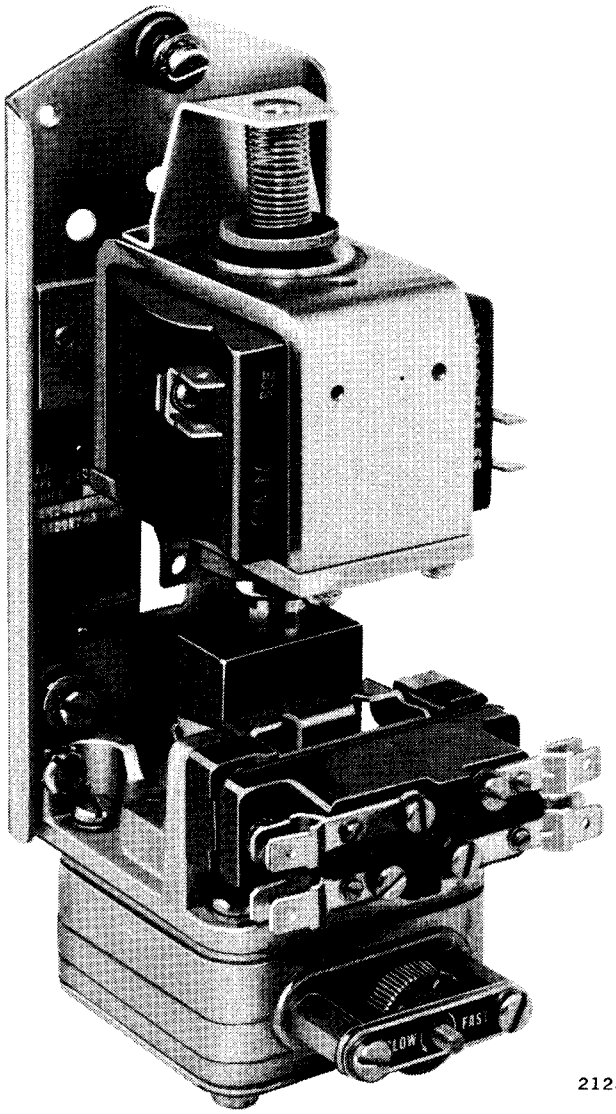
ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT

