Paw-Taw-John Services, Inc.™
18125 N. Ramsey Road
Rathdrum, ID 83858
Phone **(208) 687-1478**
Fax (208)-687-4148

INSTALLATION
and
OPERATION
MANUAL

L1/L6000

THICKNESS MEASURING SYSTEM

WESTERN MOULDING
L1WIN2A.HEX

(C) Copyright April 14, 1998 Paw-Taw-John Services, Inc.™
All rights reserved.

L1/L6000 LASER THICKNESS GAUGE SYSTEM

TABLE OF CONTENTS

INTRODUCTION 1

SYSTEM COMPONENTS 1
- L1 Interface Board 1
- L6000 Laser Thickness Gauge 2

INSTALLATION INSTRUCTIONS 2
- Control/Interface Enclosure 2
- L6000 - Top Scanning 3
- Differential (Top & Bottom) Scanning 4

APPLYING POWER 6

TYPICAL SYSTEM PROGRAM SETUP 7
- TransTerm 5 (TT5 Keyboard) Set up 7
- TransTerm 5 Register Check 8
- TransTerm 5 Terminal Displays 9
- Typical Parameter Data Entry 10
- Parameter Definitions 11
- Window Mode Parameters 12
- L1 Code Table for Inputs/Outputs 13
- Output Structure for Windows Mode 14
- TransTerm5 Troubleshooting 15

L6000 LASER ALIGNMENT 16
- Top Scanning Laser Alignment 16
- Differential Scanning Laser Alignment 16
- Width Alignment 17

SYSTEM OPERATION 17
- NAC Computer Systems 17
- PLC Systems 18
- Laser Communication/Power Cable Schematic 19

PRODUCT WARRANTY 20

SALE AGREEMENT TERMS AND CONDITIONS 22

SERVICE AGREEMENT 24

DRAWINGS

INTRODUCTION

The Laser Thickness Gauge System developed by Paw Taw John Services, Inc.™ is a thickness and width measuring system that utilizes the L1 interface board and the L6000 laser thickness gauge. It offers users the flexibility of interfacing to PLC based systems, PC based systems or stand-alone systems and it is easily installed in most environments. Top scanning of product thickness is more commonly used, but bottom scanning is also possible.

Although the system can be used in many industrial applications, the wood products industry is currently the primary user. Measurement of board thickness and width is used with board sorter and trimmer systems and in particle board, waferwood and veneer plants. Another application could be interfacing to quality control information systems.

COMPONENTS OF THE SYSTEM

L1 INTERFACE BOARD

The L1 interface board is designed to adapt to many thickness and width measurement applications. The board uses a high-speed microcontroller for data processing. Twelve source inputs and sixteen source outputs make up the I/O structure of the board. Hooking up to host systems is facilitated by screw-in terminal strips. Inputs 9 through 12 are dedicated to special functions, the optically isolated inputs and outputs are rated for 5vdc to 32vdc and all I/O points have LED indicators for determining their status.

The board is capable of interfacing to Quadrature or single input encoders. Encoder interfacing can be accomplished with either source or sink type outputs. Frequencies are limited to 1.5k Hertz with single input encoders, while Quadrature encoder frequencies are unlimited.

Two communication ports provide RS-485 or RS-422 serial interfacing. The RS-485 port is dedicated to the L6000 laser thickness gauge, while the RS-422 port can be used for a dummy terminal and/or digital display. Connections to the RS-422 port are made with a phone jack. The RS-485 connections are made to screw-in terminal strips. Baud rates are determined in the operating program and must be specified by the user.

Power is applied through the screw-in terminal strips. The board uses 5VDC and 24VDC, and a DC to DC converter can be used to generate 5VDC for the circuitry on the board. The input range is 18-72VDC and there are LED indicators to provide the status of the power, laser and RS-485 receive/transmit lines.

L6000 LASER THICKNESS GAUGE

The Model **L6000** is a non-contact measurement device used in conjunction with the L1 interface board. The unit consists of a three-piece aluminum case with the following components mounted inside: a manufactured laser assembly; a video detection device; and a circuit board for computerized data collection and laser control. A beam emission indicator and power/data connector are mounted on top of the unit for easy access and visibility. An addressing port is also located on top of the unit under a screw-in plug, facilitating setup.

INSTALLATION INSTRUCTIONS

The instructions in this section cover installation of the following: the Control/ Interface Enclosure, which contains the L1 interface card; the L6000 Laser Thickness Gauge when the application is top scanning only; and the L6000 when the application is differential (top and bottom) scanning. At this point, you may wish to look at Drawings 1-4 in the Drawings section at the end of this manual. These show typical system layouts.

CONTROL/INTERFACE ENCLOSURE

The Control/Interface Enclosure can be mounted near the location of the L6000 or in a computer room. It is important to consider the environment of the mounting area. For example, is there severe vibration, is dirt and foreign matter excessive, and/or is access difficult? The enclosure can withstand these problems to a point, but it's essential to use common sense about the location.

OBSERVE ALL WARNING SIGNS AND INDICATORS

OBSERVE ALL LOCAL LOCKOUT PROCEDURES BEFORE INSTALLING EQUIPMENT

After the enclosure is mounted, follow the next 3 steps.

STEP 1. Hook up 115VAC cable to the terminal blocks in the enclosure. Refer to Drawing 5 for power distribution.

STEP 2. Hook up I/O connections to the L1 board per Drawing 6.

STEP 3. Hook up the L6000 laser gauge power/communications cable to the L1 board per Drawing 6.

L6000 - TOP SCANNING

CAUTION

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE

Refer t hickness Gauge. Since the communications to the laser head are provided by RS-485, it is possible to have cable

runs in excess of 100 feet. If this option is used, however, the laser power supply should be moved to the location of the laser head. This prevents any power loss due to the length of the cable. The communications/power cable to the gauge can be put in ¾" conduit or strapped to the frame mounting. The cable is tough but carefully consider the environment before using the latter method.

You will need bolts and washers for mounting. We suggest using 3/8" steel plate with ¼" holes drilled to the hole pattern shown in Drawing 7. Weld the plate to the framework above the measuring area and the bolt laser gauge to it. The distance to the measuring area should be per Drawing 8. It is important for accuracy that the laser be squared with the measuring area.

If a hold down shoe is used, mount the gauge close to it. The shoe or any other mechanical object must be completely clear of the measuring area or window. This prevents any erroneous measurements from occurring. Mount the laser gauge near and above a solid base where the measurements will be referenced. For example, mounting near a lug chain raceway is good. This prevents any flexing of the product being measured and provides an accurate reading. If this mounting is used, it is advisable to use a nickel-plated skid bar near the lug chain raceway. This allows the product to be carried through the scan area with a stable reference point. Lug chains can cause errors in thickness readings due to wear of the chain, raceway and lugs. This method counters that problem.

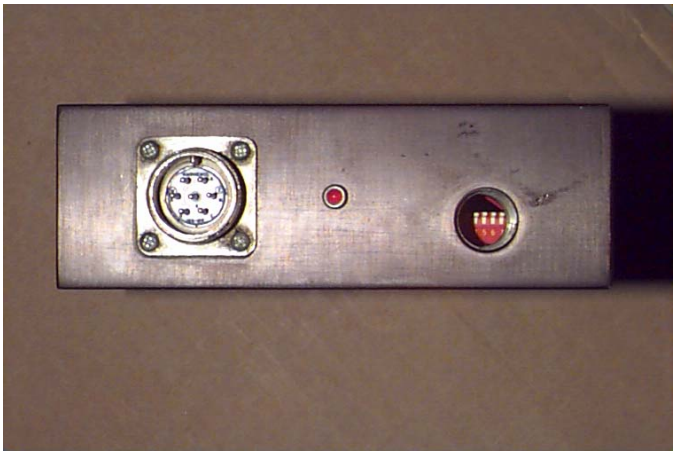
Other mounting scenarios are possible. Contact **Paw-Taw-John Services, Inc.™** at (208) 687-1478 if there are questions about mounting.

DIFFERENTIAL (TOP & BOTTOM) SCANNING

Installation of the system for differential scanning involves the same concerns about the environment as top only scanning. However, the **L6000** thickness gauges are mounted differently and are more critically placed in relationship to the zero reference area. Also, the bottom scanner needs to have an air exhaust system to keep the lens window and laser port free of debris. This prevents foreign material from blocking the laser gauge's sensor and emitter.

Refer to Drawings 9 and 10 for specifics about the installation of the top and bottom scanners. After the gauges are mounted, remove the plugs at the top or bottom of the units and verify that the address DIP switches are per the system requirements. Use the Address Port View picture and table below. Reinstall plugs.

ADDRESS PORT VIEW



LASER ADDRESS PROGRAMMING								
L600 NUMBER	*Switch Position*							
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF
2	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
3	OFF	**ON**	**ON**	OFF	**ON**	OFF	OFF	OFF
4	OFF	OFF	OFF	**ON**	OFF	OFF	OFF	OFF
5	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF
6	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF
7	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF

On **the L6000**, move the laser mechanical aperture cover to uncover the laser beam. See the Disc View picture below.

DISC VIEW

CAUTION

Verify that power, laser power and circuit breaker are turned off in the enclosure.

Before applying power insure that all warnings related to the L6000 thickness gauge is observed.

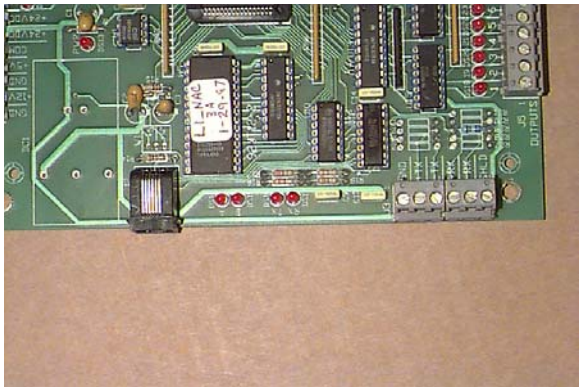
APPLYING POWER

This section applies to both top-scanning only and differential systems.

