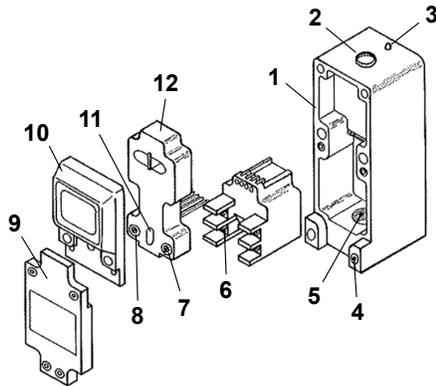


## Datasheet

The MULTI-BEAM<sup>®</sup> Optical Data Transmitter System provides a simple and very economical method for transmitting logic-level data over a modulated LED light beam. It is ideal for communication with overhead cranes and other rail-mounted control systems. It is also often used to carry data to or from rotary index tables, and in such applications replaces mechanical brush contacts.



1. Scanner block housing
2. Access to sensitivity adjustment (R1T3 model only)
3. Alignment indicator LED (R1T3 model only)
4. Mounting hole
5. Conduit entrance
6. Wiring terminals on the power block
7. Not on this model
8. Not on this model
9. Lower cover, supplied with the scanner block
10. Upper cover (lens), supplied with the scanner block
11. Light/dark operate selection
12. Logic module (R1T3 model only)



### WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

## Overview

The data emitter model **EM3T-1M** includes the following standard MULTI-BEAM components:

- Emitter scanner block **SBEM3**
- DC power block model **PBT-1M**

Emitter assembly model **EM3T-1M** uses a modulated infrared LED that is gated on and off by the data signal via an optical coupler in the power block. The light is inhibited (turned off) when current is applied to the optical coupler.

The data receiver model **R1T3** includes the following standard MULTI-BEAM components:

- Scanner block **SBR1**
- Power block **PBT**
- On/off logic model **LM3**

The output is an open-collector NPN transistor that follows the action of the data stream. Use the LIGHT/DARK operate jumper on the logic module to program the output so that a logic 1 is represented by the presence or absence of the light signal from the emitter.

A PNP (current sourcing) output is available by substituting power block model **PBP** or by ordering assembled receiver model **R1P3**. See the specifications and wiring diagrams for 3- and 4-wire DC power blocks (datasheet [03499](#)) for more information.

Data may be transmitted over a distance of up to 200 feet (60 m) in a clean environment (see excess gain curve). The data rate (BAUD rate) is limited by the modulation frequency (30 kHz) and by the receiver response. The **R1T3** receiver responds to a change in data state (light or dark) of 1 millisecond or longer, resulting in a theoretical maximum data rate (assuming a square wave) of 500 BAUD. This suggests a maximum practical data rate of 300 BAUD. The receiver scanner block may be modified for 300 microsecond (3 times faster) response. Contact the factory for further information.

The MULTI-BEAM Optical Data Transmitter System is also used in conjunction with the Banner model **MP-8** Multiplexer Module for multiple sensor arrays used for profile measurement and "curtain of light" applications. See datasheet [03421](#) for more information.

## Install and Align the Optical Transmitter System

Reliable operation of the MULTI-BEAM Optical Data Transmitter System requires the maintenance of alignment between the transmitter and receiver units. The **SMBLS** 3-axis mounting bracket is recommended for ease and reliability of alignment.

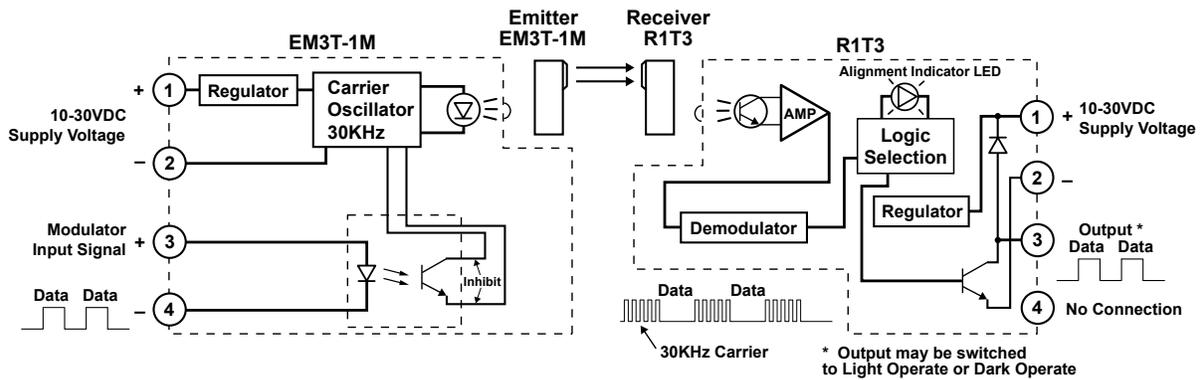
1. Wire the components
  - a) System power: Power the sensors with 10-30 V DC at terminals #1 and #2 of each power block, observing polarity. Total current requirement is 130 mA per sensor pair, exclusive of load.



