Installation of the Laser Positioner for Traversing Shuttles

NOTICE P1: "Remove power from the machine" means use the necessary safety procedure for your location. In the USA, this is the OSHA lockout/tagout (LOTO) procedure. More local requirements can also apply.

Milnor traversing shuttles manufactured after December 2010 are provided with a laser system to control shuttle travel along the rail (traverse) and the positions at which the shuttle stops. An older shuttle can be retrofitted with this system if it meets the following criteria:

- The system has, or is upgraded to Dryer/Shuttle controller (Drynet) software version 21010 or later and shuttle software with a matching date code.
- The shuttle has, or is upgraded to the microprocessor board with part number 08BSPE2T (2004 to current). The 08BSPE1T (circa 2000) and 08BSPET (circa 1994) will not work.
- The shuttle manual controls are housed in a stationary cabinet, not a shuttle-mounted box.

The laser positioner replaces the switches, targets, and mounting hardware previously used for this purpose. The laser positioner system uses the Banner L-Gage LT7 Laser.

1. Hardware Installation

WARNING 1 : Strike and Crush Hazards—A traveling machine such as a shuttle can strike, crush, or entrap you if you ride on it or enter its path. Traveling machines or their components can move automatically in any direction. Placing a system machine on line by energizing the machine control may immediately summon a shuttle or other traveling machine.

- Except where specified in this instruction, remove power from the machine to work in or near the shuttle path.

The laser beam must be parallel with the axis of shuttle travel. Typically the laser and target are mounted approximately 7 feet (1.8 meters) above the floor and and horizontally centered on the shuttle frame, but this can be modified to suit the individual circumstances. The beam must be unobstructed at all times. Locate the hardware with respect to the shuttle as follows:

> **Stationary laser support post**—in proximity to the stationary shuttle control cabinet.
> **Reflector**—on the shuttle frame. Detailed mounting instructions follow.

Install the hardware as shown in the figures below. It is necessary to install the laser on the support post but not anchor the post until the laser is aligned with the target.

CAUTION 2 : Risk of Costly Damage—Until the laser support post is anchored, it can fall if it or the cable is hit by an object such as a fork lift. This will likely destroy the laser.

- Use care to keep clear of the post except to intentionally reposition it during alignment.
- Route the cable away from any interference and secure it.
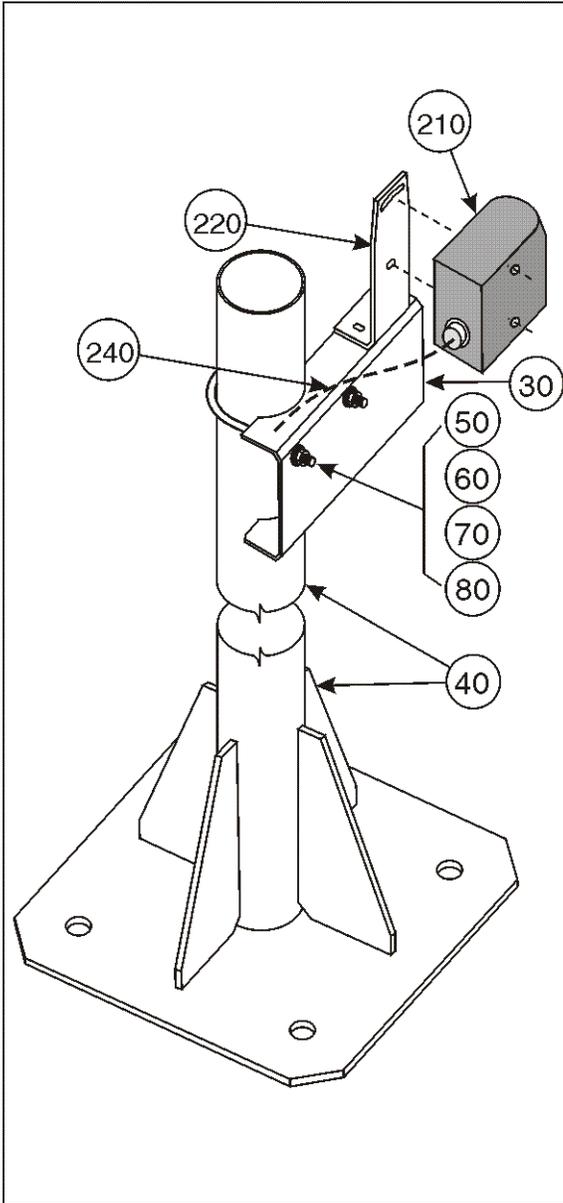
Figure 1: Laser to Post

