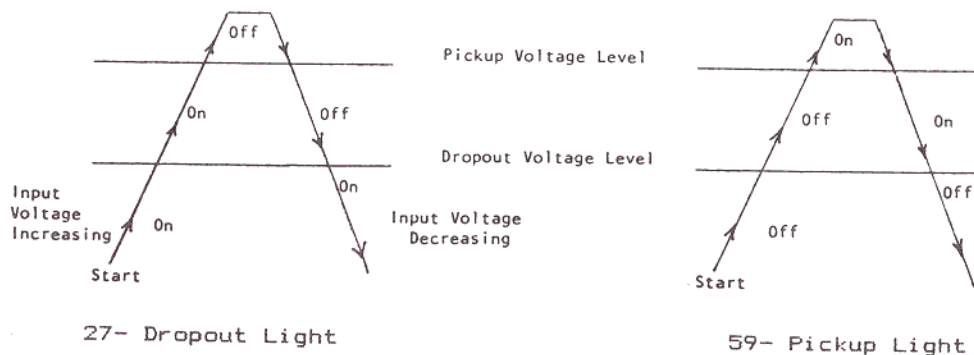


Figure 1: Operation of the Indicating Lights for the Type 27/59

---

Target Indicator and Selector Plugs (Type 27/59):

The ABB Circuit-Shield™ Type 27/59 allows the user to select the mode of operation of the target indicators by positioning internal selector plugs. Refer to the circuit board layout in Figure 5 for the locations of these plugs. With the plug in the INT position, the target is set electronically at the same time the output relay is energized to transfer the output contacts. With the plug in the EXT position, a trip-circuit current of 1 ampere or more is required in the coil labelled T or TAR on the internal connection diagram. (The polarity of this current does not matter. The coil is very low impedance and does not affect the trip circuit.) There is a separate selector plug for each of the functions: 27 and 59.

- \* Relays with catalog suffix "-ST" require only 0.25A trip-circuit current to set the target.

(Note: earlier models of the Type 27/59, catalog series 210Dxxx1 or 210Dxxx2 did not provide for external target operation.)

Target Indicator (Type 59):

The target on the Type 59 relay is electronically actuated at the time the output contacts transfer to the trip condition.

Target Reset (Type 27/59 and Type 59):

The target will maintain its indication even with loss of control power. The target must be manually reset. The target can be reset only if control power is available and the ac input voltage to the relay is within the "normal" range for the element; ie, above pickup for a 27 unit and below dropout for a 59 unit.

APPLICATION DATA

The ABB Circuit-Shield™ Type 27/59 and Type 59 are general purpose single-phase voltage relays that find application for incoming line protection, bus transfer schemes, motor protection, and in emergency generator and co-generation applications.

Solid-state design provides good accuracy and repeatability, and immunity to environmental effects such as shock and vibration.

Type 27/59:

An important application of the Type 27/59 under/overvoltage relay is in co-generation schemes to establish an acceptable voltage window for the generator at the tie to the utility system. A companion under/overfrequency relay, the Type 81, is used to establish an acceptable frequency window (see IB 7.4.1.7-5 for the Type 81). The tie is tripped when the voltage or frequency deviates from the acceptable windows.

The Type 27/59 is available with definite time and instantaneous timing characteristics. Unless speed of operation is critical, it is usually preferable to use the short-definite-time characteristic rather than the instantaneous relay, to avoid nuisance operations on momentary system fluctuations. Refer to the listing of common units and the Time-Voltage characteristic curve TVC-605848 which follow.

- \* The Type 27/59 is suitable for operation from 45 to 400 Hz. Units with a "-HF" suffix on the catalog number include a harmonic filter to reduce the response to harmonics of the 50 or 60 Hz. fundamental. The "-HF" circuitry is included as standard on relays of the catalog form 410Dxxx0.

Type 59:

The Type 59 is a general purpose overvoltage relay with an inverse timing characteristic. Refer to the Time-Voltage characteristic curve TVC-605818. The Type 59 is frequency compensated for operation from 15 to 400 Hz.

For relays with definite-time or instantaneous operating time characteristics refer to Types 59D and 59H in IB 18.4.7-2.



CHARACTERISTICS OF COMMON UNITS

| Type  | Overvoltage Element<br>Tap Range  | Element<br>Delay | Internal<br>Connections          | Control<br>Voltage | Catalog<br>Std Case | Number<br>Test Case                 |
|-------|-----------------------------------|------------------|----------------------------------|--------------------|---------------------|-------------------------------------|
| 59    | 100-150v                          | Inverse          | 16D210A                          | 48/125vdc          | 210C1175            | 410C1175                            |
|       |                                   |                  | 16D210A                          | 48/110vdc          | 210C1105            | 410C1105                            |
|       |                                   |                  | 16D211N                          | 220vdc             | 210C1125            | 410C1125                            |
|       |                                   |                  | 16D211N                          | 250vdc             | 210C1155            | 410C1155                            |
|       |                                   |                  | 16D210A                          | 120vac             | 210C1165            | 410C1165                            |
| Type  | Undervoltage Element<br>Tap Range | Element<br>Delay | Overvoltage Element<br>Tap Range | Element<br>Delay   | Control<br>Voltage  | Catalog Number<br>Drawout Test Case |
| 27/59 | 60-110v                           | Inst.            | 100-150v                         | Inst.              | see below           | 410D00x0                            |
|       |                                   | 0.1-1s           |                                  | Inst.              |                     | 410D60x0                            |
|       |                                   | 0.1-1s           |                                  | 0.1-1s             |                     | 410D66x0                            |
|       |                                   | 1-10s            |                                  | Inst               |                     | 410D40x0                            |
|       |                                   | 1-10s            |                                  | 0.1-1s             |                     | 410D46x0                            |
|       |                                   | 1-10s            |                                  | 1-10s              |                     | 410D44x0                            |
|       | 30-55v                            | Inst.            | 60-85 v                          | Inst.              | see below           | 410D11x0                            |
|       |                                   | 0.1-1s           |                                  | Inst.              |                     | 410D21x0                            |
|       |                                   | 0.1-1s           |                                  | 0.1-1s             |                     | 410D22x0                            |
|       |                                   | 1-10s            |                                  | Inst               |                     | 410D31x0                            |
|       |                                   | 1-10s            |                                  | 0.1-1s             |                     | 410D32x0                            |
|       |                                   | 1-10s            |                                  | 1-10s              |                     | 410D33x0                            |
| *     | 40-65v                            | Inst.            | 60-85 v                          | Inst.              | see below           | 410D71x0                            |
|       |                                   | 0.1-1s           |                                  | Inst.              |                     | 410D81x0                            |
|       |                                   | 0.1-1s           |                                  | 0.1-1s             |                     | 410D82x0                            |
|       |                                   | 1-10s            |                                  | Inst               |                     | 410D91x0                            |
|       |                                   | 1-10s            |                                  | 0.1-1s             |                     | 410D92x0                            |
|       |                                   | 1-10s            |                                  | 1-10s              |                     | 410D93x0                            |
|       | 30-55v                            | Inst.            | 100-150v                         | Inst.              | see below           | 410D10x0                            |
|       |                                   | 0.1-1s           |                                  | Inst.              |                     | 410D20x0                            |
|       |                                   | 0.1-1s           |                                  | 0.1-1s             |                     | 410D26x0                            |
|       |                                   | 1-10s            |                                  | Inst               |                     | 410D30x0                            |
|       |                                   | 1-10s            |                                  | 0.1-1s             |                     | 410D36x0                            |
|       |                                   | 1-10s            |                                  | 1-10s              |                     | 410D34x0                            |

