

Section T
Loop Control Processing Unit – Model LCPU
Operators Manual

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T.1 Model LCPU Loop Control Processing Unit

The SCAN-A-LINE™ Loop Control Processing Unit provides the necessary power supply voltages to support any SCAN-A-LINE™ Loop Control Sensor. The sensors, comprised of an Emitter and a Receiver with associated cables, are available with Emitters of 10, 20, 30 and 40 inch (249mm, 498mm, 747, and 996mm.) lengths, to accommodate a wide range of loop control applications. The Model LCPU is housed in a NEMA style enclosure 12 x 14 x 6.5 Inches. For detail dimensions see drawing 1295102 Rev B. Sensor connections are brought out of the enclosure with Amphenol MS style connectors. Conduit holes are provided for access to the customer connections available on barrier terminal strips inside the enclosure. Two position analogs are provided to interface with most servo amplifiers. One is 0 to 10 Volts with a 5Volt center [TB1-5], and the other is 0 to +/- 10 Volts with a 0Volt center [TB1-4]. See drawing 1493049 for terminal locations. A vertical Bar Graph Display is provided on the front panel, to display the current loop position. Normally Open relay contacts are available [TB2-5 & 6] and [TB2-7&8] for both extremes of the Bar Graph. (See drawing 1493009 Rev B for terminal locations.) These are rated at 100VA and are not designed for operation over 100 VAC. The Fail Safe circuitry monitors the scan signals from the Sensor and the power supply voltages to insure system health. 5 Amp. Rated NO [TB1-1&2] and NC [TB1-2&3] relay contacts are operated by the Fail Safe circuit. (See drawing 1493049 for terminal locations)

T.2 Model LCPU Power Requirements and Installation

The default linear power supply configuration for the Model LCPU requires a 120 VAC 50 to 60 Hz power source at a current of 1.0 Amp. The system may also be ordered with a 220 VAC linear power supply. Reasonable care should be used in selecting a reliable and stable power source for any system involved with process control operations. It is unwise to connect such a system to a power source that also operates heavy equipment, or to a source that might easily be interrupted by power outages.

The LCPU enclosure should be mounted within 50 feet (15.2 Meters) of the Loop Controller Emitter for optimum operation. Moderately longer cables may not cause any difficulty, but it is recommended that you check with Harris Instrument Engineering and special order the longer cable if it is required. As with any electronic equipment, you should avoid mounting the Model LCPU on a high vibration surface. Continuous vibration may eventually loosen hardware or cause electronic failures. Temperatures over 50 degrees Celsius (122 Degrees F.) will shorten the life of the electronics components in the LCPU.

T.3 Loop Control Sensors

SCAN-A-LINE™ Loop Control Systems use Emitters from our 10XHD-Series. These Emitters were originally used in our Weld Marker Hole Detector Systems. They offer unique properties that lend themselves nicely to Loop Control Service. They are available in 10, 20, 30 and 40 inch (249, 498, 747 and 996 mm.) operating lengths. [See Section D for dimensions.] They provide an array of high intensity, narrow beam focused Infra-Red LEDs, for long range operation and excellent ambient light rejection. The arrays are scanned in blocks of ten LEDs at a time, to further increase the IR intensity. Separation distances of over 30 feet (10 meters) can be reliably used with these Emitters when they are coupled with an appropriate receiver. Two receivers are available for use with the 10XHD-Series Emitters. The Short Range Receiver, Model 10XRA-IR1, is recommended for distances under 8 feet (2.8meters), while the Long Range Receiver, Model 10XRA-IR2, is best for applications more than 8 feet. The Long Range Receiver may experience saturation problems at closer distances. In all cases the Loop Control Receiver should be equipped with a horn blinder, HBLD Option to further improve ambient light rejection.

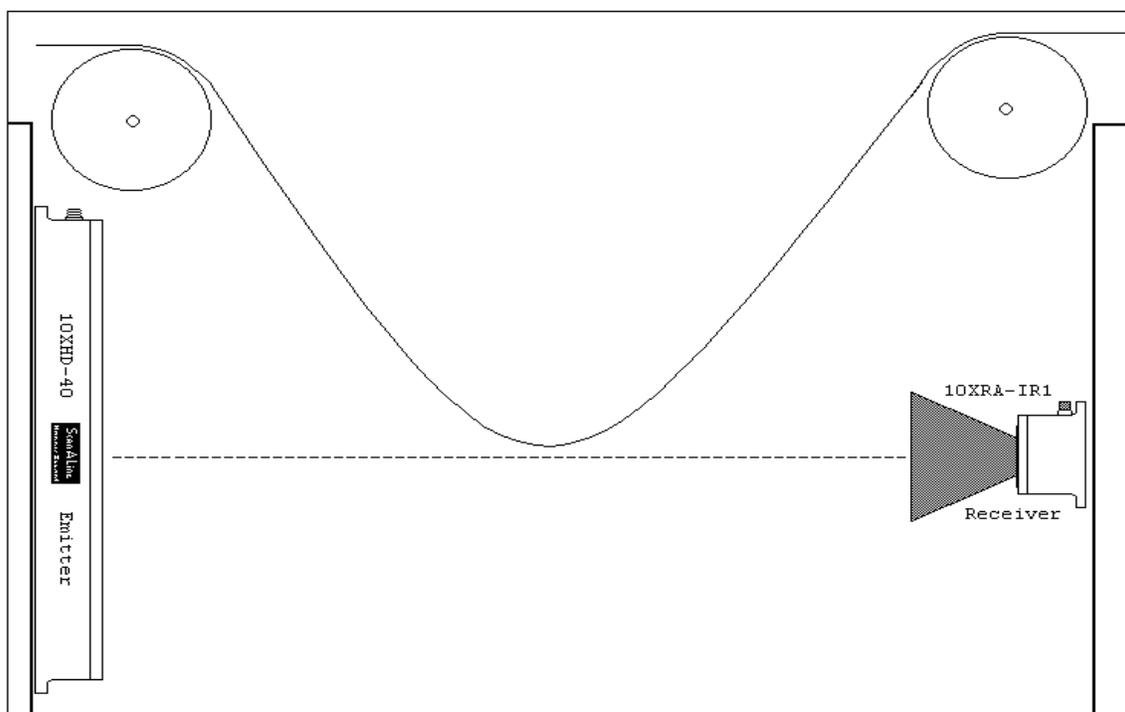
NOTE:

