



*Signaling equipment and train near the East 180th Street Station ©2009 NYCT Andre Samuel*

# Vital Relays

## COORDINATING REHABILITATION AT THREE SIGNALING LOCATIONS

### FOR GREATER CONTROL AND LESS MAINTENANCE

When age caught up with one of the busy signaling centers in the century-old New York City subway system, NYCT decided to renew it completely.

Alstom installed all new signals, relays, cases and cabinets as well as rehabilitating the interlocking equipment.

Alstom provided design, manufacture and delivery of signaling equipment and the system integration work plus training and on-site resident engineering support.

The relay room at East 180th Street consists of 40 racks which were completely updated. The vital racks have over 1,000 relays which involve the logic that safely controls the local interlocking.

In addition, Alstom equipment is ready to be tied into the Communication-Based Train Control system when NYCT makes the decision.

The new equipment provided by Alstom reduces the likelihood of failure as well as the amount of maintenance needed.

### In This Section:

- Solid State Electronic Relays
- Type B-1 Relays
- Type B-2 Relays
- Plugboard Kits
- Contact Groups
- Commonly Used Parts

## > Electronic Relays

Most versatile and direct replacements for mechanical relays in the market!

Alstom's line of **Electronic Relays** is the most versatile and direct replacements for mechanical relays in the market. Alstom is the leader in form, fit and functional replacement of mechanical relays with the new Electronic versions. Typically, mechanical units can be removed and an Alstom Electronic version can be used in its place without any need for field wiring changes.



The Alstom **Solid State Vane Relay** replaces a number of different vane relays. Pick up and drop away performance is greatly increased and will not vary over the life of the product. Phase angle settings are more easily accomplished than the mechanical counterpart. Mechanical adjustments and periodic inspections are simplified by the use of standard B relay structure.



The Alstom **Solid State Code Transmitter** is a complete replacement for all variations of the mechanical code transmitter relay. Absolutely no maintenance or adjustments are required for the life of the device. Code rate timing accuracy is greatly improved and will not vary over the life of the product. One Solid State Code Transmitter can replace multiple mechanical code transmitter relays, greatly reducing customer inventory.



The Alstom **Microchron Timer** is a drop-in replacement for a number of different timer relays. Timing accuracy is greatly increased and will not vary over the life of the product. Time duration settings are more easily accomplished than the mechanical counterpart. Mechanical adjustments and periodic inspections are simplified by the use of standard B relay structure. Both AC and DC versions are available.

# > Solid State Vane Relay

## FEATURES

- > Available in 60Hz, and 100Hz (other frequencies available upon request)
- > Mean Time Between Failures (MTBF) >300,000 hours
- > Automatically resets if unplugged from local power for 1/2 second or longer
- > No periodic FRA testing required for the 100% electronic version (available upon request)
- > Can be removed from or installed in an energized plugboard without damage or degradation
- > Immune to DC traction current and out of band AC Signals



Solid State Vane Relay

- > Meets AREMA Class B Environmental Requirements

The **Alstom Solid State Vane Relay (SSVR)** uses technology to provide an alternative product that is a direct replacement for the Alstom Mechanical Vane Relay. Local and track winding inputs match the mechanical vane relay impedances to seamlessly replace mechanical vane relays existing in the field. This product can operate in both double rail and single rail track circuit applications.

The new SSVR exhibits superior reliability, having greater than 300,000 hours Mean Time Between Failures (MTBF). The SSVR also provides versatility, allowing the customer to adjust the phase angle setting, if required, for special applications. Less frequent periodic testing is required as compared to the Mechanical Vane Relay, which requires FRA testing every 2 years. The reduced maintenance and testing of the SSVR drastically lowers the total life cycle costs.

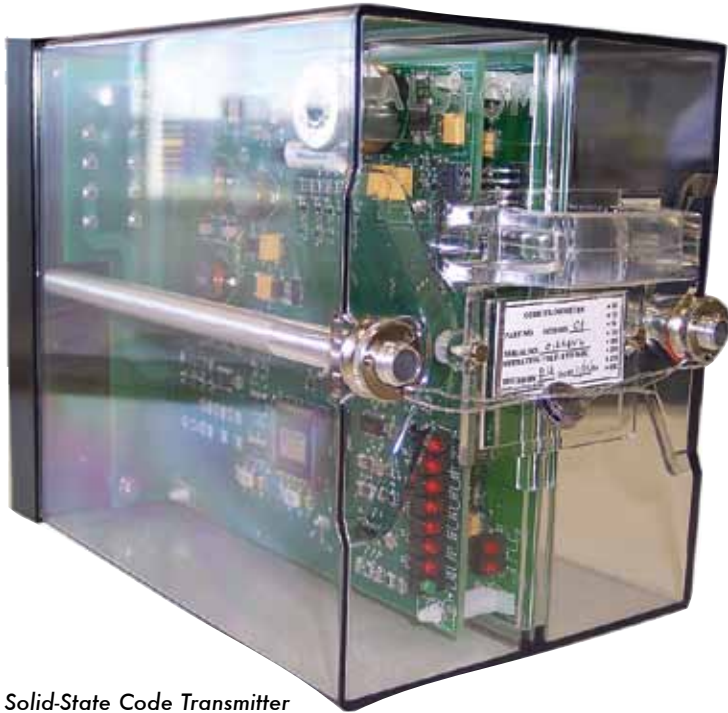
## Ordering Information

↻ Part Number	↻ Replaces	↻ Frequency	↻ Contacts	↻ Local Volts	↻ Track Volts
56005-101-01	56005-100-01	60Hz	4F-4B	110	1/0.5
56005-101-09	56005-100-09	60Hz	2F-2B	110/55	1/0.5
56005-101-18	56005-100-18	60Hz	2F-2B	110/55	5
56005-101-20	56005-100-20	100Hz	4F-4B	110	2/1
56005-101-24	56005-100-24	100Hz	4F-4B	110	2/1

Note: Shock indicator included on all relays.

For assistance in ordering or requesting further information on Solid State Vane Relays please contact the Alstom Customer Service Center 1-800-717-4477.

## > Solid State Electronic Code Transmitter



*Solid-State Code Transmitter*

### FEATURES

- > **Direct replacement of Alstom electromechanical code transmitter relays**
- > **Lower Life Cycle Cost: No mechanical adjustments or**
- > **Mean Time between failures (MTBF) >300,000 hours periodic inspections needed**
- > **Fixed or Universal rate selection**
- > **Built-in diagnostics**
- > **Available with low or high voltage contact circuits**

The **Solid State Code Transmitter (SSCT)** is a Vital code rate transmitter that combines microprocessor technology with Vital software and circuits to achieve an outstanding level of safety and reliability coupled with a maintenance-free design. The SSCT is capable of generating seven commonly used code rates, thereby reducing the number of types of units a user needs to stock. The SSCT design is based on the premise that any component degradation or failure (hardware and/or software) will not produce a code rate other than the rate selected. Should the unit detect a failure, or the input power drop below the minimum requirements, code rate generation is halted and the unit is reset. A minimum of two-second vital delay period follows every reset so that a sequence of starting and resetting does not appear as a valid code rate.

A light-emitting diode (LED) indicates when the unit is executing the two-second delay.

The SSCT is available in two rate configurations, fixed or universal. In the fixed configuration, the unit generates a single rate, and no plugboard wiring changes are required. In the universal configuration, when not installed, the unit is in a "non programmed" state. To select a code rate, a single wire jumper is added to the wiring side of the B2 plugboard. When the unit is installed, it becomes "programmed" by the jumper to generate one of the pre-programmed rates. An LED indicates which rate the unit is generating. The SSCT is powered from a DC supply, the allowable input voltage can range from 9 VDC to 16.5 VDC. At the nominal 12 VDC input the unit draws 0.30 amperes. The unit is protected from damage by the application of reverse voltage. Four solid state circuits (two front and two back) emulate the contacts of the mechanical code transmitter relay. An LED indicates which set of contacts is closed at any given time. The output circuits ("contacts") are available in two configurations, low voltage or high voltage.

