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See New Jersey, Cherry Hill
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(Philadelphia)

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Potomac Electronics, Inc.
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604 Montgomery Street
Phone: 836-1630

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Potter & Brumfield
(Federal Agencies)
D. J. Fagge
P. O. Box 36
604 Montgomery Street
Phone: 836-1630

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Division of AMF Canada Limited
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Guelph, Ontario
Phone: (519) 822-0390

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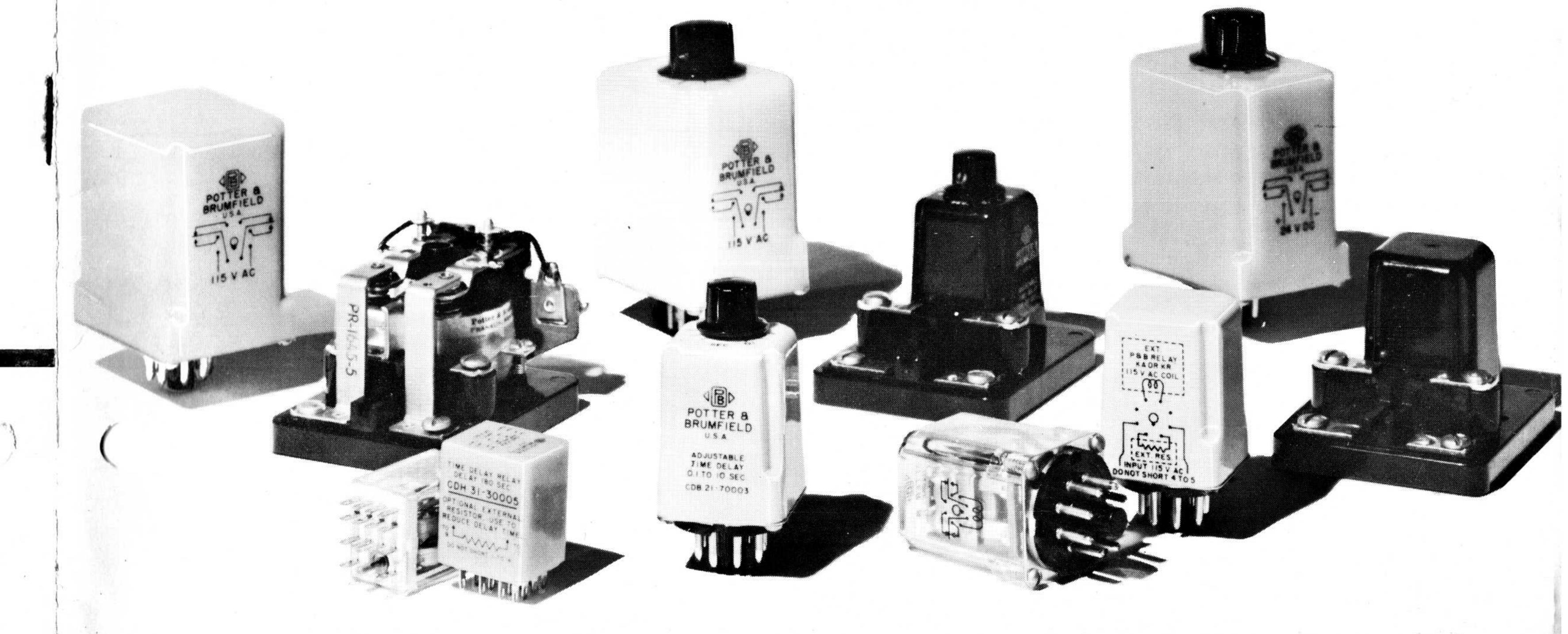
Aeromotive Engineering
Products Ltd.
887 Montee De Liesse
Phone: (514) 747-4781

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CANADA, Winnipeg 2, Manitoba Chas. L. Thompson Ltd. 1,440 Erin Street Phone: (204) SUnset 3-0848 POTTER & BRUMFIELD

# time delay relays

SOLID STATE CD AND CH SERIES





DIVISION OF AMERICAN MACHINE & FOUNDRY COMPANY • PRINCETON, INDIANA 47570 • Phone: Area Code 812 – 385-5251 TWX: 812-291-4125

CANADA Manufacturing Facility • Potter & Brumfield, Division of AMF Canada Limited • 135 Oxford Street, Guelph, Ontario • Phone: 822-0390

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FORM NO. 13C185 3-66

PRINTED IN USA

#### POTTER & BRUMFIELD SOLID STATE

## CD series

### 

#### **ACCURATE & DEPENDABLE**

A remarkably dependable, accurate and flexible series of time delay controls is represented by the Potter & Brumfield CD Series solid state time delay relays. The basic timing circuit consists of a resistor in series with a capacitor. When the input voltage is applied to the resistorcapacitor circuit, the voltage across the capacitor slowly increases. When the firing level is reached a solid state trigger circuit acts to turn on a solid state output switch that energizes a switching relay or external electrical load. The solid state design eliminates cams, clutches and motors. Using no moving parts, the timing circuit can have no mechanical wear, an advantage that is especially desirable when accurate recycling is required.

For a wide range of industrial applications where less-critical performance suffices and where economy is a primary factor, the CH series is recommended. See pages 10 and 11.

#### WIDE SELECTION

A wide selection of operational configurations, all with accurate time delay values, fast reset time and excellent repeatability, are available. This selection, shown in a variety of enclosures with

plug-in or screw terminations, is featured on the opposite page.

#### BASIC SERIES

#### 1. Knob-Adjustable

The "knob-adjustable" relays have a knob on top that provides convenient setting of the delay time. Two types, one with the relay in the same enclosure as the solid state unit, the other with an auxiliary relay, are furnished. A calibrated time dial around the knob provides  $\pm 5\%$  of full scale setting of the delay period at  $25^{\circ}$ C.

#### 2. Resistor-Adjustable

The "resistor-adjustable" relays have provisions for connecting an external resistor that is used to change the time delay period. As supplied, this series has a factory-set delay time. Connecting an external resistor to the unit decreases the delay time. Short-circuiting (instead of adding a resistor) obtains a minimum time delay. Use of a variable resistor, which may be located remotely, to provide adjustment of the delay time is possible.

#### 3. Fixed Time Delay

The "fixed time delay" relays have a time delay period that is set at the factory and cannot be modified.

#### OUTSTANDING FEATURES OF CD SERIES

±5% Accurate Time Delays
60ms Fast Reset Time
±1% Excellent Repeatability

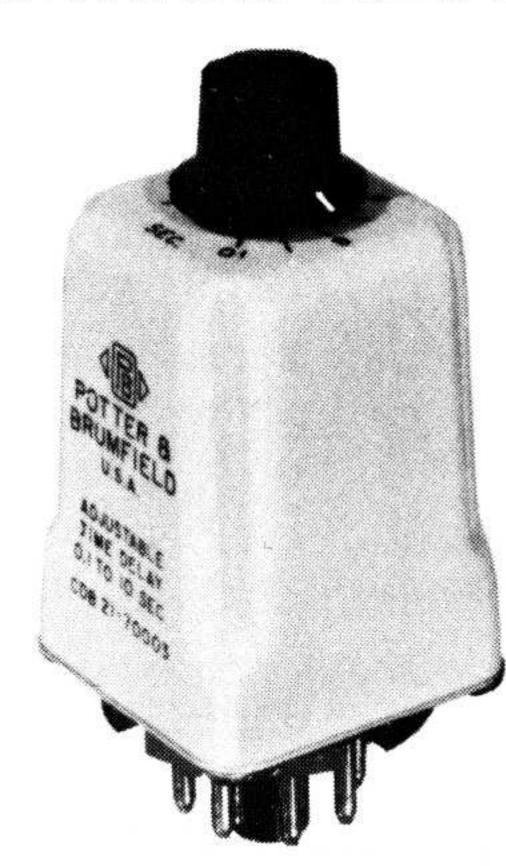
Rugged Solid State Design Flexible Circuitry Wide Choice of Enclosures