Hook up the power/communication cables to the L6000 and follow the steps below to apply power and prepare the system for operation.

1. Verify that AC is present at the circuit breaker.
2. Turn on the breaker.
3. Turn on the POWER switch and verify that the L1 board power LED comes on.
4. If a terminal enable switch is used, switch to Terminal Enable on the front of the enclosure.
5. Turn on the Laser Power switch. TransTerm 5 (see next section regarding TransTerm 5 setup) will beep and display SYSTEM OKAY on the second line.
6. After about 4 seconds, the laser emission indicator on top of the L6000 will come on.
7. Using only one L6000, LED **A** will be on. Using two (top and bottom scanning), LEDS **A** and **B** will be on.

VIEW OF LEDS



8. TX and RX LEDS will be on, dimmed, or blinking.
9. Use a DVM to measure the following voltages on the L1 terminal strip.

L1 Voltages			
Terminals		*Voltage*	
From	*To*	*Minimum*	*Maximum*
+5VDC	GND	+4.9VDC	+5.2VDC
"+12VDC	GND	+12.1VDC	+13.0VDC
"-12VDC	GND	-12.1VDC	-15.2VDC
+24VDC*	24V RET*	+5VDC	+30VDC
* Input/Output Supply Voltage			

TYPICAL SYSTEM PROGRAM SETUP

TransTerm 5 Terminal Setup

The TransTerm 5 is a complete terminal capable of all functions encountered on a normal personal computer system. The unit can be powered using a 12 volt external power unit or power can be applied to the D-25 connector.

Connect the keypad cable to the **TransTerm 5** and plug the opposite end of the cable into the RJ-style jack on the face of the **L1** interface card. Refer to Drawing 11 for wiring information.

When power is applied the **TransTerm 5** should beep three times. The top line will display the **L1** firmware program name and date. The bottom line will initialize for a moment and then display a card status message.

PRGMNAME 1/15/95 MASTER

SYSTEM OK means the **L1** and the scanners are communicating and working.

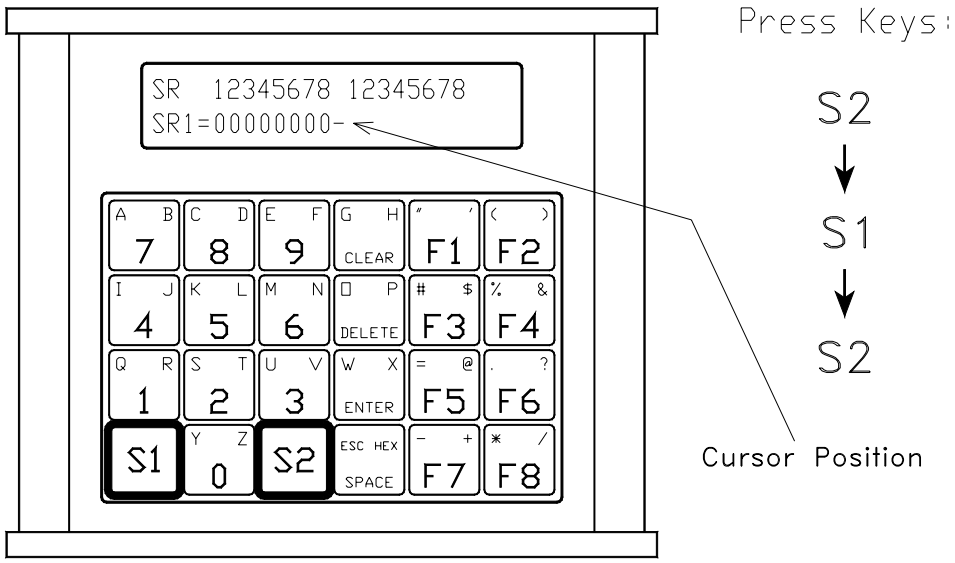
If the SYSTEM OK message is not displayed, you may see one of the following:

Scanner 1 Bad means scanner 1 is not working.
Scanner 2 Bad means scanner 2 not working.

This would mean the scanner needs to be replaced.

Trans-Term 5 Register Check

A **TransTerm 5** register check should be conducted next to make sure the **TT5** is set to properly communicate with the **L1** card. It is necessary to switch to the setup mode by entering the following keystrokes: **S2** (blue key), **S1** (red key) and **S2** (blue key).



The top line shows **SR** indicating the setup register mode and two sequential counts from 1 to 8 to mark data bit positions.

The bottom line of the display shows which of the four registers (**SR1 - SR4**) is active, the data for that register and the blinking cursor at the first new data entry position. Each register contains 8 data bits that are either "1" or "0". This data determines how the **TT5** will work. It is necessary to have the registers filled with the exact sequence of "1"s and "0"s so the terminal can communicate with the **L1** interface board.

Card. The bit sequence for register SR1 should be as follows:
SR1=0000000
If the data displayed does not match, key in "00000000". Then press the **ENTER** key. If the data displayed does match the bit sequence, just press the **ENTER** key to accept the data as displayed.

After the **ENTER** key is pressed, the display will automatically change to the next register. Repeat the procedure for all four registers, confirming or changing the data bits to match the following:

SR2=00000010
SR3=00001001
SR4=00000000

Hit the **ENTER** key after each register entry.

When all four registers are correct press the **CLEAR** key to exit the setup mode.
NOTE: Please refer to **TransTerm 5** Troubleshooting page at the end of this section if no data is displayed. Also refer to the **TransTerm 5 User's Manual** (included with the system) for more detail on terminal setup.

TransTerm 5 Terminal Displays

The **TransTerm 5** is a basic data entry terminal used with the **L1** board. The **Transterm 5** incorporates all key functions available on a standard keyboard. The specific key functions used with the **L1** system are as follows:

L1 COMMANDS				
Command Sequence	*Function or Action*			
CLEAR	Return system to Run mode			
ENTER	Enter values previously typed in			
SPACE	Scroll forward to next entry			
DELETE	Scroll backward to previous entry			
S1 → P	Enter Parameter Mode			
S1 → A	Enter Windowed Size Value Table			
S2 → B	Enter Windowed Size Value Table			
1	View Raw Scan data with Offset Value included			
2	View Average Thickness			
3	View Largest Thickness Out			
4	View Width Count			
5	View Largest Width Out			
6	View I/O data for L1 inputs and outputs			
7	View Differential Scanned value			

Different systems will utilize different combinations of these commands.

KEY DISPLAYS		
Key 1	RAW SCAN WITH OFFSET SCN1=00.000 SCN2=00.000 SCN=	(Scanner)
Key 2	AVERAGE THICKNESS T1=XX.XXX T2=XX.XXX T=	(Thickness)
Key 3	LARGEST THICKNESS OUT T1=XX.XXX T2=XX.XXX T=	(Thickness)
Key 4	WIDTH COUNTERS W1=XX.XXX W2=XX.XXX W=	(Width)
Key 5	LARGEST WIDTH OUT W1=XX.XXX W2=XX.XXX W=	(Width)
Key 6	I/O FOR MASTER BOARD IN=XX OUT=XX XX	(Status of Inputs/Outputs) (Refer to code table for I/O)
Key 7	SCAN1+SCAN2-DIFF_ADJ DIFF= THICKNESS DIFF.=XX.XXX	(Differential Adjust)
RUN DISPLAY	PROGRAM NAME/DATE SYSTEM OK	
TROUBLE DISPLAY	PROGRAM NAME/DATE LASER 1 BAD	

Depress the **CLEAR** key to return the display to the **RUN** mode.

TYPICAL PARAMETER DATA ENTRY

Enter **S2** and **P** to change the system to the parameter mode. The delete key and the space key enable the user to scroll up or down through the data. Key in the appropriate number and depress the **ENTER** key to load that value into nonvolatile memory on the L1. The following data fields display in the parameter mode:

XX.XXX=ENCODER MULT.
XX.XXX=LASER 1 OFFSET
XX.XXX=LASER 2 OFFSET
XX=ENABLE PC1 (enable photo cell 1 IF=12)
XX=ENABLE PC2 (enable photo cell 1 IF=12)
XX=ENABLE WINDOWS (IF=12)
XX=ENA. DIFF.SCAN (enable differential scan mode IF=12)
XX.XXX=DIFF.SCAN ADJUST
XX.XXX=SERIAL DELAY TIME
XX.XXX=SPARE

Depress the **CLEAR** key to return the display to the **RUN** mode.

PARAMETER DEFINITIONS

ENCODER MULT(IPLER)

The number (to thousandths) that the encoder pulse is multiplied by to develop width information.

LASER 1 OFFSET

Used to calibrate Laser 1 reading to a known thickness value. For example, if a known thickness of 2" is placed in the range of the L6000, this value can be adjusted to reflect that known value.

LASER 2 OFFSET

Used to calibrate Laser 2 reading to a known thickness value. For example, if a known thickness of 2" is placed in the range of the L6000, this value can be adjusted to reflect that known value.

ENABLE PC1

This value is 12 if a photo cell is used to determine when a board is in the scanner one window. Any other value disables this feature.

ENABLE PC2

This value is 12 if a photocell is used to determine when a board is in the scanner 2 window. Any other value disables this feature.

ENA.(BLE) DIFF.(ERENTIAL) SCAN

This value is 12 if the user wants discrete outputs for different ranges of width and thickness values. The windows table (accessed by depressing **S1**, **A**) must have values entered for this function to operate.

DIFF.(ERENTIAL) SCAN ADJUST

This data entry point is used to calibrate thickness readings when two L6000 thickness gauges are reading a thickness in opposing direction - for example, when using top and bottom scanning.

