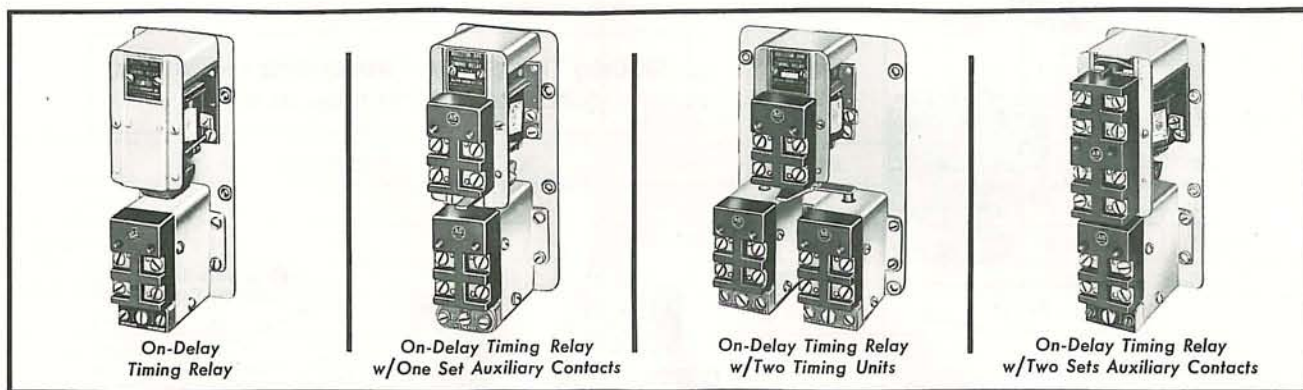


AC PNEUMATIC TIMING RELAYS



DESCRIPTION — The Bulletin 849 AC timing relay is a pneumatic type relay. A synthetic rubber bellows is actuated by the stroke of an AC solenoid. Timing relays can provide the time delay in either of two basic arrangements. The first arrangement, **On-Delay** provides the time delay **after the coil is energized**. The second arrangement, **Off-Delay** provides the time delay **after the coil is de-energized**. Basic **On-Delay** timing relays can easily be converted to **Off-Delay** operation and vice versa. Refer to Page 4 for converting details.

INSTALLATION — Bulletin 849 timing relays must be mounted in the vertical position, with the solenoid mechanism at the top, timing unit(s) at the bottom. (See illustrations above).

ENGINEERING DATA —

Contact Ratings — The timer contacts and the auxiliary contacts have a control circuit rating as follows:

| AC | | | | | DC | |
|---|---------|-------|-----------------------------------|-------------|------------------|------------------|
| Maximum Contact Rating Per Pole NEMA Rating Designation A600 | | | | | Voltage Range | Ampere Rating |
| Max. AC Voltage 60 or 50 Hz | Amperes | | Continuous Carrying Current | Voltamperes | | |
| | Make | Break | | Make | Break | |
| 120 | 60 | 6 | 10 | 7200 | 720 | 115-125 0.4 |
| 240 | 30 | 3 | 10 | 7200 | 720 | |
| 480 | 15 | 1.5 | 10 | 7200 | 720 | |
| 600 | 12 | 1.2 | 10 | 7200 | 720 | 230-250 0.2 |

Note — Circuits wired to a contact unit must be of the same polarity.

Timing Range — 1/20 second min. to 180 seconds max.

Repeat Accuracy — Approximately $\pm 10\%$ of time setting. A minimum reset time of 75 milliseconds must be provided to attain the repetitive accuracy.

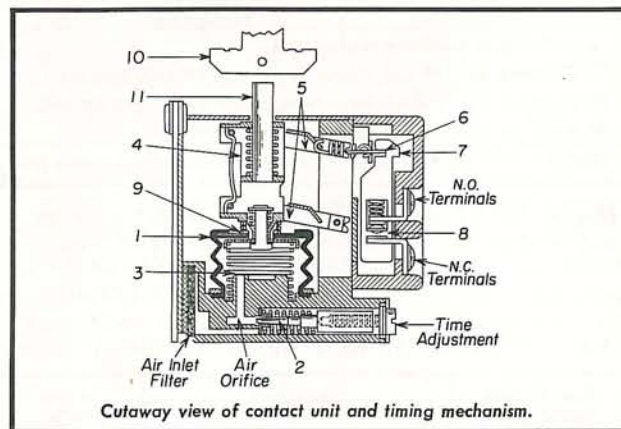
Temperature Range — 0° F. to + 104° F. (Standard) — 20° F. to + 150° F. (Wide Range — Silicone rubber bellows.) **Note** — Minimum temperature is based on the absence of freezing moisture or water.

