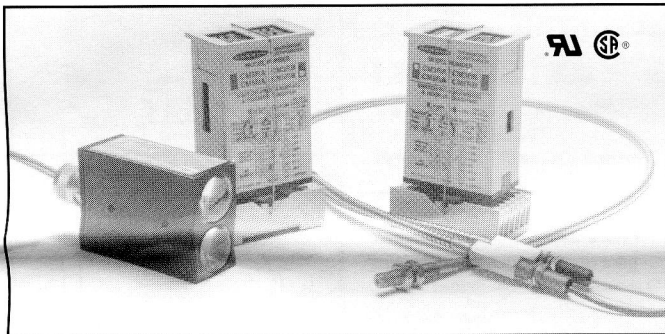


MAXI-AMP™ CM Series

Modulated Amplifier Modules



CM Series MAXI-AMPS combine power supply, modulated photoelectric amplifier, timing logic (in CM5 models) and output relay in a single compact, cost-saving module. CM Series modules work together with the popular family of Banner high-performance modulated remote sensors (pages 3-4). These sensors offer small size and excellent optical performance, and are built to operate in highly demanding sensing environments. MAXI-AMP modules themselves are also ruggedly built for dependable industrial duty.

CM Series MAXI-AMP modules contain the state-of-the-art Banner custom-designed CMOS modulator/demodulator/amplifier circuit, offering high immunity to both ambient light and electrical interference plus reliable sensor performance. All models have Banner's *exclusive*, patented Alignment Indicating Device ("AID™") system*, which lights an LED indicator whenever the sensor sees a "light" condition, and pulses the LED at a rate proportional to the received light signal strength.

All CM Series modules are programmable for LIGHT or DARK operate and either high or low hysteresis. Input response time may be set at 0.3, 2, or 10 milliseconds. The 10-millisecond response mode offers enhanced immunity to electrical interference ("noise"), and also minimizes

MODEL	SUPPLY VOLTAGE	OUTPUT	LOGIC
CM3RA	105 to 130V ac, or 12 to 28V dc	SPDT electro-mechanical relay, plus NPN transistor solid-state DC switch	ON/OFF
CM3RB	210 to 250V ac, or 12 to 28V dc		
CM5RA	105 to 130V ac, or 12 to 28V dc	SPDT electro-mechanical relay (5 amp contact rating)	12 timing functions
CM5RB	210 to 250V ac, or 12 to 28V dc		

optical "crosstalk" between adjacent sensors. Unlike other amplifier designs, input response time settings of the CM Series modules do *not* affect sensor range.

CM5 models include a versatile multi-function timing logic circuit which is programmable for 12 of the most popular and useful delay, one-shot, and latch functions (see page 7). Each timing function has a choice of three time ranges. Timing and sensitivity adjustments are accomplished via rugged 15-turn potentiometers for very accurate settings. CM Series circuitry is designed to prevent false outputs on system power-up.

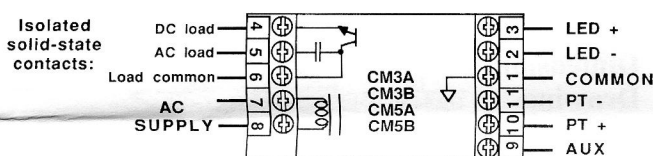
An auxiliary input is available on CM5 models for interrogation or reset of the selected logic function (see example, page 5). Page 7 describes the function of the auxiliary input for each logic mode. A dc power supply is included for powering an additional self-contained dc sensor.

The output circuit for *all* CM Series modules is an SPDT 5-amp electro-mechanical relay. *Additionally, CM3 models have an NPN transistor solid-state switch.* The output may be programmed for either normally open or normally closed operation. A solid-state relay is offered as an option to the electromechanical relay (see below).

*US patent number 4356393

Solid-state Output Option

CM Series modules are available with a solid-state relay which replaces the electromechanical relay. This is actually two SPST solid-state contacts. One contact will switch ac loads. The contact is rated at 250V ac maximum and 3/4 amps maximum at 25 degrees C (derated to 1/2 amp at 50 degrees C). The other solid-state contact will switch dc loads of up to 30V dc and up to 50 milliamps. Both contacts are isolated from the MAXI-AMP power supply.



MODEL	SUPPLY VOLTAGE	OUTPUT	LOGIC
CM3A	105 to 130V ac, or 12 to 28V dc	SPST solid-state contact for switching AC loads up to 250 V ac and up to 3/4 amp, plus solid-state contact for switching DC loads up to 30V dc and up to 50mA.	ON/OFF
CM3B	210 to 250V ac, or 12 to 28V dc		
CM5A	105 to 130V ac, or 12 to 28V dc		12 timing functions
CM5B	210 to 250V ac, or 12 to 28V dc		



WARNING These photoelectric sensing devices do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can result in *either* an energized or a de-energized output condition. Never use these products as sensing devices for personnel protection. Their use as safety devices may create an unsafe condition which could lead to serious injury or death.

Only MACHINE-GUARD and PERIMETER-GUARD Systems, and other systems so designated, are designed to meet OSHA and ANSI machine safety standards for point-of-operation guarding devices. No other Banner sensors or controls are designed to meet these standards, and they must NOT be used as sensing devices for personnel protection.

MAXI-AMP CM Series Specifications

SUPPLY VOLTAGE: Models CM3(R)A, CM5(R)A: 105 to 130V ac, 50/60Hz (4 VA), or 12 to 28V dc* at 70mA.

Models CM3(R)B, CM5(R)B: 210 to 250V ac, 50/60Hz (4 VA), or 12 to 28V dc* at 70mA.

*NOTE: do not connect ac power if using external dc power.

OUTPUT CONFIGURATION:

Models CM3A, CM3B, CM5A, CM5B have an SPST solid-state relay for switching ac or dc (see page 1).

Models CM3RA, CM3RB, CM5RA, CM5RB have an SPDT electromechanical (e/m) relay with the following ratings:

CONTACT RATING: 250V ac max, 24V dc max, 5 amps max. (resistive load), 1/10 H.P. at 240V ac. Install transient suppressor (MOV) across contacts which switch inductive loads.

CONTACT RESPONSE: 10 milliseconds max. open/close;

20 operations/second max.