IMPORTANT NOTES:

To complete the catalog number for the Type 27/59 the digits shown as "x" in the above chart must be selected. Digit "x" represents the control voltage rating.

x = 7 for 48/125 vdc  
x = 0 for 48/110 vdc

x = 9 for 24/32 vdc  
x = 1 for 175 vdc

Consult factory for variations or control voltages not shown in the above charts.  
See page 16 for information on earlier models of these relays.

1. External Resistor when shown connected between terminals 1 and 9 must be in place for normal operation. The resistor is supplied mounted on the relay.
2. Coil labelled "TAR" is a low impedance series target coil. Refer to additional information under the section "Indicators".
3. Contacts 5-6 and 12-13 on the Type 27/59 can be converted from normally-open to normally-closed by changing internal jumpers. Catalog series 410Dxxx0 provides movable links - see circuit board layout, Figure 5 for details. See pg 16 for earlier models.

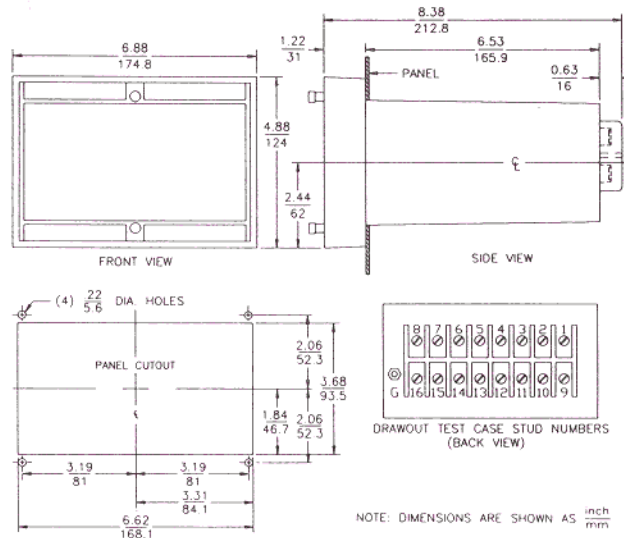


Figure 2: Relay Outline and Panel Drilling

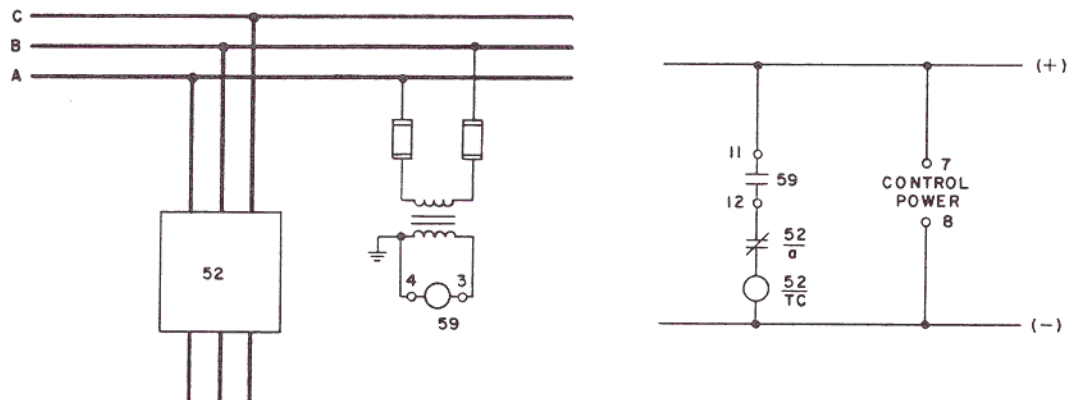


Figure 3: Typical External Connections - Type 59 Overvoltage Relay (Catalog Series 210C or 410C)