No Inherent False Operations

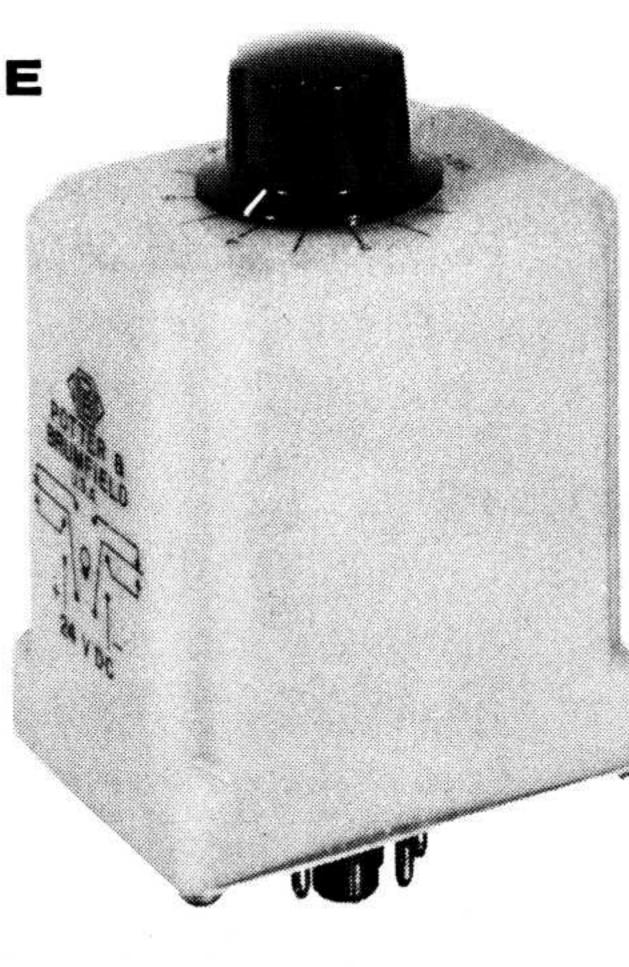
#### CHOOSE FROM THIS WIDE SELECTION

P&B GENERAL PURPOSE RELAYS ARE FEATURED ON PAGE 7

#### 1. KNOB ADJUSTABLE



CDB-21 AC INPUT CDD-21 DC INPUT Use with External P&B KRP Relay



CDB-38 AC INPUT
CDD-38 DC INPUT
Includes Internal Relay with DPDT Contacts
(Supplied as either delay on operate or release).



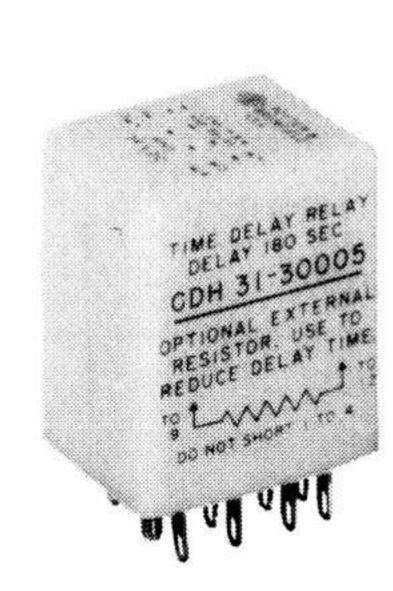
CDB-45 AC INPUT
CDD-45 DC INPUT
Use with External P&B
PR Relay

#### 2. RESISTOR-ADJUSTABLE

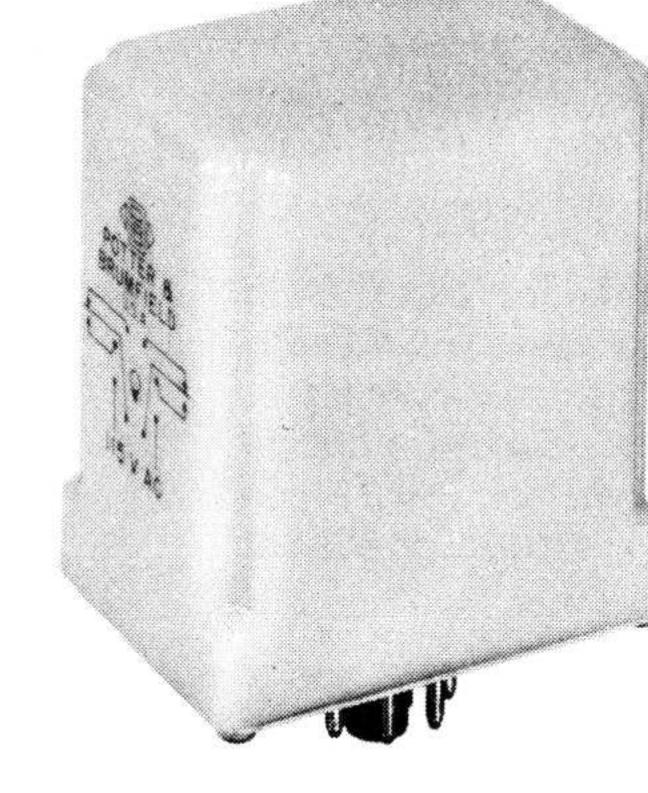


CDF-21 AC INPUT CDH-21 DC INPUT Use with External P&B KRP Relay

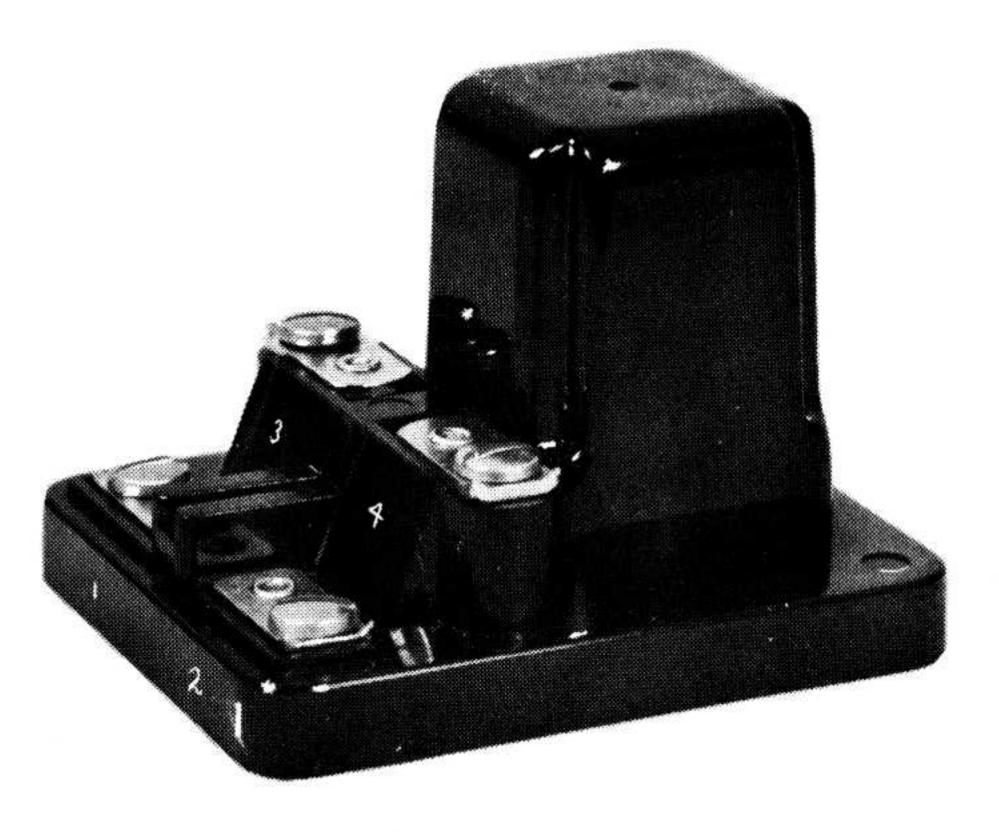
Can be supplied with Internal DPDT Relay



CDF-31 AC INPUT CDH-31 DC INPUT Use with External P&B KHP Relay



CDF-38 AC INPUT CDH-38 DC INPUT Includes Internal Relay with DPDT Contacts



NOT AVAILABLE IN RESISTOR-ADJUSTABLE STYLE

NOTE: Resistor-Adjustable and Fixed Time Delay Relays are identical in size and appearance.

#### 3. FIXED TIME DELAY

CDA-21 AC INPUT
CDC-21 DC INPUT
Use with External
P&B KRP Relay
CDC-21 DC INPUT
(Can be supplied
with Internal
DPDT Relay

CDA-31 AC INPUT CDC-31 DC INPUT Use with External P&B KHP Relay

CDA-38 AC INPUT
CDC-38 DC INPUT
Includes Internal
Relay with DPDT
Contacts

CDA-45 AC INPUT CDC-45 DC INPUT Use with External P&B PR Relay

\_

#### SPREIMEATIONS

The specifications listed here apply to standard CD relays. For deviations from standard specifications see "Special CD Variations" and "Engineering Data" on page 5.

#### TIME DELAY ON OPERATE

For those CD time delay relays that provide a time delay on operate, the delay period will begin when the input voltage is applied. The relay will then "time out" to the end of the delay period at which point the output contacts will operate. See "Engineering Data" on opposite page for detailed description of relays having the time delay on operate and on release.

#### REPEATABILITY

Under constant operating conditions, the delay time of the second and following operations will be within  $\pm 1\%$  of each other. Constant operating conditions include temperature, voltage and time between operations.

#### CALIBRATED DIAL

The dial of CD series relays is calibrated in seconds and is accurate to  $\pm 5\%$  of full scale @  $25^{\circ}$ C.