MECHANICAL LIFE: 20,000,000 operations

CM3 models also have a logic level current sinking NPN transistor switch at pin #9. See schematic (right) and hookup info.

AMPLIFIER:

RESPONSE SPEED: programmable for 10, 2, or 0.3 milliseconds. NOTE: use 10 millisecond setting whenever possible for enhanced noise rejection.

HYSTERESIS: if programmed "HIGH", approximately 20%; if programmed "LOW", approximately 5%. NOTE: see cautions for "LOW" setting, page 6.

MODULATION FREQUENCY: approximately 10kHz.

SENSOR LEAD LENGTH: 50 feet (15 m) maximum. Use separate shielded cable for emitter and receiver, or order sensors with extended cable length. NOTE: see splicing precautions, page 5.

MULTIPLE SENSOR HOOKUP: Up to three sensors may be wired together to one CM Series amplifier for "OR" operation (in LIGHT operate) or "NAND" operation (in DARK operate). Emitters are connected in series, and receivers are connected in parallel. When wiring two sensors to one MAXI-AMP, multiply excess gain data for each sensor by 1/2 (obtain data from applicable excess gain curve). When wiring three sensors to one MAXI-AMP, multiply excess gain by 1/3.

TIMERS (CM5 models only):

TIMING RANGES: LOW range - 10 to 150 milliseconds

MIDDLE range - 0.1 to 1.5 seconds

HIGH range - 1 to 15 seconds

REPEATABILITY: +/-2% of set time over all extremes of supply voltage and temperature

ADJUSTMENTS: Miniature switches for programming of LIGHT/DARK operate, amplifier response time, amplifier hysteresis, normally open or normally closed output, and timing function (CM5 models). 15-turn clutched potentiometer for gain and time setting(s) (CM5 models).

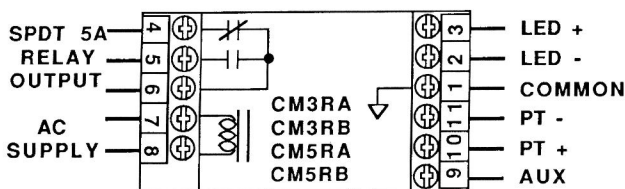
OPERATING TEMPERATURE: 0 to 50°C (32 to 122°F).

INDICATOR LEDs: Red indicator LED is "ON" when the module output is energized. Exclusive Banner Alignment Indicating Device (AID™) system lights a red LED indicator whenever the receiver "sees" its own modulated light source, and pulses it at a rate which is proportional to the strength of the received light signal.

CONSTRUCTION: Rugged NORYL® polyphenylene oxide (PPO®) housing, 1.6" x 2.3" x 4". Standard round-pin 11-pole plug base.

Generalized Hookup:

models with electromechanical relay output

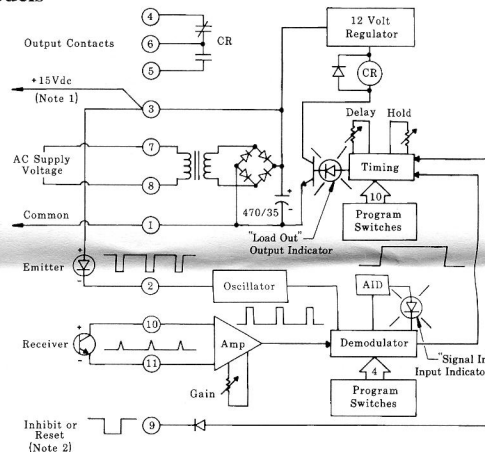


NOTE: If MAXI-AMP is powered by a dc power supply, connect +12 to 28V dc @ ≥70mA to terminal #3 and dc common to terminal #1.

Make no connections to terminal #7 or #8.

Functional Schematics

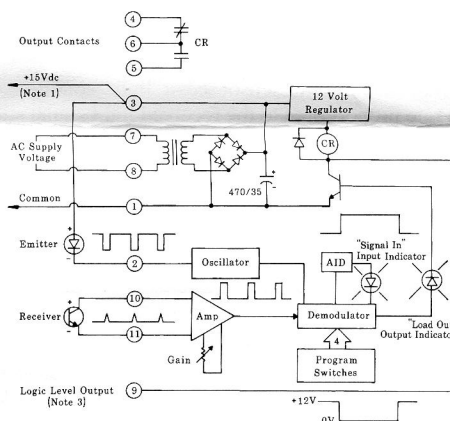
CM5 Models



NOTE #1: power is available at pins #3 (+) and #1 (-) for an external 10 to 30V dc device (see hookup example, page 17). Current available is 40 mA at 120V ac (240V ac) line level; 30mA at 105V ac (210V ac) line level. Alternately, the module may be powered by 12 to 28V dc at pins #3 (+) and #1 (-). Do not connect ac voltage if using external dc power.

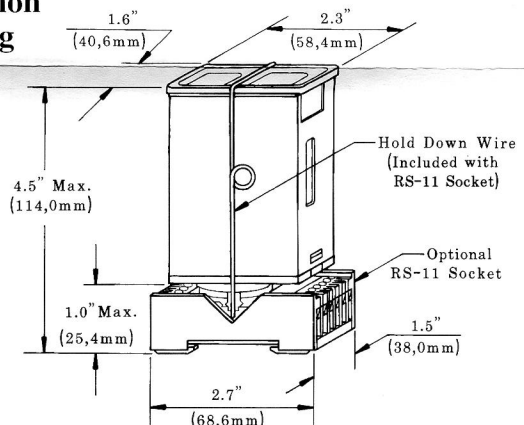
NOTE #2: pulling pin #9 low (to common) will inhibit the timing, or reset the latch of CM5 models (see "Description of Logic Functions", page 7).

CM3 Models



NOTE #3: pin #9 of CM3 models may be connected directly to the AUXILIARY input of a MAXI-AMP module. It may also serve as the input to Banner CL Series MAXI-AMPs or to Banner Plug Logic modules (see hookup example, page 5).

Dimension Drawing



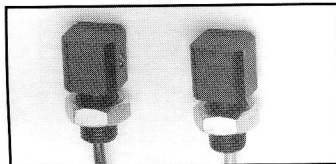
Sensors for use with CM Series Modulated Amplifiers

Models/Dimensions

Excess Gain

Beam Pattern

OPPOSED Mode



ALL MODELS:

Range: 8 feet (2.4m)

Beam: infrared, 880nm

Effective Beam: .14 in. (3.6mm) dia.