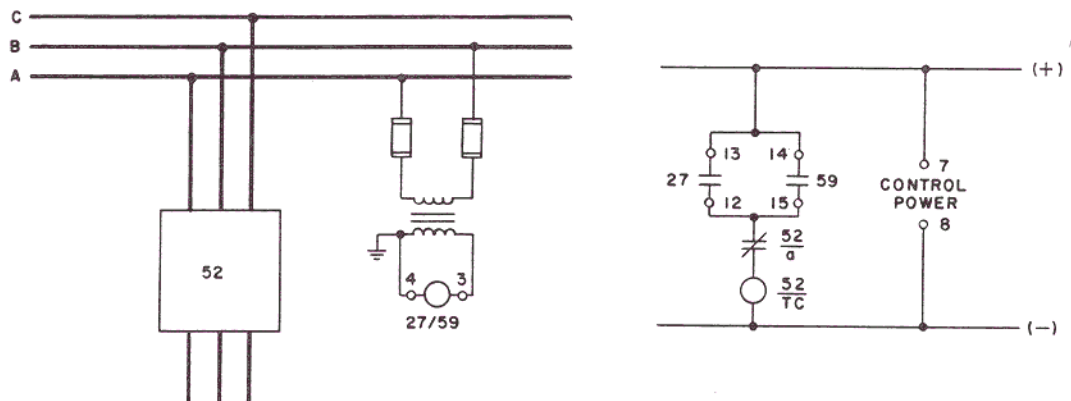
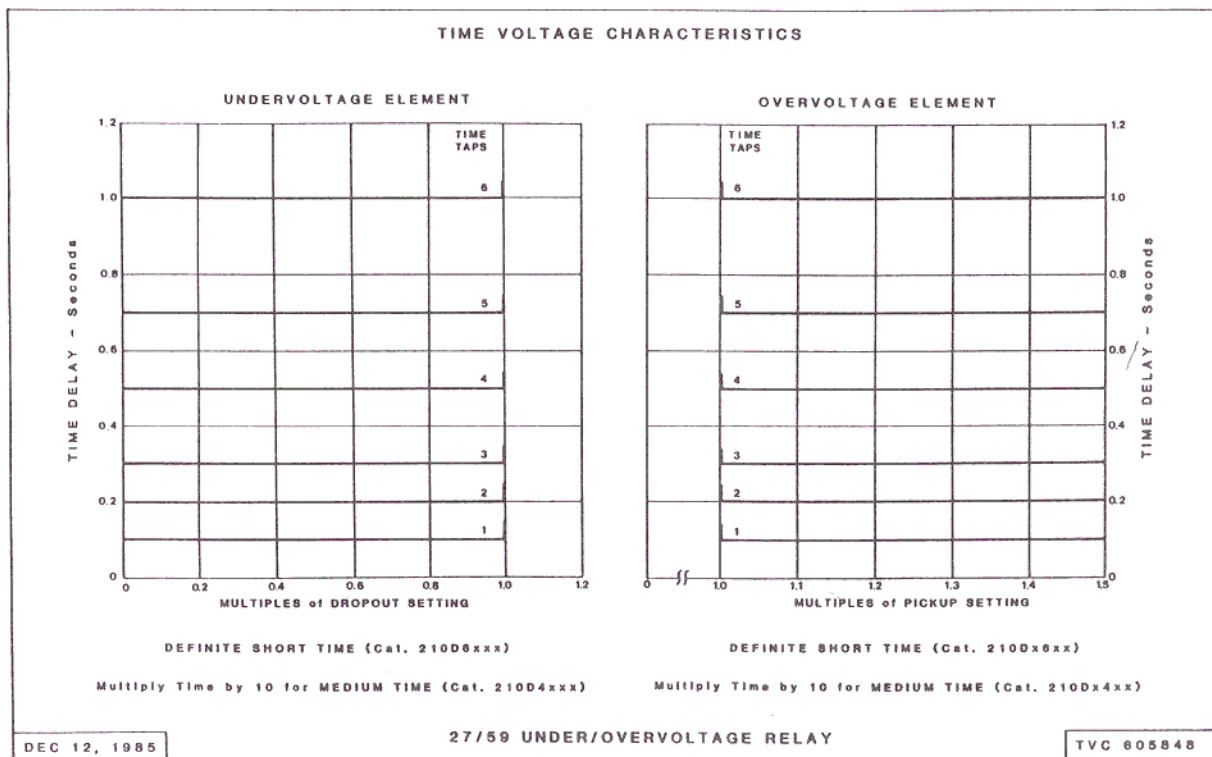
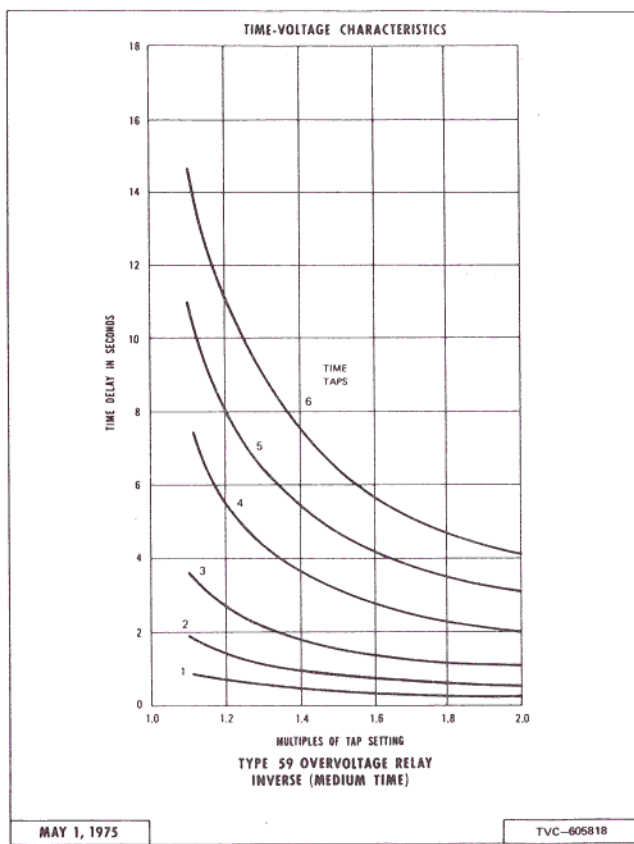


Figure 4: Typical External Connections - Type 27/59 Under/overvoltage Relay (Catalog Series 210D or 410D)



Note: Operating Time for Type 27/59 elements with INSTANTANEOUS characteristic is approximately 0.05 seconds maximum.



SPECIFICATIONS**Input Circuit:**

Rating: 160V, 50/60 Hz. continuous.  
 300V, 10 seconds.  
 Burden: Type 59 - 1.2 VA, 1.0 pf at 120 volts.  
 Type 27/59 - 0.1 VA, 1.0 pf at 120 volts.  
 Taps: available models include:  
 Type 59: 100, 110, 120, 130, 140, 150v  
 Type 27/59 (59 unit): 100, 110, 120, 130, 140, 150v  
 (59 unit): 60, 65, 70, 75, 80, 85v  
 (27 unit): 60, 70, 80, 90, 100, 110v  
 (27 unit): 40, 45, 50, 55, 60, 65v \*  
 (27 unit): 30, 35, 40, 45, 50, 55v  
 Differential between Operate and Reset Voltages:  
 Type 59: less than 0.5 percent.  
 Type 27/59: adjustable, approximately 90-99.5%,  
 factory set to approximately 1%.  
 Frequency Range: Type 59 20-400 Hertz.  
 Type 27/59 45-400 Hertz.

**Operating Time:** See Time-Voltage characteristic curves, page 8.

**Output Circuit:** each contact @125vdc @250vdc @120vac  
 Tripping duty: 30A 30A 30A  
 Continuous: 5A 5A 5A  
 Break: 0.3A 0.1A 2A

**Operating Temperature Range:** -30 to +70 deg. C.

**Control Power:** models available for

Type 59 48/125 vdc @ 0.08 A max. drain.  
 48/110 vdc @ 0.08 A max.  
 220 vdc @ 0.06 A max.  
 250 vdc @ 0.06 A max.  
 120 vac 50/60 Hz. @ 0.08 A.