MAINTENANCE INSTRUCTION

TIME DELAY RELAYS - SQUARE D

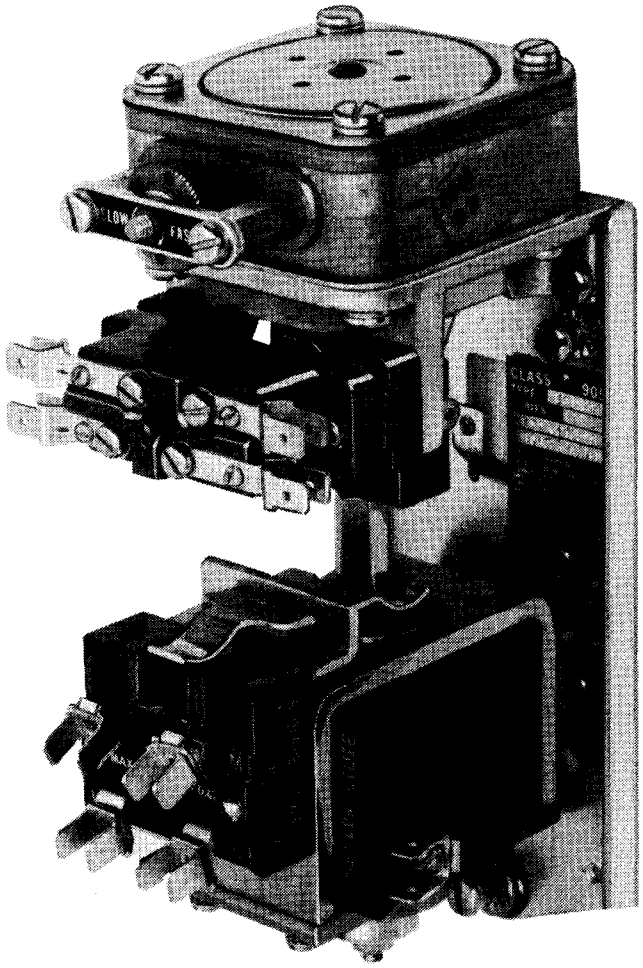
DESCRIPTION

The Square D Co. time delay relays, Figs. 1 and 2, listed under Service Data are single coil, air dashpot types. They all consist of an enclosed magnet coil and frame, a plunger type armature, a pneumatic time delay unit, and a snap action microswitch, Figs. 3 and 4. They may also be equipped with instantaneous interlocks. These components are mounted on a metal base using rubber grommets for shock and vibration absorption. The relays are front mounted with all electrical connections to the coil, microswitch contacts, and instantaneous interlocks (if applied) made to the front of the relay.



21232

Fig. 1 - Relay 8276597



21233

Fig. 2 - Relay 8276599

The mode of activation of time delay relays is either upon energization (pickup) of the coil, or

*This bulletin is revised and supersedes previous issues of this number.

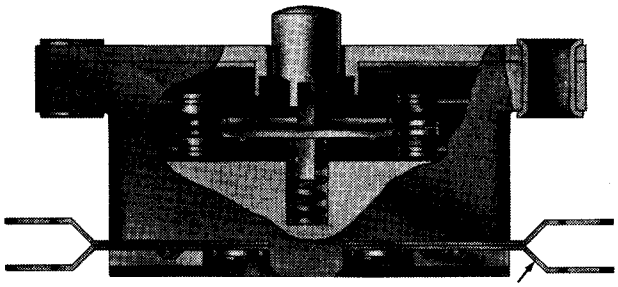


Fig. 3 - Switch Assembly Cutaway View

de-energization (dropout) of the coil. Pickup-delay relays have the pneumatic timing mechanism bottom mounted, Fig. 1, while dropout-delay relays have the timing unit top mounted, Fig. 2. (See complete listing of time delay relays in Service Data.)

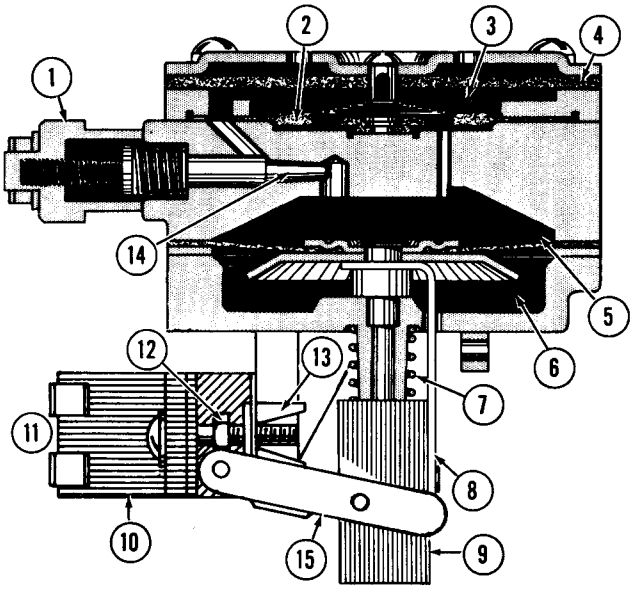


Fig. 4 - Pneumatic Timing Unit

The range of the timer unit on all relays is adjustable between .2 seconds and 3.0 minutes. Adjustment of the timing period is done by turning a knurled adjusting knob, Fig. 4. Turning the adjusting knob positions a needle valve which restricts the orifice between the upper and lower air chambers to the degree necessary to produce the desired time delay. The lubricant used for the adjusting knob provides permanent lubrication without danger of contamination of the needle valve.

The upper and lower air chambers are separated by a rubber diaphragm. A clapper valve, having a large ratio of area to sealing surface, admits filtered air to the upper chamber when the diaphragm is moved upward by the action of the plunger, Fig. 4. The valve then seats and the air escapes through the orifice.