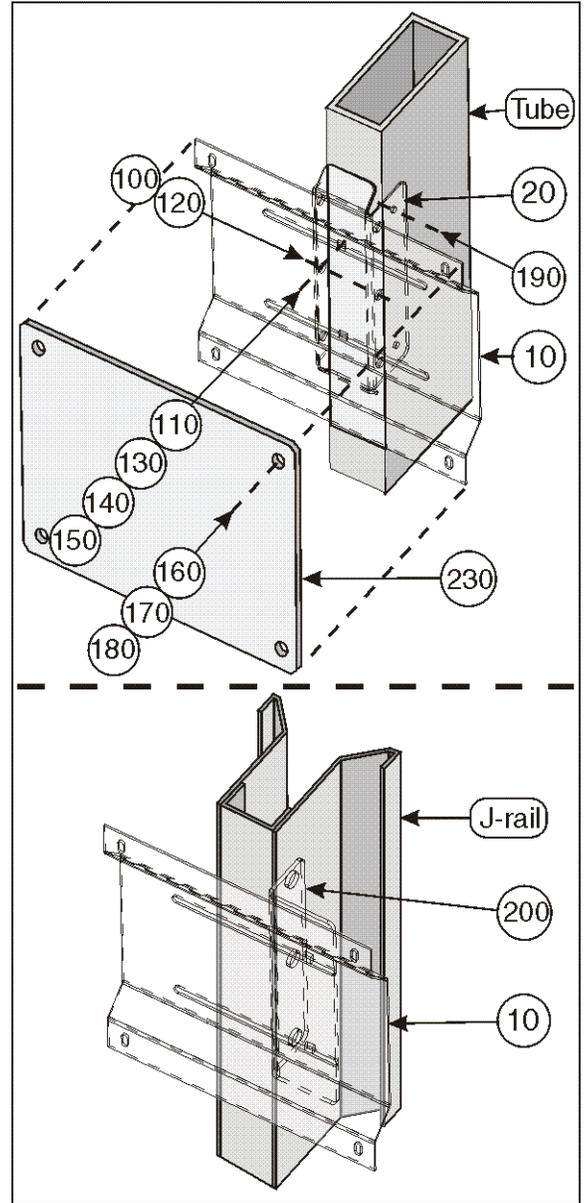**Figure 2: Reflector to Shuttle (Tube or J-rail frame)**

Table 1: Parts List for Figure 1 and Figure 2

Used In	Item	Part Number	Description/Nomenclature	Comments
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.			
Assemblies			
all	A	ALC420223	All mounting hardware except laser manufacturer components.	
Components			
A	10	04 24176	LASER TARGET FRAME	
A	20	04 24177	LASER TARGET TUBE RAIL MTG	Use with tubing type vertical frame member.
A	30	04 24146	LASER MTG CHANNEL	
A	40	W4 24180	LASER MOUNTING POST WLMT	
A	50	27A035C	U-BOLT 3/8-16X5.36 #0127316	
A	60	15U246	FLATWASHER 1"ODX25/64IDX1/8"30	
A	70	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
A	80	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
A	100	15A002A	CARBOLT 1/4-20UNC2X3/4 ZINC GR	
A	110	15K046	HXCAPSCR 1/4-20 UNC2A X 2"GR5	
A	120	17N058	HEXRIVNUT 1/4-20 UNC-2B #2520-	
A	130	15U185	FLATWASHER(USS STD) 1/4" ZNC P	
A	140	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
A	150	15G178	1/4"-20 HEXFLANGE NUT ZINC	
A	160	15N125	RDMACSCR 10-24UNC2AX1/2 ZC GR2	
A	170	15U135	FLATWASH#10 .4370DX.203IDX.04T	
A	180	15G126SZ	HXLOCKNUT 10-24 UNC STL/ZNC	
A	190	15P011	TRDCUT-F PANHD 10-24X1/2 NIKST	
A	200	04 24178	LASER TARGET J-RAIL MTG	Use with J-rail vertical frame member.
all	210	09RLE0001	Banner L-Gage LT7 Laser and mounting bracket	
all	220	09RLE0001B	Mounting Bracket and included fasteners	
all	230	09RLE0001R	50 meter Retro Reflector	
all	240	09RLE0001C	Multi-conductor cable and connector—30 foot (7.6 meters) length	
	Tube	--	A type of frame used on certain shuttles	
	J-rail	--	A type of frame used on certain shuttles	