SERIAL DELAY TIME

This value controls the time when thickness and width serial information is transmitted out of the RJ-style jack on the side of the L1 board. On some serial display devices, a flickering will occur if the data is too fast and overfills the communications buffer. This feature corrects that problem. The communications baud rate is 9600.

WINDOW MODE PARAMETERS

Depress **S1** and **A** to enable the **WINDOW** parameters.

Enter board thickness and width values here for discrete outputs on the L1 board. Again, depress the DELETE and SPACE keys to scroll through the screens. The ENTER key loads the entered values. When this parameter mode is enabled, the following screens will be displayed:

WINDOW SELECT

X.XXXX=WIDTH 1 UPPER (maximum width value for board or object)
XX.XXX=WIDTH 2 UPPER "
XX.XXX=WIDTH 3 UPPER "
XX.XXX=WIDTH 4 UPPER "
XX.XXX=WIDTH 5 UPPER "
XX.XXX=WIDTH 6 UPPER "
XX.XXX=WIDTH 7 UPPER "
XX.XXX=THICK 1 UPPER (maximum thickness value for board or object)
XX.XXX=THICK 2 UPPER "
XX.XXX=THICK 3 UPPER "
XX.XXX=THICK 4 UPPER "
XX.XXX=THICK 5 UPPER "

L1 CODE TABLES FOR INPUTS/OUTPUTS

Depress **6** on the Transterm 5 keypad to display inputs and outputs. The I/O described below is for each discrete input or output. When more than one input is on, the format is HEX code. Below are the codes:

INPUT CODE TABLE

INPUT TERMINAL	*INPUT VALUE*	*FUNCTION*
1	00	INPUT OFF (largest thickness will be output)
1	01	INPUT ON (largest width wil be output)
2	02	DATA HOLD
3	04	PHOTO CELL 1 INPUT (if used)
4	08	TEST INPUT FOR SENDING RAW SCAN DATA TO PC/PLC
5	10	DISABLE SCANNER 1 READING/OPERATION
6	20	DISABLE SCANNER 2 READING/OPERATION
7	40	PHOTO CELL 2 INPUT (if used)
8	80	EXTERNAL DISPLAY ENABLE
9		SINGLE INPUT SOURCE ENCODER

OUTPUT CODE TABLE		
OUTPUT TERMINAL	*OUTPUT VALUE*	*BINARY VALUE*
1	01	01
2	02	02
3	04	04
4	08	08
5	16	10
6	32	20
7	64	40
8	128	80
9	256	01 00
10	512	02 00
11	1024	04 00
12	2048	08 00
13	4096	10 00
14	8192	20 00
15	16384	40 00
16	32768	80 00

OUTPUT STRUCTURE FOR WINDOWS MODE		
OUTPUT TERMINAL	*BINARY VALUE*	*VALUE*
1	01	UPPER WIDTH 1
2	02	UPPER WIDTH 2
3	04	UPPER WIDTH 3
4	08	UPPER WIDTH 4
5	10	UPPER WIDTH 5
6	20	UPPER WIDTH 6
7	40	UPPER WIDTH 7
8	80	ABOVE UPPER WIDTH 7
9	01 00	THICK 1 UPPER
10	02 00	THICK 2 UPPER
11	04 00	THICK 3 UPPER
12	08 00	THICK 4 UPPER
13	10 00	THICK 5 UPPER
14	20 00	ABOVE THICK 5 UPPER
15	40 00	
16	80 00	

STEP 10. Set up initial parameter data as displayed below.

XX.XXX=ENCODER MULT.
XX.XXX=LASER 1 OFFSET
XX.XXX=LASER 2 OFFSET
XX=ENABLE PC1(PHOTO CELL 1) IF=12
XX=ENABLE PC2(PHOTO CELL 2) IF=12
XX=ENABLE WINDOWS IF=12
XX=ENA. DIFF.SCAN(ENABLE DIFFERENTIAL SCAN MODE) IF=12
XX.XXX=DIFF.SCAN ADJUST)
XX.XXX=SERIAL DELAY TIME
XX.XXX=SPARE

TRANSTERM 5 TROUBLESHOOTING

Listed below are troubles that are sometimes encountered and solutions.

TROUBLE	SOLUTIONS
Unit displays erroneous characters.	Check the terminal for proper configuration.
Unit displays cursor in upper left corner of display only.	Check the connections between the terminal and the **L1** interface board.
With power applied, the terminal doesn't display a cursor or characters or doesn't beep three times when powering up.	The terminal is I/O bounded. Try another **L1** board or replace the terminal.
Unit displays SCANNER BAD.	Replace scanner.

To check the terminal for proper configuration, depress **S2**, **S1**, **S2**. (Refer to TransTerm 5, operators manual, Chapter 6, page 11, TransTerm 5 set-up). The shift registers are as follows:

SR1=00000000
SR2=00000010
SR3=00001001
SR4=00000000
OPERATING MODE=001
CONTRAST=007
UNIT ADDRESS=001
TOTAL COLUMNS=024

The DB25P cable is wired per table. Check connector for broken wires or other damage and repair as necessary.

TRANSTERM 5 CABLE WIRING		
Signal	*Pin #*	*Color*
DTD+	23	green
DTD-	22	red
DRD+	25	black
DRD-	24	yellow
GRD	7	blue
+12VDC	20	white
DRO	16 to 3	jump to RD
DTR	20 to 5	jump to CTS

L6000 LASER ALIGNMENT

TOP SCANNING LASER ALIGNMENT

STEP 1. Depress **1** on the TransTerm 5 keypad.
SCN1 XX.XXX SCN2 XX.XXX are displayed.

STEP 2. Put an object or piece of wood with a known value of thickness underneath LASER 1 measuring area.
a. A thickness reading of the object being measured appears on the display.
b. Record the SCN reading for the head.

STEP 3. Depress **S2**, **P**. Using the TRANSTERM 5 TERMINAL DISPLAYS section of this manual, scroll to LASER 1 OFFSET.
a a. Enter an offset value to make the SCN recorded value equal to the object measured. This will require going back and forth between displays to setup. Once the SCN value equals the object value, the laser head is calibrated.
b. If more lasers are used, repeat STEPS 1-3 for each head.

DIFFERENTIAL SCANNING LASER ALIGNMENT

STEP 1. Depress 7 on the TransTerm 5 keypad. The following is displayed:

SCAN1+SCAN2-DIFF_ADJ DIFF=(DIFFERENTIAL ADJUST)
THICKNESS DIFF.=XX.XXX

STEP 2. Put an object or piece of wood with a known value of thickness between LASER 1 and LASER 2 measuring area.
a. A thickness reading appears on the display.
b. Record the **THICKNESS DIFF.=XX.XXX** reading for the heads.

STEP 3. Depress **S2**, **P**. Using the TRANSTERM 5 TERMINAL DISPLAYS section, scroll to **XX.XXX=DIFF.SCAN ADJUST)**.
a. Enter an offset value to make the **THICKNESS DIFF.** recorded value equal to the object measured. This will require going back and forth between displays to setup.

Once the SCN value equals the object value, the laser head is calibrated.

b. If more lasers are used, repeat STEPS 1-3 for each head.

WIDTH ALIGNMENT

STEP 1. Measure the distance between lugs and record. Verify the encoder pulses per revolution.

STEP 2. Divide the distance by the amount of encoder pulses per revolution.

STEP 3. Depress **S2**, **P**. Using the TRANSTERM 5 TERMINAL DISPLAYS section, scroll to ENCODER MULT. Enter the value determined in STEP 2.

SYSTEM OPERATION

NAC COMPUTER SYSTEMS

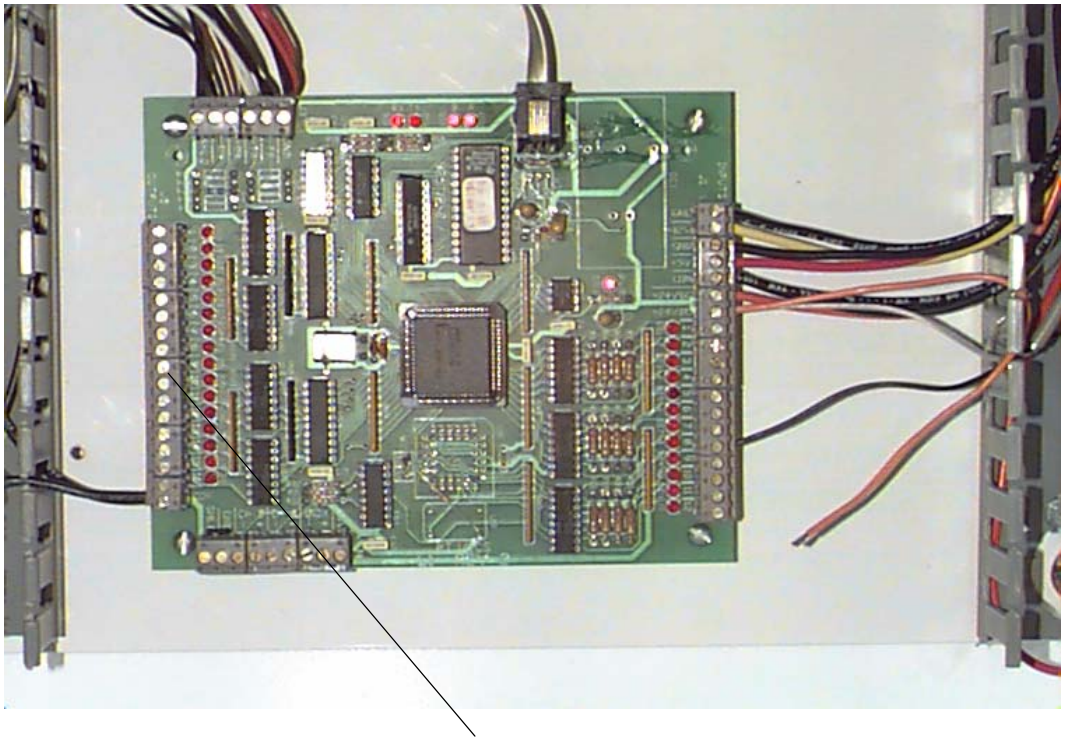
The Thickness/Width system, Model No. PTJ L6001A, is used with the NAC computer system. Thickness information is sent to the NAC by a transmit pair via the phone jack on the L1 interface board. A switch on the front of the enclosure enables either the TransTerm 5 terminal or the transmit pair to the NAC.