The microswitch operating screw, Fig. 4, is held by a nylon clinch nut for permanent grip which eliminates the possibility of its loosening to cause erratic switch action.

The snap action microswitch located in front of the timing unit plunger, Fig. 4, is equipped with Faston terminals and is lever actuated. The lever arm is pivoted on one end at the timing unit plunger and midway on the timing mechanism housing. Any upward movement of the timing unit plunger will depress the microswitch button, and any downward movement of the plunger will release the button.

These time delay relays have various voltage ratings listed under Service Data. Switch contact arrangements differ considerably, also. (Refer to Service Data.) Relays 8272600, 8418210, 8422410, 8427842, 8430489, 8461849, and 8489673 are equipped with double throw contact arrangements. Relay 8489673 time delay contacts are designated A, B, C, and D. In all other relays, contacts A and B only, are the time delay contacts. Contact letter designations C, D, E, F, J, K, L, M, N, P, R, and Q are instantaneous interlocks.

NOTE: Instantaneous interlocks having the letter designations C, D, E, and F are interchangeable with interlocks marked J, K, L, M, N, P, R, and Q.

OPERATION

The armature plunger, Fig. 5, extends through the magnet coil and makes physical contact with the timing unit plunger. In the de-energized position, the magnet coil armature extends below the coil and is held in this position by the return spring. When the relay is energized, the armature is pulled into the coil immediately, closing the microswitch and instantaneous interlocks (if equipped). When the coil is de-energized, the armature drops to open the instantaneous interlocks (if equipped) and to start the downward movement of the timing unit plunger which follows at a rate depending upon the timer setting to open the microswitch.

Relays 8253242, 8253244, 8253246, 8262424, 8267199, 8272600, 8276597, 8297115, 8304176, 8392491, 8407947, 8417479, 8421519, and 8489673 have the time delay feature upon pickup. When the top mounted coil of these relays is energized, Fig. 1, the armature is pulled upward into the coil and the timing unit plunger follows at the predetermined rate. Upon de-energization, the return spring immediately forces both plungers downward to open the microswitch.

MAINTENANCE

At regular intervals, the assembly should be examined for free movement of all moving parts, security of mounting, continuity of electrical circuits and tightness of connections. Examine the magnet coil for damaged insulation and repair or replace as necessary.

The microswitch must be replaced as a unit since it is not possible to change out the contacts. When installing a new microswitch, check the wiring diagram of the particular equipment on which the relay is used to see that the correct interlocks are normally open or closed, as required for the application. At the annual inspection date, the relay should be checked visually and electrical tests made. Check the timing and adjust if necessary.

DIAPHRAGM REPLACEMENT

If it should become necessary to replace the diaphragm, Fig. 4, the entire timing unit should be replaced.

DISASSEMBLY

Due to slight variations in models, the disassembly procedure may vary. The general disassembly procedure is as follows: Remove the two screws holding the magnet assembly to the mounting base, Fig. 5, and the four screws from the magnet yoke bottom plate which hold the magnet coil in the magnet yoke. On those relays which have instantaneous interlocks, remove the two screws holding each interlock to the interlock bracket.

To disassemble the timing unit assembly, remove the two screws holding the timing unit assembly to the mounting base, the two screws holding the microswitch, and two screws holding the plunger. Remove the four screws holding the top cover to the timing unit and the four screws holding the lower chamber to the timer unit.

ASSEMBLY

Assembly of the magnet assembly and timing unit assembly is basically the reverse of the disassembly procedure.

MICROSWITCH ADJUSTMENT

1. Adjust set screw (12), Fig. 4, so that microswitch just trips at the extreme limit of travel of the plunger. (This screw can be adjusted without loosening nut).

2. Turn the screw "in" 1/3 turn.

3. The microswitch will have approximately .4 mm (.015") overtravel and the timing unit plunger 1.1 mm (.042") overtravel.

INSTANTANEOUS INTERLOCKS

ADJUSTMENT

1. Adjust the instantaneous interlock unit so that its button has 0.8 mm (1/32") to 1.6 mm (1/16") travel when the magnet coil is energized, Fig. 5. This adjustment is made by bending lever slightly. Use extreme care.