# > Solid State Electronic Code Transmitter

## Configurations

The SSCT is available in 18 separate configurations. A unique part number designates each configuration. The group number defines the method of rate selection (fixed or universal), the rates available for that configuration, and whether the output circuits are designed for low voltage or high voltage operation.

## Specifications

Data	Value
Code rate accuracy	± 2% (Stability with temperature and power supply variations is better than ± 0.1%)
Environmental	AREMA Class C compliant
Rate configurations	Fixed or universal
Code rates	50, 75, 96, 120, 180, 220 or 270 PPM
Power	DC supply, 9 VDC to 16.5 VDC
Solid State Output Circuits 2F and 2B	Low voltage (42 VDC @ 5.6ADC/30VRMS @4ARMS) or high voltage (220 VDC @ 2 ADC/220VRMS @ 2 ARMS)

## Ordering Information

Ordering #	Rate	Low Voltage	High Voltage	Replaces These CT Relays	Price
31750-100-01	Universal (Note 1)	x		None	\$2,495.00
31750-100-02	Universal (Note 1)		x	None	\$2,495.00
31750-100-04	50 Fixed		x	57490-122-01	\$2,495.00
31750-100-05	75 Fixed	x		57490-095-01, -05 (different registration)	\$3,632.00
31750-100-06	75 Fixed		x	57490-091-05, -06	\$2,495.00
31750-101-06	75 Fixed		x	57490-080-02	\$2,495.00
31750-100-07	96 Fixed	x		57490-080-07, -09	\$2,495.00
31750-100-08	96 Fixed		x	57490-080-08	\$2,495.00
31750-100-09	120 Fixed	x		57490-096-01, -04	\$2,495.00
31750-100-10	120 Fixed		x	57490-092-01	\$3,632.00
31750-100-11	180 Fixed	x		57490-097-01, -04	\$2,495.00
31750-100-12	180 Fixed		x	57490-093-01	\$3,632.00
31750-100-13	220 Fixed	x		57490-119-01, -02 (Relay Only Had 1F-1B)	\$2,495.00
31750-100-14	220 Fixed		x	57490-111-01 (Relay Only Had 1F-1B)	\$2,495.00
31750-100-15	270 Fixed	x		57490-098-01	\$3,632.00
31750-100-16	270 Fixed		x	57490-094-01	\$2,495.00

Note 1: 50, 75, 96,120, 180, 220, 270 rate externally selected with a plugboard jumper

## > Microchron™ II Vital Timer (DC)



Microchron II  
Vital Timer Relay (DC)

### FEATURES

- > Consists of a vital timer and a vital relay structure
- > More flexible than electro-mechanical timers
- > Direct replacement for B2 Motor Timers and KB Motor Timers
- > Mean Time between failures (MTBF) >300,000 hours
- > Both AC and DC versions available

The **Microchron® II Vital Timer** is a cost-effective solution for applications requiring a vital time delay. The unit features a wide voltage range and selectable time range which eliminate the need to stock separate timers with different input voltages and time ranges. One unit does it all. The MICROCHRON II Timer uses solid-state components and a vitally programmed microprocessor to electronically energize a vital neutral relay at a preset time interval.

The vital timer and vital relay structure are contained within a standard Type B2 Relay enclosure. This enclosure may be rack-, wall- or shelf-mounted.

The Microchron II offers more application flexibility than traditional electromechanical timers. The contact configuration also permits direct "plug-in" replacement of GRS Type B2 and KB DC motor timers where circuitry allows.

## FEATURES

### > Wide Voltage Range

The DC Microchron II Timer has a wide input operating range of +8Vdc to +31.5Vdc. Protection from reverse input polarity is provided.

### > Simple, 1 Second Time Delay Adjustment

A tactile thumbwheel provides precise time settings in easy-to-read 1 second increments. Time delays may be set from 1 second to 19 minutes and 59 seconds.

### > Tamper-Evident Time Setting Seal

A special translucent seal is affixed over the time setting thumbwheel. Any attempt at tampering with the time setting requires the removal of the seal, which results in a visible "VOID" indication.

### > Lead Seal Option

The Microchron II can be ordered with a lead seal over the time setting thumbwheel instead of the translucent seal.

### > Fail-Safe Performance

The time delay will never be shorter than the set time interval.

### > Simple Installation

The timer may be rack-, wall- or shelf-mounted. It is plug-compatible with Type B2 and KB electro-mechanical DC-timer relays as well as earlier version Microchron units.

## Specifications

Data	Value
Accuracy	±0.1% of time setting (plus a turn-on delay of 500ms max.)
Time Range	1 second increments, 19 minutes, 59 seconds maximum, 1 second minimum
Environmental	AREMA Class C compliant

## Ordering Information

Description	Ordering #	Price
Microchron II Timer	50800-101-01	\$2,295.00
Microchron II Timer with seal option	50800-101-02	\$2,450.00
Plugboard Kit	59686-007-12	\$ 189.00

## > Microchron™ II Vital Timer (AC)



*Microchron II  
Vital Timer Relay (AC)*

### FEATURES

- > **Simple time delay adjustment**
- > **Replaces AC Motor Timers via a common registration plate**
- > **Interruption of power causes the unit to reset timing interval**
- > **Accuracy is + 0.1% of time setting (plus a max. delay of 0.75 sec.)**
- > **Timing range from 1.0 second to 19 minutes 59.9 seconds**
- > **Time settings in 0.1 second increments**

The **AC Microchron II Timer**, based upon the same proven design as the DC MICROCHRON, provides the ability to replace both 25Hz and 60Hz AC motor timers with a solid state unit. Using the same design principles as DC Microchron, the AC Microchron features a wide voltage range and selectable time range, which eliminates the need to stock separate timers with different time ranges.

#### > **Wide Voltage Range**

The AC Microchron II Timer has a wide input operating range of 88VRMS to +135VRMS for the 60Hz version, 44VRMS to 66VRMS for the 25Hz version.

#### > **Simple, 0.1 Second Time Delay Adjustment**

A tactile thumbwheel provides precise time settings in easy-to-read 0.1 second increments. Time delays may be set from 1.0 second to 19 minutes and 59.9 seconds.

#### > **Lead Seal Option**

The AC Microchron II includes a seal over the time setting thumbwheel to prevent inadvertent delays setting.

#### > **Fail-Safe Performance**

The time delay will never be shorter than the set time interval.

#### > **Simple Installation**

The timer may be rack-, wall- or shelf-mounted. It is plug-compatible with Type B2 electromechanical AC-timer relays.

# > Microchron™ II Vital Timer (AC)

The AC Microchron II Timer Relay can replace the following AC Motor Timer Relays:

AC Microchron	AC Motor Timer
60 Hz Relay (50800-103-01)	56007-050-01, 56007-051-01, 56007-060-01, 56007-061-01, 56007-066-01, 56007-067-01, 56007-067-02, 56007-068-01, 56007-068-02
25 Hz Relay (50800-104-01)	56007-062-01, 56007-063-01, 56007-065-01, 56007-069-01, 56007-070-01

## Ordering Information

Description	Ordering #	Price
AC Microchron II 60 Hz	50800-103-01	\$2,895.00
AC Microchron II 25 Hz	50800-104-01	\$3,295.00