#### ACCURACY OVER TEMPERATURE AND VOLTAGE RANGE

Variations of the delay time shall not exceed  $\pm 5\%$  from the stated or actual time to which the unit has been set for all variations, within the limits of rated input and ambient temperature.

#### RESET TIME

Reset time is less than 60 milliseconds. Reset time is the length of time the control voltage must be interrupted to produce a subsequent delay within 80% of the initial actual delay under constant conditions of input voltage and ambient temperature.

#### RECYCLE TIME

Recycle time is less than 60 milliseconds for the CD-38 units (internal shorting contact); 2.0 seconds for CD-21, CD-31 and CD-45 units (no internal shorting contacts). Recycle time is the length of time the control voltage must be interrupted after a timing interval has been completed, to produce a subsequent delay within  $\pm 5\%$  of the initial actual delay under constant conditions of input voltage and ambient temperature.

#### TRANSIENT PROTECTION

All relays operated on DC input voltages are internally protected from damage by reversal of input polarity.

All CD-38—115V AC relays incorporate a protecting device which assures transient protection when the relay is used across the secondary of a transformer with a rating of 7.5K VA or less.

All CD-21 and CD-45—115V AC relays incorporate a protecting device which provides transient protection when the relay is used across the secondary of a transformer with a rating of 2.5K VA or less.

Further transient protection can be incorporated upon special request.

#### TEMPERATURE RANGE

Operating:  $-40^{\circ}$  to  $+55^{\circ}$  C. Storage:  $-55^{\circ}$  to  $+85^{\circ}$  C.

SHOCK

Mechanical: 30g.

#### **VIBRATION**

Mechanical: 0.06" total excursion, 10 to 55 cps.

#### TIME DELAY VALUES

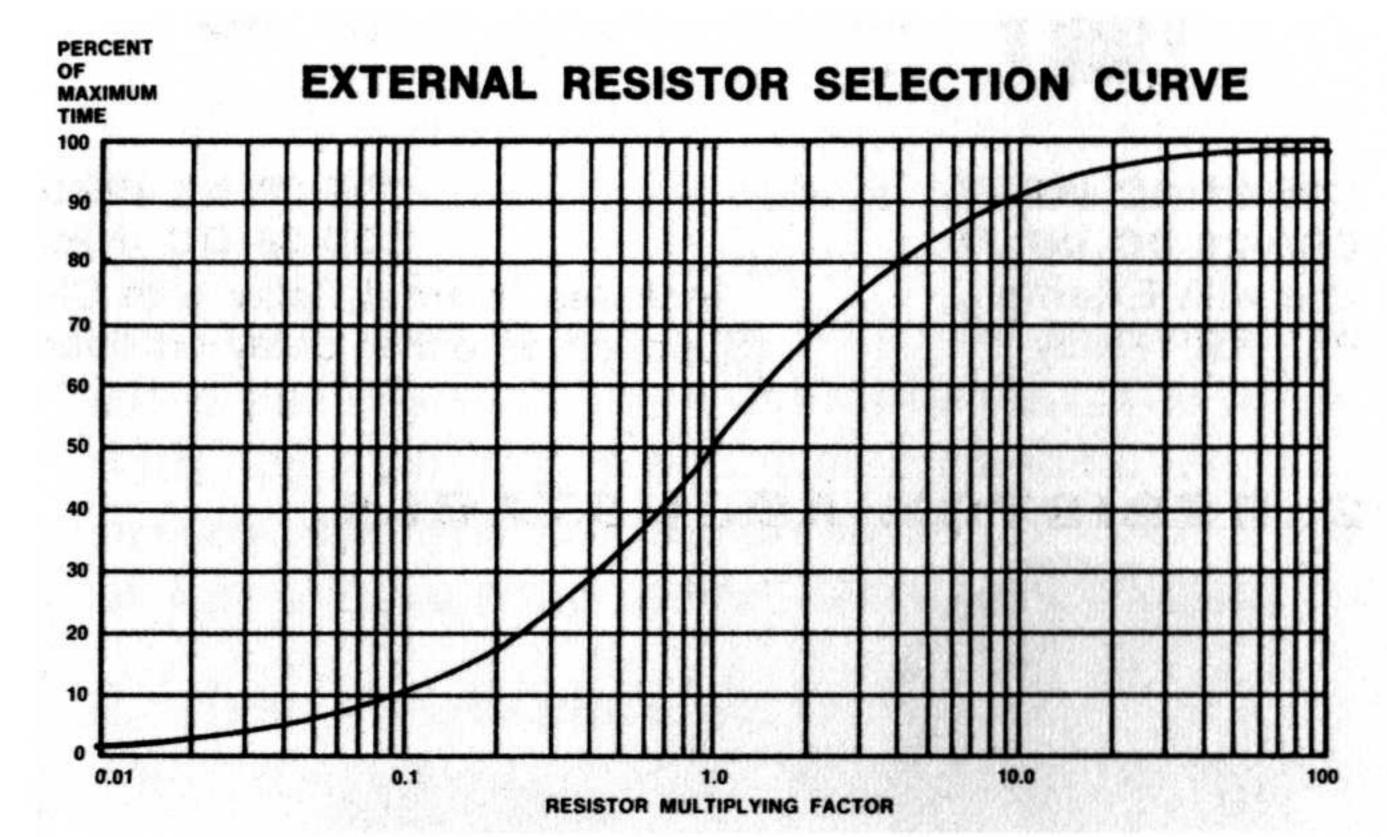
Fixed Time Delay:	Knob-Adjustable:
1, 5, 10, 30, 60, 120, or 180 seconds.	0.1 to 10 seconds or 0.6 to 60 seconds or 1.8 to 180 seconds

#### Resistor-Adjustable:

Factory-set Time Delay (seconds)	Resistance * to Reduce Delay by 1/2	Short Circuit Time Delay (seconds)
1	33K ohms	0.1
5	150K ohms	0.1
10	270K ohms	0.1
30	180K ohms	1.8
60	390K ohms	1.8
120	820K ohms	1.8
180	1.2 megohms	1.8

The resistor ratings for AC or DC resistor-adjustable time delay relays are approximate.

\*Resistor values shown correspond to a 1.0 multiplying factor. Use the graph below to determine other resistor values for periods between the limits stated.



#### INPUT VOLTAGES AND LIMITS

Nominal	Minimum	Maximum
24V AC	20V AC	28V AC
115V AC	105V AC	130V AC
24V DC	20V DC	32V DC
48V DC	41V DC	55V DC
110V DC	95V DC	125V DC
NOTE: DC power must	be filtered.	

#### POWER REQUIREMENTS

The input current required during timing is less than 10 milliamperes for both AC and DC types for all nominal voltages. The power required after timing depends on the internal or external switching relay employed but is generally less than 3 watts for DC types and less than 10 volt-amperes for AC types.

#### **ENCLOSURES & WEIGHTS**

Standard enclosures for CD time relays are molded plastic and are designed to match accompanying P&B relays in size and appearance. See page 7.

Enclosures for Time Delay Relays	Approx. Weight
Series 21	4.25 ounces
Series 31	2.00 ounces
Series 38	8.25 ounces
Series 45	6.00 ounces

#### 

#### **OUTPUT CONTACTS & LOAD SWITCHING**

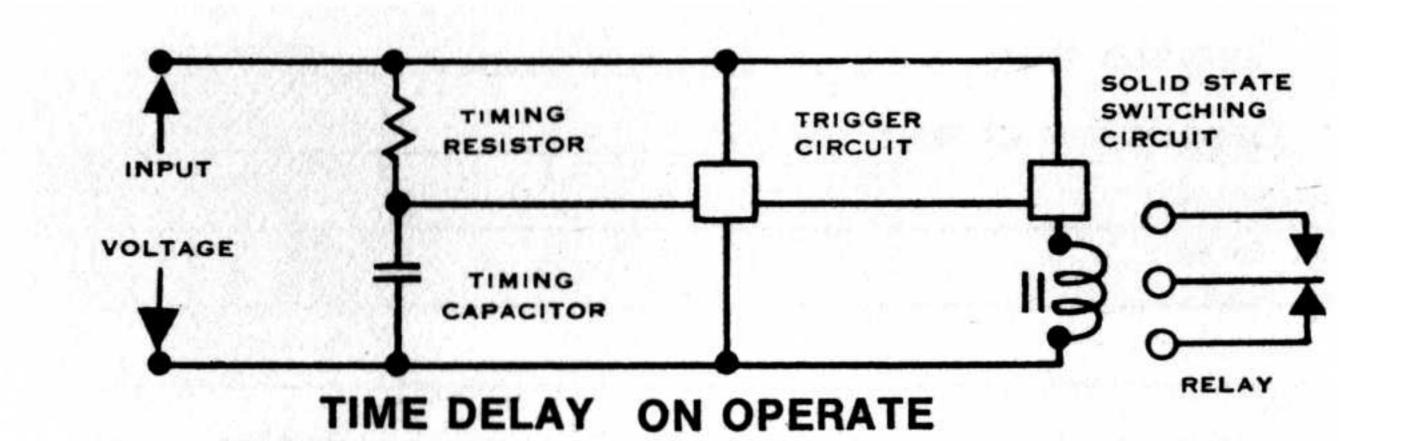
P&B solid state time delay relays provide either (Form A) solid state contacts or an internal multi-pole switching relay. Contact arrangements and ratings for relays having an internal switching relay are listed in the CD Relay Selection Table beginning on page 9. An external P&B relay is recommended for use with relays having the Form A solid state output contacts in accordance with the Recommended P&B General Purpose Relay Table on page 7. Wiring diagrams for the connection required between the solid state time delay relays and auxiliary relays are featured on page 8.