Type 27/59 48/125 vdc @ 0.05 A max. drain.  
 48/110 vdc @ 0.05 A max.  
 24/ 32 vdc @ 0.08 A max.

|                      |                |           |                 |            |
|----------------------|----------------|-----------|-----------------|------------|
| Allowable variation: | 24vdc nominal: | 19- 29vdc | 125vdc nominal: | 100-140vdc |
|                      | 32vdc "        | 25- 38    | 220vdc "        | 176-250vdc |
|                      | 48vdc "        | 38- 58    | 250vdc "        | 200-280vdc |
|                      | 110vdc "       | 88-125    | 120vac "        | 95-135vac  |

**Tolerances:** Operating Voltage: +/- 5% These tolerances are based on the printed dial markings. By using the calibration procedures given later in this book, the relay may be set precisely to the desired values of operating voltage and delay with excellent repeatability.

Operating Time: +/-10% or +/-0.05s whichever is greater.

**Repeatability:** variation in operating voltage for a 10 volt variation in control voltage: 0.2 volt, typical.

variation in operating voltage over the temperature range -20 to +55 deg C:

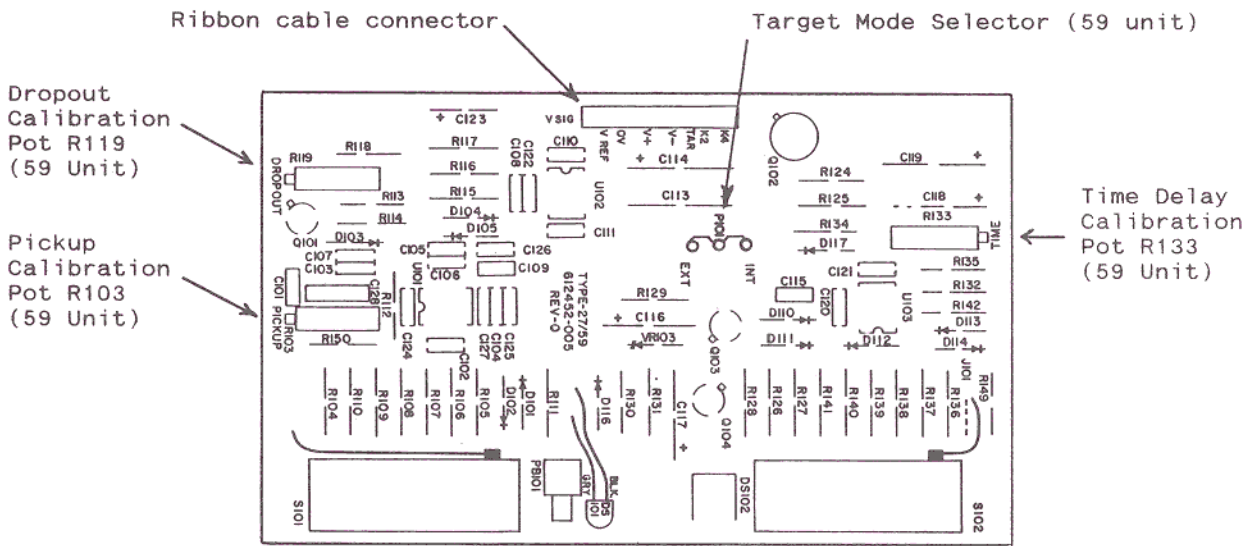
Type 59 +/-1% typical.  
 Type 27/59 (48/125vdc model) +/-1% max.  
 Type 27/59 (24/ 32vdc model) +/-2% max.

variation in time delay over temperature range -20 to +55 deg C: +/-5% typical.

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

**Seismic Capability:** More than 6g ZPA biaxial broadband multifrequency vibration without damage or malfunction. (ANSI C37.98-1978)

UPPER CIRCUIT BOARD - (59) Unit:



LOWER CIRCUIT BOARD - (27) UNIT:

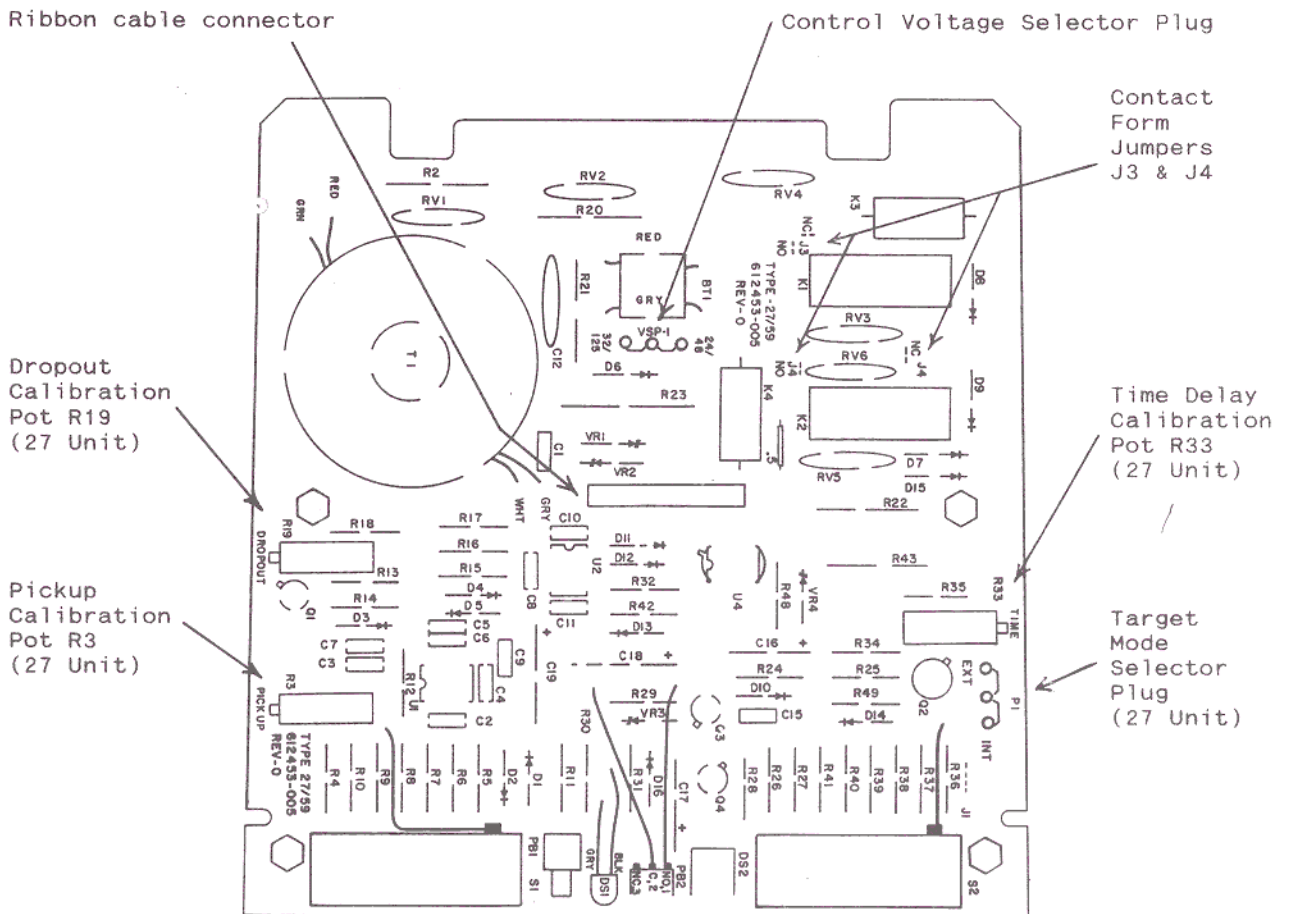


Figure 5: Typical Circuit Board Layout - Type 27/59

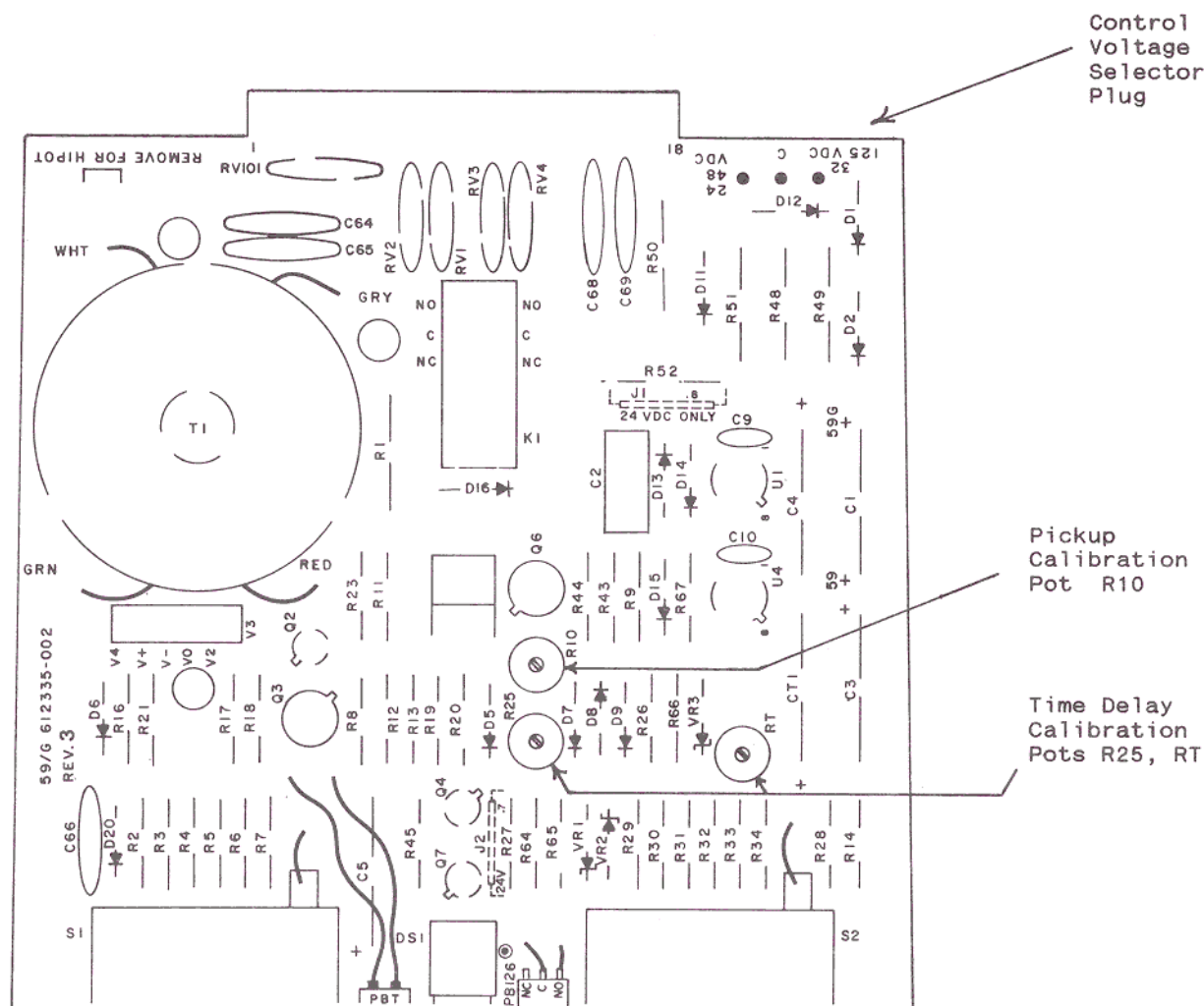


Figure 6: Typical Circuit Board Layout - Type 59 (DC Control)

## Notes for Figure 5, page 10, Type 27/59:

1. Conversion of Contacts: referring to internal connection diagram 16D410D on page 6, the form of the contacts 5-6 and 12-13 may be changed by moving jumpers on the lower circuit board. On units of catalog series 410Dxxx0 these jumper links are removable using needle-nose pliers. Earlier series units require the unsoldering, repositioning, and resoldering of jumper wires.

The jumper positions are labelled "NO" for normally-open, and "NC" for normally-closed.  
Jumper J3 is for the undervoltage unit, contact 12-13.  
Jumper J4 is for the overvoltage unit, contact 5-6.

2. Calibration: for the Type 27/59, calibration adjustments for pickup and dropout must be done in a certain order. See page 14 for details of the proper procedure.