State of the Art Relay Assembly Room at the Rochester, NY Facility

## > Type B Series Vital Relays



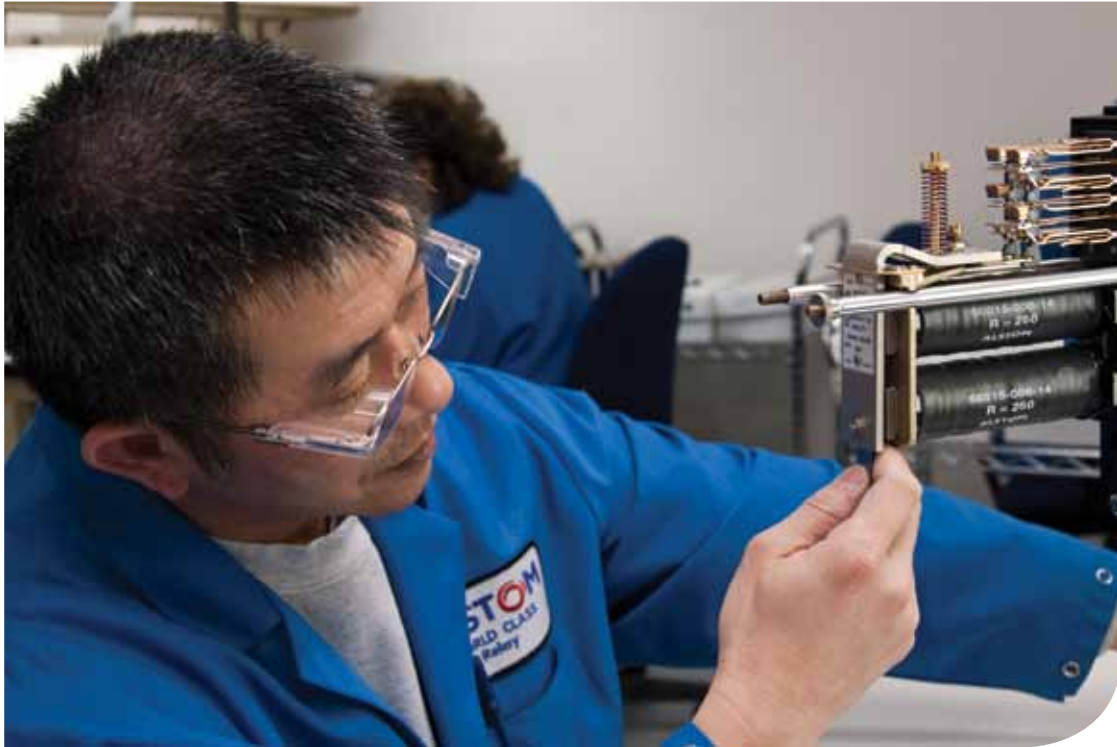
*B1 Relays Ready for Shipping*

### Past Experience Applied for Future Perfection

Alstom **Plug-in Relays** combine the tradition of excellence established by GRS with the innovation and resources of Alstom to perfect the technology, first introduced by GRS nearly 70 years ago. Today, Alstom relays are considered to be the standard in the industry. Available in a wide range of types and configurations, Alstom relays improve reliability, reduce maintenance and maximize operating life. They may be rack-installed in equipment rooms, wayside cases or housings. Alstom Type B Vital Circuit Relays are available in two sizes – B1 and B2. Two B1 relays occupy the same space as a single B2 relay. Type B Relays install quickly and easily, making positive mechanical and electrical connections to their plugboard terminals.

The contact and coil structures terminate at the base of the relay as prongs. The plugboard has wedge-shaped plug insulators. Guide rods ensure that the prongs and plug insulators make proper contact. Registration plates prevent improper installation of non-compatible relays to a plugboard. Some Type B relays are energized by DC voltage, others by AC voltage. They are designed to meet the important requirements of safety, reliability, low maintenance and long operating life. A vital Type B relay is designed so that the probability of its failing to return to a prescribed state when it is de-energized is so low that for all practical purposes it is considered to be nonexistent.

## > Type B Series Vital Relays



Type B Relay Being Assembled at the Rochester, NY Facility

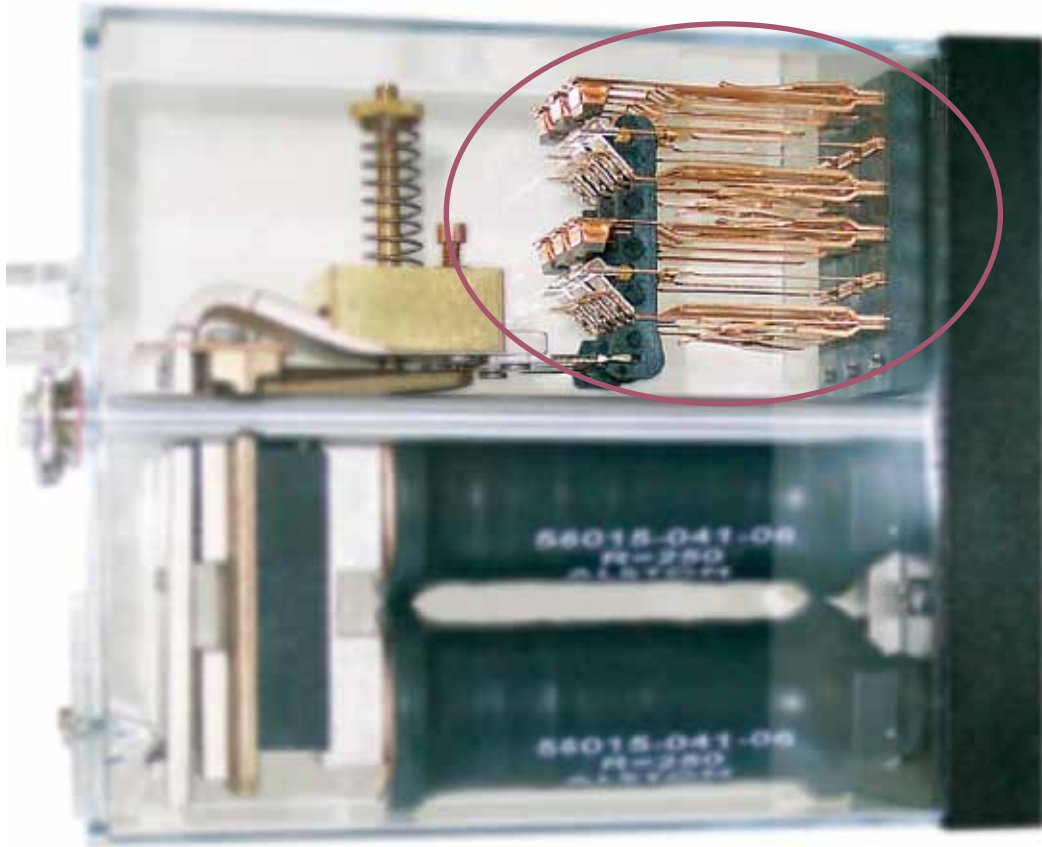
### Type B1

- > Height of relay - 6.3125" (16.034 cm)
- > Width of relay - 2.4375" (6.191 cm)
- > Depth without plugboard - 8.5625" (21.749 cm)
- Depth including plugboard - 15.5" (39.370 cm) fully wired (approx.)
- Weight of relay with plugboard - 7-10 lbs. (3.18-4.54 kg) (weight of wiring not included)
- Weight of plugboard alone without wiring - 1 lb. (0.454 kg)

### Type B2

- > Height of relay - 6.3125" (16.034 cm)
- > Width of relay - 4.9375" (12.541 cm)
- > Depth without plugboard - 8.5625" (21.749 cm)
- > Depth including plugboard - 15.5" (39.370 cm) fully wired (approx.)
- > Weight of relay with plugboard - 10-15 lbs. (3.18-6.80 kg) (weight of wiring not included)
- > Weight of plugboard alone without wiring - 2 lbs. (0.907 kg)

# > Type B Series Vital Relay Contacts



## Contact Combinations

**Type B1** Relays have space for three contact groups while **Type B2** Relays feature six contact group spaces:

Type B1		Type B2	
Neutral	2FB, 4FB, 4F-2B, 4FB-2F-1B, 6FB	Neutral	12FB, 8FB-2F, 8FB-4F-2B
Biased-Neutral	4FB-2F-1B, 6FB	Biased-Neutral	8FB-4F-2B, 12FB
Power Transfer	2FB, 6FB	Polarized	4FB-4NR, 6NR, 4NR-2FB-2F
Light-Out	4FB, 4F-2B, 6FB		

*Note: F represents Front independent contacts, B represents Back dependent contacts, FB represents Front-Back dependent contacts, and NR represents Normal-Reverse dependent contacts*

## Contact Types

**Type B** Relays may have regular, heavy-duty or heavy-duty with magnetic blowout contacts.

Contact Type	Load	Material
Regular	4 Amp continuous (resistive)	Front: Silver-impregnated carbon to Silver Back: Silver-to-Silver
Heavy Duty	>4 Amps continuous (resistive) Range 1: < 30V Range 2: 30V – 175V	Front: Silver-impregnated carbon to Silver Back: Silver-impregnated carbon to Silver
Heavy Duty with Magnetic Blowout	>4 Amps continuous (resistive) Range 2: 30V – 175V Range 3: 175V – 250V	Front and back contacts include magnets to facilitate "blow-out" function when electric arc is present.