#### AC TIME DELAY RELAYS

For some AC delay relays that do not have a relay in the same enclosure and with which an auxiliary relay with AC coil is used, it is necessary to connect a set of normally open contacts on the auxiliary relay as indicated by the wiring diagrams on page 8.

#### DELAY ON OPERATE CIRCUIT

When input voltage is applied to the basic timing circuit (consisting of a resistor in series with a capacitor), the voltage across the capacitor

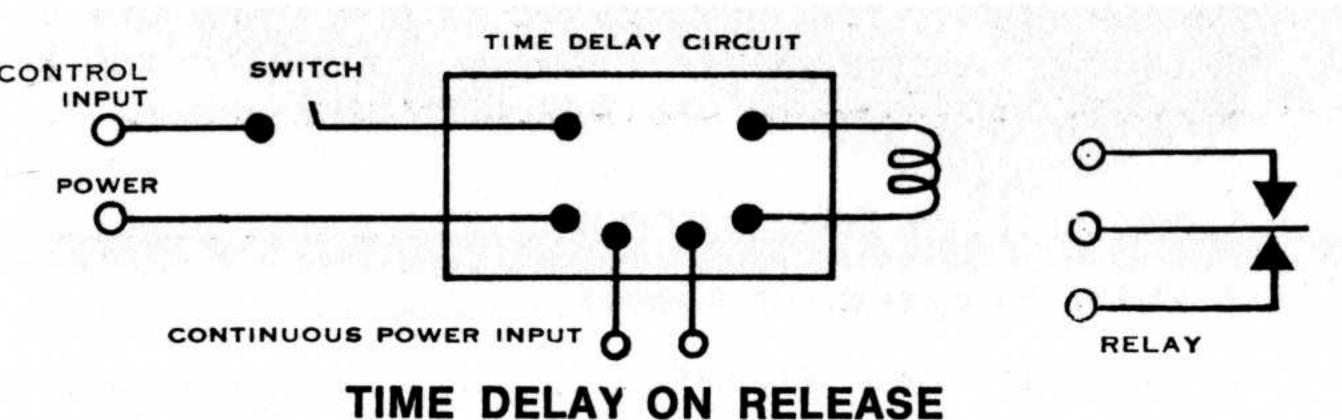


slowly increases. Employed to sense the capacitor voltage, a solid state trigger circuit acts to turn on a solid state output switch energizing the accompanying relay.

#### TIME DELAY ON RELEASE

Potter & Brumfield can furnish solid state relays providing a time delay on release. With this type of operation the switching relay acts instantaneously when the control voltage is first applied. The output remains energized as long as the control voltage is connected.

When the control voltage is disconnected the output remains energized for a specified time delay period. At the end of this period the output is de-energized. To provide power during the timing period it is necessary to use an additional power supply that will be energized continuously and will not be switched off with the control voltage. The reset and recycle times also apply to the delay on release, except that they occur during the control "on" time rather than "off" time.



P&B application engineers will gladly determine proper operational characteristics, type of switching relay and enclosure for your specific needs if full application details are furnished to us or your P&B representative.

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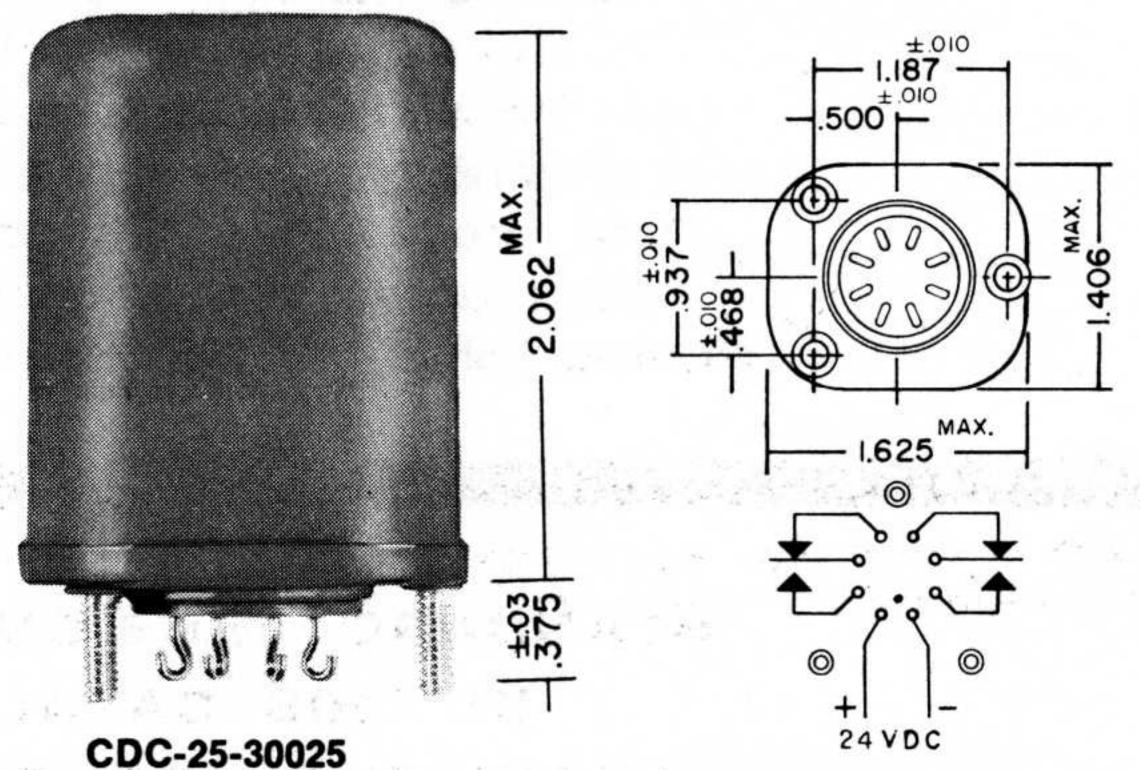
The inherent flexibility of the P&B solid state circuit design makes possible certain optional features and special variations. For example, metal enclosures, dust covers, hermetically sealed cases (for military and aerospace applications), and solder type terminals are available on special order.

In some instances, external relays other than those recommended can be used with solid state time delay relays. Loads other than relays, such as lamps and solenoids, may be connected to solid state time delay relays. Another optional feature is a screwdriver-adjustable (locking-bushing) control instead of a knob.

Delay times up to 300 seconds (5 minutes), as well as models adjustable to either a wider or narrower range than those listed are available on special order.

Please furnish complete application details listed on page 6 for the special variations listed here.

#### TYPICAL CD SEALED RELAYS



Time delay on operate: 60 seconds (other values available).

Contact rating: 3 amperes, 28V DC resistive.