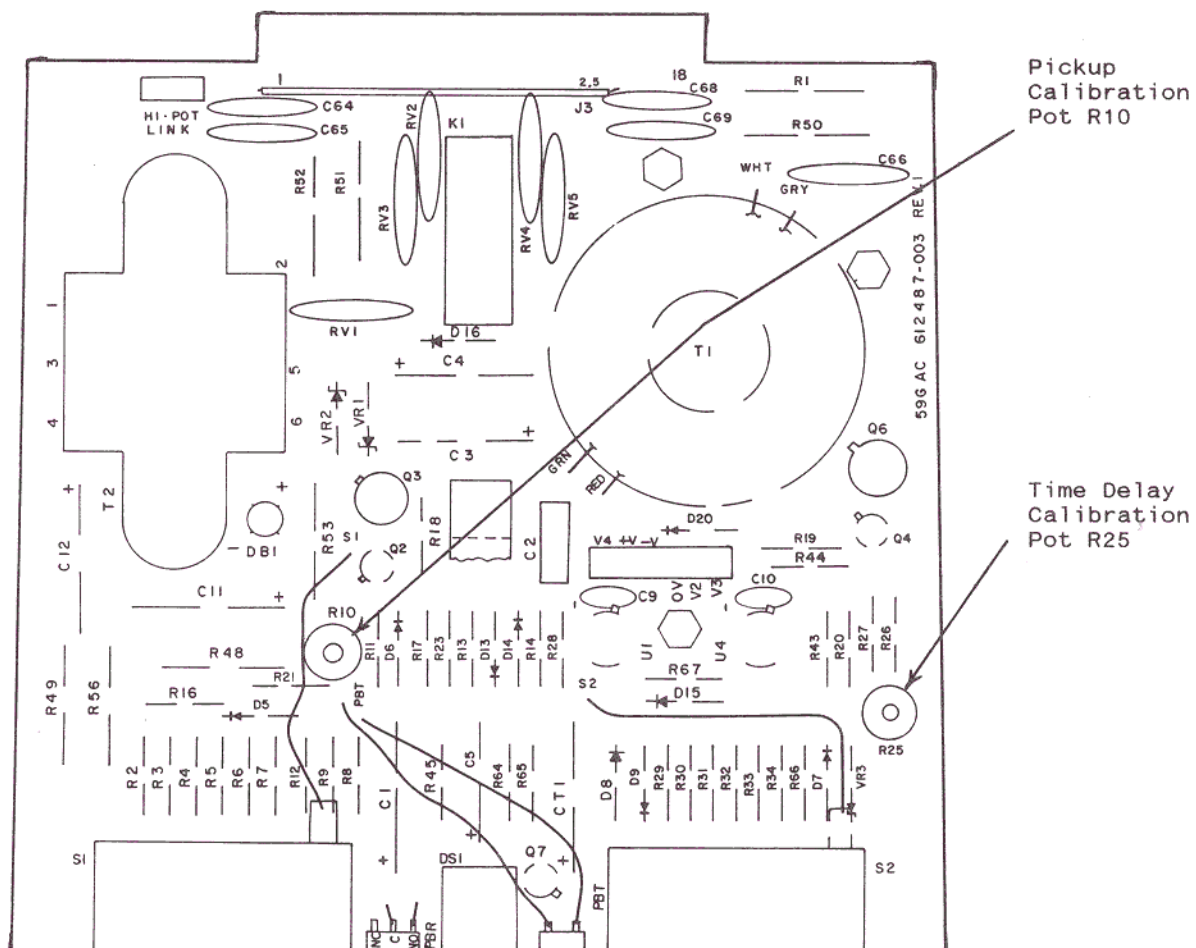


Figure 7: Typical Circuit Board Layout - Type 59 (AC Control)

---

## TESTING

### 1. MAINTENANCE AND RENEWAL PARTS

No routine maintenance is required on these relays. 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, and in some cases a circuit description, can be provided on request. Renewal parts will be quoted by the factory on request.

There are earlier versions of these single-phase voltage relays which are now obsolete and have been superseded. Refer to the information on page 15.

#### 210C and 210D 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 a 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 with the unit in service may cause an undesired operation.*

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

#### 410C and 410D Series Units:

Metal handles provide leverage to withdraw the relay assembly from the case. Removing the unit in an application that uses a normally closed contact will cause an operation. The assembly is identified by the catalog number stamped on the front panel and a serial number stamped on the bottom of the circuit 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: All 410D series Type 27/59 relays, and those 410C series Type 59 which have internal connection diagram 16D211N require an external resistor between terminals 9 and 10 on the case for proper operation. In order to test the drawout unit of these relays, a resistor must be connected temporarily between terminals 1 and 9 on the rear vertical circuit board. The value of this resistor depends on the control voltage rating of the relay. A 25 watt resistor is sufficient for testing. If no resistor is available, the resistor assembly mounted on the rear of the relay 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.*

Exception: for dual rated relays (48/125vdc, 24/32vdc, 48/110vdc) the resistor is required only when the relay is set up for the higher of the two voltage ratings.

#### External Resistor Values:

|                   |           |           |           |                |            |
|-------------------|-----------|-----------|-----------|----------------|------------|
| Type 27/59 rated: | 48/125vdc | 48/110vdc | 24/32vdc. | Type 59 rated: | 250vdc.    |
| Resistor Value:   | 4700 ohms | 4000 ohms | 600 ohms  |                | 10000 ohms |

#### Test Plug:

A test plug assembly, catalog 400X0002 is available for use with the 410 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 its case sufficient to break the rear connections before applying the test voltage.

The Type 59 includes a link on the circuit board labelled "HIPOT". This link is temporarily removed when hi-pot tests are conducted at the factory. After testing the link is restored to connect certain surge suppression components to ground for normal operation.



### 3. BUILT-IN TEST FUNCTION

Be sure to take all necessary precautions if tests are run with the main circuit energized.

The built-in test is provided as a convenient functional test of the relay and associated circuit. When you depress the button labelled TRIP, the measuring and timing circuits of the relay are actuated. When the relay times out, the output contacts transfer to trip the circuit breaker or other associated auxiliary, and the target is displayed. The test button must be held down continuously until operation is obtained.

### 4. ACCEPTANCE AND CALIBRATION TESTING

A typical test circuit is shown in Figure 8. Apply control voltage to match the relay's nameplate rating (and internal plug setting if dual-rated). A stable, harmonic free test source is recommended to obtain accurate calibration results. Do not use sources which include a ferro-resonant-transformer regulator as they tend to have high harmonic content in the output.

For relays not equipped with a pickup or dropout indicator, set the time-dial to #1 (fastest) and vary the voltage slowly to remove the effect of the time delay from the voltage measurement.

Note that in the context used here, the operating point for a 59 unit is "pickup" and reset is "dropout"; while the operating point for a 27 unit is "dropout" and reset is "pickup". See Figure 1 on page 3.

The operating point should be within  $\pm 5\%$  of the voltage tap setting.