The string format is as follows: **T xx.xxx Carriage Return**. When an object leaves the measurement zone, the thickness data is transmitted to the NAC. Although the outputs of the L1 are not used, the LEDs should change status as objects flow through the zone.

If width measuring is used, the string format is as follows: **W xx.xxx Carriage Return**. This output is enabled by inputting a high to input 1 of the L1 board.

Programs used with NAC systems are **L1_NAC2C.HEX**, **L1_NAC3A.HEX** and **L1_NAC3B.HEX.**

PLC SYSTEMS



HOST PLC INTERFACE TERMINALS

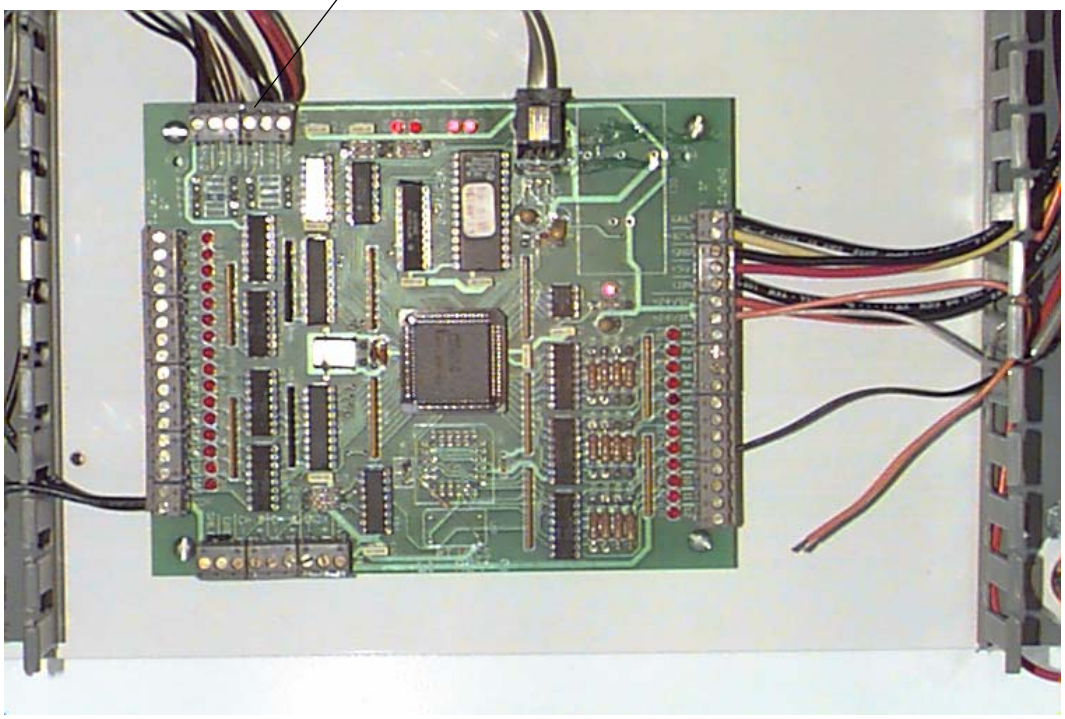
To the left of the above figure, are sixteen wire terminals. These are outputs that can be used by a PLC. Depending on the logic state to the width/thickness input on the card, determine what binary word is present at this terminal strip. Using the L1 code table shown earlier, the user can determine the thickness or width of an object in binary code.

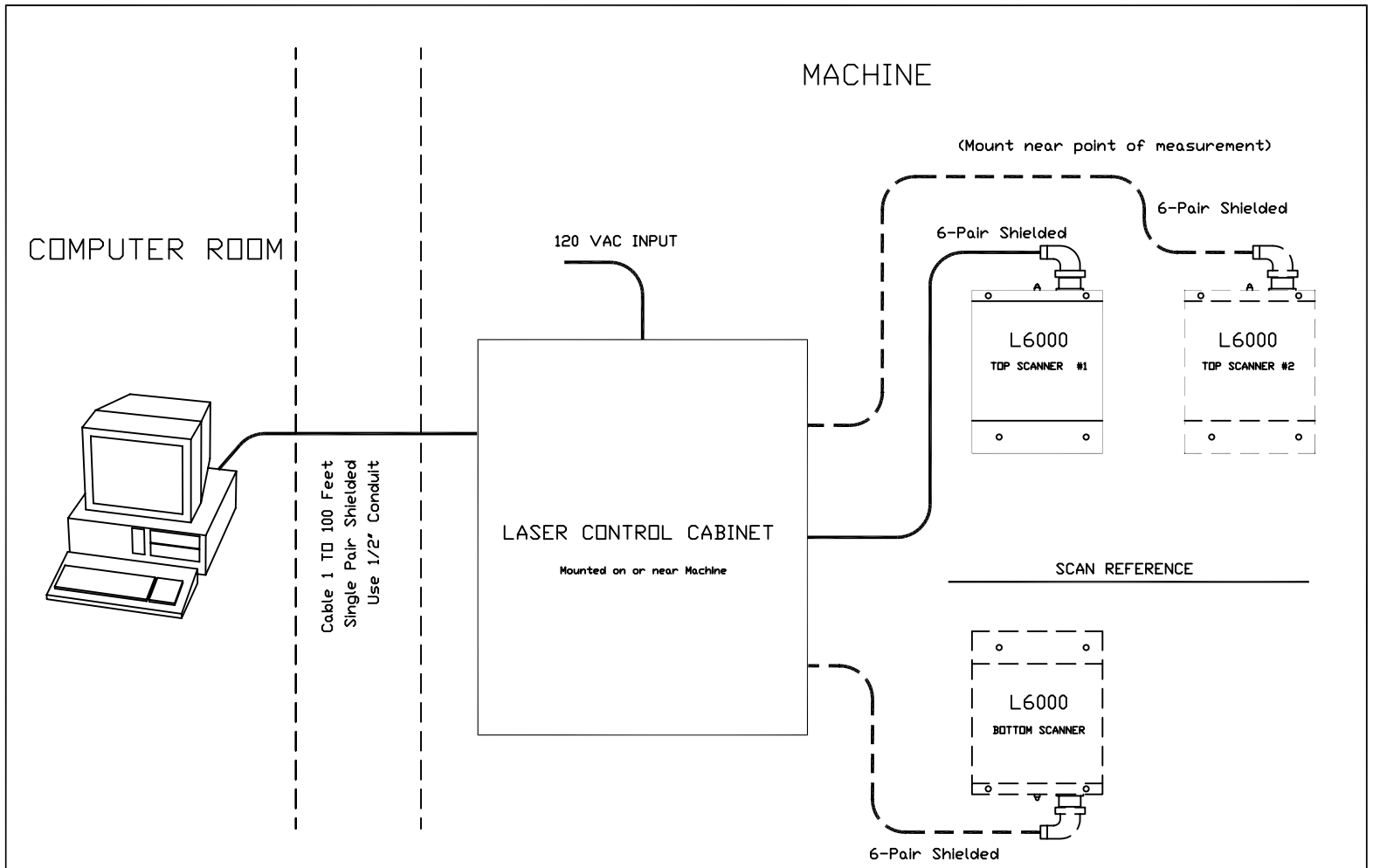
These outputs can be configured for a windowed output. By programming the L1 card for a windows output, the output section will light only one output at a time. These single outputs reflect an item that has passed a user programmed table.

LASER COMMUNICATION/POWER CABLE SCHEMATIC

M13146 6 PAIR SHIELDED CABLE CONNECTIONS			
J1 CONNECTOR	*WIRE COLOR*	*PAIR*	*L1 CONNECTOR*
A	YELLOW	1/2 OF YEL-BLK PAIR	"+12VDC
B	BROWN	1/2 OF BRN-BLK PAIR	REC +
C	BLACK	1/2 OF BRN-BLK PAIR	REC -
D	WHITE	1/2 OF WHT-BLK PAIR	TX -
E	BLACK	1/2 OF WHT-BLK PAIR	TX +
F	BLUE	1/2 OF BLU-BLK PAIR	"-12 VDC
G	RED AND BLK	RED-BLK PAIR	GRD/COM