4

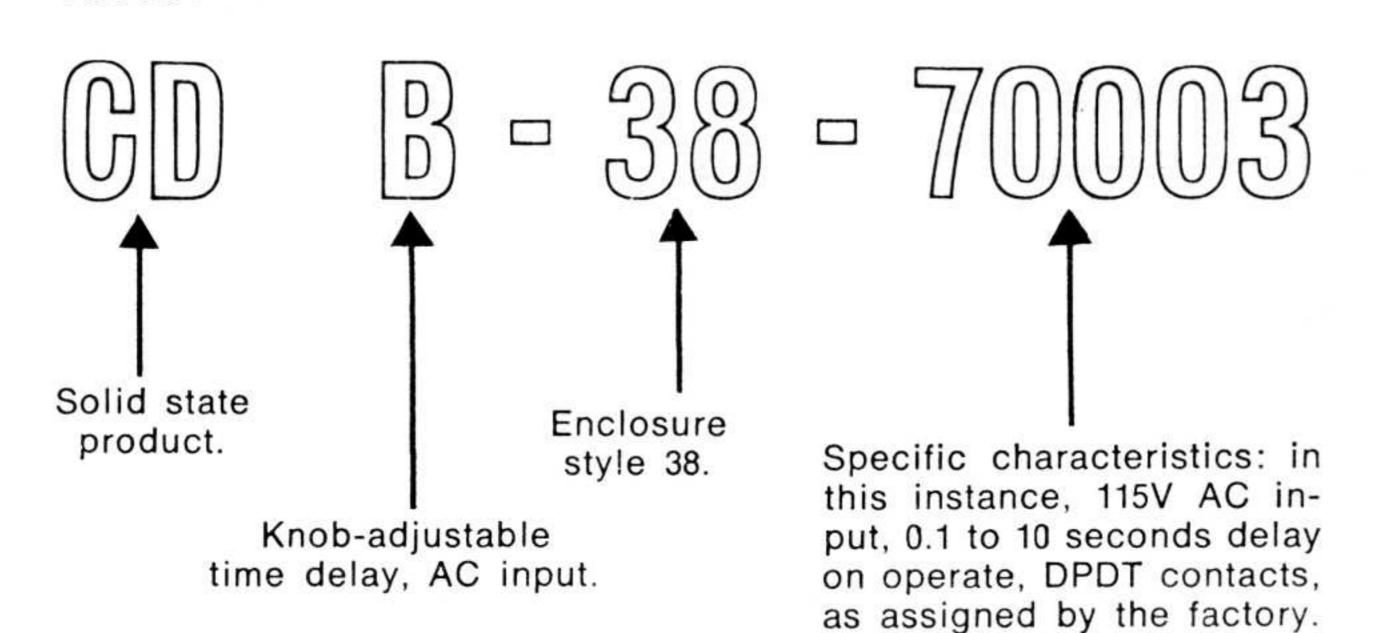
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Potter & Brumfield solid state time delay relays carry the basic designation of "CD." The letter following the CD denotes series, meaning the general operational configuration.

CDAfixed value time delay, AC input
CDBknob-adjustable time delay, AC input
CDCfixed value time delay, DC input
CDDknob-adjustable time delay, DC input
CDFresistor-adjustable time delay, AC input
CDHresistor-adjustable time delay, DC input

The next two digits identify the style of enclosure and the last five digits are assigned by the factory and code the operating characteristics of the specific time delay relay. Here is an example of the designation CDB-38-70003.



### 

Each application of time delay relays necessitates individual consideration to ascertain that the relay selected provides the desired performance. Guesswork will be eliminated and the proper selection of the relay will be expedited by providing the following information:

2. Delay on operate or release	
3. Delay accuracy required	
4. Time between repeat operations	
5. Operating voltage (value and AC or DC)	

	200		11,000	9 (6)			
7	Contact	heal	VOLTAGE	(Value	$\Delta C \cap r$	()(:)	
1.	Contact	luau	voltage	(value,	70 01	$DO_{j}$	_

Period of time delay (seconds)\_

Contact arrangement required\_

8.	Contact load current
	Ambient temperature range (Deg. F or C)
10.	Shock
	Vibration
12.	Size limitations
13.	Open, dust cover or sealed
14.	Terminal type
15.	Description of application:

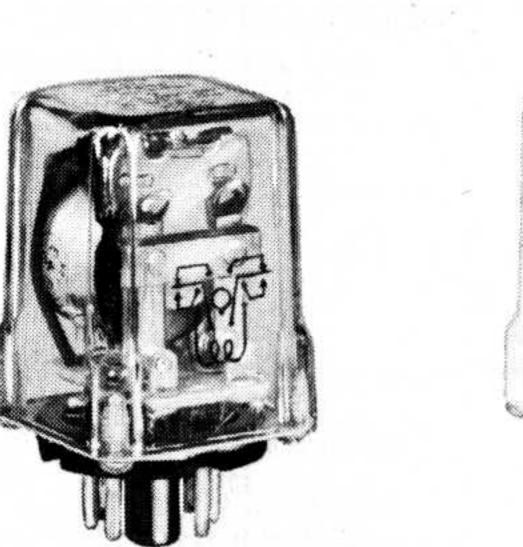
## SUGGESTED APPLICATIONS FOR CD RELAYS

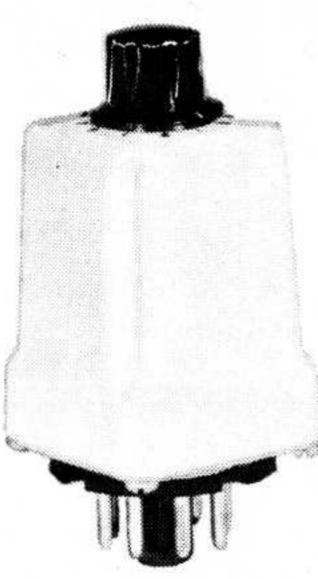
Machine tool sequencing
Motor starting circuits
Vending machines
Molding machine controls
Container-filling control
Welding timing control
Safety device control
Data processing operations
Warm-up or turn-on delay
Photographic process control

Induction heating
Elevator controls
Die casting
Alarm circuits
Vacuum processing
X-ray machines
Injection molding
Electron tube warm-up
Conveyor control

STANDARD VERSIONS OF THE RELAYS SHOWN
IN THIS CATALOG ARE STOCKED BY
LEADING ELECTRONIC PARTS DISTRIBUTORS
(See CD Relay Selection Table, page 9)