LR200 & PT200

Size: .63 in. (16.0 mm) square, right-angle design

Temp. range: -40 to +100 degrees C

LR250 & PT250

Size: .25 in. (6.4 mm) diameter; smooth barrel 1 in. (25 mm) long

Temp. range: -40 to +100 degrees C

LR300 & PT300

Size: .30 in. (7.6 mm) wide x .54 in. (13.7 mm) deep; right-angle design

Temp. range: -40 to +80 degrees C

LR400 & PT400

Size: .38 (9.7 mm) diameter, threaded barrel 1.6 in. (41 mm) long

Temp. range: -40 to +100 degrees C

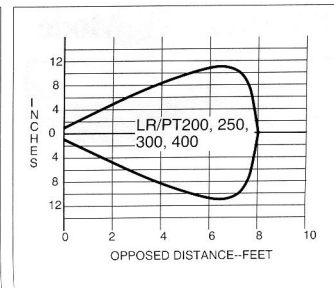
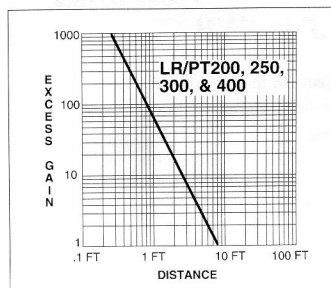
SP300EL & SP300RL

Size: .50in. (13 mm) wide x 1.9 in. (48 mm) high x 1.25 in. (32 mm) deep; right-angle design

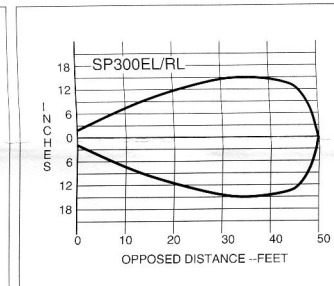
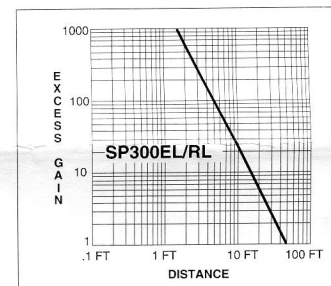
Range: 50 feet (15m)

Effective Beam: .5 inch (13mm) dia.

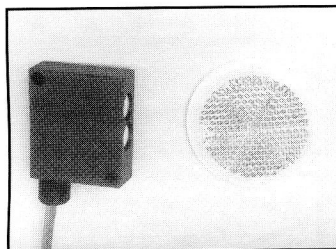
Temp. range: -40 to +100 degrees C



LR/PT200, 250, 300, and 400 opposed mode remote sensors are identical electronically and optically, and differ only in their physical packages. All are encapsulated and use hermetically sealed glass lenses to eliminate condensation inside the optical chamber. Models 200 and 300 are right-angle designs, and are most commonly used on small conveyors where it is desirable to run the cables directly down to a wireway. Models 250 and 400 are in-line tubular designs. The 250 is a smooth barrel, typically held in place in a 1/4-inch diameter hole with a small setscrew. The 3/8-32 threaded barrel of the 400s allows for a number of mounting methods. The 400s accept models L4 and L16 lens assemblies for extended range and AP-400 apertures assemblies for small-object detection or precise position sensing. The LR400 emitter is available in visible LED variations. Models SP300EL and RL are very rugged and totally encapsulated in aluminum housings. They should be used for their long range or high excess gain, or in multiple-receiver arrays where a narrow beam angle is required.



RETROREFLECTIVE Mode

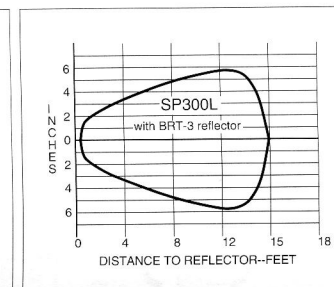
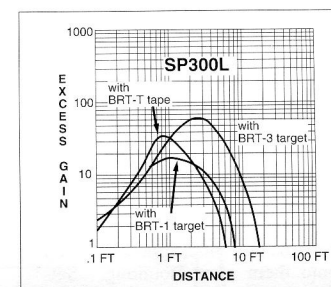


SP300L

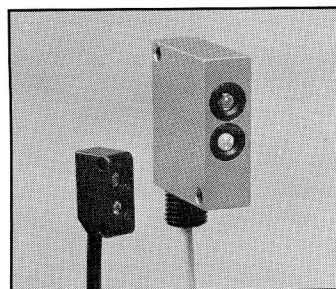
Size: .50in. (13 mm) wide x 1.9 in. (48 mm) high x 1.25 in. (32 mm) deep; right-angle design

Range: 15 feet (4.5m) with BRT-3 retroreflector

Temp. range: -40 to +80 degrees C



DIFFUSE Mode



SP300D

Size: .50in. (13 mm) wide x 1.9 in. (48 mm) high x 1.25 in. (32 mm) deep; right-angle design

Range: 12 inches (30 cm) retroreflector

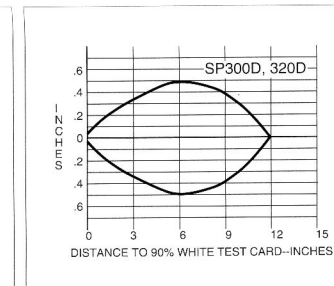
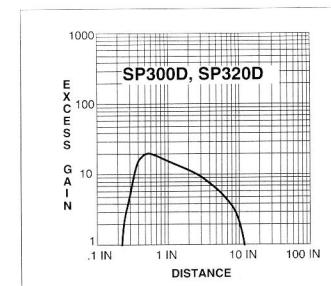
Temp. range: -40 to +80 degrees C

SP320D

Size: .32 in. (8.1 mm) wide x .80 in. (20.3 mm) high x .49 in. (12.4 mm) deep; right-angle design

Range: 12 inches (30 cm)

Temp. range: -40 to +80 degrees C



The SP300D and SP320D are identical except for housings. The 320 has a miniature plastic housing; the 300 has the same rugged housing as the SP300L. Both are ideal for presence sensing and are highly resistant to washdown, steam, vibration, and shock.