2. Electrical Connections

The electrical cable provided with this system has a pre-wired connector on one end that attaches to the laser. Shuttles manufactured after February 2011 have the control box end of the cable pre-wired also. The cable is secured to the control box. If the shuttle was not provided with the cable pre-wired, make connections as explained below. **Do not connect the cable to the laser until the wiring in the electric cabinet is completed.**

1. Determine the best route for the cable. Ensure that:

    • objects cannot strike the cable,

   • there is sufficient slack on each end to reach the connection points.

2. Route the cable and secure the center portion to protect against accidental movement. If not pre-wired, route the cable into the shuttle processor box through the hole in the box shown in Figure 3.

3. Set jumper J1 on the shuttle processor board to the GPX position as shown in Figure 4.
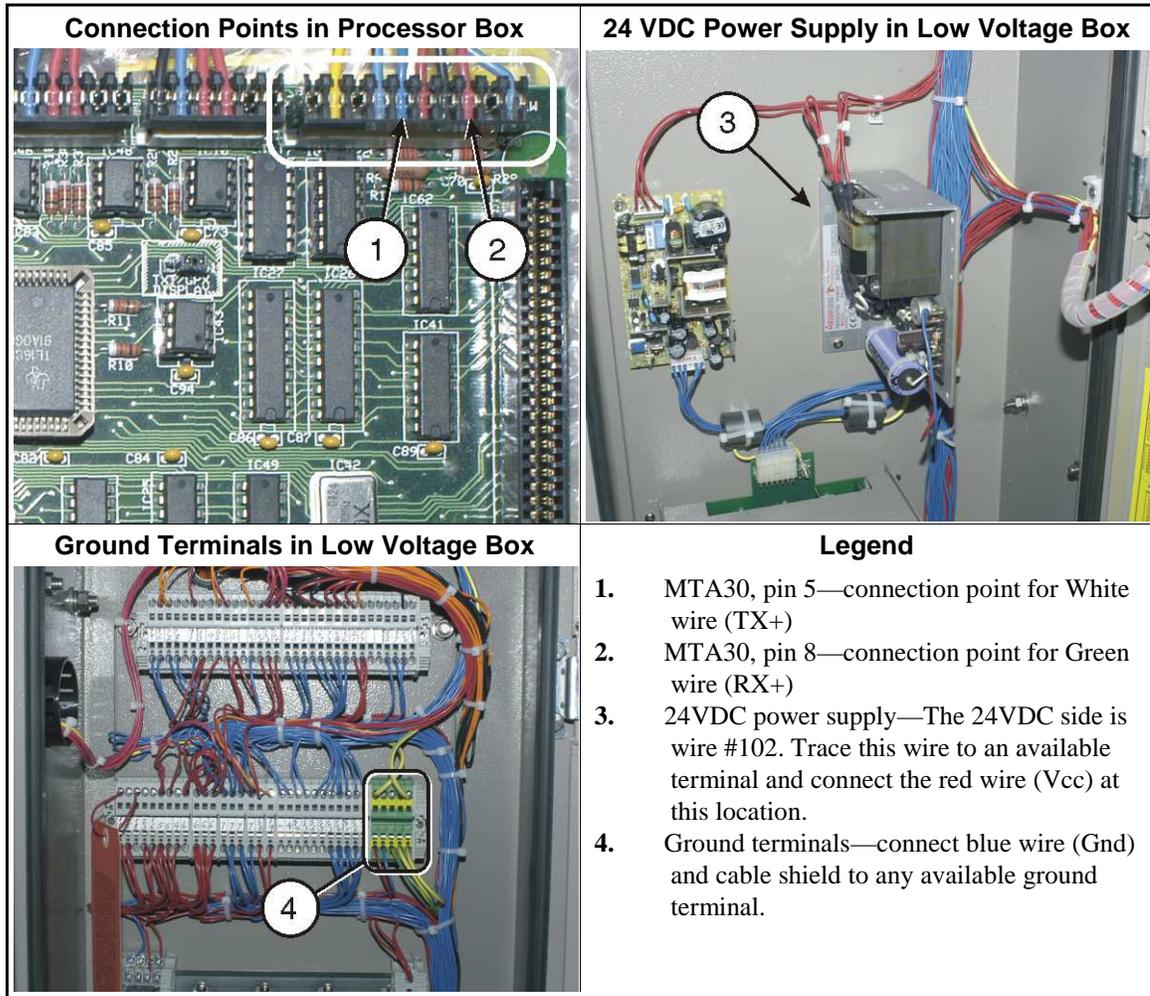
Figure 3: Hole in Shuttle Processor Box for Cable

