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**Trend Series  
TLG2300 / TLG4500 Loadgard  
Operating Instructions**

*Force Measurement and Control Solutions*

**LIMITED WARRANTY**

Helm Instrument Co., Inc. ("HELM") hereby warrants that the instruments and sensors (collectively the "Product") manufactured by it and sold to customer, are free from defects in material and/or workmanship under normal use subject to the following conditions. This warranty shall not apply to any Product which has been subjected to improper installation, misuse, negligence, accident, alteration, where service has been performed by other than an authorized Helm serviceman, or where the serial number has been defaced or altered. This warranty shall extend for the one (1) year period from date of shipment from our factory or authorized dealer, provided that the product is returned, freight prepaid, to Helm within the one (1) year warranty period within specific written authorization to perform repairs. Helm's obligations and the exclusive remedy of customer under this warranty are limited to repairing or replacing any defective Product at no additional charge and returning Product to customer freight paid. Repair parts and replacement Products shall be furnished on an exchange basis and shall be either new or reconditioned. All replaced parts and Products shall become the property of Helm.

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Should you have any questions concerning this Warranty, you may contact Helm by writing or calling:

**HELM INSTRUMENT COMPANY, INC.  
CUSTOMER SERVICE  
361 WEST DUSSEL DRIVE  
MAUMEE, OHIO 43537  
(419) 893-4356**

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**EXPLANATION OF SYMBOLS**

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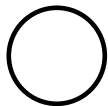
Alternating Current



Earth (ground) TERMINAL



On (Supply)



Off (Supply)



Caution, risk of electric shock



Caution (refer to accompanying documents)

Introduction..... 1  
Trend System Operation ..... 1  
The Strain Gain Transducer Operation ..... 1  
Trend Loadgard Installation..... 2  
Enviromental Conditions ..... 2  
Strain Gain Installation And Wiring ..... 2  
Sensor Wiring Connections..... 2  
Instrument Power And Relay Wiring ..... 3  
Electrical Specifications..... 3  
Replacement Fuses ..... 3  
Instrument Calibration ..... 5  
Preliminary Calibration Adjustment Procedures ..... 6  
Individual Channel Adjustments..... 6  
Manual Zero Adjust ..... 6  
Gain Adjust..... 7  
Meter Calibrate Switches ..... 8  
Setting Meter Calibrate Switches On Two Channel Systems ..... 9  
Alarm Set Procedures ..... 10  
Setting Capacity Alarm..... 11  
Setting High - Low Tolerance Limits ..... 12  
Establishing Optimum Tolerance Settings ..... 12  
Job Data Control (Jdc) ..... 13  
Initial Storing Of Capacity And Tolerance Settings ..... 13  
Storing Of Target Loads..... 13  
Testing For Open Job Number..... 14  
Calling Stored Job Data For Die Setup ..... 14  
Front Panel Controls - Operating Instructions..... 15  
Three Position Function Selector ..... 15  
Setup (Clear) Keyswitch Position ..... 15  
Monitor Parts Keyswitch Positions ..... 16  
Alarm Set Status ..... 17  
Digital Meter Display ..... 17  
Trend Display-Quality Window..... 18  
Recorder Output Jacks..... 19  
Front Panel Push Buttons ..... 20  
    Alarm Reset..... 20  
    Capacity Alarms..... 20  
    Strokes Per Minute ..... 20  
    Tolerance Alarms..... 20  
    Reverse Load ..... 20  
    Target Load ..... 20  
Cleaning ..... 21  
Computer Interface And Filter Card Wiring .....Appendix A

## INTRODUCTION

You have just purchased the most advanced load monitoring system available. In addition to this system, HELM INSTRUMENT CO., INC. manufactures a complete line of load monitoring control systems for use on metal stamping, forging, compaction and assembly presses; cold forming, cold heading, injection molding and die cast machines.

Standard or custom transducers and load cells are available for in-die monitoring or transfer or progressive tooling. Easy to use software systems designed for your specific plantwide SPC programs are also available.

At HELM, quality is inherent not only in the design of our products but in the attitudes of our employees as well. We're working together to give you the best. After all, that's what our business is all about - providing innovative instrumentation to help make your manufacturing process more productive and your operation more effective.

## TREND SYSTEM OPERATION

The HELM TREND LOADGARD control system provides protection for the die, the product and the machine with minimal operator involvement. The Loadgard takes a sample of the forming force of an ideal part, stores this level in memory and compares each subsequent force level against the ideal.

In addition to capacity alarms for overload protection, the TREND Loadgard features high and low tolerance limits, set automatically for each channel based on a pre-established setting.

Digital meters display load, machine speed, alarm settings and capacity alarms. Machine stop is initiated when an off tolerance part is produced.

## THE STRAIN GAIN TRANSDUCER OPERATION

The basic function of the HT-400 Strain Gain is to detect the amount of the deflection imposed on the press as parts are being formed. All Strain Gain sensors are matched to within 1% and therefore can be replaced without re-calibration of the machine.

The HT-400 Strain Gain sensors are mounted to strategic high stress areas of the machine frame. Signals from these sensors are routed to the TREND Loadgard for processing. The HT-400 is capable of measuring either a tension or compression signal.