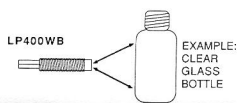
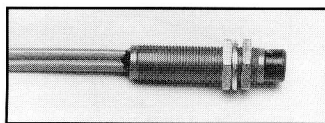
Sensors for use with CM Series Modulated Amplifiers

Models/Dimensions

Excess Gain

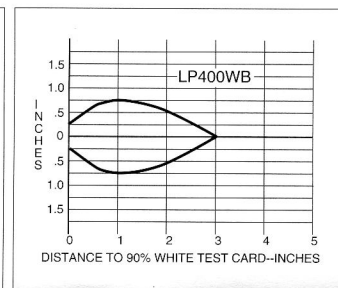
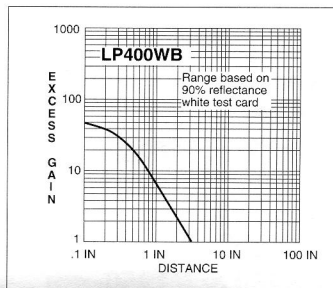
Beam Pattern

DIVERGENT Mode LP400WB

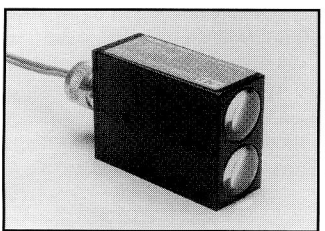


Size: .38 in. (9.7 mm) diameter, threaded barrel; 1.5 in. (38 mm) long
Range: 3 inches (76mm)
Temp. range: -40 to +80 degrees C
Housing material: blue anodized aluminum

The LP400WB (Wide Beam) is an infrared divergent mode (wide angle diffuse mode) sensor which is particularly forgiving for reflectively sensing transparent or translucent materials or for sensing objects with irregular surfaces (e.g. webs with "flutter"). The optics are such that even small threads or wires .005"

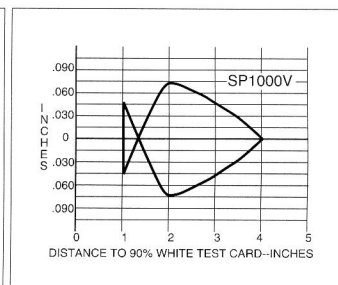
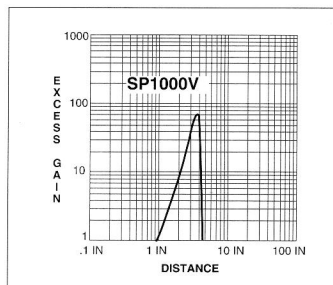


CONVERGENT Mode SP1000V



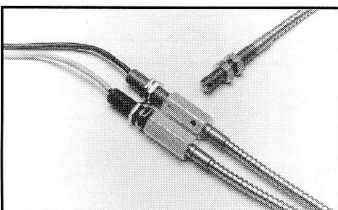
Size: 1.25 in. (31.8 mm) wide x 2.25 in. (57.2 mm) high x 4.2 in. (107 mm) long
Range: focus at 3.8 inches (96mm)
Temp. range: -40 to +80 degrees C
Housing material: black anodized aluminum

The SP1000V is a convergent mode sensor that produces a very small 0.1 inch (2.5mm) diameter sensing image at a point exactly 3.8 inches (96mm) from its glass lenses. As the excess gain curve illustrates, the SP1000V has a very sharp drop-off of gain beyond the focus point. This feature makes



it an excellent choice for detecting a small part which is only a fraction of an inch in front of another surface, such as parts on a conveyor (viewed from above). It is also ideal for fill level detection and for precise positioning control, in lieu of opposed sensing.

FIBER OPTIC Mode



LR400 & PT400 with FOF-400 fittings and fiber optics

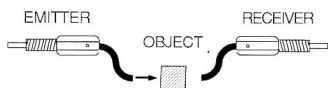
Range: see excess gain curves
Temp. range: -40 to +100 degrees C

The threaded barrel design of the LR400 and PT400 permit the connection of any Banner glass fiber optic assembly by using two model FOF-400 fittings. The sensors are typically mounted through 3/8 inch (10mm) diameter clearance holes, with the FOF-400 fittings threaded onto them after mounting. Set-screws in the fittings lock the fibers in place, but allow rapid replacement without disturbing any electrical wiring.

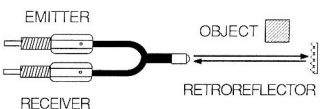
The Banner product catalog details the wide selection of standard and custom glass fiber optic assemblies.

Banner plastic fiber optics may be used with the MAXI-AMP by substituting emitter model LR400VH, which employs a high-intensity visible red LED light source suitable for efficient transmission through plastic fiber optic cable.

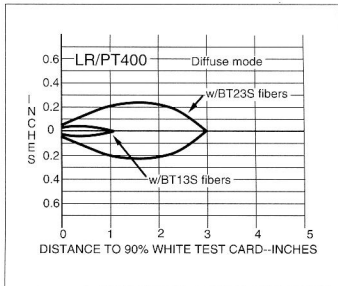
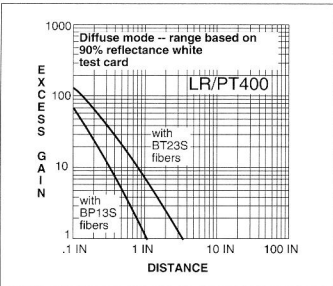
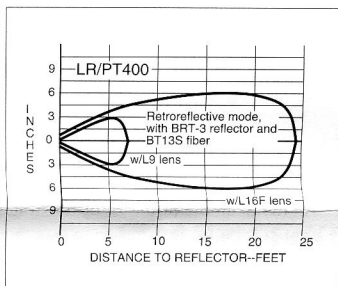
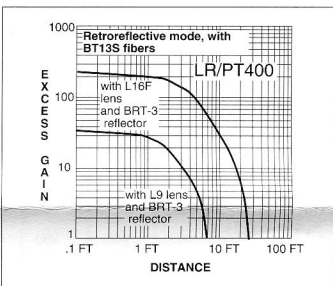
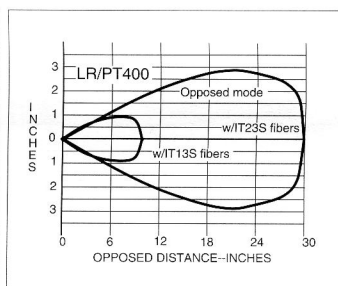
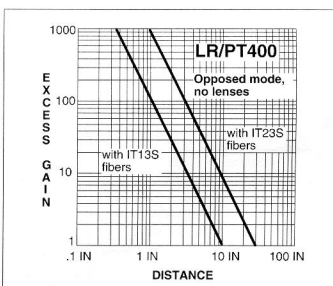
OPPOSED MODE