To check timing, select time-dial #3. For (27) units, switch the input voltage from a value above pickup to zero volts. For (59) units, switch the voltage from zero volts to a value of 1.5 times the pickup tap setting. (Observe the input voltage ratings of the relay - do not let high values of input voltage persist beyond the time required to obtain operation.) The operating time should be within  $\pm 10\%$  of the value shown on the time-voltage curve for the particular relay.

Calibration can be trimmed to the final settings required for the application at this time. Settings may be varied from the fixed taps by using the internal calibration potentiometers. The identification of these potentiometers is given below, and their locations can be found on the circuit board layouts shown in Figures 5, 6 and 7.

For the Type 59 pickup and dropout are set with the same potentiometer and have a fixed relationship.

For the Type 27/59 calibration must be done in the following order: Pickup, then Dropout, then Time Delay. Be sure to refer to Figure 1 which illustrates the pickup and dropout levels. The voltage tap pin should be placed in the setting closest to the desired pickup voltage level. Then adjust the internal pickup calibration potentiometer to obtain pickup at the desired level. Then adjust the dropout calibration potentiometer to obtain dropout at the desired voltage. Several trials will probably be required to make these adjustments. Note that the pickup adjustment is not affected by the dropout adjustment, but the dropout adjustment is affected by the pickup adjustment. Dropout generally should be set at least 0.5 volts below pickup. The settings for the (27) unit are completely independent of the settings for the (59) unit.

#### Internal Calibration Potentiometers

| Relay Type | Adjustment     | (27)Element | (59)Element     |
|------------|----------------|-------------|-----------------|
| Type 59    | Pickup/Dropout | ---         | R10             |
|            | Timing         | ---         | R25 (main) & RT |
| Type 27/59 | Pickup         | R3          | R103            |
|            | Dropout        | R19         | R119            |
|            | Timing         | R33         | R133            |

Note: on the Type 59, R25 is the main timing calibration pot;  
RT is a secondary adjustment provided on some units.

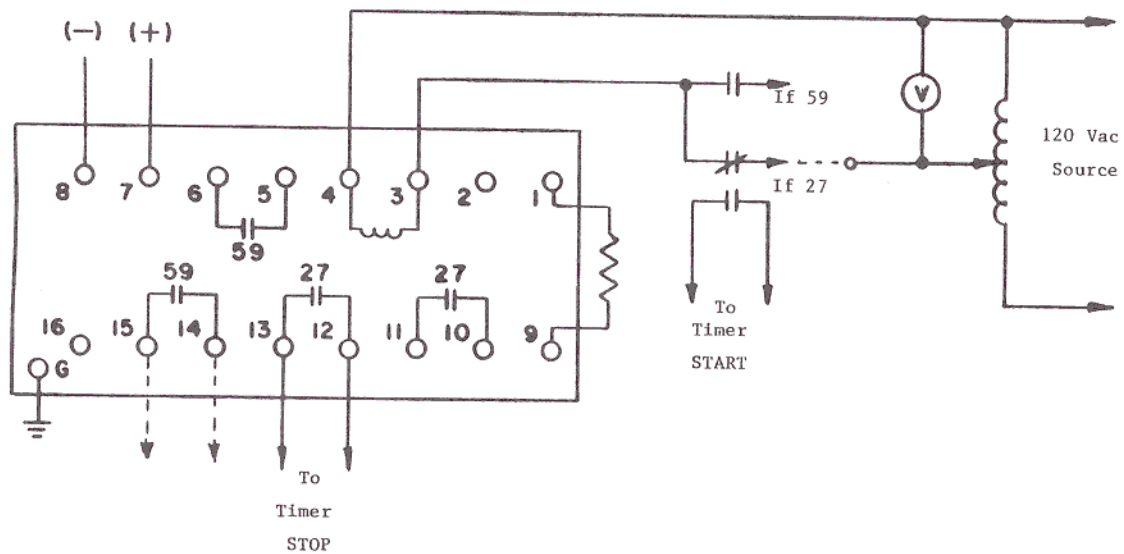


Figure 8: Typical Test Circuit Connections, Type 27/59

Notes for Type 27/59:

1. Apply rated dc control voltage to terminals 7 and 8 in the correct polarity. Be sure the internal control voltage selector plug is in the correct position.
2. Contacts 5-6 and 12-13 are convertible to normally-closed.
3. If the target mode selector links are set for external trip-circuit actuation of the targets, connect suitable external load such as a lockout relay to output contacts 10-11 and 14-15 to obtain target operation.

## 5. TESTING and REPLACEMENT of EARLIER MODELS

The following information is a guide to earlier versions of these relays and the replacement of these or similar relays. Suggested rewiring information is given; however, be sure to review the overall purpose of the scheme and the final wiring. Also, a functional test should be conducted.

### Type 27/59 Catalog Series 210Dxxx7, 410Dxxx7, 210Dxxx8, 410Dxxx8:

\* This series of units is identical to the Type 27/59 shown in this instruction book, except that the output contact form is selected by soldered-in jumpers on the circuit board. To change the contact form the jumpers must be unsoldered, repositioned, and resoldered. See the page opposite for the characteristics of these units.

Calibration and testing is the same as described on pages 13 and 14.

Replace any of these units with the corresponding 410Dxxx0.

### Type 27/59 Catalog Series 210Dxxx1 and 210Dxxx2:

This series of units is identical to the Type 27/59 shown in this book, except the contact form is set by soldered-in jumpers; and, they do not include the option to have target operation by external trip circuit current; Target operation is electronic at the time the relay contacts transfer to the trip condition.

Calibration and testing is the same as described on pages 13 and 14.

Replace any of these units with the corresponding 410Dxxx0.

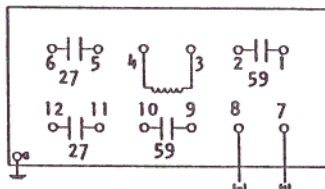
### Type 27/59 Catalog Series 211Lxxx5:

This series of units did not include a true overvoltage function. The equivalent type for replacement purposes is the Type 27N. Refer to IB 7.4.1.7-7 for details on the Type 27N.

### Type 27/59 Catalog Number 211D1171:

This relay has inverse curves; therefore, a catalog series 410D unit is not an exact replacement. If definite time curves are acceptable, then the replacement unit would be catalog 410D4470, with 1-10 second definite time curves for each function. (If inverse curves are required, the 211D1171 must be replaced with separate Type 27 and Type 59 relays, catalog numbers 411R1175 and 410C1175.)