Figure 4: Jumper Position
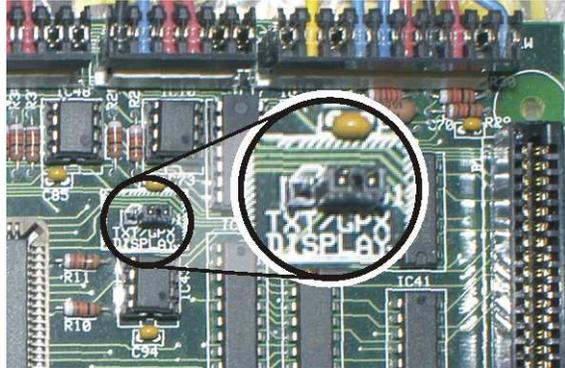
Only four of the conductors (the green, white, red, and blue wires) and the cable shield are used for this application. If the cable must be field-wired, make electrical connections as shown in Figure 5.

Figure 5: Connections—Previously Installed Shuttle

Connection Points in Processor Box	24 VDC Power Supply in Low Voltage Box

Ground Terminals in Low Voltage Box	Legend
	1. MTA30, pin 5—connection point for White wire (TX+) 2. MTA30, pin 8—connection point for Green wire (RX+) 3. 24VDC power supply—The 24VDC side is wire #102. Trace this wire to an available terminal and connect the red wire (Vcc) at this location. 4. Ground terminals—connect blue wire (Gnd) and cable shield to any available ground terminal.

3. Configure, Align, and Program

These instructions apply specifically to Banner L-Gage LT7 laser device. You received a manual with this device. **Review the safety information in this manual.** The manual provides more information than necessary to implement the laser positioner system for the shuttle. The following sections give the pertinent instructions. You can find detailed information in the Banner manual.

Display or Action	Explanation
⊕	Energize the shuttle (at the MultiTrac or Drynet console). This will also apply power to the laser.
✎	Set the shuttle to the Manual mode (at the stationary shuttle control panel). This will take the shuttle off line.

Perform the procedures in this section with shuttle power on, but with the machine off line. **Use extreme care when you work in or near the shuttle path.**