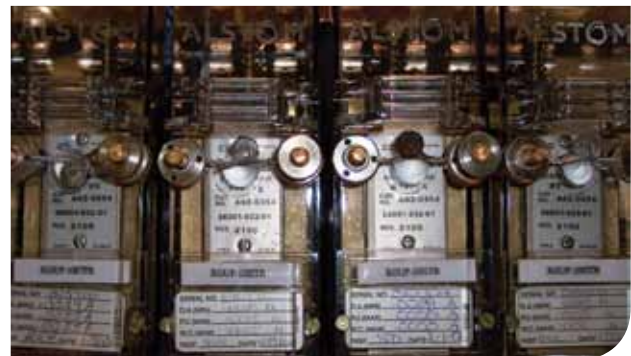
# > Type B Series Vital Relay Coils and Name Plates



*Assembly of Vital Relay Coils at the Rochester, NY Facility*

**Type B Relays** may have one or two coils. A typical coil is wound on a phenolic spool which slips over the core of the relay. Relays with one coil may have one or two windings while relays with two coils may have up to three windings. Leads from the windings fasten to prongs which engage the plugboard. Slow-acting relays are made by placing copper washers or copper/aluminum slugs on the cores. The more washers, or the longer the slug, the slower acting the relay.

All **Type B Relays** have a name plate displaying the catalog number, drawing number, serial number and nominal coil resistance. The relay cover contains the tag holder for up to two separate tags: a tag for relay operating and testing data and a tag for circuit designation.

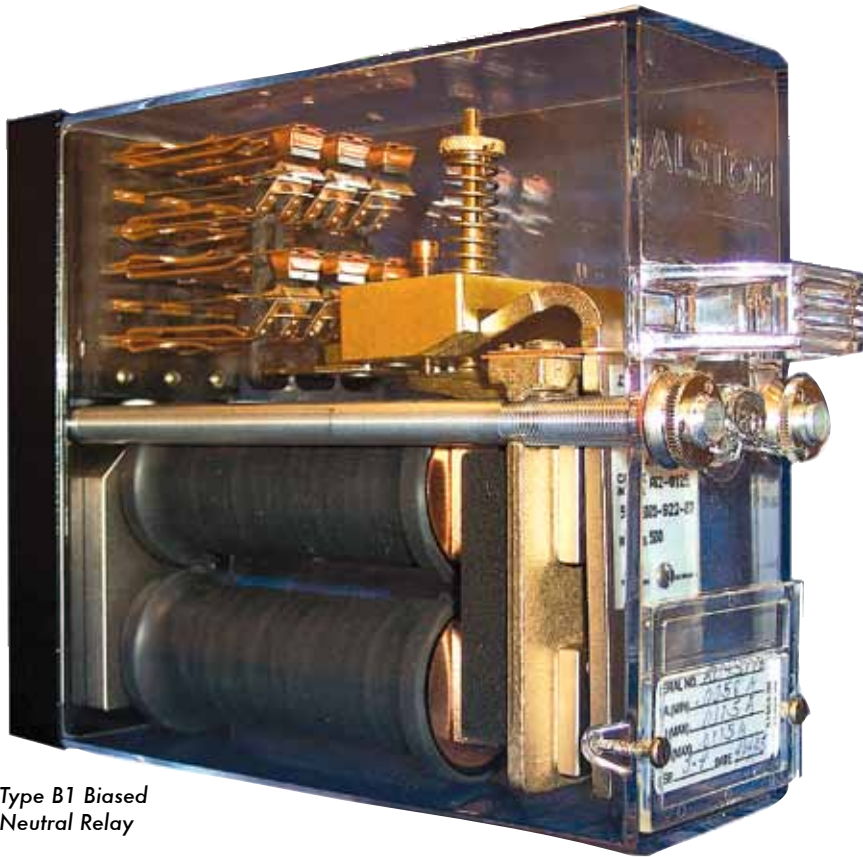


*Type B Relays with Name Plates*

## Ordering Information

*For assistance in ordering or requesting further information on Type B Series Vital Relays, coils, contacts, name plates and other parts please contact the Alstom Customer Service Center 1-800-717-4477.*

## > Type B1 and B2 Biased-Neutral Relays



Type B1 Biased  
Neutral Relay

### FEATURES

- > Picks up only with proper polarity voltage
- > Fifty times normal voltage for 2 seconds will not affect relay operation
- > Will not pick up on reverse polarity

Introduced in 1935, the **Type B1 and B2 Relays** are still the industry standard. To date, over 2 million have been sold. Biased-Neutral Relays pick up only if a voltage of the proper polarity is applied to the coils - a characteristic provided by a permanent magnet and a leakage strip bridging the cores

and placed between the coils and armature. Fifty times normal relay working voltage applied for 2-seconds at both normal and reverse polarity will not affect relay operating characteristics more than 2%, and will not pick up the armature on reverse polarity.

# > Type B1 and B2 Biased-Neutral Relays

## Ordering Information

Relay	Contacts	Nominal Resistance $\Omega$	Max Pickup Working Amperes	Notations	Ordering #	Price
B1	2F-2B	2100	0.0093	EHD Contacts	56001-942-01	\$ 850.00
B1	4FB-2F-1B	2	0.158		56001-921-09	\$ 899.00
B1	4FB-2F-1B	500	0.0121		56001-921-07	\$ 912.00
B1	6FB	500	0.0121		56001-922-07	\$ 849.00
B1	4FB-2F-1B	100	0.026		56001-921-02	\$ 840.00
B1	4FB-2F-1B	63	0.0305		56001-921-05	\$ 795.00
B1	4FB-2F-1B	375	0.0126		56001-921-14	\$ 850.00
B1	4FB-2F-1B	750	0.0084		56001-921-10	\$ 895.00
B1	6FB	63	0.0305		56001-922-05	\$ 850.00
B1	6FB	250	0.0168		56001-922-01	\$ 850.00
B1	6FB	100	0.026		56001-922-02	\$ 850.00
B1	6FB	1	0.236		56001-922-10	\$ 795.00
B1	2FB-4F-2B	1000	0.0088		56001-927-01	\$ 789.00
B1	2FB-3F-3B	1000	0.0088		56001-928-01	\$ 899.00
B1	4FB-2F-1B	2100	0.0058		56001-932-01	\$ 740.00
B1	2FB-4F-2B	2100	0.0058		56001-933-01	\$ 799.00
B1	4FB-2F-1B	500	0.0121	HD Contacts(*)	56001-956-01	\$ 950.00
B1	4FB-2F-1B	2	0.158	HD Contacts(*)	56001-956-02	\$ 985.00
B1	4FB-2F-1B	1000	0.009		56001-921-04	\$ 799.00
B1	5F-4B	0.5(**)	0.32	High % Release	56001-961-01	\$ 1,099.00
B1	5F-4B	0.5(**)	0.374	High % Release	56001-965-01	\$ 965.00
B1	6FB	2	0.13		56001-968-01	\$ 950.00
B1	5F-4B	4	0.126		56001-963-01	\$ 999.00
B1	2FB-4F-2B	2100	0.0058	Special Single Coil DA	56001-970-01	\$ 958.00
B1	2FB-4F-2B	2100	0.0058	HD Contacts(1)	56001-945-01	\$ 734.00
B1	8F-1B (1)	2100	0.0058	Tightly Controlled DA	56001-971-01	\$ 989.00
B1	5F-1B-2FB	100	0.026	1B is AgC	56001-972-01	\$ 899.00
B1	5F-1B-2FB	2100	0.0058	1B is AgC	56001-973-01	\$ 995.00
B1	6FB	4	0.109		56001-979-01	\$ 835.00
B1	4FB-1F-2B	750	0.0084		56001-925-10	\$ 865.00
B1	2F-2B	500	0.019	EHD Contacts	56001-926-01	\$ 995.00
B1	4FB-2F-1B	2100	0.0099		56001-980-01	\$ 780.00
B1	8F-1B	2100	0.0058	(2F-1B) HD, 1B is AgC	56001-969-01	\$ 895.00
B2	8FB-4F-2B	350	0.0189		56002-719-01	\$ 2,921.00
B2	12FB	350	0.0189		56002-720-01	\$ 2,939.00
B1	4FB-2F-1B	.5(2)	.393		56001-987-01	\$ 799.00
B1	4FB-2F-1B	2100	.0058		56001-986-01	\$ 895.00
B1	2FB-4F-2B	2100	.0099	HD Contacts	56001-984-01	\$ 895.00

Note (\*): Silver-Impregnated Carbon fronts and backs.