**INSTALLATION GUIDELINES**

TREND LOADGARD INSTALLATION

 **WARNING**

If this unit is modified in a manner not specified by the manufacturer, protection provided may be impaired. Repair or calibration of this equipment is to be done by authorized personnel only. This unit contains no serviceable parts other than those outlined in this manual. Return unit to manufacturer for repair.

For purposes of safety, this unit is to be permanently installed. Electrical lines will be housed in conduit so that wiring is not subject to mechanical stress. A means of electrical disconnect (switch or circuit breaker) shall be included in the permanent power installation. This disconnect device will be in close proximity to the equipment and within easy reach of the operator. The device will be clearly marked as the disconnect for the equipment (ref. Drawing T-2227 Appendix A).

For best results, mount the TREND Loadgard at eye level and within operators' reach. Use the supplied rubber shock mounts to isolate the unit from vibration. Care should be taken to insure that the instrument chassis ground  $\Omega$  is the same potential as the machine ground. See **Mounting Detail Illustration** in Appendix A.

 **ENVIRONMENTAL CONDITIONS**

This unit is designed for indoor use only. Operating temperature range is from 5°C up to 55°C.

 **STRAIN GAIN INSTALLATION AND WIRING**

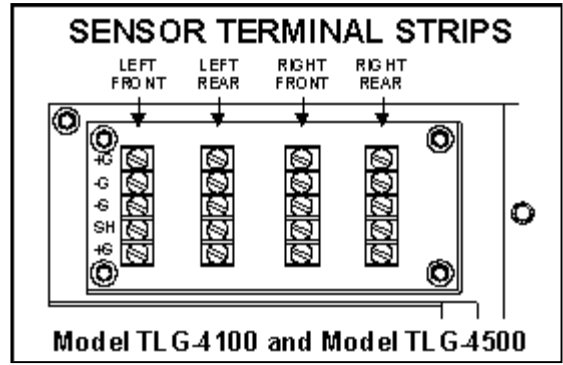
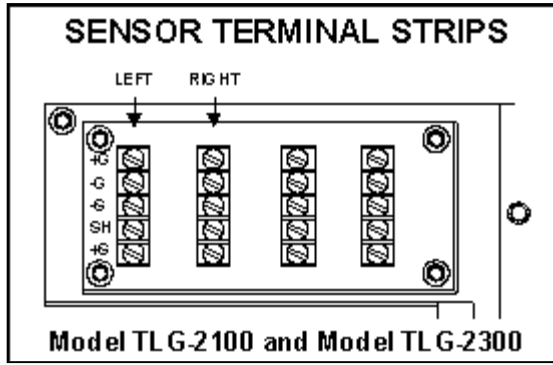
Specific sensor location and mounting instructions are described in the “Installing Strain Gain Transducers” manual. Refer to this manual for proper location and installation. Sensor nominal resistance values should check out in accordance with HELM drawing number T-2344-51 in Appendix A. For proper wiring, use separate conduit or sealtite for transducer cables and avoid running these cables with any press control or high power motor circuits. Transducer cables should never be run near high voltage (220VAC, 440VAC) circuits.

**SENSOR WIRING CONNECTIONS**

The Sensor Terminal Strips are located inside the box, above the circuit board card rack.

**NOTE: Always route power and sensor cables through proper holes as designated inside the LOADGARD enclosure.**

	TENSION	COMPRESSION
+G (gage positive)	green	black
-G (gage negative)	black	green
-S (signal negative)	red	red
(shield)	shield	shield
+S (signal positive)	white	white



**INSTRUMENT POWER AND RELAY WIRING**

Trend Loadgard supply wiring connections shall be made with 14 ga. THHN wire or equivalent.

Electrical Specifications

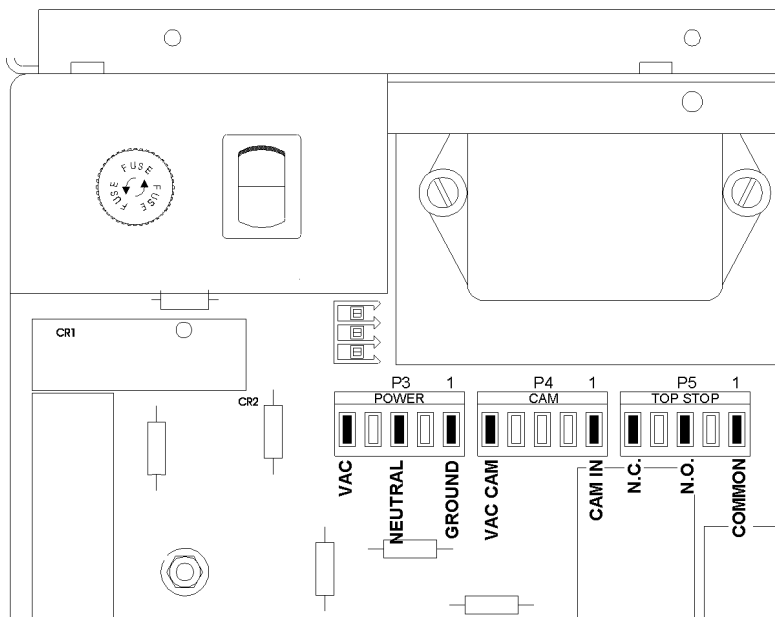
Unit marked for 120V~ operation	120V~ ±10%
	50-60 Hz 500 mA Max.
Unit marked for 220V~ operation	220V~ ±10%
	50-60 Hz 250 mA Max.
Installation Class III	

Replacement Fuses

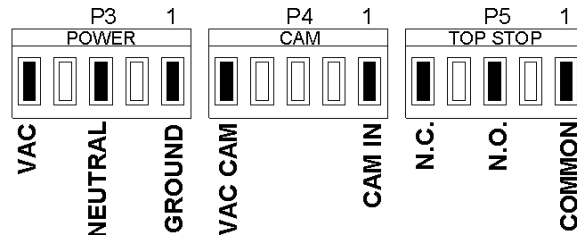
Replace fuses with main power OFF! (o)

Replace fuses with "TT" time delay fuses of specified rating only!

