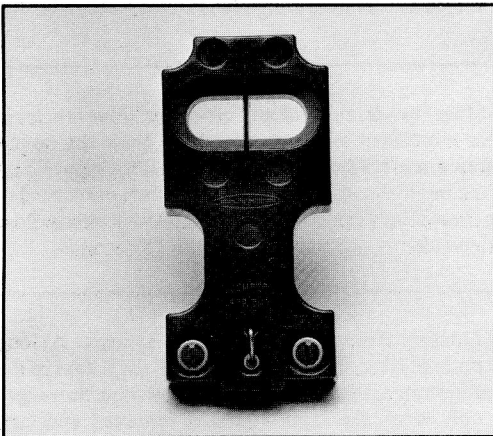


MULTI-BEAM[®] for MULTI-BEAM 2-wire modular photoelectric sensors

2-wire AC Logic Modules



The logic module interconnects the power block and scanner block of a MULTI-BEAM sensor both electrically and physically using a unique blade-and-socket connector. It also provides the LIGHT/DARK operate function and the timing functions, all of which are fully adjustable.



All MULTI-BEAM 2-wire logic modules are color-coded black, and are for use *only* in MULTI-BEAM 2-wire AC sensors. The time ranges specified below for the logic modules are standard time ranges. Other time ranges are available (see page 2 for information).

In the diagrams below, the "signal" represents the light condition (in LIGHT operate) or the dark condition (in DARK operate), and the "output" represents the energized condition of the solid-state output switch (power block). "Delay" refers to the time delay before the output operates, and "hold" refers to the time that the output remains "on" after the event has occurred.

SPECIFICATIONS, 2-WIRE LOGIC MODULES:

CONSTRUCTION: molded Valox™ housing; electronic components epoxy encapsulated. Gold plated blade connectors.

OPERATING TEMPERATURE: -40 to +70 degrees C (-40 to +158 degrees F).

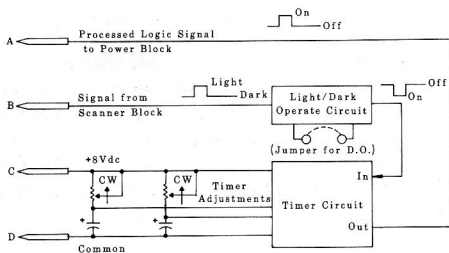
TIMING ADJUSTMENT(S): one or two single turn potentiometers with slot for blade-type screwdriver adjustment. NOTE: when turning time adjustments fully clockwise or counterclockwise, avoid excessive torque to prevent damage to potentiometers.

TIMING REPEATABILITY: plus or minus 2% of maximum range under constant power supply and temperature conditions; plus or minus 5% of maximum range under all conditions of supply voltage and temperature.

TIMING RANGE: useful range is from maximum time down to 10% of maximum (e.g. from 1 to 0.1 seconds, or from 15 to 1.5 seconds). When timing potentiometer is set fully counterclockwise, time will be approximately 1% of maximum.

RESPONSE TIME: response time will be that for the scanner block plus the power block (plus the programmed delay if the logic includes a delay function).

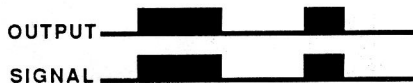
FUNCTIONAL SCHEMATIC



Model and Function

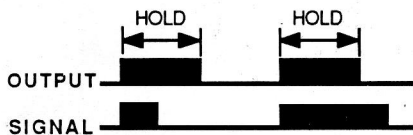
Description of Logic

2LM3 on-off



The 2LM3 is an on/off logic module that has the ability to be programmed for either LIGHT or DARK operate. It comes with a jumper wire installed: with the jumper in place, the output is DARK operated; with the jumper removed, the output is LIGHT operated. The 2LM3 is used when no timing function is desired.

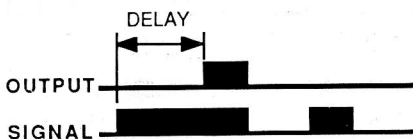
2LM4-2 one-shot



Setable time range: .1 to 1 second.

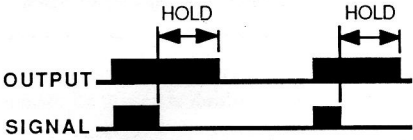
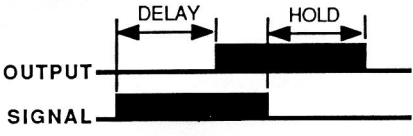
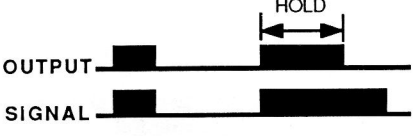
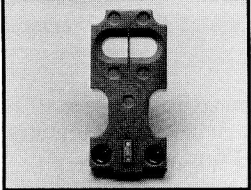
The 2LM4-2 provides a one-shot ("single shot") output pulse *each time there is a transition* from LIGHT to DARK (jumper installed) or from DARK to LIGHT (jumper removed). The output pulse time range is from .01 to 1 second. The duration of the output pulse is independent of the duration of the input signal. The timing of the 2LM4-2 is restarted each time the input signal is removed and then reapplied. This is referred to as a *retriggerable* one shot, and this feature may be applied to some rate sensing applications.

2LM5 on-delay



Setable time range: 1.5 to 15 seconds.

The 2LM5 is a true "on-delay" type logic module. The input signal must be present for a predetermined length of time before the output is energized. The output then remains energized until the input signal is removed. If the input signal is not present for the predetermined time period, no output occurs. If the input signal is removed momentarily and then reestablished, the timing function starts over again from the beginning. The standard time range is .15 to 15 seconds (field adjustable), and other ranges are available.