Note (\*\*): Resistance with coils in parallel.

# > Type B1 Flasher Relay Direct Current



Type B1 Flasher Relay

## FEATURES

- > Maintains constant flashing rate
- > 48 to 54 flashes per minute for highway crossing
- > 56 to 64 flashes per minute for wayside signals
- > Equipped with heavy-duty contacts

This electronically-driven highway-crossing flasher consists of a **Type B1 Neutral Relay** and a solid state flasher module. The flasher module is designed for use with either AC or DC power. If using AC, the current must be rectified and filtered. DC current can come from a battery or from a line outside the case with an arrester with a 1000V breakdown rating or less for surge protection. The flasher operates at a constant rate through an 8-16 Volt input range, and it maintains a constant ratio of "on-off" time throughout a temperature range of -40°F to 160°F (-40°C to 70°C).

The flasher module establishes and maintains a flashing rate of 48 to 54 flashes per minute for highway-crossing signals, and 56 to 64 flashes per minute for flashing wayside aspects. The flasher module drives the Type B1 Neutral Relay which is equipped with four dependent front-back, heavy duty, lamp-control contacts (silver-cadmium-oxide). Full back contact pressure is maintained when the relay is not operating. The flasher module is mounted on the back of the relay plugboard by using mounting kit 17550-071-01.

## Ordering Information

Description	Ordering #	Price
Flasher Relay (60 Ω)	56001-985-01	\$ 717.00
Mounting Kit	17550-071-01	\$ 125.00
Flasher Module 48-54 Flashes per minute Drives 1,2, or 3 60 Ω flasher relays in parallel	30733-003-01	\$ 245.00
Flasher Module Rate 56-64 flashes per minute Drives 1,2, or 3 60 Ω flasher relays in parallel	30733-003-02	\$ 375.00
Flasher Module Rate 56-64 flashes per minute Drives 1 18 Ω flasher relay	30733-003-04	\$ 314.00

# > Type B1 Light Out Neutral Relays (AC or DC)

## FEATURES

- > Detects signal lamp failures
- > Operates on either AC or DC current
- > Can be used with double filament lamps



Type B1 Light-Out Neutral Relay



For more information on our B1 Relays visit:  
[www.alstomsignalingsolutions.com](http://www.alstomsignalingsolutions.com)

**Light-Out Neutral Relays** are used to detect signal lamp failures. They operate on either AC or DC current. Relays with low-resistance windings are used for hot-filament checks; relays with both low- and high-resistance windings are used for hot and cold filament checks.

Where double filament lamps are used, the relays may be furnished to either hold up or drop out when the main filament opens. Front contacts are silver-impregnated carbon to silver. Back contacts are silver to silver.

## Ordering Information

Contacts	Nominal Resistance $\Omega$	Use with lamp Volts @ 60Hz	Watts	Max. Working Amps AC/DC for low res. winding	Ordering #	Price
4FB	0.24	10	5+3.5	0.68	56001-785-35	\$895.00
4FB	450-0.069	10	18+3.5	1.52	56001-785-61	\$895.00
4FB	450-0.12	12.0-16.0	21(CP)	0.883	56001-873-01	\$767.00
6FB	450-0.2	10	10	0.84	56001-785-10	\$910.00
4FB	0.4	10	13+3.5	0.294	56001-785-55	\$859.00
Rectifier					54728-062-01	\$529.00
<b>An external rectifier is required for operation and must be ordered separately.</b>						

# > Type B1 Lamp Control Relay Direct Current



Type B1 Lamp Control Relay

## FEATURES

- > Controls highway crossing flashing light lamp circuits
- > Able to handle heavy surge current of lamps
- > Used in 2 million installs world wide. The standard in signal relays
- > Two no bounce back contacts

The **Lamp-Control Relay** is used primarily for controlling lamp circuits at highway grade crossings equipped with flashing lights. It has two regular front-back contacts and two back contacts for handling the heavy surge current characteristic

of highway crossing lamps. The back contacts are rated at 15 Amperes at 12 Volts AC or DC. The front contacts are silver-impregnated carbon to silver, and the back contacts are silver to silver.

### Ordering Information

Description	Nominal Resistance $\Omega$	System Voltage	Ordering #	Price
2FB-2B	210	10	56001-880-01	\$ 825.00

# > Type B1 Power Transfer Neutral Relay (Rectified AC)

## FEATURES

- > A DC line relay which operates on rectified AC
- > Automatically switches to battery if AC fails
- > Contacts able to carry 15 Amps at 15 Volts



Type B1 Power-Transfer Neutral Relay

The **Power-Transfer Neutral Relay** is essentially a DC line relay operating on rectified AC. If AC energy fails, the relay armature drops, automatically transferring the circuits to local battery. The ratio of release voltage to pickup voltage is about 75 percent, to provide transfer before signal aspects are

impaired. Contacts are silver to silver, or silver-impregnated carbon to silver, with a capacity of 15 Amperes at 15 Volts. An external rectifier is required for operation and must be ordered separately.

## Ordering Information

↻ Contacts Heavy-Duty 15 Amps, 15 Volts	↻ Rated Volts AC	↻ Nominal Res $\Omega$	↻ Ordering #	↻ Price
6FB(*)	10	100-100	56001-745-01	\$ 799.00
6FB(**)	10	100-100	56001-947-01	\$ 778.00
6FB(*)	12	100-100	56001-745-02	\$ 895.00
<b>An external rectifier is required for operation and must be ordered separately.</b>				
AC Rectifier			59899-005-03	\$ 299.00

Note (\*): Silver-to-Silver contacts

Note (\*\*): Silver-Impregnated Carbon to Silver Fronts, Silver to Silver backs

# > Type B1 Code Responsive Relay Direct Current



Type B1 Code Responsive Relay

## FEATURES

- > Responds quickly to pulses of coded energy
- > Contacts close only with proper polarity voltage
- > Operates in response to changes in direction of current

**Code Responsive Relays** are made with an armature and contact structure that responds quickly to pulses of coded energy as high as four pulses per second. The B1 Code Responsive Relay has three basic internal structures. The first has two dependent front-back contacts. The second has four dependent front-back contacts and is usually supplied for heavy service since the contact design provides more effective non-bounce characteristics.

The third structure is a Polar-Stick (or Magnetic-Stick) Code Responsive Relay, that is similar to the first structure without a bias spring assembly.

In the first two types, the armatures are polarized by two permanent magnets, which allow the front contacts to close only if voltage of the proper polarity is applied (polar-biased). When the relay is de-energized, the bias spring together with magnetic bias, returns the armature to the de-energized position closing the back contacts.

The Polar-Stick Relay operates in response to a change in the direction of the current flow in its coils. The armature stays in its last-operating position when the energy is cut off, held in place by the two permanent magnets.