TLG-4500 models marked for 120V~ operation require a .5A 20mm x 5mm type TT fuse.  
 TLG-4500 models marked for 220V~ operation require a .25A 20mm x 5mm type TT fuse.



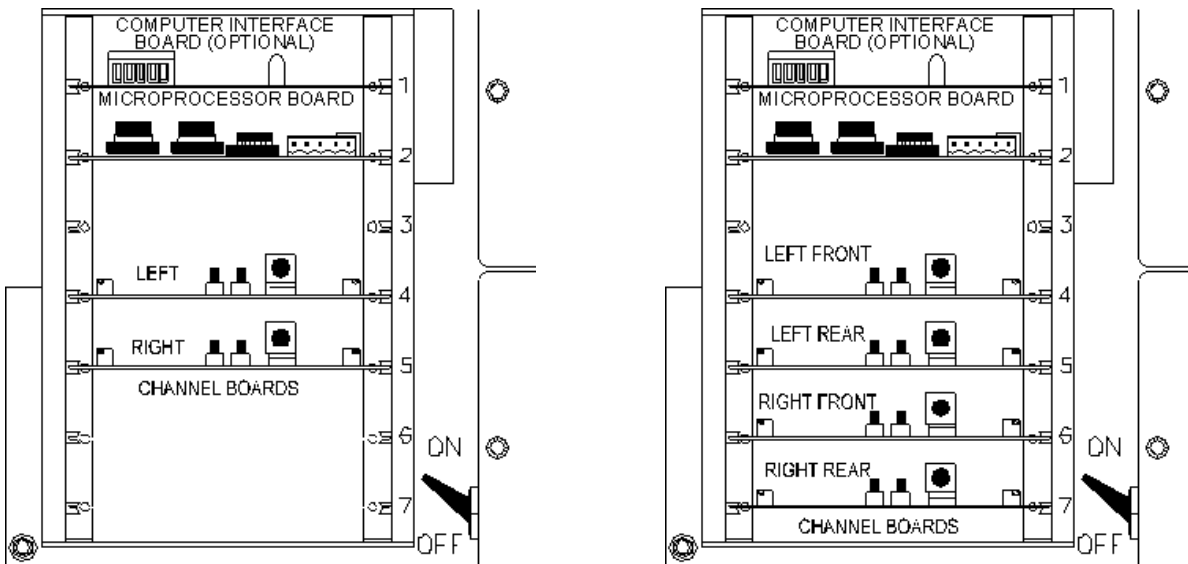
A mechanical relay is provided to activate machine stop when an alarm condition occurs. This relay is wired "fail-safe" and will pass current through the normally closed and common contacts when the instrument is turned on and no alarms are tripped. Current rating for these contacts is 10 amps at 120VAC. Cam switch connections are supplied, if applicable.



**CARD RACK - Channel Boards**

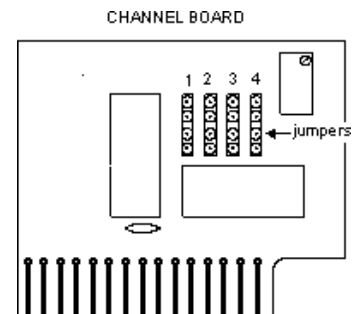
The steel cabinet (card rack) inside the instrument holds all the circuit boards. Slot #1 is reserved for the optional computer interface card. Slot #2 contains the microprocessor board that controls all instrument logic. Slot #3 is open.

Slots #4 through 7 are reserved for channel boards. Refer to the illustrations below for the proper location of each channel board in your instrument(s).



Channel boards are interchangeable. Use the jumper plugs on the individual channel boards for setting the proper channel board number.

NOTE: Jumpers are factory set prior to shipment. Adjust this jumper only if you switch channel board locations.