## P&B GENERAL PURPOSE/TIME DELAY RELAY COMBINATIONS



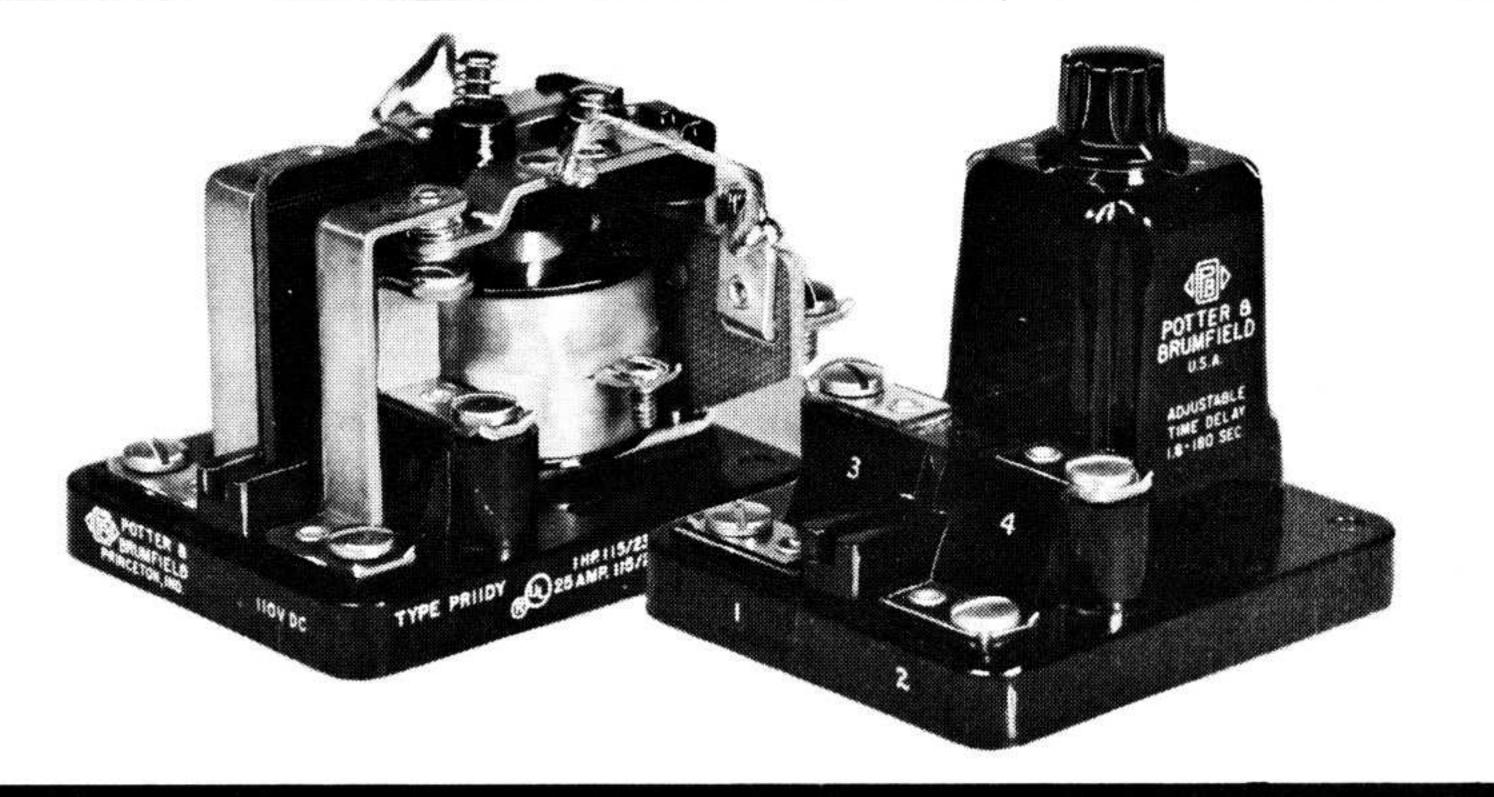


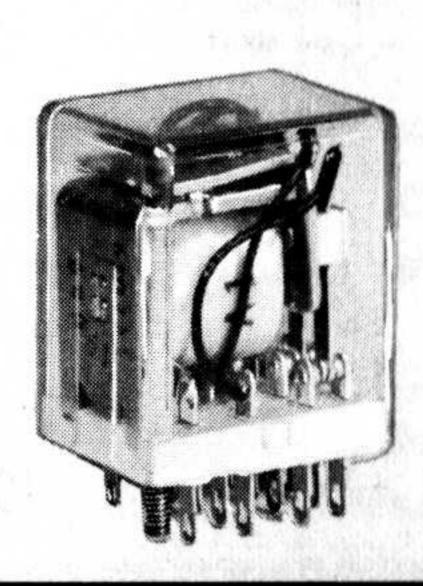
#### KRP RELAYS

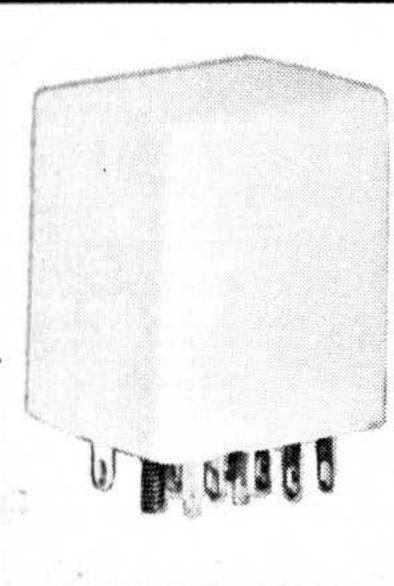
The versatile, multi-contact arrangement of KRP relays together with the clear plastic dust covers in which they are housed make them a worthy companion to all CD relays with the series 21 enclosure. KRP relays have silver-cadmium oxide contacts rated at 10 amps at 115V AC resistive. KRP5 relays are SPDT; KRP11 are DPDT; KRP14 are 3PDT. Standard 8-pin octal-type plug for KRP5 and KRP11, 11-pin for KRP14.

#### PR RELAYS

Long life and fast action make the heavy duty PR relay a practical choice as the general purpose relay used with the CD-45 series relays. Its DPDT silver-cadmium oxide contacts are rated 25 amps at 115V AC, non-inductive, or 1 HP at 115/230V AC single-phase. Underwriters' Laboratories and Canadian Standards Association listed. The similarity of the PR with the 45 series relays in appearance, together with their heavy duty screw terminals, results in a neat, symmetrical installation.







#### KHP RELAYS

Small, rugged, with a plastic dust cover, KHP relays are designed to meet the exacting requirements of the CD-31 series solid state units. Four poles are available for switching on DC relays and three poles may be used on AC relays. Their gold-flashed silver contacts are rated 3 amps at 30V DC or 115V AC resistive. Like their CD-31 series counterpart, they are designed for solder terminal sockets or printed circuit sockets. The KHP/CD-31 series combination is especially desirable when installation space is at a premium.

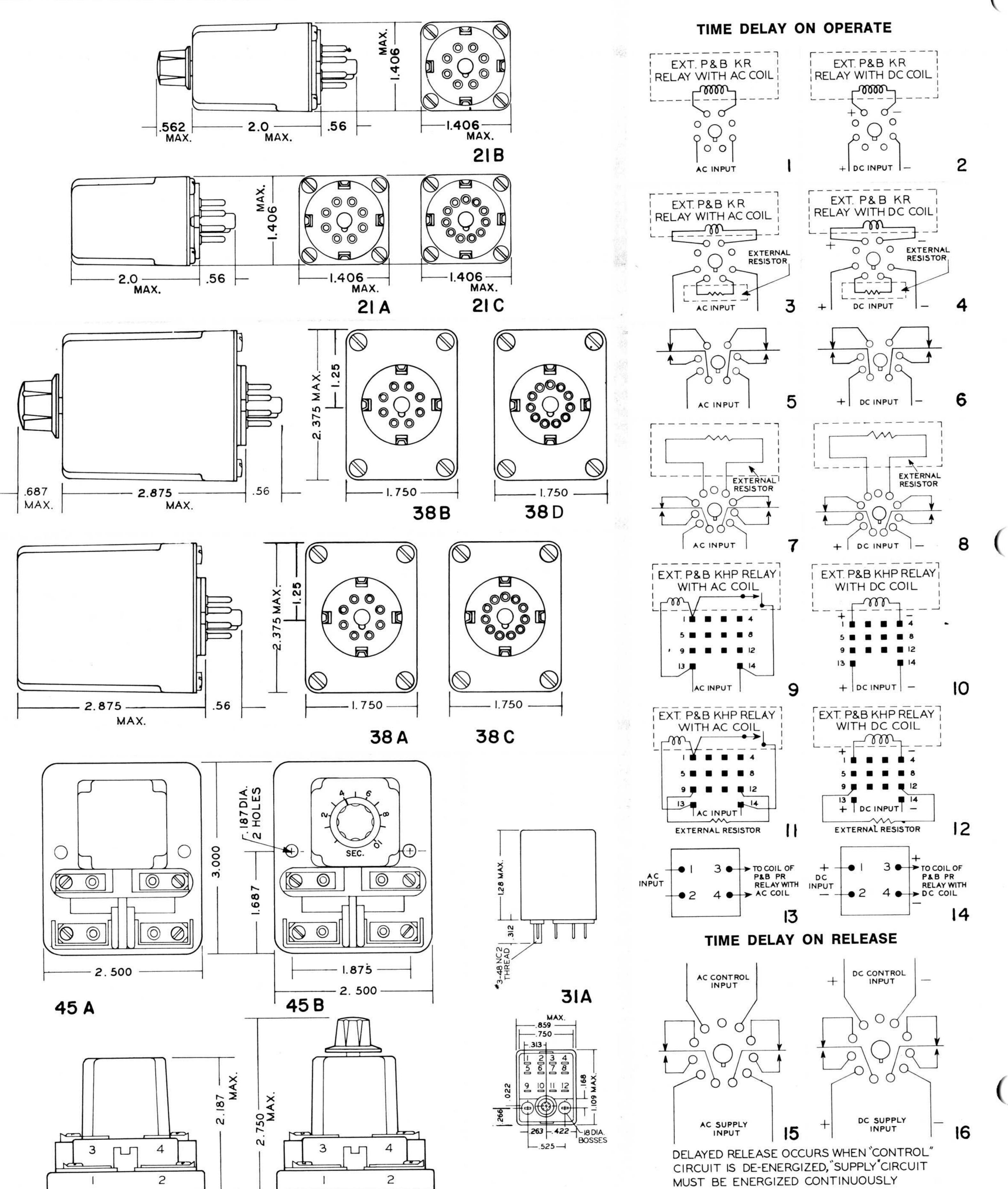
To choose a matching P&B general purpose relay proceed as follows: (1). Select the specific CD time delay required from the tabulation in the back of this catalog (example: CDA-21 with a 115V AC input voltage). (2). Use this designation (CDA-21-) to enter the center

column in the following table. (3). Read across in the 115V AC "input voltage" row. (4). Select the KRP5AG-115V AC, KRP11AG-115V AC or KRP14AG-115V AC relay.

	USE THESE SOLID STATE TIME DELAY RELAYS		
Input Voltage for Time Delay or Coil Voltage for Ext. Relay	CDA-31, CDC-31, CDF-31, CDH-31	CDA-21, CDB-21, CDC-21, CDD-21, CDF-21, CDH-21	CDA-45, CDB-45, CDC-45, CDD-45
	WITH THE FOL	LOWING P&B GENERAL PUR	POSE RELAYS
115 volts AC	KHP17A11-115V AC	KRP5AG-115V AC KRP11AG-115V AC KRP14AG-115V AC	PR11AY-115V AC
24 volts DC	KHP17D11-24V DC	KRP5DG-24V DC KRP11DG-24V DC KRP14DG-24V DC	PR11DY-24V DC
48 volts DC	KHP17D11-48V DC	KRP5DG-48V DC KRP11DG-48V DC KRP14DG-48V DC	PR11DY-48V DC
110 volts DC	KHP17D11-110V DC	KRP5DG-110V DC KRP11DG-110V DC KRP14DG-110V DC	PR11DY-110V DC