OPERATION — When the solenoid plunger (10) is retracted from the push rod (11) it allows the spring (3) located inside the synthetic rubber bellows (1) to push the timing mechanism plunger (4) upward. As the plunger rises, it causes the over-center toggle mechanism (5) to

move the snap action toggle blade (6) upward which in turn picks up the push plate (7) which carries the movable contacts (8).

The speed with which the bellows can expand is determined by the setting of the needle valve (2). If this needle valve is nearly closed, an appreciable length of time will be required for air to pass it and permit the bellows to expand. The setting of the needle valve determines the time interval which must elapse between operation of the solenoid actuator and expanding of the bellows to operate the contact unit.

When the push rod (11) is again depressed by the solenoid plunger (10), it forces the timing mechanism plunger (4) to the lower position, exhausting the air through the release valve (9) and resetting the timer almost instantaneously.



REPAIRS — Timing relays can be disassembled as depicted in the illustrations on page 2 of this instruction sheet. Additional consideration should be given to the following technique.

REPLACING CONTACT UNIT — The toggle blade (6) on the timing mechanism **must** be in its down position to fit into the push plate (7) of the contact unit. Refer to cutaway illustration above. Hold down the push rod (11) and flip the toggle blade (6) down. Then place the contact unit in position being sure that the "loose" black phenolic insulation, that isolates the contact cavity is in place. Secure with two mounting screws. After assembly, check for normal contact operation.

ADDING AUXILIARY CONTACTS — Remove original spring support plate assembly from the solenoid mechanism and discard. The return springs on the new spring support plate assembly supplied with the auxiliary contact kit must be inserted into the plunger pin. Be sure toggle is placed over (under when arranged for off-delay operation) the operating angle. Then secure new spring support plate to the solenoid frame. Referenced parts illustrated below.

On-Delay Timing Relay—Formerly Style A—Illustrated
(other types of timing relays are similar)

| Timing Mechanism Temperature Ranges | |
|-------------------------------------|---------------------|
| Standard | 0° F. to +104° F. |
| Wide | -20° F. to +150° F. |

NOTE — Minimum temperature is based on the absence of freezing moisture or water.

▲ Included in auxiliary contact sets.

1 Concave side of coil clamp to be against coil, opposite T end of solenoid plunger.

2 Molded coil shown is interchangeable with old style coil.

3 Refer to Page 4 for bellows and air inlet filter listings.

NOTE — Parts indicated with ⚙ are recommended spare parts.

TIMING RELAY IDENTIFICATION — The table below is designed to assist in the accurate identification of a timing relay. Knowledge of the timing relay's catalog number coupled with data from the table will determine the complete description of the relay. Once the description of the timing relay is determined an accurate selection of replacement parts can be made from the table on page 3. EXAMPLE: Catalog number 849-ZOA325; the basic catalog number is 849-ZOA; the suffix identification is 32 (see table); the modification code number is 5 (see table) and a complete description of the relay is "an on-delay timer with a maintained contact timing unit, formerly known as a Style AM timing relay."

| Basic Catalog Number Suffix Identification | Description of Timing Relay | Former Style Letter |
|--|---|---------------------|
| 32 | On-Delay — Time Delay After Coil is Energized | A |
| 33 | Off-Delay — Time Delay After Coil is De-energized | B |
| 122 | On-Delay with Two Timing Units | H |
| 123 | Off-Delay with Two Timing Units | L |
| 124 | On and Off Delay Double Unit | AB |

| Modification Code Number | Description of Modification | Former Modification Letter |
|--------------------------|--|----------------------------|
| 1 | One set of Instantaneous Auxiliary Contacts (1NO-NC) | X |
| 2 | Dial Indicator on Timing Mechanism | D |
| 5 | Maintained Contact Timing Unit | M |
| 7 | Two sets of Instantaneous Auxiliary Contacts (2NO-NC) | XX |
| 9 | Silicone Rubber Bellows for Wide Temp. Range (-20° F. to +150° F.) | Y |
| 3 | Combination of modifications, Nos. 1 and 2 | (DX) |
| 4 | Combination of modifications, Nos. 2 and 7 | (DXX) |
| 6 | Combination of modifications, Nos. 1 and 5 | (MX) |

RENEWAL PARTS

NOTE — Blank listings in the parts table indicate that timing relays, of the description and modification where the blank exists, have not been manufactured, up to the date on this instruction sheet. To determine the availability of such a timing relay, refer to the nearest Allen-Bradley Sales Office or the Sales Office at Milwaukee.