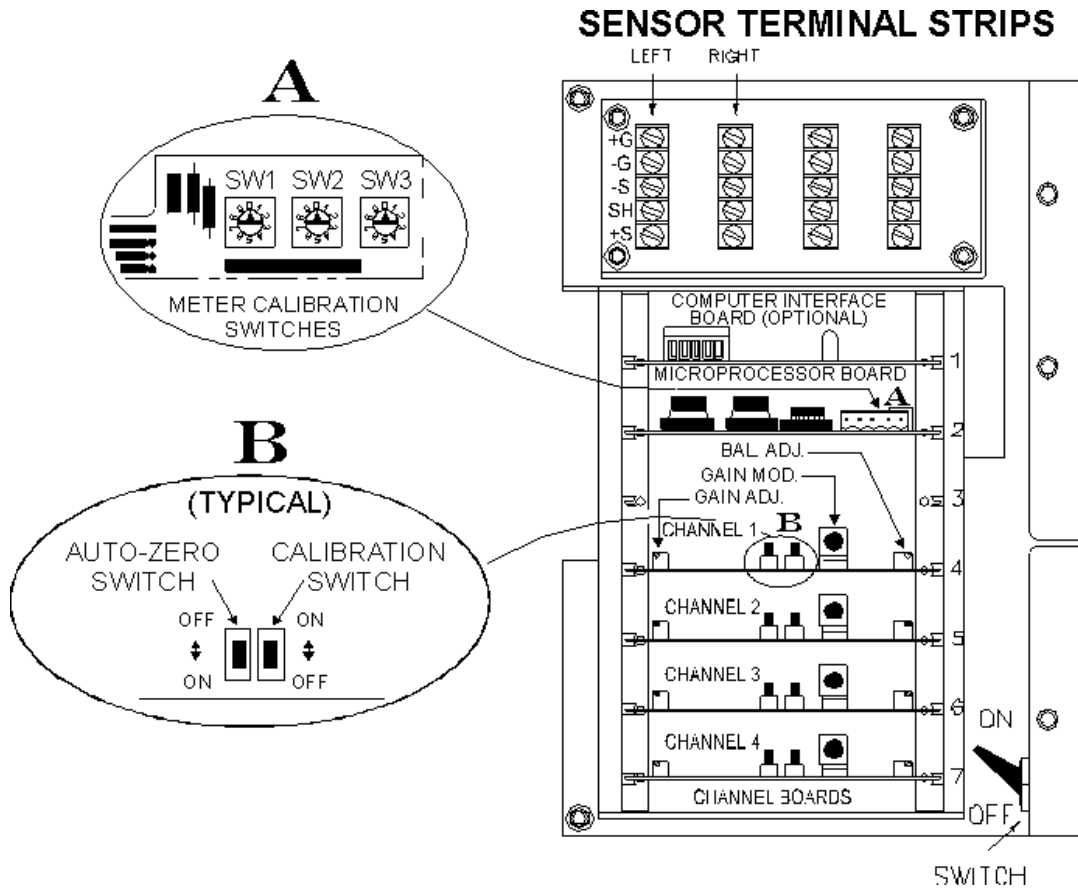




INSTRUMENT CALIBRATION

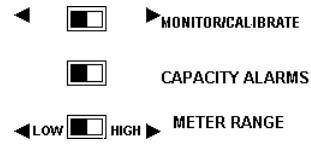
This section details calibration procedures. If this system has been calibrated by a HELM Field Service Engineer or by the machine manufacturer, the calibration numbers will be noted on a tag inside the instrument. Once calibrated, it is not necessary to re-calibrate unless the machine is moved, dismantled or otherwise structurally changed. If you have any questions or need a HELM Field Engineer for calibration, please contact our Field Service Department at 419-893-4356.

The illustration below details the locations of switches and potentiometers used during calibration.



PRELIMINARY CALIBRATION ADJUSTMENT PROCEDURES

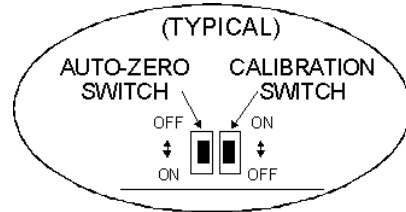
1. Turn function keyswitch to SETUP position.
2. Open enclosure door, turn power on.
3. Set MONITOR/CALIBRATE switch, located on inside of door, to the CALIBRATE position.



INDIVIDUAL CHANNEL ADJUSTMENTS

MANUAL ZERO ADJUST

1. Push AUTO ZERO switch to the OFF (back) position.
2. Pull CALIBRATION switch to the OFF (forward) position.
3. Adjust the ZERO BALANCE



The zero balance (BALANCE ADJUST) controls are the small multi-turn potentiometers at the extreme right of each channel board.

Watch the outside meter and turn the BALANCE ADJUST control of the first channel board until the meter displays all zeros. Repeat for all channels.



**NOTE:** On models TLG-4100 & TLG-2100, push LEFT or RIGHT DISPLAY button to display individual channel readings.

GAIN ADJUST

The GAIN ADJUST control is a small multi-turn control located on the extreme left of each channel board. This control is used to adjust the instrument to display the proper CAL (calibration) number on the digital meter(s).

1. Push CALIBRATION SWITCH to the ON (back) position. This switch puts the CAL resistor (simulated load) across the sensor for that channel.

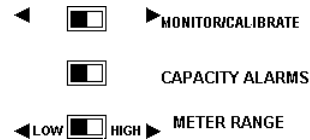
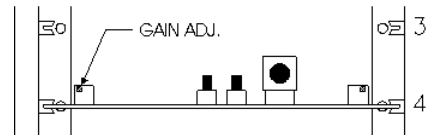
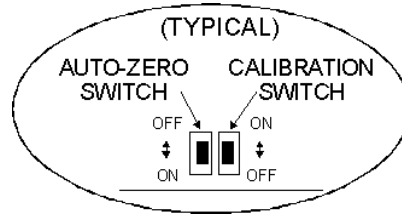
2. Set the GAIN ADJUSTMENT

If the press has been calibrated, use the CAL numbers that are recorded for each channel. If the press has not been calibrated, use 50 as a temporary cal number.

Watch the digital meter and turn the GAIN ADJUST control until the meter displays the correct CAL number. Repeat for all channels.