RETROREFLECTIVE MODE



DIFFUSE MODE



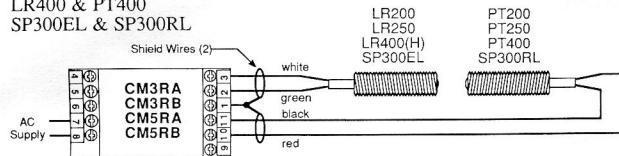
Sensor Hookup Diagrams for CM Series MAXI-AMP Modules

Hookup of LR/PT200, 250, 300, and 400

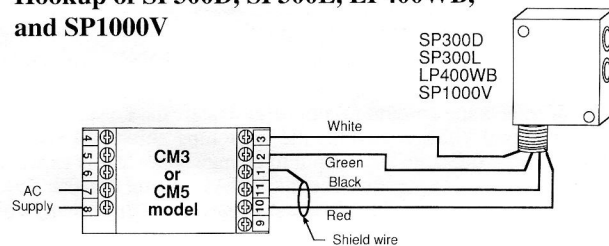
TO SENSOR PAIR MODELS:

LR200 & PT200
LR250 & PT250
LR400 & PT400
SP300EL & SP300RL

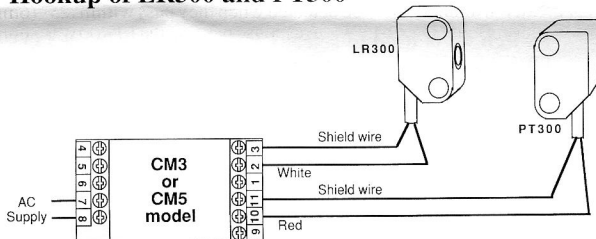
NOTE: both shield wires must be connected to COMMON (terminal #1) to avoid cable crosstalk.



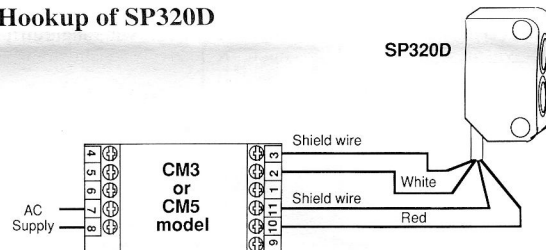
Hookup of SP300D, SP300L, LP400WB, and SP1000V



Hookup of LR300 and PT300



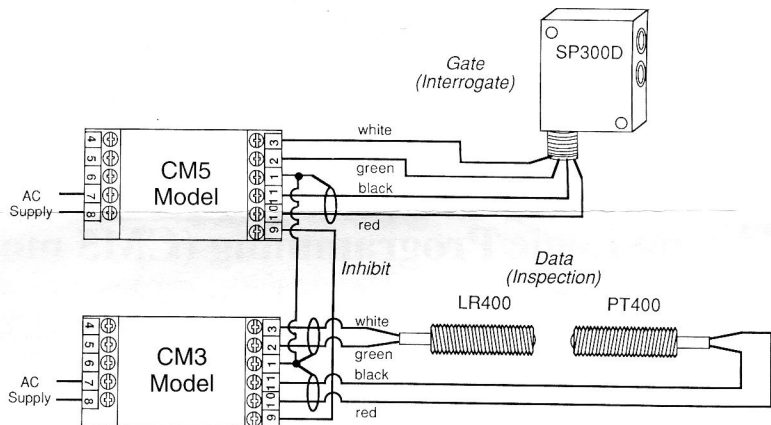
Hookup of SP320D



Logic Level NPN Output (CM3 models)

The AUXILIARY terminal (#9) of CM3 models offers a logic-level NPN (current sinking) output which may be used as a fast-response solid-state inhibit signal to the AUXILIARY input of MAXI-AMP CM5 modules. This output may also serve as an input to any Plug Logic, MAXI-AMP CL Series, or MICRO-AMP logic module. In addition, this output may interface to other dc devices or circuits like counters, rate meters, or programmable logic controllers. Switching capacity is 20mA at 12V dc.

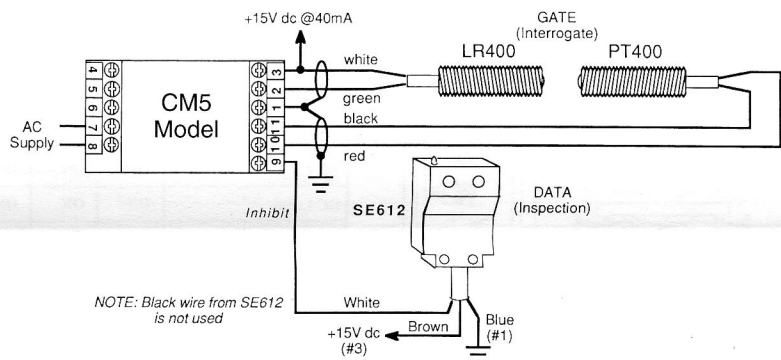
The example here shows the use of LR & PT400 sensors and a CM3 module to provide inspection information, with the SP300D functioning as a product sensor. Typically, the CM5 module would be programmed for the ONE-SHOT or DELAYED ONE-SHOT logic function. If the LR & PT400 "sees" an acceptable condition when the SP300D senses the leading (or trailing) edge of a product, the CM3 will inhibit a reject pulse from occurring.



Power for External Devices

External 10 to 30V dc devices such as self-contained sensors may be connected between terminals #3 (+) and #1 (-) of any CM Series MAXI-AMP module. Terminal #3 offers 40mA maximum. This is sufficient to power most Banner self-contained dc sensors.

As the example at the right illustrates, the current sinking output of a self-contained sensor powered by the MAXI-AMP may be used as the input to the AUXILIARY terminal of a CM5 module.