# > Type B1 Code Responsive Relay Direct Current

## Ordering Information

↻ Contacts	↻ Nominal Sys Voltage	↻ Nominal Res $\Omega$	↻ Notations	↻ Ordering #	↻ Price
2FB(**)	10	200	Line Code Repeater	56001-672-01	\$ 3,695.00
4FB(**)	10	80	Line Code Repeater	58640-172-03	\$ 9,999.00
2FB(**)-2FB(***)	12	80	Line Code Repeater	58640-171-04	\$ 4,097.00
4FB(***)	10	80	Line Code Repeater	58640-171-03	\$ 5,369.00
4NR(***)	—	500	Magnetic-Stick Relay	58645-172-05	\$ 6,982.00
2FB(**)	—	10	Line Code Repeater	56001-672-02	\$ 4,055.00
2NR(**)	—	520	Polar-Stick Ground Detector	56001-675-01	\$ 3,995.00

Note (\*): Specific application relay

Note (\*\*): Silver-Platinum contacts for 30v or less

Note (\*\*\*) : Tungsten contacts for over 30v

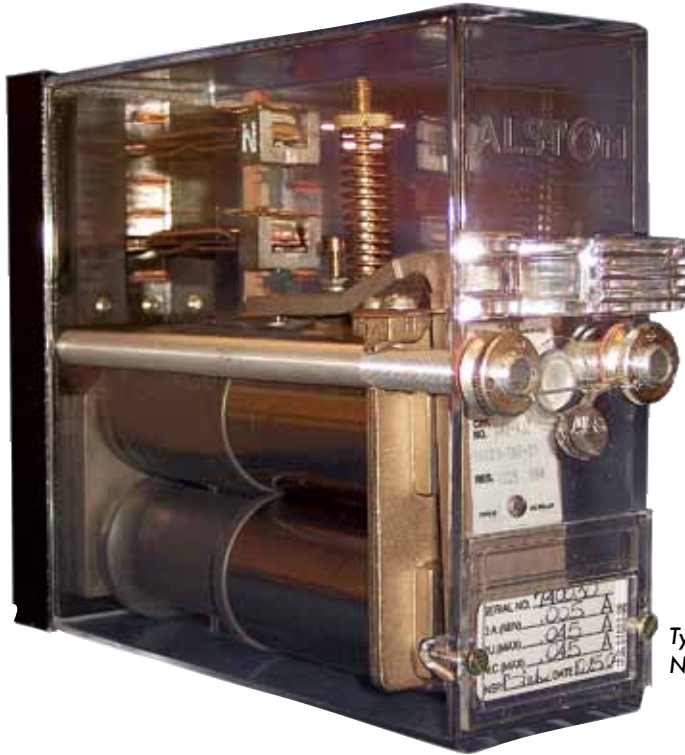
Note (\*\*\*\*): Silver-Impregnated Carbon to Silver

Note (~~): Silver-Impregnated Carbon to Silver-Platinum



Type B Relay Being Assembled at the Rochester, NY Facility

# > Type B1 Switch Overload Neutral Relay



Type B1 Switch-Overload Neutral Relay

## FEATURES

- > Used to cut off energy when switch machine motor is overloaded
- > Provides automatic resetting when current polarity is reversed
- > Will permit repeated switch operation to try to dislodge obstruction
- > Available for low or high voltage machines

The **Switch-Overload Relay** is used to cut off energy when a switch machine motor is overloaded because of an obstruction, and to provide for automatic resetting when polarity of the control circuit is reversed. The relay picks up on the overload current and remains picked up until the current in the control circuit is reversed.

Built-in thermal slow-pickup characteristics prevent pickup on the normal current surges through the switch machine motor when starting. This feature permits repeated switch operation which may dislodge the switch obstruction causing the overload. The relay has make-before-break (MB) contacts with .030" (0.762mm) front contact openings. These relays are available for low- or high-voltage switch machines.

## Ordering Information

↻ Contacts	↻ Nominal Res $\Omega$	↻ Switch Machine Oper. Voltage	↻ Overload Rating Amperes	↻ Ordering #	↻ Price
2FB(**) (MB)	.058-135	Low	18	56001-916-02	\$ 1,159.00
2FB(**) (MB)	.058-135	High	12	56001-916-01	\$ 999.00
2B(***)	.068-1225	High	12	56001-785-01	\$ 1,099.00
2FB(**) (MB)	.068-220	High	11.5	56001-785-21	\$ 993.00

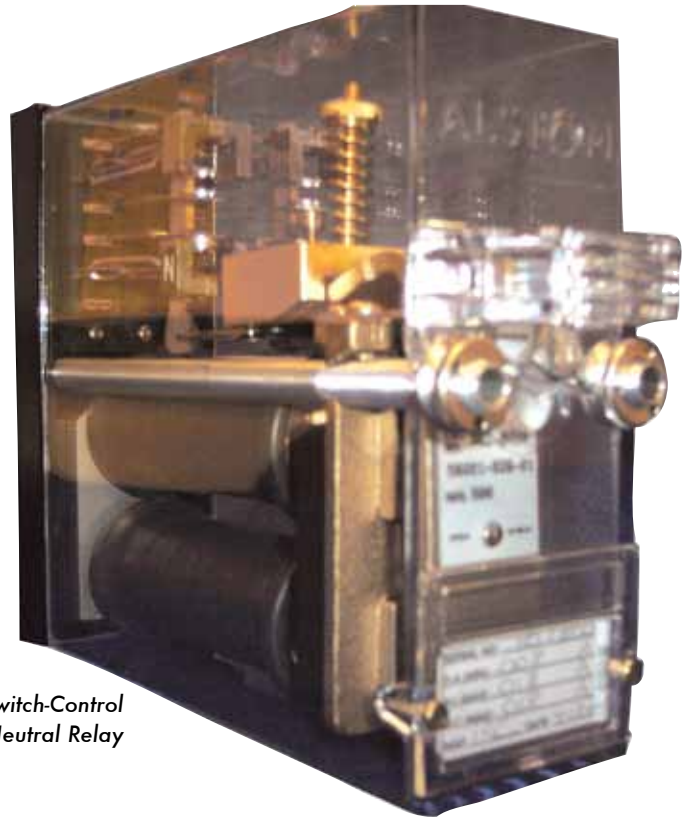
Note (\*\*): Silver-Impregnated Carbon-Silver Front Contacts

Note (\*\*\*): Silver-Silver Contacts

# > Type B1 Switch Control Relay Direct Current

## FEATURES

- > Available either as a neutral relay with heavy duty contacts or a biased-neutral relay with all or a combination of extra heavy-duty and medium duty safety contacts
- > Used to control operating energy to switch machines
- > All extra heavy duty contacts are silver-cadmium-oxide. Medium duty contacts are silver impregnated carbon to silver front and silver to silver back



Type B1 Switch-Control  
Neutral Relay

## Ordering Information

Contacts	Nominal Res $\Omega$	Switch Machine Oper. Voltage	Maximum Pickup working Amperes	Notations	Ordering #	Price
4FB	500	Low	0.0136	Neutral Relay. HD contacts, .090" (2.286mm) front contact opening	56001-917-01	\$ 699.00
2F-2B	500	Low or High	0.019	Biased-Neutral Relay. EHD contacts. .125" (3.175mm) front contact opening	56001-926-01	\$ 995.00
2FB-5F-1B	0.045-450	High	0.0315	Neutral Relay. HD contacts. .090" (2.28mm) front contact opening. For Model 6 Switch Machine control.	56001-785-99	\$1,495.00
2F-1B-1FB	500	Low or High	0.019	Biased Neutral Relay. 2F-1B are EHD contacts. .125" (3.175mm) Front contact openings. 1FB are medium duty contacts.	56001-988-01	\$ 895.00

# > Type B1, B2 Neutral Normal Release Relay

## Direct Current, Line and Track



Type B1 Neutral Normal Relay

### FEATURES

- > Neutral Relays have normal pickup and release times, and are called "regular-release" relays
- > Relays may be energized by current of either polarity
- > A variety of neutral relays are available to meet a wide range of circuit requirements