#### OUTLINE DIMENSIONS & WIRING DIAGRAMS

#### CD RELAY SELECTION TABLE

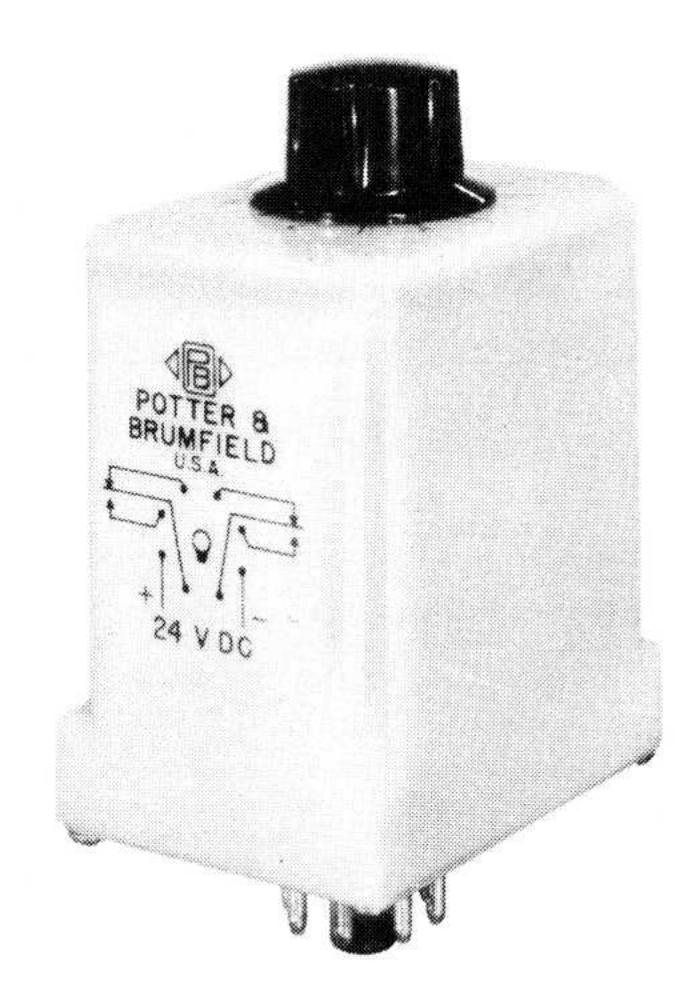


	Туре	Time			wings
Operation	and Series	Delay (Seconds)	Input Voltage	Out- Line	Wiring
TIME DELAY ON OPERATE	CDA-21 Fixed	1, 5, 10, 30, 60, 120 or 180	115 VAC	21A	1
	CDB-21 Knob- Adjust.	0.1 to 10* 0.6 to 60 or 1.8 to 180*	115 VAC	21B	1
	CDC-21 Fixed	1, 5, 10, 30, 60, 120 or 180	24 VDC 48 VDC 110 VDC	21A	2
Use with KRP Relay	CDD-21 Knob- Adjust.	0.1 to 10* 0.6 to 60 or 1.8 to 180*	24 VDC* 48 VDC 110 VDC	21B	2
	CDF-21 Resistor Adjust.	1, 5, 10, 30, 60, 120 or 180	115 VAC	21A	3
	CDH-21 Resistor Adjust.	1, 5, 10, 30, 60, 120 or 180	24 VDC 48 VDC 110 VDC	21A	4
Includes Internal Relay, DPDT Contacts Rated 2 amps, 28 Volts DC, or 115 Volts AC, Resistive	CDC-21 Fixed	1, 5, 10, 30, 60, 120 or 180	24 VDC	21A	6
	CDH-21 Resistor Adjust.	1, 5, 10, 30, 60, 120 or 180	24 VDC	21C	8
	CDA-31 Fixed	1, 5, 10, 30, 60, 120 or 180	115 VAC	31A	9
Use with KHP Relay	CDC-31 Fixed	1, 5, 10, 30, 60, 120 or 180	24 VDC 48 VDC 110 VDC	31A	10
	CDF-31 Resistor Adjust.	1, 5, 10, 30, 60, 120 or 180	115 VAC	31A	11
	CDH-31 Resistor Adjust.	1, 5, 10, 30, 60, 120 or 180*	24 VDC* 48 VDC 110 VDC	31A	12
(Described in next column)	CDA-38 Fixed	1, 5, 10, 30, 60, 120 or 180	24 VAC 115 VAC	38A	5

	Туре	Time			wings
Operation	and Series	Delay (Seconds)	Input Voltage	Out- Line	Wiring
TIME DELAY ON OPERATE	CDB-38 Knob- Adjust.	0.1 to 10* 0.6 to 60* or 1.8 to 180*	24 VAC 115 VAC*	38B	5
Includes Internal Relay, DPDT Contacts	CDC-38 Fixed	1, 5, 10, 30, 60, 120 or 180	24 VDC 48 VDC 110 VDC	38A	6
Rated 10 amps, 115 Volts AC, Resistive	CDD-38 Knob- Adjust.	0.1 to 10* 0.6 to 60* or 1.8 to 180*	24 VDC* 48 VDC 110 VDC	38B	6
	CDF-38 Resistor Adjust.	1, 5, 10, 30, 60, 120 or 180	24 VAC 115 VAC	38C	7
	CDH-38 Resistor Adjust.	1, 5, 10, 30, 60, 120 or 180	24 VDC 48 VDC 110 VDC	38C	8
	CDA-45 Fixed	1, 5, 10, 30, 60, 120 or 180	115 VAC	45A	13
Use with PR Relay	CDB-45 Knob- Adjust.	0.1 to 10 0.6 to 60 or 1.8 to 180	115 VAC	45B	13
	CDC-45 Fixed	1, 5, 10, 30, 60, 120 or 180	24 VDC 48 VDC 110 VDC	45A	14
	CDD-45 Knob- Adjust.	0.1 to 10 0.6 to 60 or 1.8 to 180	24 VDC 48 VDC 110 VDC	45B	14
TIME DELAY ON RELEASE	CDB-38 Knob- Adjust.	0.1 to 10 0.6 to 60* or 1.8 to 180	115 VAC	38D	15
Includes Internal Relay, DPDT Contacts	CDD-38 Knob- Adjust.	0.1 to 10 0.6 to 60* or 1.8 to 180	24 VDC	38D	16
Rated 10 amps, 115 Volts AC, Resistive	CDA-38 Fixed	1, 5, 10, 30, 60, 120 or 180	115 VAC	38C	15
	CDC-38 Fixed	1, 5, 10, 30, 60, 120 or 180	24 VDC	38C	16

<sup>\*</sup>Stocked by Leading Electronic Parts Distributors.

<sup>\*\*</sup>Individual time delay periods are available in each input voltage listed.



#### POTTER & BRUMFIELD SOLID STATE

## CH series

- KNOB-ADJUSTABLE
- PLUG-IN MOUNTING

Engineered for a wide range of industrial applications where not-too-critical performance suffices and where economy is a primary factor, CH series solid state time delay relays include an internally mounted quality P&B DPDT relay to form a convenient and compact assembly. Enclosed in a molded white nylon dust cover, CH

- DELAY ON OPERATE OR RELEASE
- POLARITY REVERSAL PROTECTION

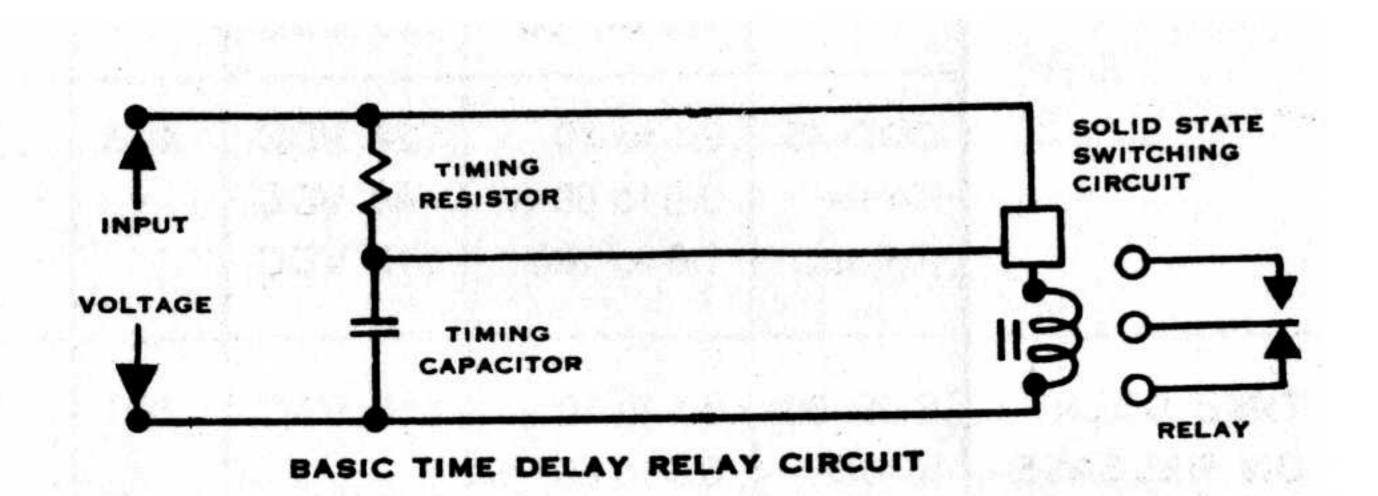
relays are knob-adjustable, equipped with plugin octal-type terminals, and available for AC or DC operation with either delay on "operate" or on "release" as well as "interval on". For fixed time delays or other special types of operation of CH series relays, please consult factory.