NOTE REGARDING CABLE SPLICING:

When splicing additional cable length to modulated remote sensors, it is important to use a separate shielded cable for emitter and receiver wires. Combining emitter and receiver wires together in the same cable (even if the cable is shielded) will result in direct coupling of the emitter signal to the receiver leads. This is called "cable crosstalk",

and will not allow full amplifier sensitivity setting without an amplifier "lock on" situation, which appears as a continuous LIGHT condition. Banner offers extension cable for remote sensors which, if used for cable splicing, will minimize the chances for cable crosstalk.

MAXI-AMP CM Series

Amplifier Programming (all models)

Amplifier response conditions may be programmed via the group of four switches located on one of the narrow sides of the MAXI-AMP module.

Switch #1 selects the amount of amplifier hysteresis. Hysteresis is the amount of signal change beyond the switching threshold which is required to cause the amplifier output to change state, and is expressed as a percent of amplifier gain. The NORMAL setting of 20% should *always* be used, except for low contrast situations such as many color registration applications.

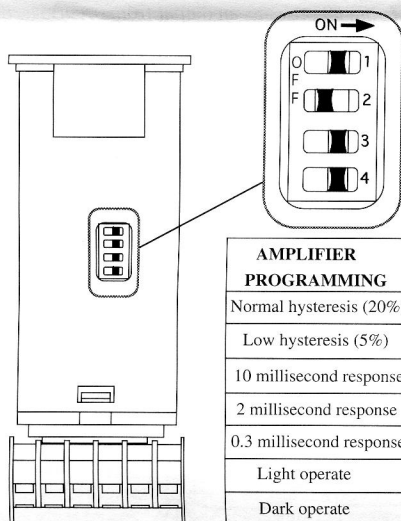
NOTE: the LOW hysteresis setting should be used only when all sensing conditions remain stable. "Buzzing" of the output (in ON/OFF and LIMIT operation) or false outputs (in DELAY, ONE-SHOT, or LATCH operation) may occur if sensing variables (e.g.-web flutter) result in optical contrast approaching unity.

Switches #2 and #3 are used to program the amplifier response time. The 10 millisecond setting should be used whenever possible for the greatest immunity to electrical interference ("noise"). The 2 millisecond setting has more interference rejection than the 0.3 millisecond mode. Sensor performance (excess gain) is identical in all three response settings.

Switch #4 is used to select LIGHT OPERATE or DARK OPERATE. In the LIGHT OPERATE mode, the output will energize (in ON/OFF or LATCH operation) or the timing function will initiate (in DELAY, ONE-SHOT, or LIMIT operation) when the receiver "sees" sufficient light (excess gain greater than 1X). In DARK OPERATE, the output will energize or timing will begin when the receiver is sufficiently dark (excess gain less than 1X).

The diagram at the left shows the location of switches 1-4, and the table summarizes the settings required for each response condition.

NOTE: an adhesive-backed mylar label is supplied, which may be marked to indicate switch programming and then applied to the MAXI-AMP housing as a switch cover.

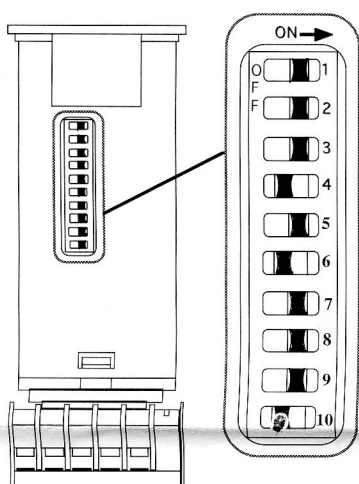


Factory settings shown at left. "Underlined" settings in table below are factory settings.

AMPLIFIER PROGRAMMING	SWITCH #1	SWITCH #2	SWITCH #3	SWITCH #4
Normal hysteresis (20%)	<u>ON</u>	—	—	—
Low hysteresis (5%)	OFF	—	—	—
10 millisecond response	—	<u>OFF</u>	<u>ON</u>	—
2 millisecond response	—	ON	ON	—
0.3 millisecond response	—	ON	OFF	—
Light operate	—	—	—	<u>ON</u>
Dark operate	—	—	—	OFF

Timing Logic Programming (CM5 models)

Settings illustrated below are factory settings. Factory settings are "underlined" in the table.



TIMING LOGIC PROGRAMMING	SWITCH #1	SWITCH #2	SWITCH #3	SWITCH #4	SWITCH #5	SWITCH #6	SWITCH #7	SWITCH #8	SWITCH #9	SWITCH #10
On/Off	<u>ON</u>	<u>ON</u>	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>	<u>ON</u>	—	—	—
On Delay	ON	ON	OFF	OFF	ON	OFF	ON	—	—	—
Off Delay	ON	OFF	ON	OFF	ON	OFF	ON	—	—	—
On and Off Delay	ON	OFF	OFF	OFF	ON	OFF	ON	—	—	—
One-shot	OFF	OFF	ON	OFF	ON	OFF	ON	—	—	—
Delayed One-shot	OFF	OFF	OFF	OFF	ON	OFF	OFF	—	—	—
Limit	ON	ON	OFF	OFF	OFF	OFF	ON	—	—	—
Repeat Cycle	ON	OFF	OFF	ON	ON	OFF	ON	—	—	—
AC Latch	OFF	ON	ON	OFF	ON	ON	ON	—	—	—
DC Latch	ON	ON	ON	OFF	ON	ON	ON	—	—	—
Delay and Latch	ON	ON	OFF	OFF	ON	ON	ON	—	—	—
Limit and Latch	ON	ON	OFF	OFF	OFF	ON	ON	—	—	—
N/C Output								OFF	—	—
N/O Output								<u>ON</u>	—	—
.15 Sec. Max. Time								—	OFF	OFF
1.5 Sec. Max. Time								—	ON	OFF
15 Sec. Max. Time								—	OFF	ON

A group of ten switches, located on the side of the module opposite the amplifier program switches, is used to select the timing logic for the CM5 models.