Internal Connections  
Catalog 211D1171  
(for reference only)



The 410D4470 will mount in the same panel cutout; however, some rewiring is required per the following suggested chart:

|                                 |   |   |   |   |    |    |   |   |    |    |    |    |   |
|---------------------------------|---|---|---|---|----|----|---|---|----|----|----|----|---|
| Wire on 211D1171 terminal ----> | 1 | 2 | 3 | 4 | 5  | 6  | 7 | 8 | 9  | 10 | 11 | 12 | G |
| moves to                        |   |   |   |   |    |    |   |   |    |    |    |    |   |
| Terminal on 410D4470 ---->      | 5 | 6 | 3 | 4 | 10 | 11 | 7 | 8 | 14 | 15 | 12 | 13 | G |

## CHARACTERISTICS OF EARLIER MODELS

| Type  | Undervoltage Tap Range | Element Delay | Overvoltage Tap Range | Element Delay | Control Voltage | Catalog Std Case | Number Test Case |
|-------|------------------------|---------------|-----------------------|---------------|-----------------|------------------|------------------|
| 27/59 | 60-110v                | Inst.         | 100-150v              | Inst.         | see below       | 210D00xy         | 410D00xy         |
|       |                        | 0.1-1s        |                       | Inst.         |                 | 210D60xy         | 410D60xy         |
|       |                        | 0.1-1s        |                       | 0.1-1s        |                 | 210D66xy         | 410D66xy         |
|       |                        | 1-10s         |                       | Inst          |                 | 210D40xy         | 410D40xy         |
|       |                        | 1-10s         |                       | 0.1-1s        |                 | 210D46xy         | 410D46xy         |
|       |                        | 1-10s         |                       | 1-10s         |                 | 210D44xy         | 410D44xy         |
|       | 30-55v                 | Inst.         | 60-85 v               | Inst.         | see below       | 210D11xy         | 410D11xy         |
|       |                        | 0.1-1s        |                       | Inst.         |                 | 210D21xy         | 410D21xy         |
|       |                        | 0.1-1s        |                       | 0.1-1s        |                 | 210D22xy         | 410D22xy         |
|       |                        | 1-10s         |                       | Inst          |                 | 210D31xy         | 410D31xy         |
|       |                        | 1-10s         |                       | 0.1-1s        |                 | 210D32xy         | 410D32xy         |
|       |                        | 1-10s         |                       | 1-10s         |                 | 210D33xy         | 410D33xy         |
|       | 30-55v                 | Inst.         | 100-150v              | Inst.         | see below       | 210D10xy         | 410D10xy         |
|       |                        | 0.1-1s        |                       | Inst.         |                 | 210D20xy         | 410D20xy         |
|       |                        | 0.1-1s        |                       | 0.1-1s        |                 | 210D26xy         | 410D26xy         |
|       |                        | 1-10s         |                       | Inst          |                 | 210D30xy         | 410D30xy         |
|       |                        | 1-10s         |                       | 0.1-1s        |                 | 210D36xy         | 410D36xy         |
|       |                        | 1-10s         |                       | 1-10s         |                 | 210D34xy         | 410D34xy         |

IMPORTANT NOTES:

Do not use the above list for new applications - see Page 5.

To complete the catalog number for the Type 27/59 the digits shown as "x" and "y" in the above chart must be selected. Digit "x" represents the control voltage rating, and digit "y" represents the contact arrangement.

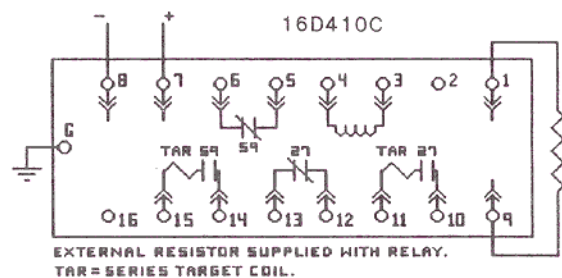
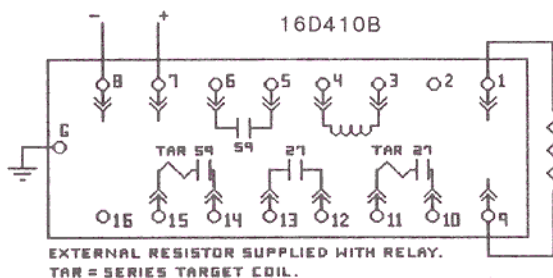
Contact arrangement:

- y = 1 or 7 for 2 normally open contacts per function, per internal connection diagram 16D410B.  
 y = 2 or 8 for 1 normally open, 1 normally closed/contact per function, per connection diagram 16D410C.

Note: for y = 1 or 2, no series target coil is provided.

Control Voltage:

- x = 7 for 48/125 vdc      x = 0 for 48/110 vdc  
 = 9 for 24/ 32 vdc

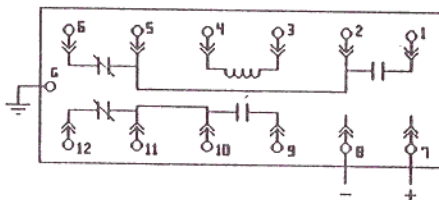


Type 59 Catalog Numbers 211C1171, 211C1175, and 211C1165 :

The replacement relay for 211C1175 or 211C1171 is catalog 410C1175.  
The replacement for 211C1165 is catalog 410C1165.

The diagram for the 211C1175 and 211C1165 is shown here. The 211C1171 is similar, but does not have the normally-closed contacts.

Internal Connections  
Catalog 211C1175 or 211C1165  
(for reference only)



The 410C1175 will mount in the same panel cutout; however, some rewiring is required per the following suggested chart:

|                            |    |    |   |   |    |    |   |   |    |    |    |    |   |
|----------------------------|----|----|---|---|----|----|---|---|----|----|----|----|---|
| Wire on 211C terminal ---> | 1  | 2  | 3 | 4 | 5  | 6  | 7 | 8 | 9  | 10 | 11 | 12 | G |
| moves to                   |    |    |   |   |    |    |   |   |    |    |    |    |   |
| Terminal on 410C1175 --->  | 11 | 12 | 3 | 4 | 12 | 10 | 7 | 8 | 15 | 14 | 14 | 13 | G |

Basic test and calibration procedures for the earlier models of the Type 59 are the same as given on pages 13 and 14.



NOTES



**ABB Power T&D Company, Inc.**  
Power Automation & Protection Division  
7036 North Snowdrift Road  
Allentown, PA 18106  
Telephone: (610) 395-7333 • Fax: (610) 395-1055

ISSUE D 1/99  
Supersedes Issue C

---

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in conjunction with installation, operation, or maintenance. Should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to ABB.