#### 

A brief review of the "Comparison of Specifications of CH with CD Series" table on the opposite page will disclose the difference in characteristics between the two series. The following types of operation are available as standards:

#### TIME DELAY ON OPERATE

When input voltage is applied to the basic timing circuit (consisting of a resistor in series with a capacitor), the voltage across the capacitor slowly increases. A solid state trigger circuit is used to sense the capacitor voltage and acts to energize the coil of the switching relay.



#### TIME DELAY ON RELEASE

An external switch or relay is required for time delay on release operation. The internal contacts will operate immediately when the external SPDT contacts are operated. When these contacts are returned to the off position, the internal relay contacts will not release until the end of the delay period. A continuous source of power must be available to keep the internal relay energized during the delay period.

#### ADJUSTABLE INTERVAL

The relay will operate immediately when the input voltage is applied. At the end of an adjustable interval the relay will release and remain in this state until reset by interruption of input voltage.

#### **ACCURACY AND TOLERANCE**

Delay periods are accurate within ±10% of the adjusted or the nominal values for all variations within the limits of rated input voltage and operating temperature.

For fixed delays (available on special order), delay periods are within a tolerance of  $\pm 5\%$  of the nominal value at nominal voltage in a 25°C ambient temperature.

#### RESET TIME AND REPEATABILITY

If the timing interval is interrupted, the switching relay contacts may momentarily transfer. This transfer will last for less than 100 milliseconds after which the relay contacts will return to the de-energized position and the timing circuit will be reset. After completion of a timing cycle, if the input voltage is off for at least 100 milliseconds, the following timing cycle will be within 5% of the first cycle providing input voltage and ambient temperature remain constant.

#### **CONTACT RATING**

100,000 operations at 10 amperes, 115 volts AC, resistive

**Approximate** 

#### INPUT VOLTAGES AND LIMITS

Nominal	Minimum	Maximum	Steady State Current
24V AC	20V AC	28V AC	20 ma
115V AC	90V AC	130V AC	30 ma
24V DC	18V DC	32V DC	20 ma
48V DC	41V DC	55V DC	20 ma
TEMPERATUR	E RANGE		

 $(+14^{\circ} \text{ to } +131^{\circ}\text{F.})$  $-10^{\circ}$  to  $+55^{\circ}$ C. Operating:  $(-67^{\circ} \text{ to } + 185^{\circ} \text{F.})$  $-55^{\circ}$  to  $+85^{\circ}$ C. Storage:

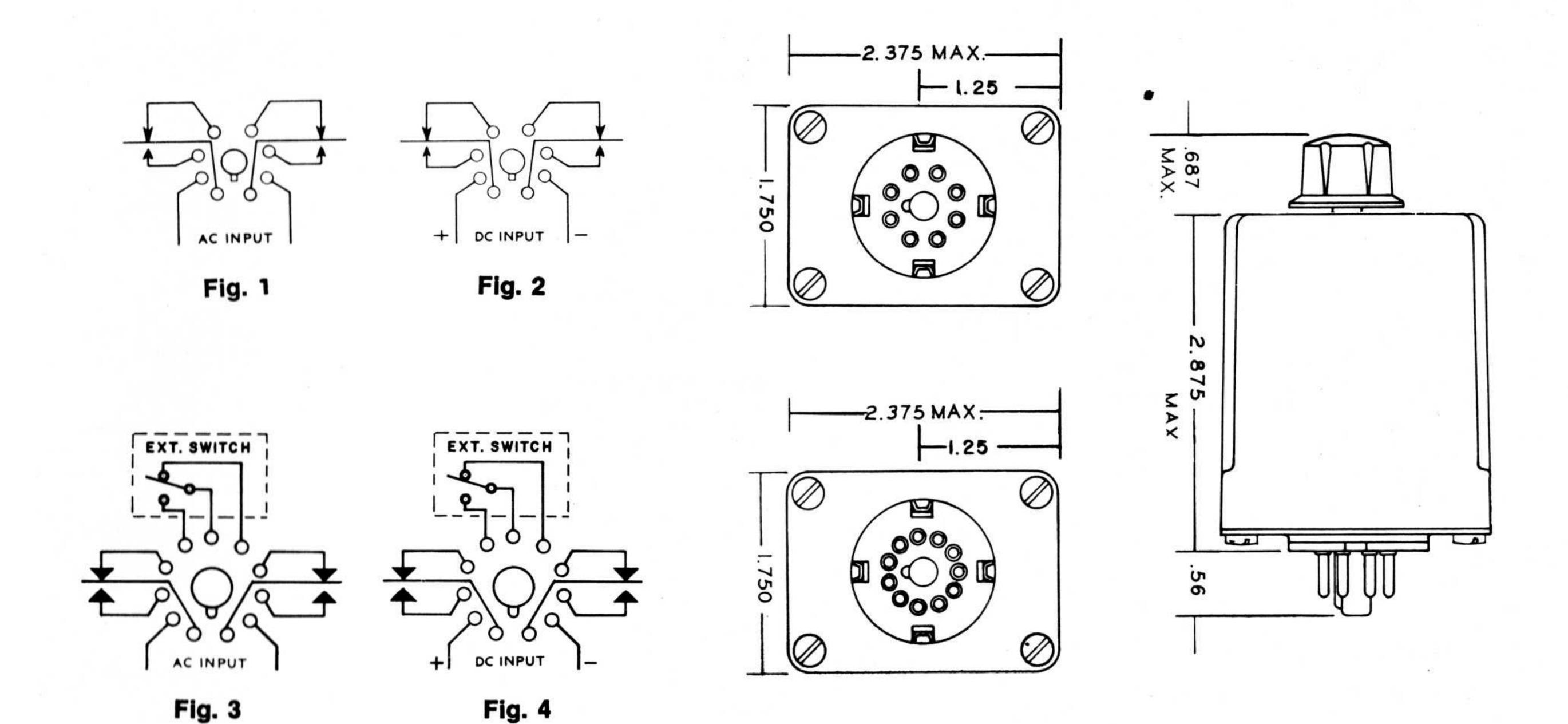
#### PROTECTION

Relays rated for operation on DC input voltages are internally protected from damage by reversal of input polarity. Relays will not operate falsely nor be damaged by a transient input voltage having a magnitude up to twice rated input voltage and a duration of eight milliseconds.

#### 

Delay on Operate Type Number	Delay on Release Type Number	Adjustable Interval Type Number	In (Seconds)	Input Voltage
Fig. 1	Fig. 3	Fig. 1		
CHB-38-30001*	CHB-38-30011	CHB-38-30021	1.0 to 10	24 VAC
CHB-38-30002	CHB-38-30012	CHB-38-30022	1.0 to 60	24 VAC
CHB-38-30003*	CHB-38-30013	CHB-38-30023	1.0 to 180	24 VAC
CHB-38-70001*	CHB-38-70011*	CHB-38-70021	1.0 to 10	115 VAC
CHB-38-70002	CHB-38-70012	CHB-38-70022	1.0 to 60	115 VAC
CHB-38-70003*	CHB-38-70013*	CHB-38-70023	1.0 to 180	115 VAC
Fig. 2	Fig. 4	Fig. 2		•
CHD-38-30001*	CHD-38-30011*	CHD-38-30021	1.0 to 10	24 VDC
CHD-38-30002	CHD-38-30012	CHD-38-30022	1.0 to 60	24 VDC
CHD-38-30003*	CHD-38-30013*	CHD-38-30023	1.0 to 180	24 VDC
CHD-38-40001	CHD-38-40011	CHD-38-40021	1.0 to 10	48 VDC
CHD-38-40002	CHD-38-40011	CHD-38-40022	1.0 to 60	48 VDC
CHD-38-40003	CHD-38-40013	CHD-38-40023	1.0 to 180	48 VDC

<sup>\*</sup>Available from the Stock of P&B Authorized Distributors



#### COMPARISON OF SPECIFICATIONS OF CH WITH CD SERIES

Туре	Dial Setting	Temp. Range	Accuracy (Temp. & Volt. Range)	Transient Protection	Inherent False Oper.	Reset Time	Repea- tability	Polarity Protection
СН	Reference scale	—10° +55°C	±10% of nominal	Twice rated input voltage for 8 milli-seconds	Contacts transfer momentarily if timing interval is interrupted	100 milli- seconds	±2º/o	Yes
CD	Time—cali- brated ±5% of full scale	—40° to +55°C	±5% of nominal	Tested to 1000V — 1/2 cycle surges (on all 115V AC models)	None	60 milli- seconds	±1º/o	Yes

For fixed time delays or other special types of operation of CH series relays, please consult factory.