2. Readjust the microswitch so that the instantaneous interlock closes at approximately the same time as the microswitch contact opens when the coil is energized. Recheck for proper microswitch and plunger overtravel.

CLEANING

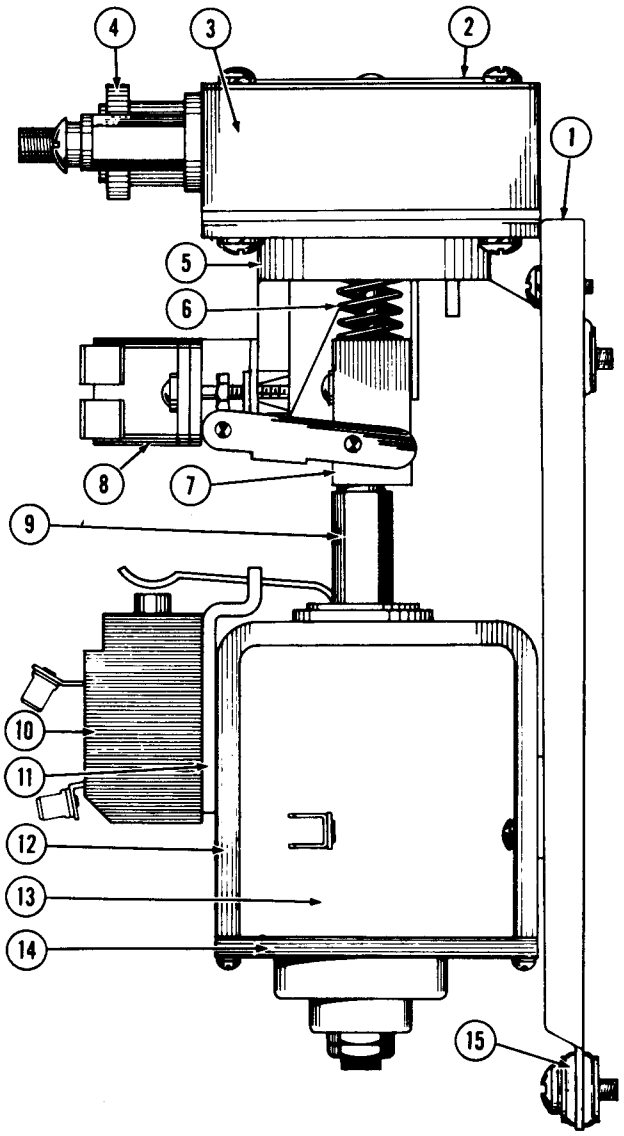
Contact cleaning of time delay instantaneous interlocks can be performed by the following procedure:

1. Obtain a spray can of good television tuner cleaner from any local television parts distributor.

2. Remove two screws and cover on instantaneous interlock assembly.

3. Spray contacts with TV tuner cleaner. Do not over spray. Over spraying will result in excessive moisture in interlock contact chamber and other parts of the relay.

CAUTION: This liquid in many cases is flammable. Care should be exercised in handling. Allow all spray moisture to evaporate before electrically energizing relay.



1. Mounting Base
2. Timer Cover
3. Timer Unit
4. Timer Adjusting Knob
5. Lower Chamber
6. Block Spring
7. Timing Unit Plunger
8. Microswitch
9. Armature Plunger
10. Instantaneous Interlocks
11. Interlock Bracket
12. Magnet Yoke
13. Magnet Coil
14. Yoke Bottom Plate
15. Grommets

21241

Fig. 5 - Relay 8276599

4. Push down at the centerline of the contacts on the movable bar, continuing to alternate from left side to right side, then left side, etc., to engage two contacts against each other. Clean both normally open and closed contacts in this manner.

All precautions should be taken to prevent any foreign matter from entering the interlock contact chamber. Do not use any cloth or abrasives to wipe contacts.

TIMING UNIT ADJUSTMENT

NOTE: The relay timing should not be set by turning the knurled nut on the timer unit to a certain number of turns since this method is not accurate.