Switches #1 through #7 are used to select the logic function. Switch #8 programs the output for either NORMALLY OPEN or NORMALLY CLOSED operation. Switches #9 and #10 program the time range(s). There are three ranges: 10 to 150 milliseconds, 0.1 to 1.5 seconds, and 1 to 15 seconds. The programmed range will be the same for *both* functions of a dual timing mode (ON & OFF DELAY, DELAYED ONE-SHOT, and REPEAT CYCLE). However, DELAY and HOLD times are independently adjustable within the selected range.

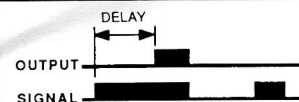
The diagram shows switch locations, and the table summarizes the program switch positions.

Description of Logic Functions, CM5 models

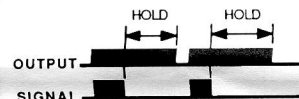
ON/OFF: ON/OFF operation does not involve timing. The output simply follows the action of the input signal. Grounding pin #9 (AUXILIARY) turns the output "off", regardless of the state of the input signal. This may be accomplished by closing a switch or relay contact between pins #9 and #1 (common), or by connecting an open collector NPN (current sinking) output of any external dc device directly to pin #9. NOTE: connect the COMMON of any external dc device to pin #1 of the MAXI-AMP to establish a voltage reference between the dc supply for the external device and the internal dc supply of the MAXI-AMP.



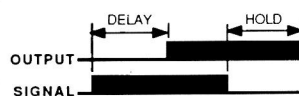
ON DELAY: The ON DELAY timer keeps the output "off" until the selected LIGHT or DARK signal has been present for the preset "DELAY" time. If the input signal is interrupted, the timing is reset and starts over with the next signal. Grounding pin #9 immediately cancels an output in progress and resets the delay timer. The delay timer is restarted when the inhibit signal is removed, if an input signal is present.



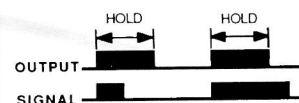
OFF DELAY: The output energizes immediately when the input signal occurs, but does not de-energize until the signal has been removed for the preset OFF-DELAY ("HOLD") time. Grounding pin #9 prevents an output from occurring. If an inhibit input occurs during an output, the output remains "on" for the remainder of the OFF-DELAY time.



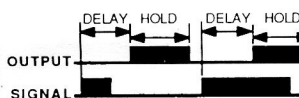
ON & OFF DELAY: ON and OFF DELAY logic combines both timing functions into a single mode. The ON-DELAY ("DELAY") time and the OFF-DELAY ("HOLD") time are independently adjustable within the selected time range. Momentary grounding of pin #9 during the ON-DELAY period resets the DELAY timer. An inhibit signal which occurs during an output will allow the output to stay energized for the remainder of the OFF-DELAY time. ON and OFF DELAY logic is often used in jam and void control, high/low level control, and edge-guiding applications.



ONE-SHOT: The output of a ONE-SHOT function is a pulse of adjustable "HOLD" duration which is independent of the duration of the input signal. With the MAXI-AMP programmed for LIGHT operate, the pulse occurs when the input signal changes from dark to light. In DARK operate, the pulse occurs with a light to dark input transition. Grounding pin #9 prevents the one-shot from triggering, but does not affect a pulse already under way.



DELAYED ONE-SHOT: A DELAYED ONE-SHOT is initiated by either a momentary or maintained input signal. This input starts the adjustable "DELAY" period, after which the output pulses for an adjustable pulse ("HOLD") time. No further action occurs unless the input is removed and reapplied, beginning a new sequence. Grounding pin #9 during the delay period will cancel the sequence, and no output occurs. This feature is often used for inspection/rejection control logic. An inhibit signal will not affect a pulse under way.



LIMIT: The output of the LIMIT function follows the action of the input, as it does with the ON/OFF function. However, an input signal which is longer than the adjustable LIMIT ("HOLD") time will turn the output "off". Removing the input signal resets the timer. This function is sometimes called "TIME LIMITED ON/OFF", and is useful for energy conservation. Grounding pin #9 cancels the output. Lifting the inhibit restarts the LIMIT timer, if an input signal is present.



REPEAT CYCLE: The REPEAT CYCLE function provides an oscillating output when an input signal is present. Presence of an input signal triggers an adjustable "DELAY" timer. After the delay, the output energizes for an adjustable "HOLD" period. If the input remains, the output continues to cycle "on" and "off" at this rate indefinitely. When the signal is removed, any output in progress completes and then remains "off" until the next signal and DELAY period. Grounding pin #9 cancels the sequence, but will allow the completion of a "HOLD" period in progress. Lifting the inhibit signal begins the DELAY period, if an input signal is present.



AC LATCH: An AC LATCH is the combination of a ONE-SHOT and a LATCH. A momentary or sustained input will latch the output "on". Grounding pin #9 will reset the latch, even if the input signal remains. The output will not re-latch until the input signal is removed and then reapplied.



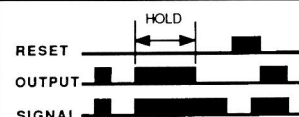
DC LATCH: The output will latch "on" whenever the selected LIGHT or DARK input condition occurs. Grounding pin #9 of a dc latch will turn the output "off" regardless of the state of the input signal. If the signal is present when the reset is removed, the output will immediately latch "on" again.



DELAY AND LATCH: The DELAY + LATCH is a combination of the ON-DELAY and DC LATCH functions. An input must be present for at least the adjustable "DELAY" time for the output to latch "on". If the input signal is removed during the timing cycle, the timing is reset. Momentary grounding of pin #9 resets the latch and/or the DELAY timing cycle. Sustained grounding of pin #9 inhibits any output.



LIMIT AND LATCH: The LIMIT + LATCH operates exactly like the LIMIT function, except that the LIMIT ("HOLD") timer can be reset *only* by the auxiliary input. An output remains latched "off" until reset by momentarily grounding pin #9. In addition to resetting the timer, grounding pin #9 will hold the output "off", regardless of the state of the input signal.