### Ordering Information

Relay Size	Contacts	Nominal System Resistance $\Omega$	Max Pickup and Working Amperes	Notations	Ordering #	Price
B1	6FB	1.8	0.13	Track Relay	56001-714-03	\$ 895.00
B1	6FB	4	0.089	Track Relay	56001-714-01	\$ 865.00
B1	6FB	500	0.0121	Line Relay	56001-762-02	\$ 765.00
B1	4FB-2F-1B	4	0.089	Track Relay	56001-787-01	\$ 925.00
B1	4FB-2F-1B	500	0.0121	Line Relay	56001-783-02	\$ 725.00
B1	6FB	84	0.0195	Line Relay	56001-785-31	\$ 999.00
B1	6FB	900	0.0084	Line Relay	56001-762-01	\$ 895.00
B1	6FB(*)	500	0.0157	Line Relay	56001-951-01	\$ 899.00
B1	4F-2B	350	0.0086	Line Relay	56001-789-05	\$ 950.00
B1	4FB-2F-1B	84	0.0195	Line Relay	56001-785-37	\$ 955.00
B1	4FB-2F-1B	900	0.0084	Line Relay	56001-783-01	\$ 789.00
B1	4FB-2F-1B	350	0.0136	HD contacts (silver backs)	56001-822-06	\$ 899.00
B1	4FB-2F-1B	500	0.0121	HD contacts (silver backs)	56001-822-02	\$ 790.00
B1	4FB-2F-1B	900	0.0084	HD contacts (silver backs)	56001-822-01	\$ 899.00
B1	6FB	9	0.055	Operated from decoder unit.	56001-785-12 00400-004-01	\$ 976.00
B1	4FB	6	0.116	Overlay track circuits	56001-785-91	\$1,090.00
B1	4FB-2F-1B	100	0.0192	V P I	56001-787-05	\$ 699.00
B1	2FB-1B-2F	500	0.0158	EHD on 2F contacts	56001-881-01	\$ 799.00
B1	4F-2B(*)	1	2.3	Intermittent train control	56001-931-02	\$ 790.00
B1	6FB	500	0.012	HD front & back contacts	56001-978-01	\$1,129.00
B1	2F-1B	1400	0.0315	LINE RELAY	56001-911-01	\$ 729.00
B1	6FB	500	0.0157	.4FB(*)	56001-983-01	\$ 816.00
B2	12FB	500	0.0152	Line Relay	56002-703-01	\$3,145.00
B2	8FB-2F	330	0.0294	EHD on 2F contacts	56002-710-01	\$3,199.00

Note \*: Heavy Duty Silver-cadmium oxide fronts and backs

# > Type B1, B2 Neutral Slow Acting Relay Direct Current

## FEATURES

- > In slow-release and slow-pickup relays, the time delay is determined by copper or aluminum slugs or copper washers on the cores
- > The time of release is the time required to open the front contacts after energy is removed from the relay
- > Time of pickup is the time required to close the front contacts after energy is applied to the relay



Type B1 Neutral Slow Acting Relay

## Ordering Information

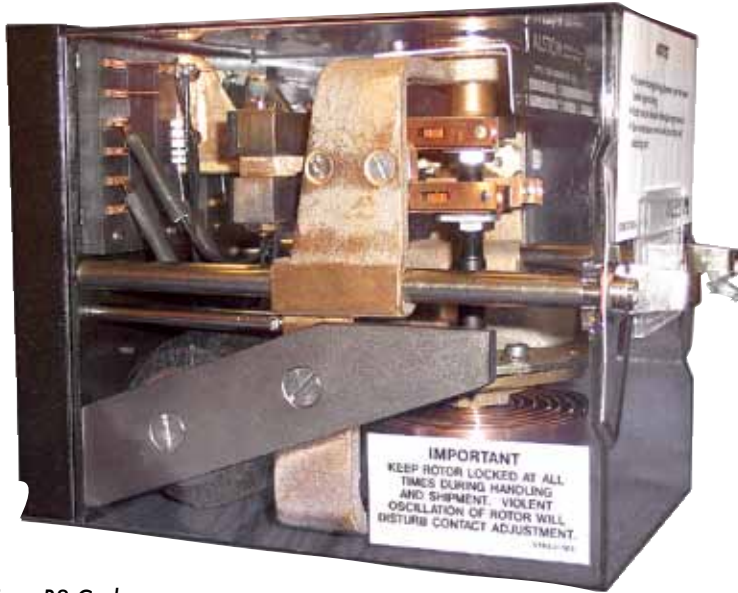
Relay Size	Characteristics	Contacts	Nominal Resistance $\Omega$	Max Pickup and Working Volts/Amps	Minimum Time of Pickup and/or Release	Ordering #	Price
B1	Slow-Pickup	4FB-2F-1B	300	0.034A	1.4 sec at 13.2V	56001-790-01	\$1,695.00
B1	Slow-Pickup	6FB	220	9.45V	1.35 sec at .050A	56001-736-01	\$ 1,469.00
B1	Slow-Release	4FB-2F-1B	194	0.046A	0.9-1.0 sec release at 10V	56001-851-01	\$ 1,099.00
B1	Slow-Release	2FB	460	0.014A	3-3.75 sec at 9V	56001-830-01	\$ 899.00
B1	Slow-Release	4FB	450	0.013A	0.9-1.1 sec at 10V	56001-808-26	\$ 859.00
B1	Slow-Release	4FB	194	0.031A	3.0-3.75 sec at 12V	56001-774-01	\$ 995.00
B1	Slow-Release	4FB-2F-1B	194	0.035A	1-1.25 sec at 10V	56001-792-02	\$ 895.00
B1	Slow-Release	4FB-2F-1B	194	0.0335A	2.8-3.5 sec at 10V	56001-778-01	\$ 1,099.00
B1	Slow-Release	4FB-2F-1B(**)	194	0.0347A	1.0-1.25 sec at 10V	56001-957-01	\$ 995.00
B1	Slow-Release	6FB	194	0.035A	1-1.25 sec at 10V	56001-780-01	\$ 950.00
B1	Slow-Release	4FB(**/ ***)	194	0.0315A	3-3.75 at 12V	56001-960-01	\$ 995.00
B1	Slow-Release	4FB-2F-1B	300	0.0283A	1.7-2.1 sec. at 8.4V	56001-817-01	\$ 972.00
B1	Slow-Release	4FB-2F-1B	800	0.121A	0.9-1.1 sec. at 10V	56001-792-01	\$ 995.00
B1	Slow-Release(*)	4FB-2F-1B	460-460	0.036A	0.8-0.9 sec. at 21.6V	56001-785-85	\$ 930.00
B1	Slow-Release	2F-4B	80	0.0242A	0.1-0.125 sec at 2V	56001-759-01	\$ 5,995.00
B1	Slow-Release	2FB-4F-2B(*)	460	0.022A	2.0-2.5 sec at 32V	56001-950-01	\$ 1,090.00
B1	Partial, Slow-Rel.	4FB(3)	210	0.0109A	Approximately 0.15 sec	56001-886-01	\$ 1,050.00

Note (\*): Lower coil only

Note (\*\*): Silver-Impregnated Carbon backs

Note (\*\*\*): Heavy Duty Contacts

# > Type B2 Code Transmitter Relay (Direct Current)



Type B2 Code Transmitter Relay

## FEATURES

- > Available in code rates of 50, 75, 120, 180, 220, 270, or 333.3 ppm
- > Contact arc supressor which eliminates radio interference
- > See pages 102-103 for our new Solid State Electronic Code Transmitter

**Code Transmitter Relays** have an oscillating armature on a vertical shaft carrying cams which open or close contacts in field circuits. A contact interrupts the energy to the driving

coil to keep the armature oscillating. Other contacts interrupt circuits at a rate for which the transmitter is designed.