Laser Communication Terminal Strip J1

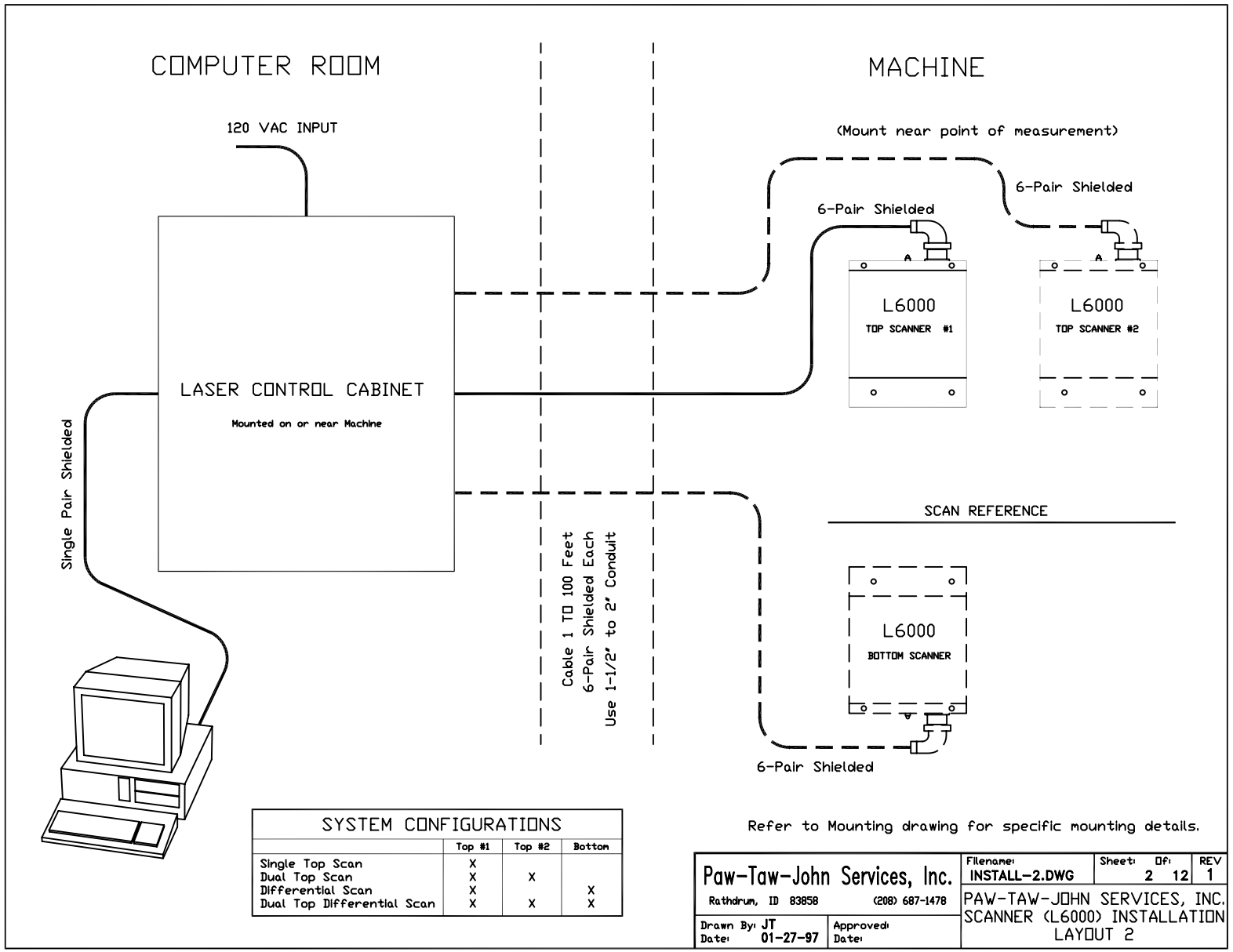




SYSTEM CONFIGURATIONS			
	Top #1	Top #2	Bottom
Single Top Scan	X		
Dual Top Scan	X	X	
Differential Scan	X		X
Dual Top Differential Scan	X	X	X

Refer to Mounting drawing for specific mounting details.

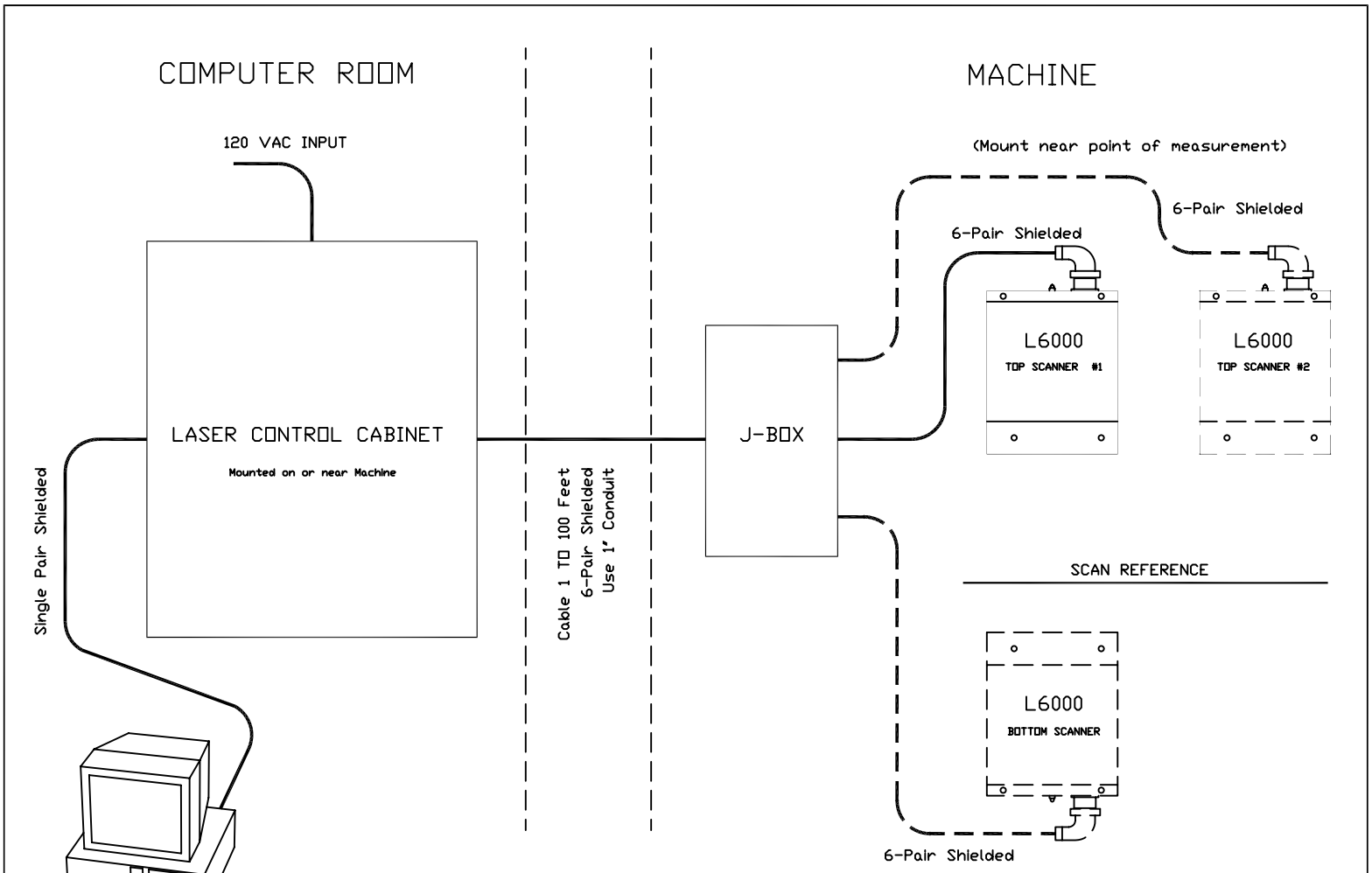
Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: INSTALL-1.DWG	Sheet: 1 Of: 12	REV 1
Drawn By: JT Date: 01-27-97	Approved: Date:	PAW-TAW-JOHN SERVICES, INC. SCANNER (L6000) INSTALLATION LAYOUT 1	



SYSTEM CONFIGURATIONS			
	Top #1	Top #2	Bottom
Single Top Scan	X		
Dual Top Scan	X	X	
Differential Scan	X		X
Dual Top Differential Scan	X	X	X

Refer to Mounting drawing for specific mounting details.

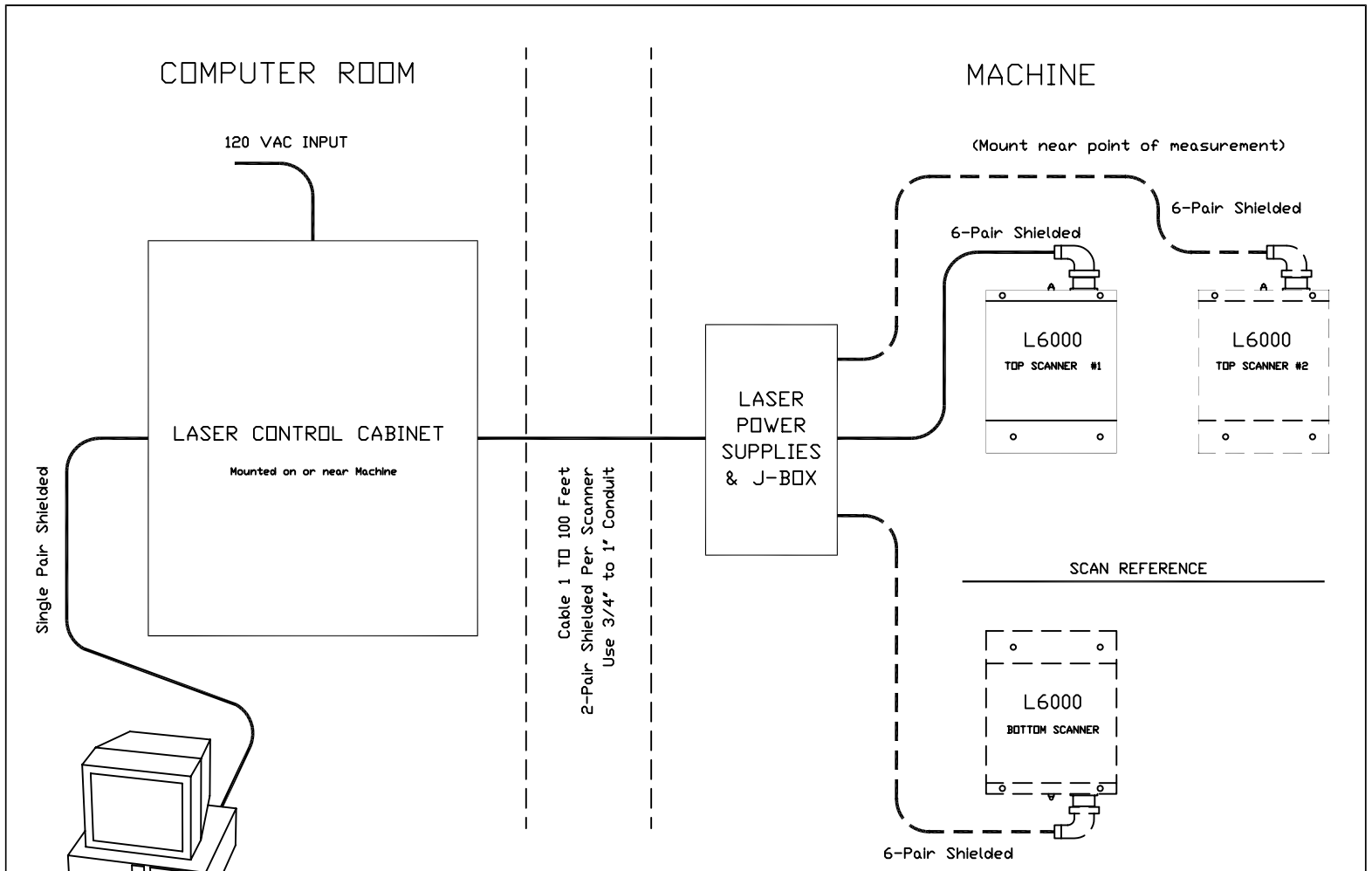
Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: INSTALL-2.DWG	Sheet: 2 Of: 12	REV 1
Drawn By: JT Date: 01-27-97	Approved: Date:	PAW-TAW-JOHN SERVICES, INC. SCANNER (L6000) INSTALLATION LAYOUT 2	