- b) Emitter gate input: Install a suitable series resistor to limit current to 10-30 mA. Observe polarity when connecting the gating signal.
  - c) Receiver output: The output of the receiver at terminal #3 can sink up to 250 mA at 10-30 V DC. If a current sourcing output is required, substitute power block model PBP, or assembled receiver model R1P3.
2. Mount the emitter in place.
  3. Apply power to both units.
  4. Align the units to each other as best you can by eye.
  5. While holding the receiver and watching its alignment indicator LED, move the receiver up-down and left-right, including angular position, to locate the center of the beam.  
The center of the beam corresponds to the strongest received signal level (fastest receiver LED indicator pulse rate).
  6. If the sensing area is large, reduce the sensitivity of the receiver (remove the white nylon screw and turn the control counterclockwise) to shrink the area.  
Note that this is a 15-turn control. If the emitter-receiver distance will change during use, perform the alignment at the greatest expected separation distance. Mount the receiver securely in the center of the beam, and increase the SENSITIVITY control to maximum (15 or more full turns fully clockwise).
  7. Final checkout: The red LED indicator on the R1T3 receiver should be on with power applied to correctly aligned units and should go off when current is applied to the modulator input (terminal #3) of the EM3T-1M transmitter. The light/dark operate selection jumper on the R1T3's logic module reverses the polarity of the receiver's data stream output.

## Wiring Diagram

Figure 1. Functional schematic and wiring diagram



## Specifications

### Supply Voltage

10 V DC to 30 V DC, 10% maximum ripple  
**EM3T-1M:** 100 mA maximum, exclusive of load  
**R1T3:** 30 mA maximum, exclusive of load

### Range

200 feet (60 m)  
 See excess gain curve

### Input Signal

The input consists of the LED portion of an optical coupler.  
 A suitable series resistor (customer supplied) must be installed to limit current to between 10 and 30 mA DC.  
 When current is applied to the LED, the 30kHz carrier is inhibited.

### Output Configuration

Open-collector NPN transistor (sinks current to negative side of supply), 250mA maximum  
 On-state voltage drop less than 1 V DC  
 Offstate leakage current less than 10 microamps.

### Response Time

1 millisecond ON and OFF  
 Maximum data rate: 300 BAUD

### Indicators

Red LED on top of R1T3 receiver  
 Banner's exclusive, patented Alignment Indicating Device (AID™) lights the LED whenever the receiver detects the light from the EM3T-1M, and pulses the LED at a rate proportional to the received light level. It will go off with current applied to the modulator input.

### Construction

Same as standard MULTI-BEAMs. Reinforced VALOX® housing with components totally encapsulated. Stainless steel hardware.

### Environmental Conditions

Meets NEMA standards 1, 3, 12, and 13  
 -40 °C to +70 °C (-40 °F to +158 °F)

## Performance Curves

Figure 2. Excess gain curve for the optical data transmitter system

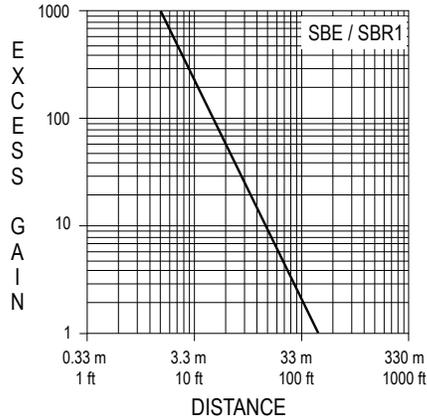
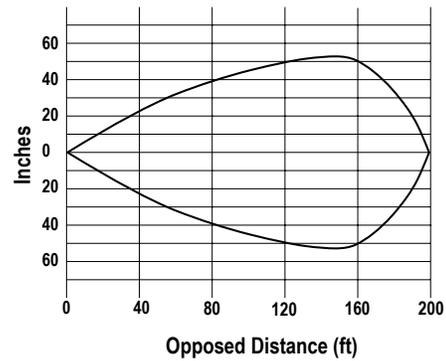
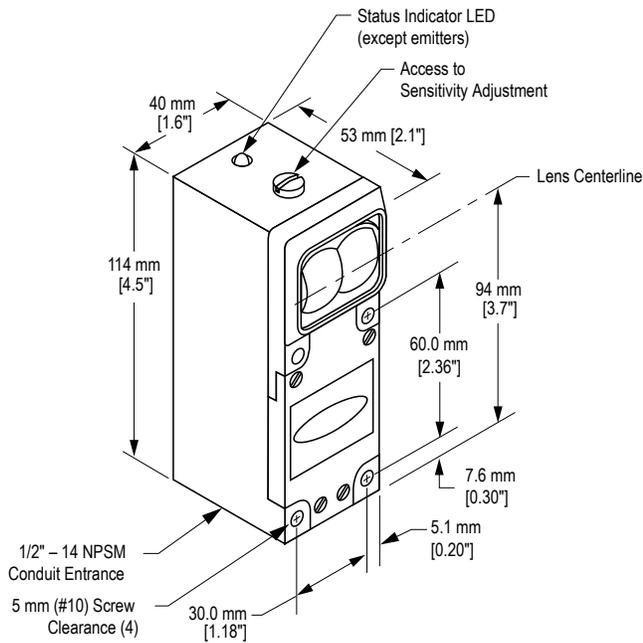


Figure 3. Beam pattern for the optical data transmitter system



## Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise.



## Accessories and Replacement Parts

The modular parts of the Optical Data Transmitter System may be ordered individually.

The **R1T3** Receiver includes the following parts:

- **SBR1** Scanner Block (includes covers)
- **UC-L** upper cover (includes lens)
- **LCMB** lower cover (includes screws)

**PBT** 10-30 V DC Power Block with sinking (NPN) output; for a sourcing (PNP) output, use power block model **PBP**

**LM3** Logic Module (light or dark operate)

The **EM3T-1M** Emitter includes the following parts:

- **SBEM3** Scanner Block; includes upper cover **UC-L** (includes lens) and lower cover **LCMB** (includes screws)
- **PBT-1M** 10-30 V DC Power Block with optically-coupled emitter gate

The logic module is not required for the emitter. The emitter scanner block connects to the emitter power block via a 4-pin connector supplied with the scanner block.

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