The correct timing period is accomplished by positioning the needle valve in the orifice between the upper and lower air chambers, Fig. 4. Indicating arrows on the plate show the direction in which the adjusting knob should be turned to increase or decrease the delay period.

Outlined below is the proper method for accurately measuring the time delay period. This is the only method to use when the desired time delay period is very short. Longer periods can be set accurately without the necessity of cycling 10 times.

1. With the engine shut down and the isolation switch in the START position (if provided), make preliminary test and adjustments if necessary, in order to obtain an approximate cycling time.

2. Turn the adjusting knob all the way in the direction for FAST timing, then turn the knob back toward SLOW to the estimated point for proper time delay.

3. Open the control circuit at the control stand, disconnect and tape the positive lead to the magnet coil.

4. Disconnect positive leads to normally closed contacts of microswitch.

5. Connect a snap switch in series with one terminal of the NC contacts of the microswitch. Connect the other terminal of the NC contact to the magnet coil and connect the other terminal of the snap switch to a positive battery supply, Fig. 6.

6. Connect a low watt 64 volt lamp to one terminal of the NO contact of the microswitch and the other terminal to battery negative. Connect the other terminal of the snap switch (OPEN) to battery positive, Fig. 6.

7. When the snap switch is closed, the relay will cycle and the lamp will indicate the time lapse of the relay. Allow the relay to cycle ten times. Using a stop watch, record the

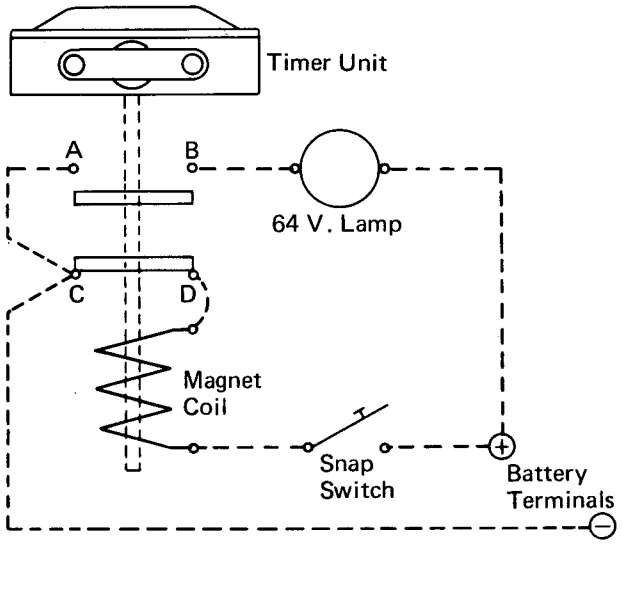


Fig. 6 – Schematic Test Connections

time required for the ten cycles and divide by ten to compute the relay timing. As previously stated, time delay periods may be obtained for 0.2 seconds to 3.0 minutes as required, minimum to maximum orifice opening.

8. In case the timing is not within the limits listed as required for the particular application, readjust and repeat until proper timing is obtained.

9. After satisfactory relay timing has been obtained, disconnect the testing equipment and reconnect the relay into its normal circuits and run a sequence check. On relays which have holes provided in the adjusting knob, apply a lead seal to prevent tampering by unauthorized personnel. On relays on which no holes are provided, a No. 8 locknut may be applied to the exposed threads of the adjusting nut.

SERVICE DATA

Complete Listing Of Time Delay Relays - Square D

INSTANTANEOUS DROPOUT DELAY PERIOD ON PICKUP

(Time delay after energization)

	Time Delay (Micro Switch)	Instantaneous Interlocks
8253242	1 N.O., 1 N.C.	
8253244	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8253246	1 N.O., 1 N.C.	1 N.O., 1 N.C.
8262424	1 N.O., 1 N.C.	1 N.O., 1 N'C.
8267199	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8272600	2 N.O., 2 N.C.	1 N.O., 1 N.C.
8276597	1 N.O., 1 N.C.	
8297115	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8304176	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8392491	1 N.O., 1 N.C.	1 N.O., 1 N.C.
8407947	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8417479	1 N.O., 1 N.C.	
8421519	1 N.O., 1 N.C.	
8489673	2 N.O., 2 N.C.	