3. Turn AUTO ZERO on by moving the AUTO ZERO switch to the ON (forward) position. Pull CALIBRATION switch to the OFF (forward) position to remove simulated load.

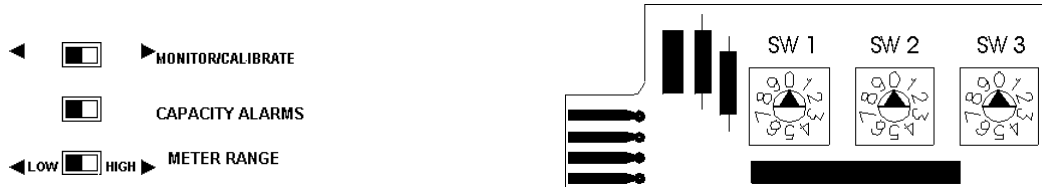
4. Set MONITOR/CALIBRATE switch back to "MONITOR" position.



**During normal operation, Auto Zero and Calibration switches must be in the forward position. Monitor/Calibrate switch must be in Monitor position.**

METER CALIBRATE SWITCHES

These switches, located on the microprocessor board (slot #2), are used to set meter scale based on rated machine capacity. Pull the microprocessor board out of the card rack for this adjustment. Make sure power to the instrument is OFF before pulling any boards from the rack.



SETTING METER CALIBRATE SWITCHES ON FOUR CHANNEL SYSTEMS

- FOR MACHINES UP TO AND INCLUDING 500 TON TOTAL CAPACITY

Put the METER RANGE selector to the LOW position. Calculate the capacity of one corner by dividing the total machine capacity by the number of channels (4).

Set the METER CALIBRATE switches to the capacity of one corner using the red switches labeled SW1, SW2, SW3.

- FOR MACHINES OVER 500 TONS TOTAL CAPACITY

PRESS CAPACITY	SWITCH SETTING	PRESS CAPACITY	SWITCH SETTING	PRESS CAPACITY	SWITCH SETTING
550	014	900	023	3500	088
600	015	950	024	4000	100
650	016	1000	025	4500	113
700	018	1500	038	5000	125
750	019	2000	050	5500	138
800	020	2500	063	6000	150
850	021	3000	075	6500	162

METER CALIBRATE SWITCHES (cont.)

SETTING METER CALIBRATE SWITCHES ON TWO CHANNEL SYSTEMS

- FOR MACHINES UP TO AND INCLUDING 250 TONS TOTAL CAPACITY

Put the METER RANGE selector to the LOW position. Calculate the capacity of one side by dividing the total machine capacity by the number of channels (2).

Set the METER CALIBRATE switches to the capacity of one side using red switches labeled SW1, SW2 and SW3.

EXAMPLE: For a 100 ton machine rated at 50 tons per side, set switches to 050 by setting left switch (SW1) to 0, middle switch (SW2) to 5 and right switch (SW3) to 0. Re-install board.

- FOR PRESS OVER 250 TONS TOTAL CAPACITY

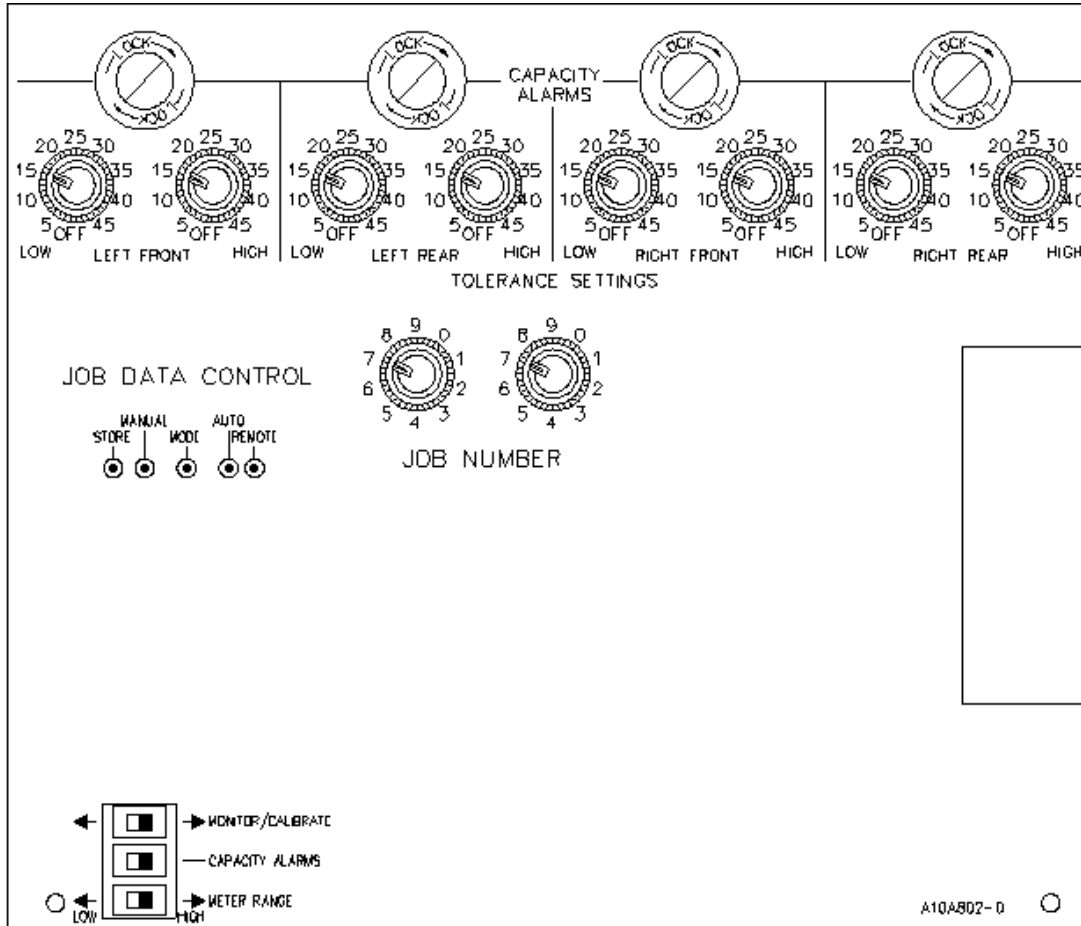
Put the METER RANGE selector to the HIGH position. Set METER CALIBRATE switches based on the following table.