3.1. Laser Configuration—Required configuration settings:

Serial interface: RS422

    Baud rate: 19,200
    Data Bits: 8
    Stop Bits: 1
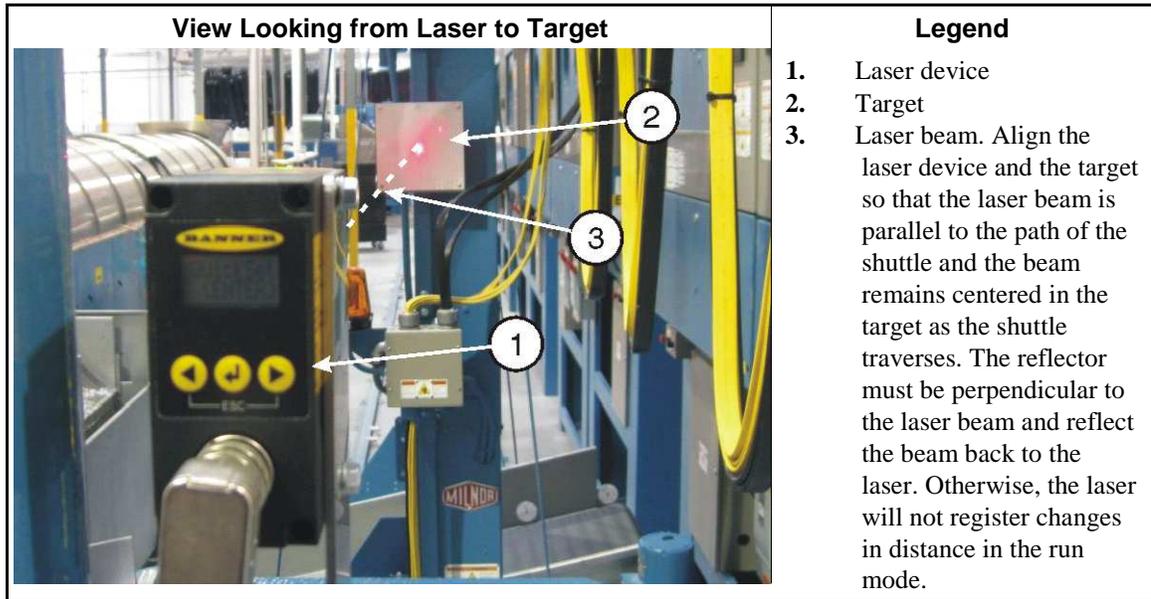   Data method: REPEAT

At the laser device:

Display or Action	Explanation
DIST mm >250000	This or a similar display indicates the laser run mode. The laser displays distance in hundredths of units.
⏎	Accesses the laser program mode. This also activates the visible pilot laser used for alignment.
QuickSet <ENTER>	This is the first sub-menu in the Program menu.
▶, ▶...	Scrolls the sub-menus. Select "UNIT".
UNIT <mm>	This display indicates the laser is configured for millimeter units. You can choose millimeters or inches (<inch>). If you want to change units:
⏎	Accesses the *UNIT* field.
UNIT >mm	You can now select inch units.
▶	Toggles between *mm* and *inch* each time the key is pressed.
⏎	Locks in the selected value.
UNIT <inch>	Indicates that the laser is configured for inch units. When the laser is properly aligned, the Run display will show the distance between the laser and target in hundredths of **inches**.
▶, ▶...	Scrolls the sub-menus. Select the "SERIAL" sub-menu.
SERIAL <RS422>	This is the display you should see and indicates that the currently configured interface type is RS422. If you see any other value on the bottom line, access this field as follows.
⏎	Accesses the field to select the type of interface.
SERIAL >RS422	You can now select another type of interface.
▶, ▶...	Scrolls the interface types, which are: RS422, SSI 1/8, SSI1/10, and EXT.BUS. Select RS422.
⏎	Locks in the selected value.
SERIAL <RS422>	Indicates that the laser is configured for an RS422 interface.
▶	Advances to the RS422 sub-menu.
RS422	Because the RS422 selection has it's own sub-menu, this display appears. This

Display or Action	Explanation
`<ENTER>`	sub-menu has four data fields: baud rate, data bits, stop bit, and data method.
▶	Advances to the first field in the RS422 sub-menu: baud rate.
`RS422` `<19k2Bd>`	19k2Bd is the correct value. If a different value appears on the bottom line, access this field and correct the value in the same manner as above. Otherwise, proceed to the Data Bits field.
▶	Advances to the next field in the RS422 sub-menu: data bits.
`RS422` `<8DATAb>`	8DATAb is the correct value. If <7DATAb> appears on the bottom line, access this field and correct the value. Otherwise, proceed to the Stop Bits field.
▶	Advances to the next field: stop bits.
`RS422` `<1STOPb>`	1STOPb is the correct value. If <2STOPb> appears on the bottom line, access this field and correct the value. Otherwise, proceed to the data method field.
▶	Advances to the next field: data method.
`RS422` `<REPEAT>`	REPEAT is the correct value. If <SINGLE> appears on the bottom line, access this field and correct the value. Otherwise, return to the Run mode.
◀ + ▶,	Returns to each higher-level menu, then the Run mode.
◀ + ▶...	