| Description of Timing Relay → | On-Delay Formerly Style A | Off-Delay Formerly Style B | On-Delay W/Two Timing Units Formerly Style H | Off-Delay W/Two Timing Units Formerly Style L | On and Off Delay Double Unit Formerly Style AB |
|--|---------------------------------|----------------------------------|--|---|--|
| Description of Part | Part No. | Part No. | Part No. | Part No. | Part No. |
| Operating Angle | B-28419 | B-28419 | B-28419 | X-147391 | B-28419 |
| 1 Solenoid Base Assembly | X-151136 | X-151136 | X-278961 | X-261399 | X-151136 |
| Plunger Pin | B-25169 | B-25169 | E-12860 | B-25169 | B-25169 |
| Plunger Guide | E-8675 | E-8675 | E-8675 | E-8675 | E-8675 |
| Coil Clamp | E-8676 | E-8676 | E-8676 | E-8676 | E-8676 |
| Spring Support Plate Assembly | X-221969 | X-221969 | X-221970 | X-221969 | X-221969 |
| Spring Support Plate Assembly (for use on timers modified with one or two sets of instantaneous auxiliary contacts — formerly modifications X and XX) | X-228311 | X-228311 | X-228310 | X-228311 | X-228311 |
| 2 One Set of Instantaneous Auxiliary Contacts (formerly modification X) | 849-N1A | 849-N1A | 849-N2A | 849-N1A | 849-N1A |
| Two Sets of Instantaneous Auxiliary Contacts (formerly modification XX) | 849-N3 | 849-N3 | 849-N4 | 849-N3 | 849-N3 |
| One Set of Early Break Auxiliary Contacts (special) | Z-17048 | Z-17048 | — | Z-17048 | Z-17048 |
| 3 Standard Contact Unit | *40262-001-54 | *40262-001-54 | *40262-001-54 | *40262-001-54 | *40262-001-54 |
| Maintained Contact Unit — Hand Reset (formerly modification M) | *40262-001-55 | *40262-001-55 | — | — | — |
| Timing Mechanism w/o Contact Unit (standard temperature range) | *40262-012-56 | *40262-012-56 | *40262-012-56 | *40262-012-56 | *40262-012-56 |
| Timing Mechanism w/Dial Indicator w/o Contact Unit (standard temperature range, formerly modification D) | *40262-012-54 | *40262-012-54 | *40262-012-54 | *40262-012-54 | *40262-012-54 |
| Timing Mechanism w/o Contact Unit (wide temperature range, formerly modification Y) | *40262-012-52 | *40262-012-52 | — | — | — |
| Timing Mechanism w/Dial Indicator w/o Contact Unit (wide temperature range, formerly modification DY) | *40262-012-55 | — | — | — | — |
| Complete Timing Unit (with standard contact unit and standard temperature range) | 1496-N1 | 1496-N1 | 1496-N1 | 1496-N1 | 1496-N1 |
| Complete Timing Unit (with maintained contact unit, formerly modification M , and with standard temperature range) | 1496-N2 | 1496-N2 | — | — | — |
| Complete Timing Unit (with standard contact unit, dial indicator, formerly modification D , and with standard temperature range) | *40262-008-51 | *40262-008-51 | *40262-008-51 | *40262-008-51 | *40262-008-51 |
| Complete Timing Unit (with maintained contact unit and dial indicator, formerly modification DM , and with standard temperature range) | *40262-008-52 | — | — | — | — |
| Complete Timing Unit (with standard contact unit and wide temperature range, formerly modification Y) | 1496-N3 | 1496-N3 | — | — | — |
| Complete Timing Unit (with maintained contact unit and wide temperature range, formerly modification MY) | 1496-N4 | — | — | — | — |
| Complete Timing Unit (with standard contact unit, dial indicator and wide temperature range, formerly modification DY) | *40262-008-54 | — | — | — | — |
| 2 Complete Timing Unit (with standard contact unit, special for timing in both directions, formerly modification Z and with standard temperature range) | *40262-007-54 | — | — | — | — |

1 Includes operating angle with screws and washers, coil clamp and plunger guide.

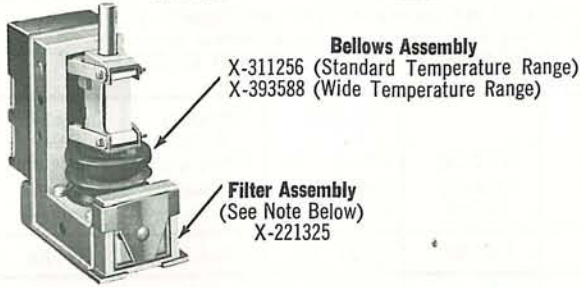
2 Timing mechanism w/o contact unit **not** available for this **special** timing unit.