## Ordering Information

Contacts	Nominal Code Rate	Nominal Resistance $\Omega$	Nominal System Voltage	Ordering #	Price
2F-2B(*)	75	150	10	57490-095-05	\$ 3,995.00
2F-2B(*)	180	150	10	57490-097-04	\$ 1,799.00
2F-2B(*)	270	150	10	57490-098-01	\$ 3,632.39
2F-2B(**)	75	150	10	57490-091-05	\$ 3,750.00
2F-2B(**)	120	150	10	57490-092-01	\$ 3,699.00
2F-2B(**)	180	150	10	57490-093-01	\$ 3,699.00
2F-2B(**)	270	150	10	57490-094-01	\$ 3,699.00
2F-2B(*)	75	150	10	57490-080-01	\$ 3,450.00
1F-1B(*)	220	150	10	57490-119-02	\$ 3,799.00
2F-2B(*)	50	150	10	57490-121-01	\$ 3,385.00

Contacts are:

Note (\*): Silver-Platinum contacts for 30v or less

Note (\*\*): Tungsten contacts for over 30v

# > Type B2 Vane, Two-Position AC Track Relay

## FEATURES

- > Used mainly for track circuits
- > Operates on low wattage
- > High efficiency
- > Two position
- > Jewel bearings
- > Aluminum alloy vane



Type B2 Vane

**Alternating - Current Vane Relays** are made principally for track circuits. They are high efficiency relays requiring low wattage in the track element for operation. A vane of aluminum alloy, specially annealed to prevent warping, is secured to a horizontal shaft. The shaft is supported at the ends by steel pivots rotating in jewel bearings to position the vane in the air gap between two magnetic field structures - one from the local source and one from the track signal. The electromagnets are constantly energized while the relay is picked up, but the magnetism produced by one of the electromagnets lags in time with respect to the other. The reaction on the vane of the two independent magnetisms, which are out of step, produces rotation. Pushers of insulated material transmit the movement of the vane shaft to the contacts.

These contacts are similar to the ones used in DC relays, being flat springs molded in a phenolic block. Front contacts are silver-impregnated carbon to silver. Back contacts are silver to silver. The local coil is double-wound so that the two windings can be hooked up in series or in multiple. When connected in multiple, they are operated on half-voltage, and it becomes possible to connect a phase-shifting device, should track operating conditions make it necessary. Track windings are furnished the same way. All Vane Relays come with a shock indicator attached to the relay cover. The shock indicator will give a clear and non-reversible indication when relay is subjected to a shock or vibration in excess of its rating.

See page 113 of this section for our Electronic Vane Relay offering.

## Ordering Information

Contacts	Local Winding Volts	Track Winding Volts	Frequency (Hz)	Ordering #	Price
2F-2B	110/55	1.0/0.5	50	56005-100-08	\$ 2,995.00
2F-2B	110/55	1.0/0.5	60	56005-100-09	\$ 2,995.00
4F-4B	110/55	1.0/0.5	60	56005-100-01	\$ 3,295.00
4F-4B	110/55	2.0/1.0	100	56005-100-20	\$ 3,583.00
2F-2B	110	5	60	56005-100-18	\$ 2,995.00
2F-2B	110	5	50	56005-100-21	\$ 2,995.00

# > Plugboard Kits & Contact Groups (Types B1, B2 & Microchron Relays)

## Ordering Information for Plugboard Kits

Description	Ordering #	Price
<b>Type B1 Plugboard Kit</b> , for all Type B, Size 1 Relays, includes insulators; solder terminals; relay mounting studs with nuts and washers; plugboard; test post; mounting bolts, nuts and washers. Does not include registration plates or voltage post.	59686-005-01	\$ 99.00
PLUGBOARD KIT, Same as above except has #16-20. AWG crimp type terminals	59686-005-05	\$ 196.00
PLUGBOARD KIT, Same as above except has #10-14. AWG crimp type terminals	59686-005-04	\$ 299.00
PLUGBOARD KIT, Same as above except without terminals	59686-005-08	\$ 98.00
<b>Type B2 Plugboard Kit - (Except Vane and Microchron)</b> , for all Type B, Size 2 Relays except B2 Vane and Microchron Timer includes insulators; solder terminals; relay mounting studs with nuts and washers; plugboard, test post, mounting bolts, nuts and washers. Does not include registration plates, voltage post, or terminal block.	59686-007-01	\$ 120.00
PLUGBOARD KIT, Same as above except has #16-20. AWG crimp type terminals	59686-007-06	\$ 299.00
PLUGBOARD KIT, Same as above except without terminals	59686-007-10	\$ 149.00
<b>Plugboard Kit for Vane Relay</b> , for all Type B2 Vane, includes insulators; solder terminals; relay mounting studs with nuts and washers; plugboard, test post, mounting bolts, nuts and washers. Does not include registration plates, voltage post, or terminal block	59686-007-02	\$ 199.00
PLUGBOARD KIT, Same as above except has #16-20, AWG crimp type terminals	59686-007-07	\$ 259.00
PLUGBOARD KIT, Same as above except has #10-14. AWG crimp type terminals	59686-007-05	\$ 261.00
<b>Plugboard Kit for Microchron Relay</b> , for all Microchron Timer, includes insulators; solder terminals; relay mounting studs with nuts and washers; plugboard, test post, mounting bolts, nuts and washers. Does not include registration plates, voltage post, or terminal block	59686-007-12	\$ 189.00
Terminal Block (2 Post), to mount on back of plugboards	46048-053-01	\$ 150.00

## Ordering Information for Contact Groups

Combination	Front Contacts	Back Contacts	Ordering #	Price
2FB	AgC to S (MD)	S to S (MD)	56012-108-06	\$ 199.00
2FB	AgC to S (HD)	S to S (HD)	56012-108-09	\$ 199.00
2FB(*)	SCdO to SCdO (HD)	SCdO to SCdO (HD)	56012-108-40	\$ 199.00
2F-1B	AgC to S (MD)	S to S (MD)	56012-108-02	\$ 199.00
2F-1B	AgC to S (HD)	S to S (HD)	56012-108-03	\$ 199.00
1F-2B	AgC to S (MD)	S to S (MD)	56012-108-05	\$ 232.00
2FB	AgC to S (HD)	S to AgC (HD)	56012-108-07	\$ 199.00
2F-1B	AgC to S (HD)	S to AgC (HD)	56012-108-04	\$ 199.00

**Legend**

AgC to S= Silver-Impregnated Carbon to Silver  
 HD = Heavy-Duty  
 MD = Medium Duty  
 EHD = Extra Heavy-Duty, with magnetic blowouts  
 SCdO = Silver Cadmium Oxide

Note (\*): Minimum current rating is 0.300 amps for reliable contact operation.  
 Note (\*\*): Specify drawing number of relay on which contact group will be used so magnets can be magnetized and assembled correctly.

# > Commonly Used Parts (Tools & Kits)

## Commonly Used Parts

Description	Ordering #	Price
VOLTAGE TEST POST COMPLETE, includes screw, nuts, washers and eyelet, for opening coil circuit	42788-001-02	\$ 18.00
CURRENT TEST POST COMPLETE, includes screw, nuts, washers and connector, for opening coil circuit	42788-001-01	\$ 35.00
TERMINAL, solder type, two required per insulator	55871-019-00	\$ 5.00
TERMINAL, crimp type for #16 - 20 AWG wire, two required per insulator	55871-074-00	\$ 5.00
TERMINAL, crimp type for #10 - 14 AWG wire, two required per insulator	55871-098-00	\$ 5.00
INSULATOR, for holding terminal in position on plugboard	55862-024-00	\$ 5.00
NUT, knurled, for holding relay to plugboard	00846-029-00	\$ 5.00
STUD	48813-006-00	\$ 6.00
Nut, for locking nut	01472-008-00	\$ 5.00
Nut, .250" -28 hex., elastic stop	42333-065-00	\$ 5.00
Terminal Block Complete	46048-053-01	\$150.00
Washer, internal tooth lock .164" ID, .340" OD, .023" THK	53029-068-00	\$ 5.00
Sleeve, rubber, insulating	35189-033-00	\$ 5.00

## Commonly Used Tools and Kits

Description	Ordering #	Price
Extractor, for plugboard terminal (*)	59688-000-00	\$99.00
B Relay Terminal Hand Crimp Tool, for AWG. 10-20 Wire (*)	24745-148-00	\$3,403.00
B Relay Contact Burnishing Tool (**)	55411-003-00	\$232.00
Spanner Nut Wrench for B Relay 3E Post (*)	55393-003-01	\$75.00

Note (\*): Signal Maintainer Tool

Note (\*\*): Shop Tool



**ONLINE NOW!**  
Relays is NOW part of the NEW  
On-line Spare Parts Catalog.