PRESS CAPACITY	SWITCH SETTING	PRESS CAPACITY	SWITCH SETTING	PRESS CAPACITY	SWITCH SETTING
300	015	600	030	900	045
350	018	650	033	950	048
400	020	700	035	1000	050
450	023	750	038	1500	075
500	025	800	040	2000	100
550	028	850	043	2500	125
				3000	150

INSIDE CONTROLS

ALARM SET PROCEDURES

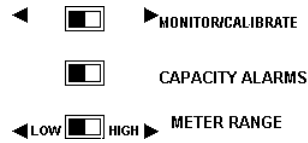
Capacity and tolerance alarm adjustments are located on the inside door panel. Capacity alarms provide press overload protection. Tolerance alarms provide tooling and die protection as well as providing part quality assurance.



SETTING CAPACITY ALARM

1. Turn Function Selector to SETUP position.

2. Open enclosure door and locate slide switches on inside door.



3. Slide top switch on inner door to CALIBRATE position (right) and center switch marked CAPACITY ALARMS to the right.

4. Unlock Capacity Alarm control knob by turning the locking ring counter clockwise.

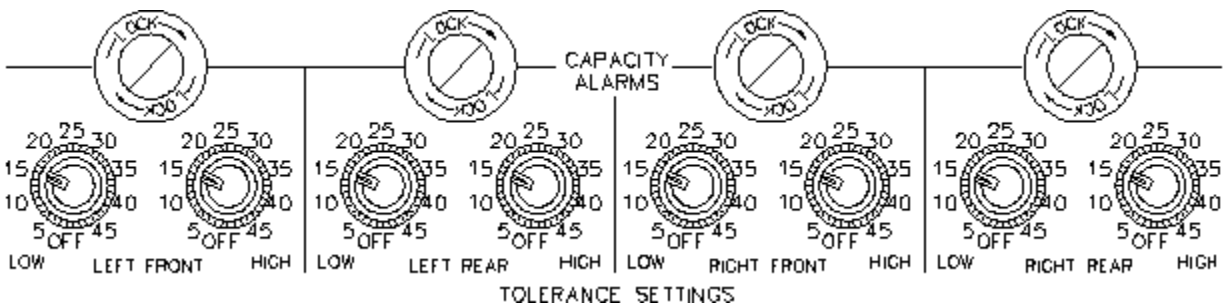
5. Calculate capacity alarm for each channel by dividing total press capacity by the number of channels on the instrument. Divide by four (4) for four channel systems. Divide by two (2) for two channel systems.

6. Watch the digital meter(s) and adjust capacity for each channel. Models 2100 & 4100 use the LEFT or RIGHT DISPLAY button for displaying individual channel settings on the digital meter.

7. Turn locking ring clockwise to lock Capacity Alarm sets.

8. Return top and center slide switches to left position. For normal operation, these two slide switches must be in the left position.

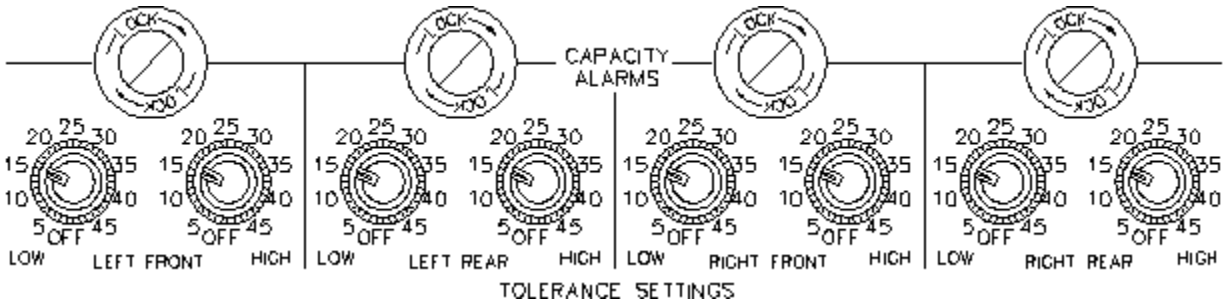
EXAMPLE: For a press with a four channel system and a total rated capacity of 500 tons, calculate the per channel capacity. Divide press capacity by the number of channels ( $500/4 = 125$  per corner). Turn the control to make the meter display 125 tons.



