

A Banner MULTI-BEAM Ambient Light Receiver is a compact modular self-contained photoelectric switch that is operated by sunlight or an incandescent, fluorescent, infrared, or laser light source. It consists of three components: a scanner block, a power block, and a logic module. The scanner block, described in this data sheet, comprises the housing for the sensor and contains the receiver optoelements and lenses, receiver circuitry, and space for the other modules.

The *power block module* provides the interface between the scanner block and the external circuit. It contains a power supply for the MULTI-BEAM plus a switching device to interface the sensor to the circuit to be controlled. 3- and 4-wire dc power block modules operate from dc voltages and are discussed in data sheet 03499. 3- and 4-wire ac power blocks operate from ac voltages and are covered in data sheet 03501. The *logic module* (data sheet 03304) interconnects the power block and receiver scanner block both electrically and mechanically. It provides the desired timing logic function (if any) plus the ability to program the output for either light- or dark-operate.

NOTE: Ambient light receiver scanner blocks will also work with 2-wire ac power blocks and logic modules (see data sheet P/N 03498). However, the light/dark operate functions will be reversed when using 2-wire operation.

Power block and logic modules are purchased separately. This modular design, with field-replaceable power block and logic module, permits a large variety of sensor configurations, resulting in exactly the right sensor for any ambient light receiver application.

The circuitry of all MULTI-BEAM components is encapsulated within rugged, corrosion-resistant VALOX<sup>®</sup> housings that meet or exceed NEMA 1, 3, 12, and 13 ratings. MULTI-BEAM ambient light receiver scanner blocks have a top-mounted red indicator LED that lights whenever a light level sufficient to cause a change in the output is being sensed.

All MULTI-BEAM scanner blocks are totally solid-state for unlimited life.

### Specifications (see also "Modifications", page 2)

**Supply Voltage:** Input power and output connections are made via a power blocks. See data sheet 03499 (DC Power Blocks) or 03501 (AC Power Blocks), or refer to the Banner product catalog.

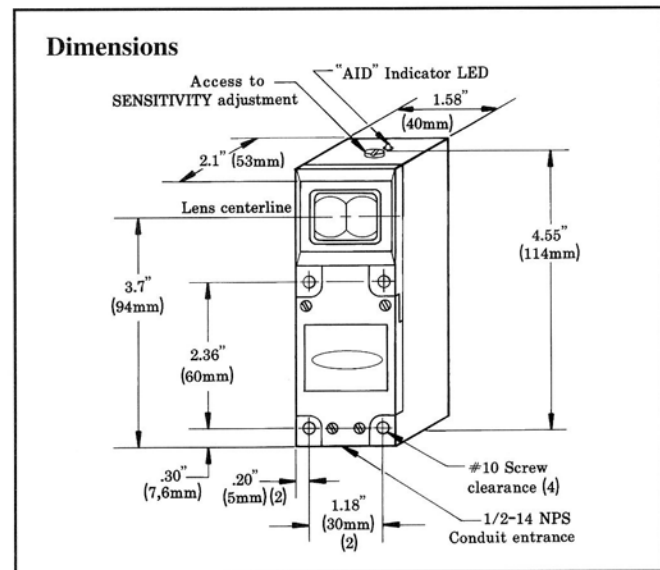
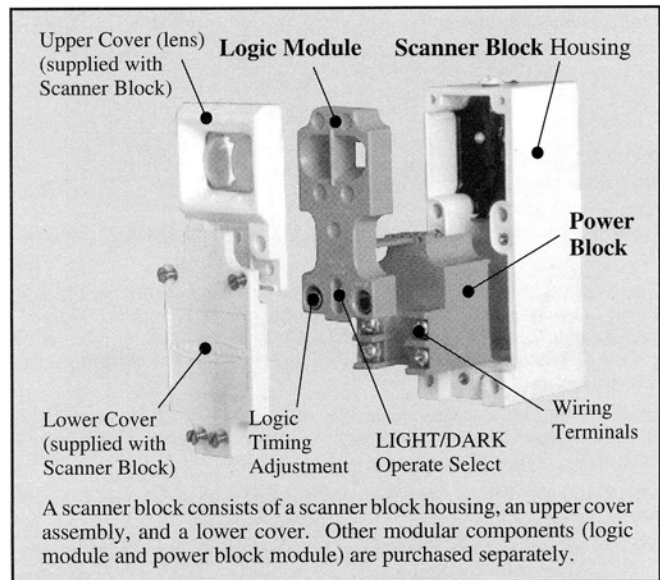
**Response Time:** 10 milliseconds "on" and "off", independent of signal strength.


**Sensitivity Adjustment:** Easily-accessible, located on top of scanner block beneath o-ring gasketed nylon screw cover. 15-turn clutched control; rotate clockwise to increase sensitivity.

**Alignment Indicator:** A red LED indicator on top of the scanner block lights when enough light is present to cause a change in the output of the scanner block. The threshold level is set by the SENSITIVITY adjustment.

**Construction:** Reinforced VALOX<sup>®</sup> housing; components totally encapsulated. Stainless steel hardware. Meets NEMA standards 1, 3, 12, and 13.

**Operating Temperature Range:** -40 to +70° C (-40 to +158° F).





**WARNING** These photoelectric sensors 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 sensor output condition.

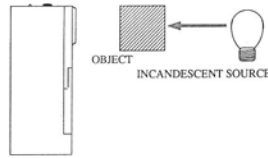
Never use these products as sensing devices for personnel protection. Their use as safety devices may create an unsafe condition which could lead to serious injury or death.

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.