*Close Proximity to Strobe Lights May Interfere
With Sensor Operation. Avoid aiming the Receiver in the
Direction of any Strobe Light Source.*

Insure that the Receiver Horn Blinder is aimed properly at the 10XHD-Series Emitter. The wide plane of the Horn Blinder must be parallel to the length of the Emitter. Aim may be critical as the Receiver to Emitter distance approaches 30 feet and greater. A SCAN-A-LINE™ Model AA10X Alignment Adapter can be useful in obtaining a good alignment. This adapter can be used with a DVM or Scope to optimize the Receiver setup. Be sure to protect the Emitter and Receiver from excessive oil, dirt and vibration whenever possible.

T.4 Sensor Power Requirements, Inputs and Outputs

The 10XHD-Series Sensors require +12 Volts + or - 0.3 Volt at 250 mA. and -12 Volts + or - 0.3 Volts at 50 mA. for proper operation. These voltages are provided by the Model LCPU controller module. The Sensor delivers two signal outputs. The Sync output [TB2-2] is a 5 uSec. duration, 12 Volt CMOS level pulse, that marks the end of each scan of the LED array. The Video Pulse [TB2-3] is a 12 Volt CMOS square wave that represents the portion of the Emitter that is visible to the Receiver. (See drawing 3693049 for terminal Locations.) As more of the Emitter is blocked by the descending loop, less of the Video Pulse duty cycle will be Positive. Pulse duration depends on Emitter length and loop position. Sensor scan rates depend on the Emitter length. The 10XHD-40 scans at 500 Hz. while proportionally higher rates can be obtained with shorter sensors. The Model 10XHD-10 scans at 2000 Hz., at four times the 10XHD-40 scan rate.



Typical System Installation

T.5 System Application and Operation

Most Loop Control Systems are used to control strip loops in accumulator pits. In these applications, the Emitter and Receiver are mounted on opposite ends of the pit, and mounted on the opposite walls. The Receiver is connected to the Emitter by means of a 50 foot shielded cable with two 6 pin Amphenol MS style connectors. The Emitter is in turn connect to the LCPU with a 25 foot shielded cable that uses a pair of 7 pin Amphenol MS style connectors. For special cable lengths, check with Engineering at Harris Instrument Corp. In this configuration, the lowest position of the loop will occur about half way across the length of the pit. Because of the geometry of this situation, the Loop Control Sensor will have a dynamic measurement range of one half the length of the Emitter. Measurement and control can not be maintained over any greater range than this Emitter length divided by two. The Receiver and Emitter centerlines should be position at the target height of the strip loop. The sensitivity of the Bar Graph display can be adjusted to set off the out of range relays at any desired position within the measurement range. See drawing 1493009 Rev B for the location of the sensitivity adjustment potentiometer. A ramp and sample digital to analog converter converts the digital video pulse into a 0 to 10 volt analog output signal. An analog amplifier is used to convert this analog into a +/- 10Volt analog for use with bipolar servo amplifiers. These signals are processed on the Loop Controller Personality Module shown in drawing 1493049. A 100K gain adjustment potentiometer, pre set at the factory, is available on this board to set the span of the D/A converter to 10 volts. (See Drawing 1493049) This will need re-adjustment if you must change sensor size. The gain potentiometer can be set by covering the top ½ of the Emitter with opaque tape and adjusting the gain potentiometer until the 0 to 10 Volt analog [TB1-5] reads 5.0 Volts. No adjustment is required when replacing sensors of the same size. See drawing 1493049 for customer terminal connections.

T.6 Troubleshooting

There are four LED indicators on the inside panel of the Loop Controller Personality Module. See Drawing 1493049. If the Fail Safe Relays indicate a system failure, examine these Indicators for a first analysis of the problem. If either the -12 or +12 Indicator is not lighted, a power supply failure is indicated. This is usually the result of a short circuit in a connecting cable or connector. Try removing the Receiver cable and then the Emitter cable to isolate the short circuit. If this doesn't restore power, examine the power line fuse. (See 1489030 Rev A). Next try unplugging the cable to the Bar Graph and finally the Loop Controller Personality module 1493049 to locate the short circuit. If these measures all fail, call Harris Instrument for a return authorization.

T.7 Related Drawings

Drawing #	Description	Drawing Format
<i>1295102 Rev. B</i>	<i>Model LCPU Dimensions</i>	<i>AutoCAD LT Rel. 3</i>
<i>1489030 Rev. A</i>	<i>Model LCPU Power Supply Assembly</i>	<i>AutoCAD LT Rel. 3</i>
<i>1493009 Rev. B</i>	<i>Model LCPU BGA Option</i>	<i>AutoCAD LT Rel. 3</i>
<i>1493049</i>	<i>Model LCPU Personality Module</i>	<i>AutoCAD LT Rel. 3</i>