SETTING HIGH - LOW TOLERANCE LIMITS

Every TREND system features tolerance alarms which are used to establish a “quality window” that the process will operate within. These alarms are set as a percentage of the forming force and automatically adjusted each time a sample is taken or a new job is started.

The ability to establish alarms in percent eliminates the need to re-adjust settings for each job change. For example, with high and low tolerance settings of 10%, a 100 ton job has alarms automatically set at 110 tons high and 90 tons low. A 40 ton job has alarms automatically set at 44 tons high and 36 tons low.



There are two switches for each channel of monitoring; one to establish the LOW alarm setting and one for the HIGH alarm setting. Each switch is selectable from 5% to 45%, in increments of 5%. There is also a position to turn the alarms off.

A tolerance setting of plus 5% on an individual channel will cause an alarm when the load level increases 5% above the sampled load.

A tolerance setting of minus 45% on a particular channel will cause an alarm when the load decreases 45% from the sampled load.

ESTABLISHING OPTIMUM TOLERANCE SETTINGS

A good baseline starting point is 25%, high and low. With the instrument in Monitor Parts mode, watch the trend lights during a production run. Begin lowering tolerance percents until the center green (GOOD) LED starts flashing one LED up and down from center.



JOB DATA CONTROL (JDC)

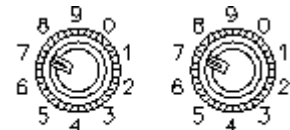
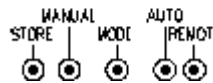
The JED feature provides memory storage of up to 100 different job numbers per LOADGARD. The following data is stored for each job:

- Capacity alarm settings
- Tolerance alarm settings
- Target (optimum) load values

INITIAL STORING OF CAPACITY AND TOLERANCE SETTINGS

1. Put JDC switch in manual mode.
2. Set selector switches to desired job number (0-99).
3. Check capacity and tolerance settings; readjust if necessary.
4. Press STORE button
5. Green LED on JDC panel will flash, indicating data is being stored.
6. To over-ride and store new settings, follow steps 1-5.

JOB DATA CONTROL



JOB NUMBER

STORING OF TARGET LOADS

1. Put JDC switch in Auto mode.
2. Turn front panel keyswitch to monitor parts mode.
3. TARGET values are automatically stored during initial setup when front panel keyswitch is turned to Monitor Parts mode. The TARGET value is current peak tonnage as displayed on digital meters.
4. To over-ride and store new TARGET values, put JDC switch in Auto Mode and press store button. Peak loads as displayed on the digital meters will be stored as new target loads.
5. Green LED will flash, indicating data is being stored.

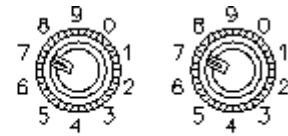
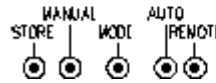
**Capacity and Tolerance settings are stored in MANUAL mode. Target loads are stored in AUTO mode.**

JOB DATA CONTROL (cont.)

TESTING FOR OPEN JOB NUMBER

1. Put JDC switch in AUTO mode.
2. Select job number.
3. Yellow LED will flash if job number is available.

JOB DATA CONTROL

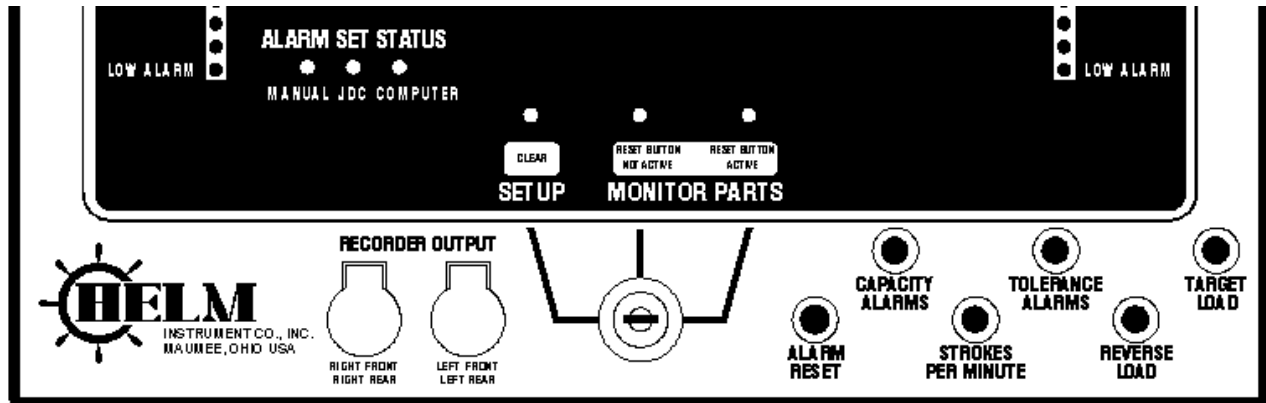


JOB NUMBER

CALLING STORED JOB DATA FOR DIE SETUP

1. Select job number to be recalled.
2. Put JDC switch in auto mode.
3. Capacity and Tolerance settings are activated for first hit protection.
4. Press Target Load button on front panel to display target values on each channel.  
Job number is displayed on center meter.
5. With front panel function selector switch in SETUP mode, Trend columns are used to indicate if the current peak load value is above or below the stored target value.