## AMBIENT LIGHT RECEIVERS

### SBAR1

**Response:** 10ms on/off  
**Amplifier:** normal gain  
**Optical response:** ultra-violet through near infrared (includes all visible wavelengths)



### SBAR1GH

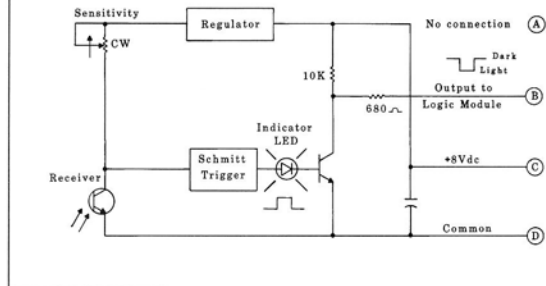
**Response:** 10ms on/off  
**Amplifier:** high gain  
**Optical response:** ultra-violet through near infrared (includes all visible wavelengths).

These scanner blocks are non-modulated receivers which are operated by sunlight or incandescent, fluorescent, infrared, or laser sources. A typical application would involve mounting the scanner block underneath a roller conveyor, "looking" up between the rollers at the overhead factory lighting. Any objects passing over the sensor would then cast a shadow, resulting in an output (dark operate). Ambient receivers are used with LM5-14 delay logic to sense daylight for outdoor lighting control. These sensors can also sense the large amounts of infrared light (heat energy) which is emitted by hot or molten glass, metal, or plastic during processing of these materials.

Model SBAR1 is for general application. Model SBAR1GH is a high gain version. It is about twenty times more sensitive to light as compared to the SBAR1. The range at which either model will sense a light source depends upon both the intensity of the light source and the contrast in intensity between the source and the rest of the ambient light in the viewing area.

NOTE: ambient receiver scanner blocks will also work with 2-wire power blocks and logic. However, the light/dark operate functions will be reversed when using 2-wire components.

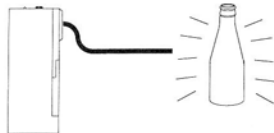
### Functional Schematic



## FIBER OPTIC AMBIENT LIGHT RECEIVER (glass fiber optics)

### SBAR1GHF

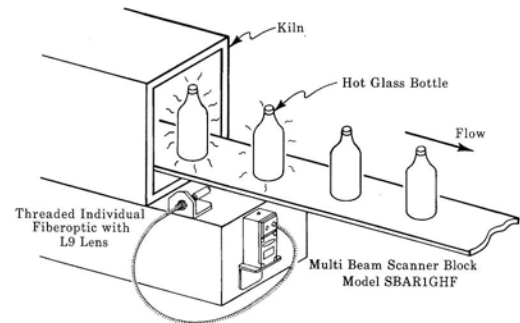
**Response:** 10ms on/off  
**Amplifier:** high gain  
**Optical response:** wavelengths from visible blue through near infrared



Model SBAR1GHF is identical to model SBAR1GH (above) except that it is equipped with an upper cover assembly (model UC-RF) which allows an individual glass fiber optic assembly to be attached to the receiver optoelement. This model is used for ambient light detection in locations which are either too confined or too hot for mounting of the complete scanner block. A typical application involves sensing product presence or counting during processing of red-hot or molten glass or metal. The addition of an L9, L16F, L16FAL, or L16FSS lens to a threaded fiber assembly (e.g. IT23S) can narrow the angle of light acceptance to less than the angle of the SBAR1 lens. The high gain amplifier of model SBAR1GHF helps to offset light losses which are experienced with fiberoptic light pipes.

NOTE: glass fibers will not efficiently pass ultraviolet wavelengths.

### Direct Sensing of Radiant Infrared Energy



Counting bottles during the manufacturing process by detecting infrared (heat) radiation with an ambient light receiver.

## Alignment of Ambient Light Receivers

Alignment of SBAR1, SBAR1GH, and SBAR1GHF receivers is basically a matter of locating and adjusting them to pick up as much as possible of the desired ambient light source while "seeing" as little as possible of other, possibly interfering, light sources.

### 1) Alignment to lamp, laser, or infrared (red-hot object) light source.

**a)** With the receiver at the position where it will be mounted, point it at the light source. If the LED indicator is not "on", increase the SENSITIVITY control (rotate clockwise) until the LED comes "on". Direct the receiver (or fiber optic sensing tip) up/down and right/left and locate the center of the zone of movement within which the LED indicator remains "on". This will be easiest to accomplish if you reduce the SENSITIVITY control (rotate counterclockwise) to a point just above the lowest setting needed to make the LED come "on". The center of the "on" zone corresponds to optimum alignment to the light source.

**b)** Remove the light source (or otherwise create a "dark" condition for the receiver). Turn the SENSITIVITY control clockwise until the LED comes "on", then reduce it two or more full turns (counterclockwise) past

the point where the LED goes "off". If the LED never comes "on", set the SENSITIVITY control at the maximum clockwise position.

**c)** Alternately present the "light" and "dark" conditions to the receiver. The indicator LED should be "on" in the "light" condition and "off" in the "dark" condition.

**d)** Secure all mounting hardware. Connect the load to the output (terminals #3 and/or #4 of the power block). Check the operation of the load by alternately presenting the "light" and "dark" conditions to the receiver. The action of the load should "follow" the receiver output.

### 2) Alignment to sunlight.

**a)** Point the receiver to the north, if possible (or to the south in the southern hemisphere), or otherwise angle the receiver so that it will not "see" the sun directly at any time.

**b)** Adjust the SENSITIVITY control at dawn or dusk (follow steps 1B through 1D).

**c)** For best results, use the model LM5-14 logic module. Set both DELAY settings to the maximum clockwise position.