<i>Model and Function</i>	<i>Description of Logic</i>
<p>2LM5R off-delay</p>  <p>Setable time range: 1.5 to 15 seconds.</p>	<p>The 2LM5R is an "off-delay" logic module, similar to the 2LM5, except that timing begins on the <i>trailing</i> edge of the input signal. When the input occurs, the output is immediately energized; if the input is then removed, the output remains energized for the adjustable predetermined time period, then deenergizes. If the input is removed but then reestablished while the timing is holding the output energized, a new output cycle is begun. The LIGHT/DARK operate jumper wire option is included. Timing range is .15 to 15 seconds, and optional ranges are available.</p>
<p>2LM5-14 on & off delays</p>  <p>Setable time range: 1.5 to 15 seconds.</p>	<p>The 2LM5-14 combines the function of an "on-delay" and an "off-delay" into one logic module. When the signal is present for more than the output on-delay time, the output energizes. The off delay circuit is now active, and holds the output on even if the input signal disappears for short periods of time. If the input signal is gone for longer than the off-delay time, the output finally drops out. The time delays can control high and low levels in flow control applications. Each delay is independently adjustable for .15 to 15 seconds.</p>
<p>2LM5T limit timer</p>  <p>Setable time range: 1.5 to 15 seconds.</p>	<p>The 2LM5T "limit" timer combines the function of on-off logic and on-delay logic. As long as the signal is present for only short periods of time, the output "follows" the action of the input signal. If the input signal is present for longer than the predetermined time, the output deenergizes. The output reenergizes only when the input signal is removed and then reestablished. Interval timers are used to operate loads which must not run continuously for long periods of time, such as intermittent duty solenoids and conveyor motors. Timing range is .15 to 15 seconds.</p>
<p>LMT test logic</p> 	<p>Model LMT is a plug-in test logic module for use in troubleshooting MULTI-BEAM sensors. It contains LED indicator lights in place of the timing potentiometers and a miniature switch in place of the LIGHT/DARK operate jumper. The indicator lights display the operation of the scanner block and power block to verify proper functioning, and the switch permits manual operation of the load to verify the output switching circuit. The step-by-step testing procedure included with the LMT will allow a MULTI-BEAM to be completely tested without removing it from the installation, and if there is a faulty scanner block, power block, or logic module, the LMT will identify it.</p>

Logic Module Modifications

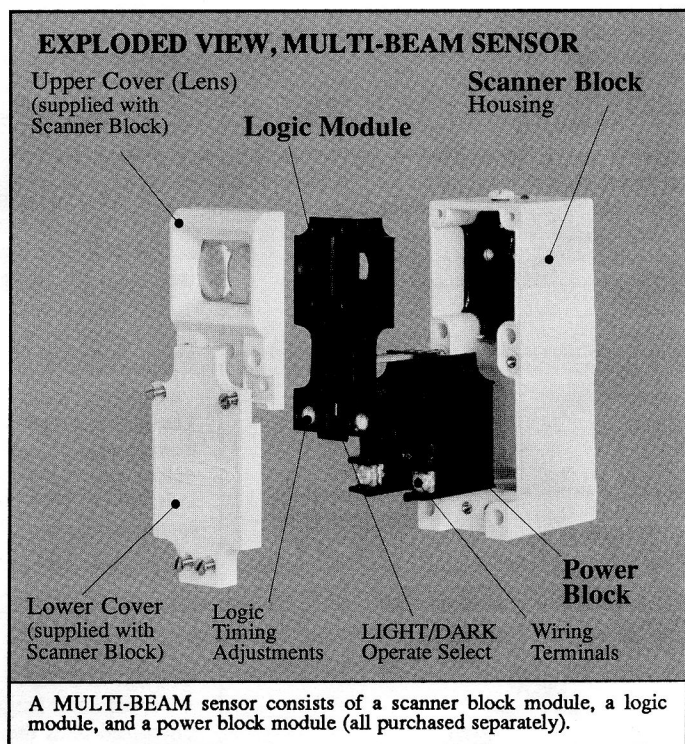
The time ranges of any MULTI-BEAM 3- & 4-wire logic module may be factory modified. Time range modification is often necessary to improve the setability of the timing function. Some time range modifications are carried in stock. The current Banner products price list is the best source of this information. Other time range modifications may be quoted. When ordering modified logic modules, add the letter "M" after the model number, followed by the maximum time desired (in seconds). The table below lists possible modifications.

MODEL NUMBER SUFFIX	SETABLE TIME RANGE
M.01	.001 to .01 seconds
M.1	.01 to .1 seconds
M.5	.05 to .5 seconds
M1	.1 to 1 second
M5	.5 to 5 seconds
M15	1.5 to 15 seconds

- For logic modules with a single timing function, specify the maximum desired time in seconds (e.g., LM5M5 indicates an LM5 on-delay with the delay time adjustable up to 5 seconds).

- For logic modules with dual timing functions, specify the maximum desired delay and hold time in seconds (e.g., LM5-14M1M5 indicates an LM5-14 on-off delay with an on-delay adjustable up to 1 second and an off-delay adjustable up to 5 seconds). Always specify *both* timing ranges, even if only one is to be modified.

- For fixed timing, the letter "F" should always be followed by the desired time, in seconds (e.g., LM5MF1 would be an LM5 on-delay with a fixed 1 second delay time). For fractions of seconds, use decimal equivalents, such as LM5MF.5, or LM5MF.01, etc.



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.