INSTANTANEOUS PICKUP DELAY PERIOD ON DROPOUT

(Time delay after de-energization)

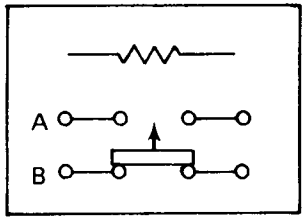
	Time Delay (Micro Switch)	Instantaneous Interlocks
8222042	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8230427	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8253241	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8253245	1 N.O., 1 N.C.	
8276598	1 N.O., 1 N.C.	
8276599	1 N.O., 1 N.C.	1 N.O., 1 N.C.
8282728	1 N.O., 1 N.C.	1 N.O., 1 N.C.
8304177	1 N.O., 1 N.C.	
8348748	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8418210	2 N.O., 2 N.C.	
8421520	1 N.O., 1 N.C.	
8422410	2 N.O., 2 N.C.	2 N.O., 2 N.C.
8426205	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8427842	2 N.O., 2 N.C.	2 N.O., 2 N.C.
8430489	2 N.O., 2 N.C.	
8461849	2 N.O., 2 N.C.	
8466382	1 N.O., 1 N.C.	2 N.O., 2 N.C.
8492028	1 N.O., 1 N.C.	2 N.O., 2 N.C.

SERVICE DATA (CONT'D)

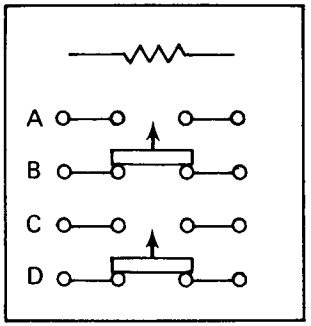
Schematic Of Coil And Contact Arrangements