SYSTEM CONFIGURATIONS			
	Top #1	Top #2	Bottom
Single Top Scan	X		
Dual Top Scan	X	X	
Differential Scan	X		X
Dual Top Differential Scan	X	X	X

Refer to Mounting drawing for specific mounting details.

Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: INSTALL-3.DWG	Sheet: 3 Of: 12	REV 1
Drawn By: JT Date: 01-27-97	Approved: Date:	PAW-TAW-JOHN SERVICES, INC. SCANNER (L6000) INSTALLATION LAYOUT 3	

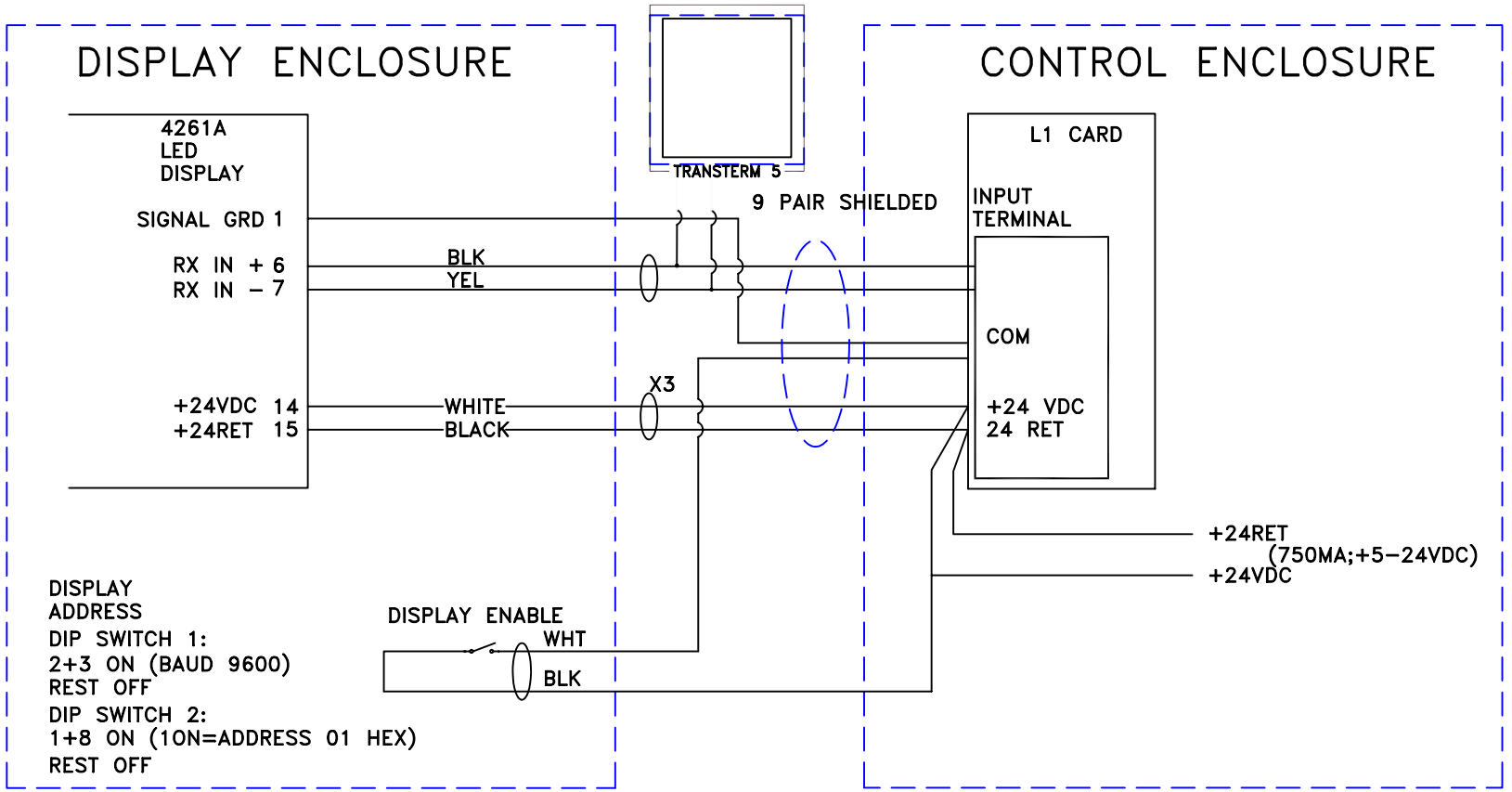


SYSTEM CONFIGURATIONS			
	Top #1	Top #2	Bottom
Single Top Scan	X		
Dual Top Scan	X	X	
Differential Scan	X		X
Dual Top Differential Scan	X	X	X

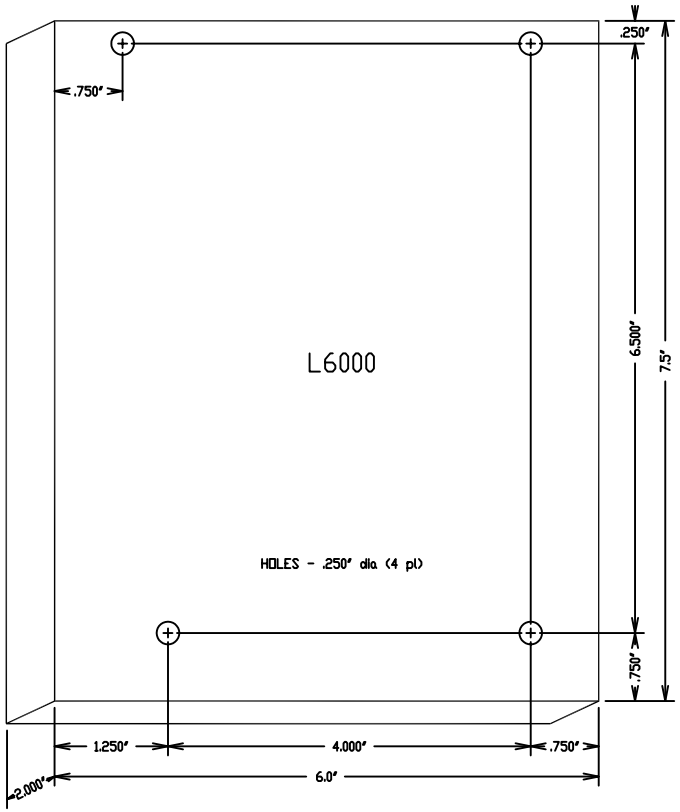
Refer to Mounting drawing for specific mounting details.

Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: INSTALL-4.DWG	Sheet: 4 Of: 12	REV 1
Drawn By: JT Date: 01-27-97	Approved: Date:	PAW-TAW-JOHN SERVICES, INC. SCANNER (L6000) INSTALLATION LAYOUT 4	

DISPLAY INTERFACE



Paw-Taw-John Services, Inc.	Filename: DISPLAY INTERFACE	Sheet: 12	Of: 12	REV: 1
Rathdrum, ID 83858 (208) 687-1478	PAW-TAW-JOHN SERVICES, INC			
Drawn By: JL Date: 06-25-98	Approved: JJ Date: 06-25-98	L6000 DISPLAY INTERFACE		

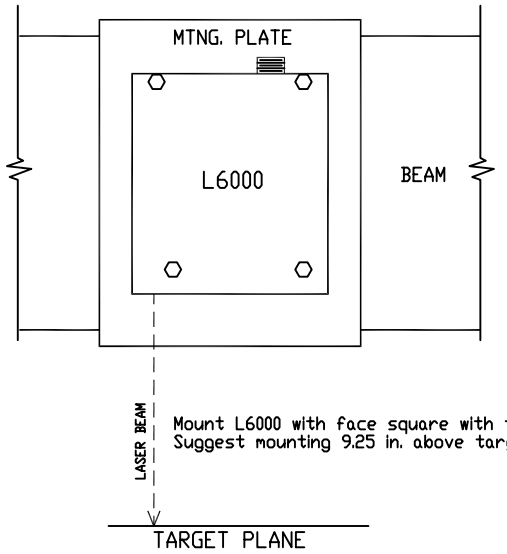


Notes:

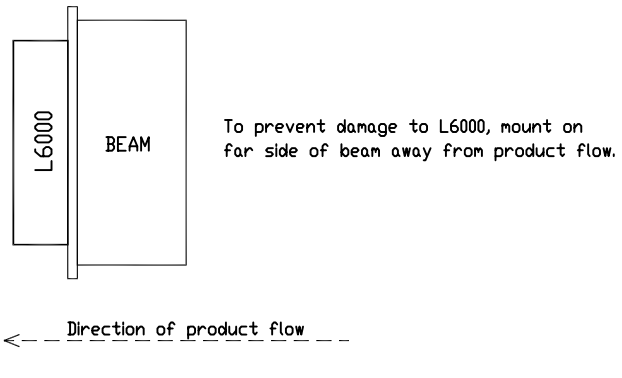
1. Suggest using 1/4" or 3/8" steel plate.
2. Drill L6000 mounting hole pattern show above.
3. Weld plate to beam over hanging measurement area.
4. Bolt L6000 gauge to plate with 4 ea 1/4 x 3" bolts.

Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: L6000 Mtng.dwg	Sheet: 7 Of: 12	REV 1
Drawn By: JT Date: 03-27-97	Approved: Date:	PAW-TAW-JOHN SERVICES, INC. SCANNER (L6000) INSTALLATION MOUNTING HOLE PATERN	

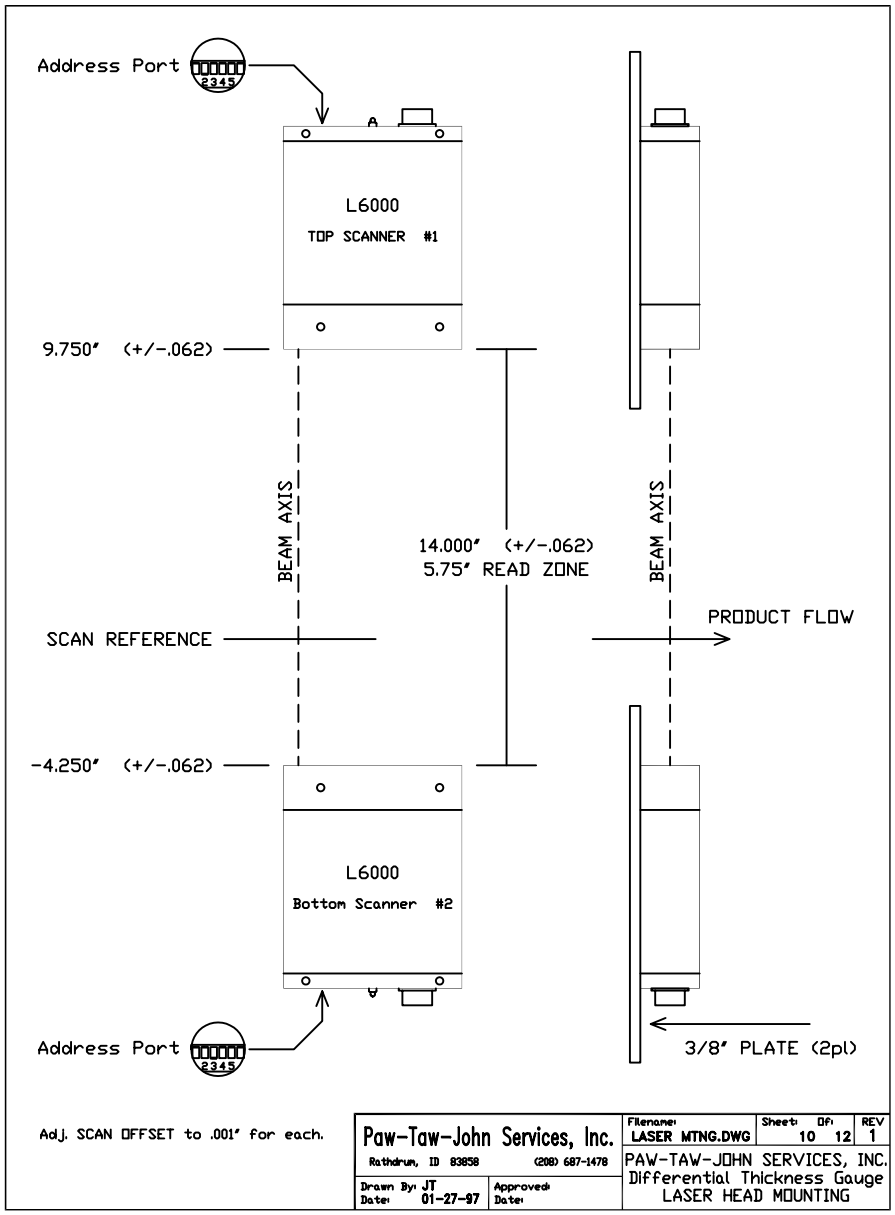
FRONT VIEW

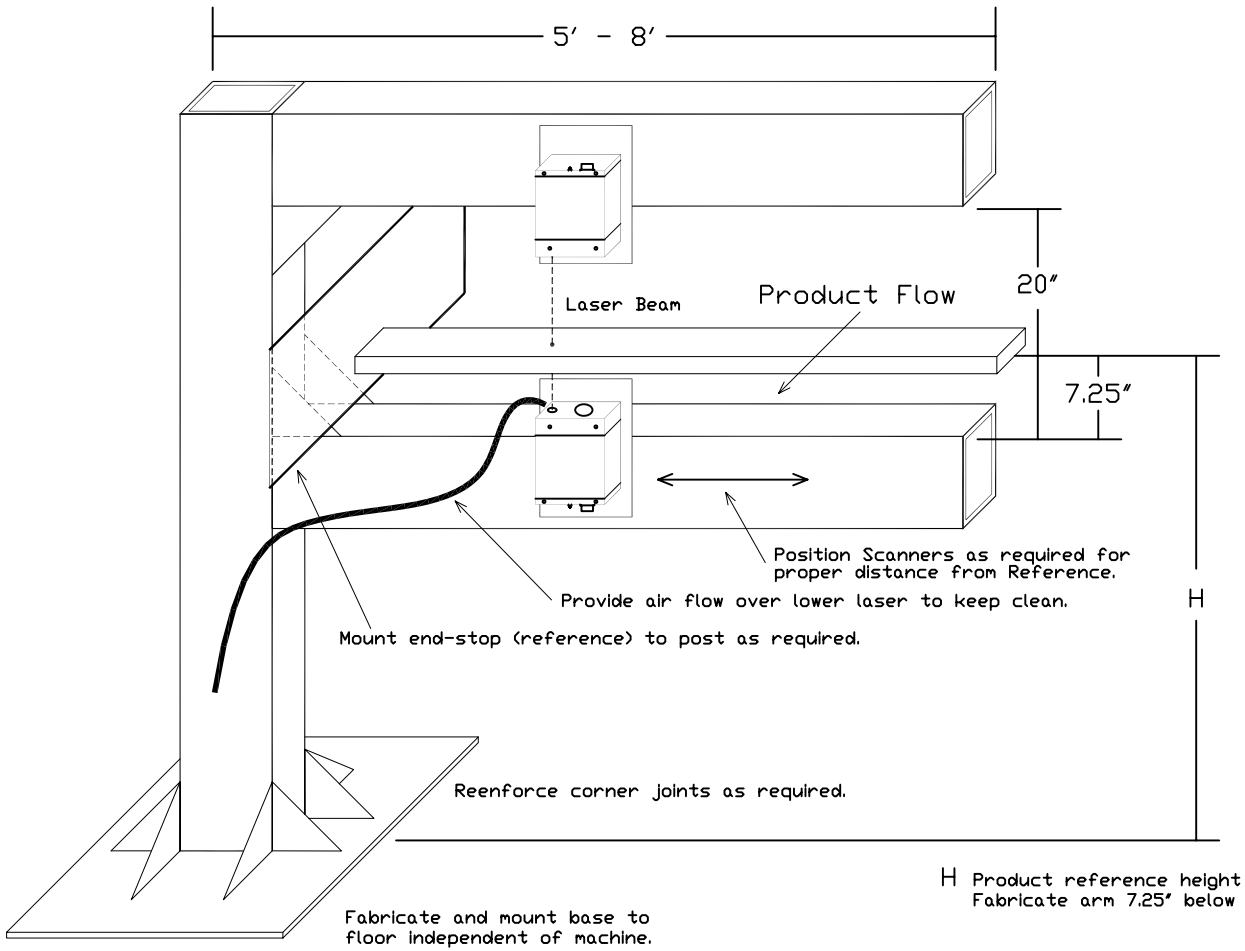


SIDE VIEW



Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: L6000 Posit.dwg	Sheet: 8 Of: 12	REV 1
Drawn By: JT Date: 03-27-97	Approved: Date:	PAW-TAW-JOHN SERVICES, INC. SCANNER (L6000) INSTALLATION L6000 POSITIONING	


Address Port
2345
L6000
TOP SCANNER #1
9.750" (+/-.062)
BEAM AXIS
14.000" (+/-.062)
5.75" READ ZONE
BEAM AXIS
SCAN REFERENCE
PRODUCT FLOW
-4.250" (+/-.062)
L6000
Bottom Scanner #2
Address Port
2345
3/8" PLATE (2pl)
Adj. SCAN OFFSET to .001" for each.
Paw-Taw-John Services, Inc.
Rathdrum, ID 83858
(208) 687-1478
Filename: LASER MTNG.DWG
Sheet: 10 Of: 12
REV 1
Drawn By: JT
Date: 01-27-97
Approved:
Date:
PAW-TAW-JOHN SERVICES, INC.
Differential Thickness Gauge
LASER HEAD MOUNTING