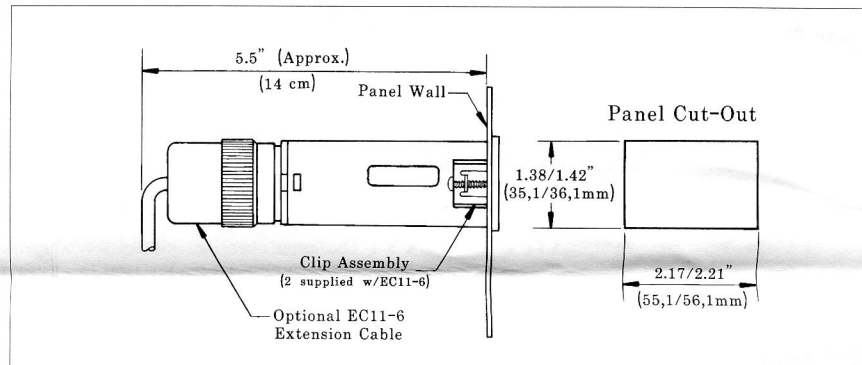
MAXI-AMP System

Mounting and Accessories

Panel Wall Mounting of MAXI-AMP Module

After the panel cutout has been completed and deburred, slide the MAXI-AMP through the cutout and place one clip assembly into the rectangular depression on each of the two narrow sides of the housing. Orient clips as shown, and alternately tighten the screws for equal pressure against the inside of the panel wall. Do not overtighten the screws. Attach the optional EC11-6 extension cable (described below) to the MAXI-AMP and route the opposite end of the cable to the RS-11 (or equivalent) socket.

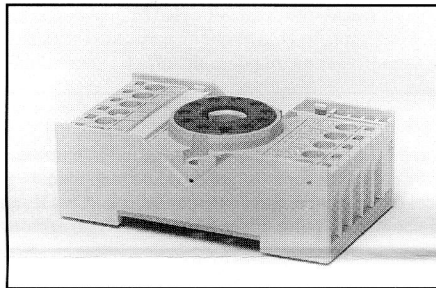
Model EC11-6 extension cable is 6 feet (2m) long. Clips for panel wall mounting of the MAXI-AMP are included with the cable.



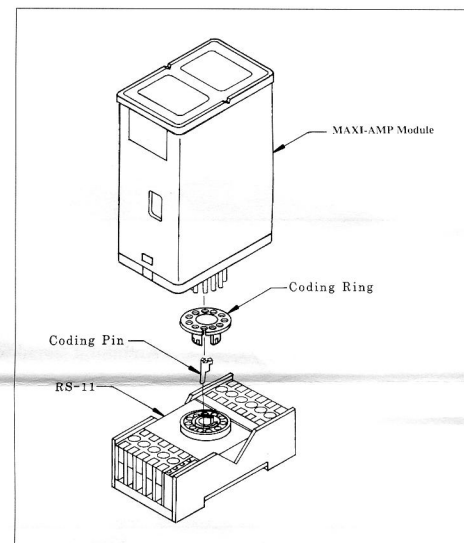
Accessories for MAXI-AMP Modules

Model RS-11 Socket

Model RS-11 is an eleven-pole round-pin screw terminal relay socket which is used to make electrical connections to any MAXI-AMP module. The socket provides in-line wire clamp screw terminals which will accept from one #24 AWG up to two #14 wires at each pin. The RS-11 is UL recognized (file #E92191) and CSA approved (file #LR38486). It may be mounted directly to a panel plate or via standard 35mm DIN-rail track (see below). A hold-down wire is supplied with each RS-11 socket (see dimension diagram on page 2).

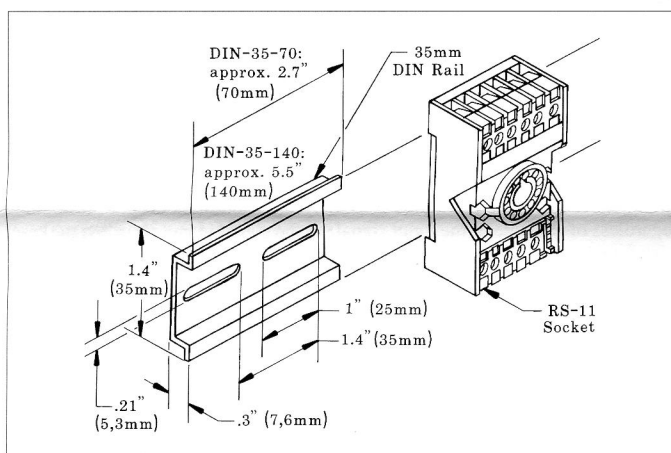


The RS-11 is supplied with a coding ring and pin (see diagram at right). This allows a MAXI-AMP to be keyed to fit only its own 11-pin socket. The pin is installed in one of the eleven slots in the RS-11, and the notch in the ring is aligned to slip over the pin. When the MAXI-AMP is removed from the RS-11, the coding ring stays with the MAXI-AMP base, while the coding pin remains in the socket.



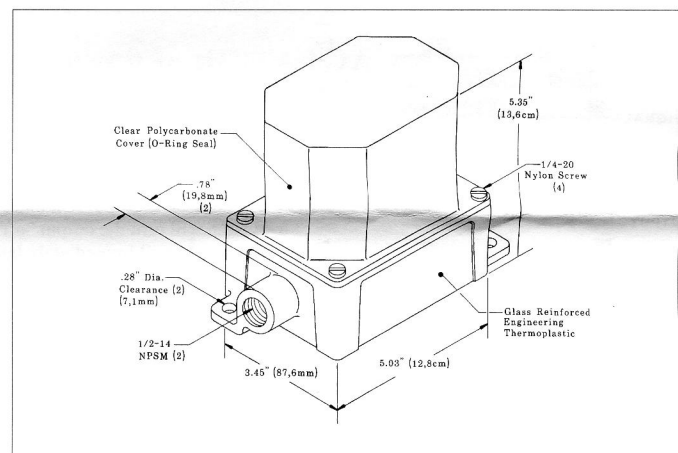
35mm DIN Rail Track

Track model DIN-35-70 accommodates one RS-11 socket. Model DIN-35-105 holds two sockets. Model DIN-35-140 holds up to three sockets. The RS-11 socket is designed to snap (or slide) directly into the 35mm DIN track.



Model BENC-4 Enclosure

Model BENC-4 is a NEMA-4 rated corrosion-resistant enclosure for a MAXI-AMP module or other control device. It is supplied with a DIN-35-70 track for easy mounting of one RS-11 socket. For mounting two sockets, use DIN-35-105.



WARRANTY: Banner Engineering Corporation warrants its products to be free from defects for one year. Banner Engineering Corporation will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.