DELAY PERIOD ON PICKUP - INSTANTANEOUS DROPOUT

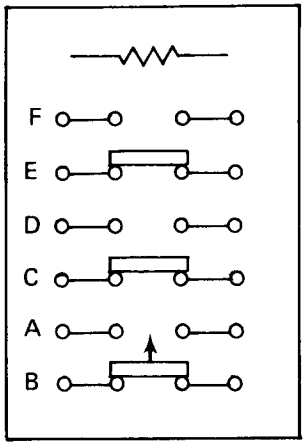
8253242
8276597
8417479
8421519



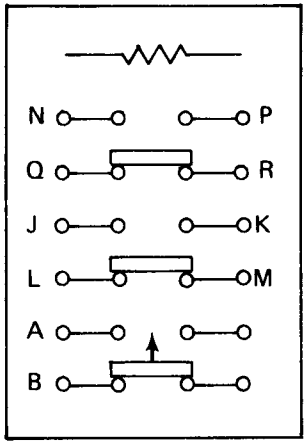
(Both time delay)
8489673



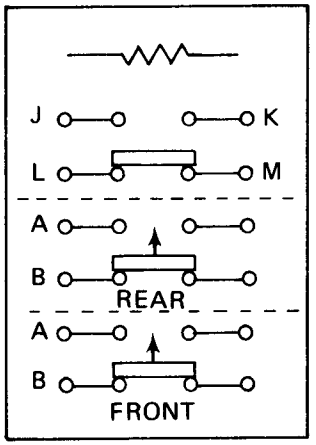
8297115



8253244
8267199
8304176
8407947

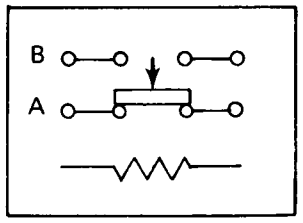


(Double throw time delay)
8272600

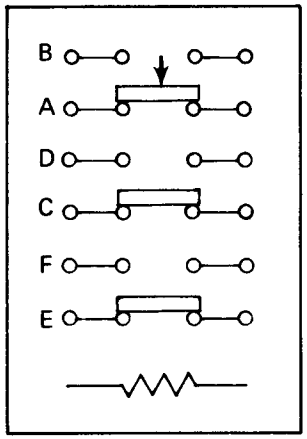


DELAY PERIOD ON DROPOUT - INSTANTANEOUS PICKUP

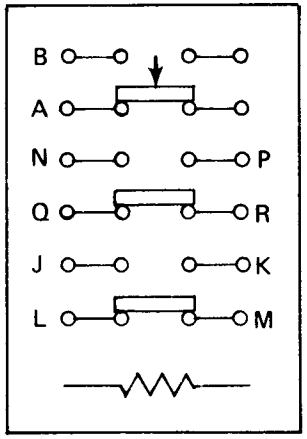
8253245
8276598
8304177
8421520



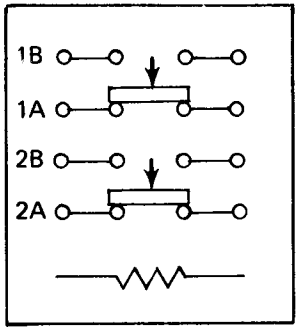
8222042
8230427



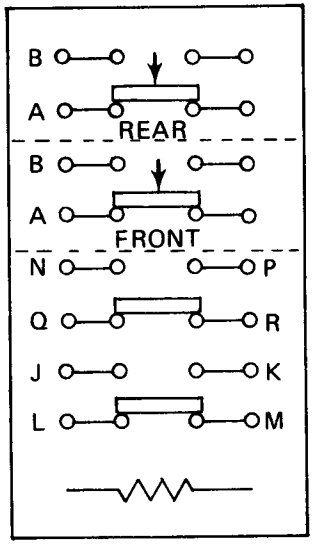
8253241
8348748
8426205
8466382
8492028



(Double throw)
8461849



(Double throw & instantaneous)
8427842



21235

Time Delay Settings . . . . . Refer to specific product wiring diagram for proper time delay.