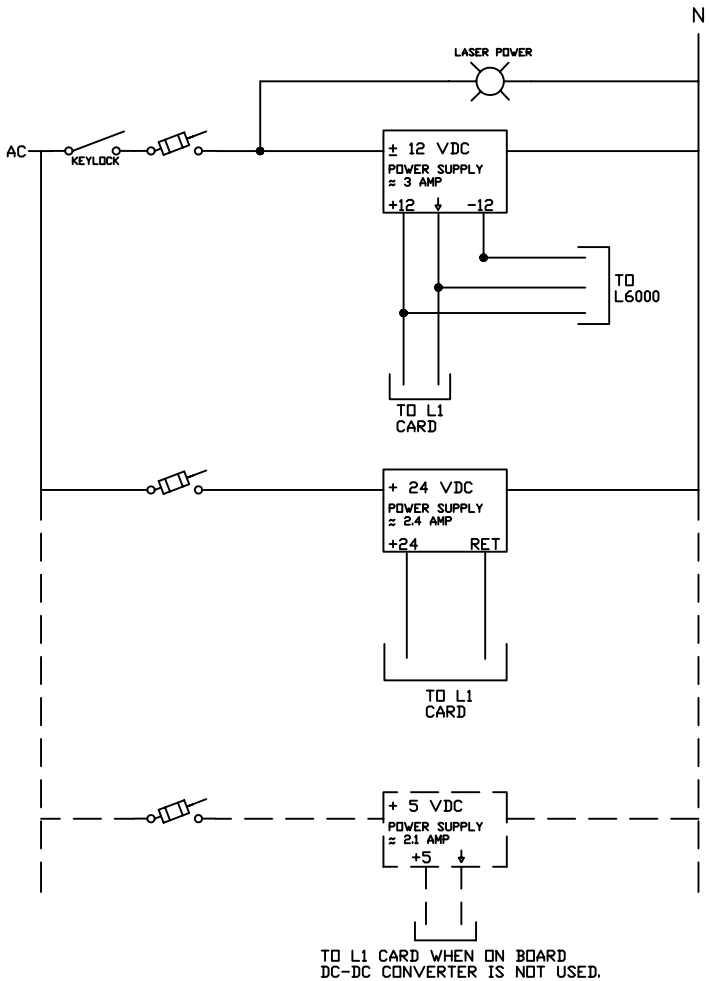
H Product reference height above floor. Fabricate arm 7.25″ below reference.

Fabricate post and arms from 4″ X 8″ (3/8 - 1/2 wall) box tubing.

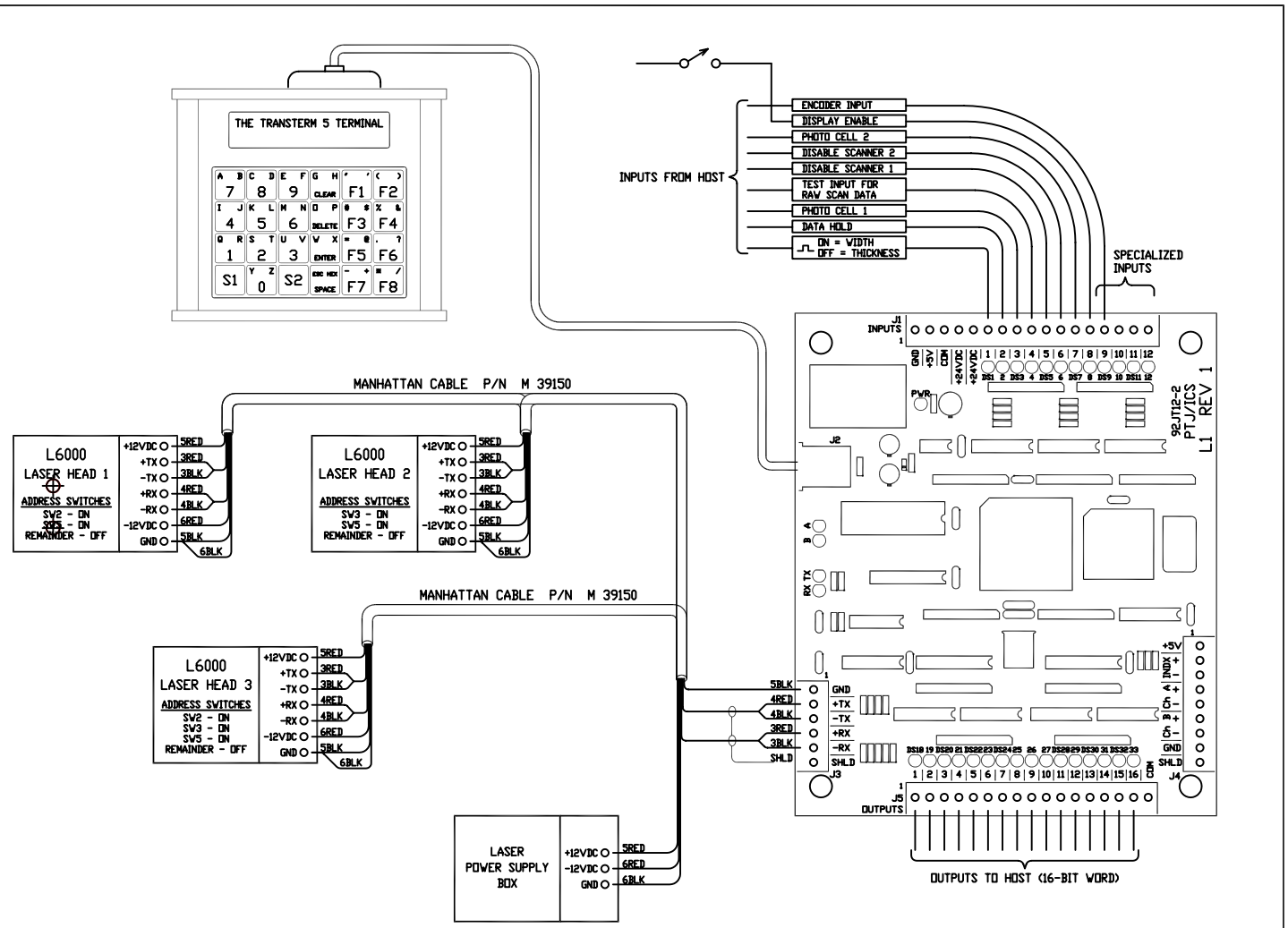
This concept drawing is provided as guidence for fabricating a pedestal with mounting arms. Actual design may vary to suit location and application.

Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478		Filename: PEDESTAL.DWG	Sheet: 9 Of: 12 REV: 1
Drawn By: JT Date: 01-28-97	Approved: Date:	PAW-TAW-JOHN SERVICES, INC. DIFFERENTIAL SCANNER SYSTEM MOUNTING PEDESTAL CONCEPT	

POWER SCHEMATIC TYPICAL
LASER THICKNESS SYSTEM

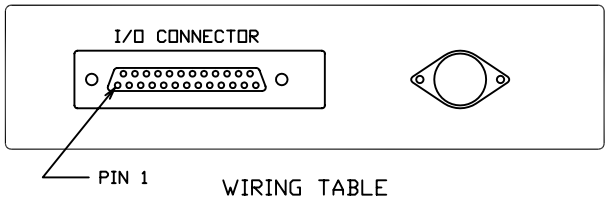


Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: Pwr Schematic	Sheet: 5 Of: 12	REV 8
Drawn By: MW Date: 02-23-99 / Approved: JJ Date: 02-23-99	PAW-TAW-JOHN SERVICES, INC. L6000 LASER THICKNESS SYST TYPICAL POWER SCHEMATIC		



Paw-Taw-John Services, Inc.	Filename: System Wir.dwg	Sheet: 6 Of: 12	REV 1
Rathdrum, ID 83858 (208) 687-1478	PAW-TAW-JOHN SERVICES, INC. THICKNESS GAUGE TYPICAL SYSTEM WIRING		
Drawn By: JT Date: 03-27-97	Approved: Date:		

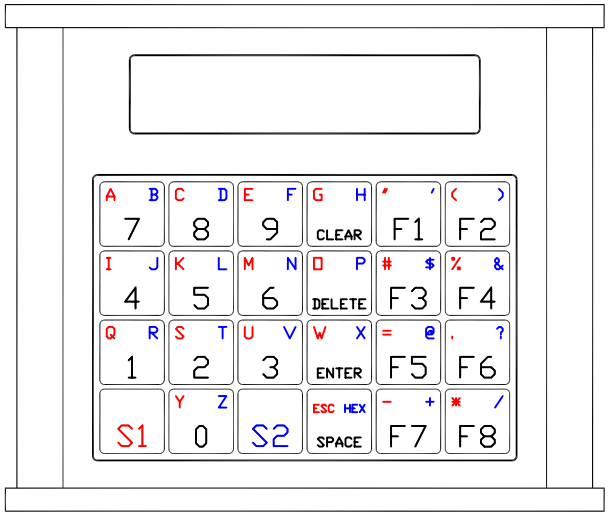
REAR PANEL VIEW



WIRING TABLE

CONNECTOR PIN NO.	WIRE COLOR	FUNCTION
23	GREEN	+TX
22	RED	-TX
25	BLACK	+RX
24	YELLOW	-RX
7	BLUE	GND
5, 20	WHITE	+12VDC
3, 16	ANY	JUMPER

FRONT VIEW



Paw-Taw-John Services, Inc. Rathdrum, ID 83858 (208) 687-1478	Filename: TT5-WIRING.DWG	Sheet: 11 Of: 12	REV 1
Drawn By: JT Date: 06-25-97 / Approved: JJ Date: 11-17-94	Paw-Taw-John Services, Inc. TRANSTERM 5 TERMINAL TERMINAL & CABLE WIRING		