3.2. Laser and Reflector Alignment

1. At the laser device, access the program mode as previously explained. This activates the visible pilot laser used for alignment.

2. Adjust the orientation of the laser on its mounting brackets to place the beam at the center of the target.

3. Operate the shuttle in manual mode to move it along the shuttle path. Find manual operation instructions for the shuttle in the Drynet Dryer/Shuttle operator guide. As the shuttle traverses, observe the position of the beam on the target.

4. Move the laser post, and adjust the orientation of the laser and target to achieve the alignment described in Figure 6.

5. When alignment is achieved, anchor the laser post to the floor.

6. When the laser post is securely anchored, check the alignment again and make final adjustments.

7. Tighten the laser and target bracketry.

Figure 6: Laser and Reflector Alignment

View Looking from Laser to Target	Legend
	1. Laser device **2.** Target **3.** Laser beam. Align the laser device and the target so that the laser beam is parallel to the path of the shuttle and the beam remains centered in the target as the shuttle traverses. The reflector must be perpendicular to the laser beam and reflect the beam back to the laser. Otherwise, the laser will not register changes in distance in the run mode.

3.3. **Drynet Configuration and Programming of Shuttle Stop Positions**—The Drynet Dryer/Shuttle controller requires configure data to use the laser positioner. For example, it must know the distance between the laser and the target, as detected by the laser device, for each position at which the shuttle stops. Determine these values at the laser device. Enter this data at the Drynet or MultiTrac console, in the *Configure Shuttle Encoder* form (Figure 7).

Figure 7: *Configure Shuttle Encoder* Form Configured for a Laser Device

1. At the MultiTrac or Drynet console, access the shuttle Encoder form:

   a. In the Dryer/Shuttle Controller (DevComm Setup) window, select *Configure, Shuttles and Cobucs* on the menu. This displays one or more tabbed forms—one for each shuttle device in the system.

   b. Select the tab corresponding to the shuttle with the new laser device. This displays the main configuration form for this shuttle.

   c. Near the bottom right of the form, find the field *Shuttle has an Encoder.* Select (or re-select) the value 1. This displays the *Configure Shuttle Encoder* form (Figure 7).

2. Enter values in the fields on the left column of the encoder form in accordance with Table 2.

3. Do this procedure for each position at which the shuttle stops:

   a. At the stationary shuttle control box, manually move the shuttle to the stop position. Ensure that the shuttle is precisely aligned with the interfacing device.

   b. At the laser device, read the distance value in hundredths of units (inches or millimeters as previously configured). Hence, read the displayed value 26147 as 261 inches or millimeters.

   c. At the Drynet controller, enter this value (whole inches or millimeters) in the appropriate field:

      • Distance at Home Station
      • Distance at Load Station ___
      • Distance at Discharge Station ___

Table 2: Guidelines for Encoder Values for Laser Device

Data Field	Required Value or Guideline
Using laser tracking	1
Number of Load Stations	Per physical layout
Number of Discharge Stations	Per physical layout
Distance at Home Station	See Item 3 below.
Slow Down Distance	Between 6 and 10 inches (152 and 254 mm) recommended
High Speed Distance (feet)	Not currently implemented
Counts at Left Oops Target	Disabled and not applicable to laser device.
Counts at Right Oops Target	
Counts at Reset Point	
Stop Offset Counts	0
At Decel Time: in 10ths of a second	0
Laser Position	Face the direction that goods move as they are loaded onto the shuttle bed. If the post-mounted laser is located to the right of the shuttle, enter 0. If to the left of the shuttle, enter 1.

4. Testing

When you have entered all shuttle stop positions in the Drynet controller, test each position as explained in document BIVSRC01 "How to Test Traversing Shuttle Stop Positions."

— End of BIVSVI01 —