	Magnet Coil			Contact Rating		
	Working Voltage	Pickup	Dropout	Resistance @ 20°C (68°F)	Time Delay (Micro Switch)	Instantaneous Interlocks
8222042	115 V DC	98 V DC Max.	12-42 V DC	1200 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8230427	74 V DC	48 V DC Max.	5-28 V DC Min.	417 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8253241	115 V DC	98 V DC Max.	10-42 V DC Min.	1055 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8253242	115 V DC	98 V DC Max.	10-42 V DC Min.	1055 Ohms ± 10%	0.5 Ampere @ 115 V DC	
8253244	115 V DC	98 V DC Max.	10-42 V DC Min.	1055 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8253245	115 V DC	98 V DC Max.	10-42 V DC Min.	1055 Ohms ± 10%	0.5 Ampere @ 115 V DC	
8253246	120 V DC	98 V DC Max.	12 V DC Min.	1055 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8262424	110 V AC	98 V AC Max.	12 V AC Min.	43 Ohms ± 10%	15 Ampere @ 110 V AC	6 Ampere @ 110 V AC
8267199	74 V DC	48 V DC Max.	5-28 V DC Min.	417 Ohms ± 10%	3 Ampere DC	3 Ampere DC
8272600	74 V DC	48 V DC Max.	5-28 V DC Min.	417 Ohms ± 10%	3 Ampere DC	3 Ampere DC
8276597	74 V DC	48 V DC Max.	5-28 V DC Max.	417 Ohms ± 10%	3 Ampere DC	
8276598	74 V DC	48 V DC Max.	5-28 V DC	417 Ohms ± 10%	3 Ampere DC	
8276599	74 V DC	48 V DC Max.	5-28 V DC	417 Ohms ± 10%	3 Ampere DC	3 Ampere DC
8282728	110 V AC	98 V AC Max.	12 V AC Min.	43 Ohms ± 10%	15 Ampere @ 110 V AC	6 Ampere @ 110 VAC
8297115	115 V AC	102 V AC Max.	12 V AC Min.	61 Ohms ± 10%	15 Ampere @ 115 V AC	6 Ampere @ 115 V AC
8304176	48 V DC	28 V DC Max.	4.8 V DC Min.	165 Ohms ± 10%	0.5 Ampere @ 48 V DC	0.5 Ampere @ 48 V DC
8304177	48 V DC	28 V DC Max.	2.8 V DC Min.	165 Ohms ± 10%	0.5 Ampere @ 48 V DC	
8348748	74 V DC	48 V DC Max.	5-28 V DC Min.	417 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
*8392491	74 V DC	48 V DC Max.	5-28 V DC Min.	417 Ohms ± 10%	3 Ampere DC	3 Ampere DC
8407947	24 V DC	19.2 V DC Max.	2.4 V DC	41 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8417479	115 V AC	102 V AC Max.	12 V AC Min.	61 Ohms ± 10%	15 Ampere @ 115 V AC	
8418210	120 V DC	98 V DC Max.	12-42 V DC	1055 Ohms ± 10%	0.5 Ampere @ 115 V DC	
8421519	24 V DC	19.2 V DC Max.	2.4 V DC	41 Ohms ± 10%	0.5 Ampere @ 115 V DC	
8421520	24 V DC	19.2 V DC Max.	2.4 V DC	41 Ohms ± 10%	0.5 Ampere @ 115 V DC	
8422410	74 V DC	48 V DC Max.	28 V DC Min.	417 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8426205	110 V AC	98 V AC Max.	12 V AC Min.	43 Ohms ± 10%	15 Ampere @ 110 V AC	6 Ampere @ 110 V AC
8427842	74 V DC	48 V DC Max.	5-28 V DC Min.	417 Ohms ± 10%	3 Ampere @ 74 V DC	3 Ampere @ 74 V DC
8430489	74 V DC	48 V DC Max.	5-28 V DC Min.	417 Ohms ± 10%	3 Ampere @ 74 V DC	
8461849	74 V DC	48 V DC Max.	5-28 V DC	417 Ohms ± 10%	2 Ampere @ 74 V DC	
8466382	48 V DC	28 V DC Max.	4.8 V DC	190 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC
8489673	115 V DC	98 V DC Max.	10-42 V DC	1055 Ohms ± 10%	0.5 Ampere @ 115 V DC	
8492028	24 V DC	19.2 V DC Max.	2.4 V DC Min.	41 Ohms ± 10%	0.5 Ampere @ 115 V DC	0.5 Ampere @ 115 V DC

*Contacts are gold diffused.

SERVICE DATA (CONT'D)

HI POT DATA

Relays: 8267199, 8276597, 8276598, 8348748, 8427842, 8430489, 8461849, 8422410, 8230427

Coil to Ground:	600 Volts RMS - 60 Hz - 1 Minute
Coil To Contacts:	600 Volts RMS - 60 Hz - 1 Minute
Contacts To Ground:	2400 Volts RMS - 60 Hz - 1 Minute

Relays: 8272600, 8392491

Coil To Ground:	600 Volts RMS - 60 Hz - 1 Minute
Coil To Contacts:	600 Volts RMS - 60 Hz - 1 Minute
Contacts To Ground:	2400 Volts RMS - 60 Hz - 1 Minute
Contact To Contact:	2400 Volts RMS - 60 Hz - 1 Minute

Relays: 8222042, 8253241, 8253242, 8253244, 8253245, 8253246, 8262424, 8282728, 8297115, 8304176, 8304177, 8407947, 8417479, 8418210, 8421519, 8421520, 8425205, 8466382, 8489673, 8492028

Coil To Ground:	1500 Volts RMS - 60 Hz - 1 Minute
Coil To Contacts:	1500 Volts RMS - 60 Hz - 1 Minute
Contacts To Ground:	1500 Volts RMS - 60 Hz - 1 Minute

Relay: 8275699

Coil To Ground:	600 Volts RMS - 60 Hz - 1 Minute
Coil To Contacts:	2400 Volts RMS - 60 Hz - 1 Minute
Contacts To Ground:	2400 Volts RMS - 60 Hz - 1 Minute
Contact To Contact:	2400 Volts RMS - 60 Hz - 1 Minute

Litho in U.S.A.