*Added or changed since previous issue.

NOTE — Parts indicated with **3** are recommended spare parts.

ORDERING INFORMATION—Your order cannot be entered unless the following information is given: Part number, description of part, catalog number and series letter of the timer. This instruction sheet applies also to these timers when used on control apparatus listed under other Bulletin numbers.

Bellows—Air Inlet Filter



IMPORTANT — The filter assembly is replaceable **only** on timing units **identical** to the illustrated unit.

Coil Selection

| Description of Timing Relay | Former Style Letter | Select Coil from Table No. |
|---------------------------------|---------------------|----------------------------|
| On-Delay | A | 1 |
| Off-Delay | B | 1 |
| On-Delay with Two Timing Units | H | 2 |
| Off-Delay with Two Timing Units | L | 2 |
| On and Off Delay Double Unit | AB | 2 |

⊕ OPERATING COILS

| Volts | Hz | Table 1 | | | | | Table 2 | | | | |
|-------|----|-------------|--------------|--------|--------------|--------|-------------|--------------|--------|--------------|--------|
| | | Coil Number | Coil Current | | Volt-Amperes | | Coil Number | Coil Current | | Volt-Amperes | |
| | | | Inrush | Sealed | Inrush | Sealed | | Inrush | Sealed | Inrush | Sealed |
| 120 | 60 | 21A244 | .750 | .150 | 90 | 18 | 21A86 | 1.30 | .270 | 155 | 32 |
| 110 | 50 | | .770 | .160 | 85 | 18 | | 1.35 | .305 | 150 | 34 |
| 110 | 60 | 21A237 | .810 | .160 | 89 | 18 | 21A01 | 1.40 | .295 | 155 | 32 |
| 110 | 25 | 21A05 | .525 | .185 | 58 | 20 | ② 21A284 | .790 | .360 | 87 | 40 |
| 208 | 60 | 21A106 | .435 | .085 | 90 | 18 | 21A113 | .760 | .155 | 160 | 32 |
| 240 | 60 | 21A75 | .375 | .075 | 90 | 18 | 21A83 | .650 | .135 | 155 | 32 |
| 220 | 50 | | .385 | .080 | 85 | 18 | | .670 | .155 | 145 | 34 |
| 220 | 60 | 21A238 | .405 | .080 | 89 | 18 | 21A06 | .705 | .150 | 155 | 33 |
| 220 | 25 | 21A10 | .260 | .090 | 57 | 20 | ② 21A285 | .395 | .180 | 87 | 40 |
| 480 | 60 | 21A241 | .190 | .035 | 91 | 17 | 21A288 | .325 | .065 | 155 | 31 |
| 440 | 50 | | .190 | .040 | 84 | 18 | | .335 | .075 | 145 | 33 |
| 440 | 60 | 21A240 | .200 | .040 | 88 | 18 | 21A11 | .350 | .075 | 155 | 33 |
| 440 | 25 | 21A15 | .130 | .045 | 57 | 20 | ② 21A286 | .195 | .090 | 86 | 40 |
| 600 | 60 | 21A250 | .150 | .030 | 90 | 18 | 21A81 | .255 | .055 | 155 | 33 |
| 550 | 50 | | .150 | .030 | 82 | 16 | | .265 | .060 | 145 | 33 |
| 550 | 60 | 21A271 | .160 | .030 | 88 | 16 | 21A16 | .290 | .060 | 160 | 33 |
| 550 | 25 | 21A20 | .115 | .035 | 63 | 19 | ② 21A287 | .155 | .070 | 85 | 38 |

① Values shown are for molded coils only.

② Coils are rated 25% intermittent duty, based on one minute operation out of every four minutes.

NOTE — Parts indicated with ⊕ are recommended spare parts.

CONVERTING TIMING OPERATION — First, remove the solenoid mechanism from the mounting plate. Rotate the solenoid mechanism 180°, and put it back on the mounting plate, being careful to use the proper screw holes. There are four mounting holes for the solenoid mechanism. The upper-left and lower-right holes are used for on-delay; the upper-right and lower-left holes are used for off-delay. The on-delay mounting holes are so labeled on the mounting plate.

Notice that when the relay is changed from on-delay

to off-delay, the normally open and normally closed time-delay contacts mounted on the timing mechanism are changed. With the relay set up for on-delay, the normal position of the push rod is down, making terminals 1 and 2 the normally open contact terminals and terminals 3 and 4 the normally closed contact terminals. When set up for off-delay, the normal position of the push rod is up, making 1 and 2 normally closed, and 3 and 4 normally open. These numbers are molded on the face of the contact unit.



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