## FRONT PANEL CONTROLS - OPERATING INSTRUCTIONS



## THREE POSITION FUNCTION SELECTOR

- A position marked SETUP (Clear)
- A monitoring position marked MONITOR PARTS (RESET BUTTON NOT ACTIVE)
- A monitoring position marked MONITOR PARTS (RESET BUTTON ACTIVE)

## SETUP (CLEAR) KEYSWITCH POSITION

Use this position for machine and die set up. The following conditions are present in SETUP mode:

- Machine capacity alarms are active. Press button labeled "CAPACITY ALARMS" to display alarm settings on each channel.
- The alarm RESET button will initiate a PEAK reset.
- The REVERSE LOAD and strokes per minute buttons are not active.
- The TREND display and the TREND alarms are turned OFF.
- Parts counter is not updated.

**NOTE:** Always power on the instrument in the SETUP position. If the instrument is powered on in either MONITOR PARTS position, the machine stop relay will prevent the machine from running and the digital display will flash zeroes. Turn the function switch to SETUP to reset machine stop relay.

## MONITOR PARTS KEYSWITCH POSITIONS

During production, the keyswitch should be in one of these MONITOR PARTS positions.

Once the machine is set up and producing good parts, turn the switch to one of these positions. The instrument will take a sample of the forming loads and store this sample in memory. Each subsequent hit is compared to this sample. The TREND lights will display any changes in the forming loads.

Tolerance alarms are automatically adjusted when this sample is taken. Any load change that meets or exceeds the tolerance settings will cause an alarm condition and activate the machine stop relay.

In Monitor Parts/Reset Not Active, the ALARM RESET button is inactive and the keyswitch must be turned to Reset Active before alarms can be reset.

The following conditions are present in MONITOR PARTS position:

- Capacity alarms are active.
- The TREND display and the TREND alarms on ON.
- All front panel switches are active.

**NOTE:** The sample loads are erased whenever the function switch is turned to the SETUP position. To stop the machine for a break, leave the instrument in MONITOR PARTS-RESET ACTIVE position. When restarting the machine, push ALARM RESET button to clear any alarms.

## ALARM SET STATUS

LED's located on front panel indicate status of instrument capacity and tolerance alarm settings as follows:

- **MANUAL**  
JDC and Computer controls are inactive.  
Alarm limits adjusted based on switch settings inside door.
- **JDC**  
Alarm limits adjusted based on settings stored in Job Data memory circuit. With JDC feature active, adjustments made on capacity or tolerance alarm switches have no effect.
- **COMPUTER**  
When interfaced with computer or PLC, JDC job numbers and alarm limits can be sent to the LOADGARD from remote location. With computer set limits, JDC and manual selector switches are inactive and computer has control.

## DIGITAL METER DISPLAY

During normal operation, the center digital meter displays the total tonnage being applied on the press. The meter is also used for displaying total reverse (snap-thru) loads and machine speed (SPM). On single digital meter instruments, this center meter is used to display capacity alarm settings and high and low tolerance setting for each channel.

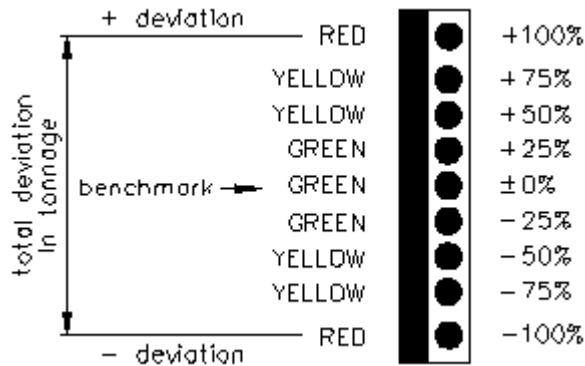
**Models TLG-4500 & TLG-2300** have additional digital meters for displaying the load and alarm settings on individual channels.

**Models TLG-4100 & TLG-2100** use the Left and Right Display buttons for displaying individual channel DISPLAY button for additional meter display.

TREND DISPLAY-QUALITY WINDOW

Each vertical TREND column represents one channel of monitoring. The TREND portion of the instrument works on the “benchmark” principle. The instrument will take a sample of the forming loads at each channel and automatically establish the high and low alarm limits.

After the load sampling and the alarm setting sequence is complete, only the center green GOOD lights will be on in each TREND display. As each subsequent part is formed, the load deviation from the ideal condition is displayed on the TREND display.

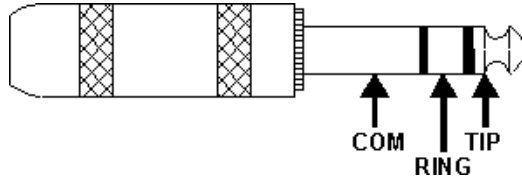
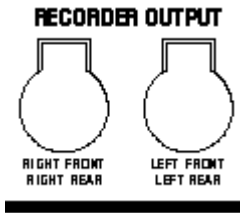


- The center green GOOD light of each column represents the average benchmark level. When only the GOOD lights are on, the last part was formed at the same load as the sampled benchmark (no deviation in load).
- The top red lights of each column represents the HIGH alarm trip point as set by the tolerance selector switch. A red light indicates that the last part was formed at a force higher than the setting of the HIGH tolerance.
- The bottom red lights of each column represent the LOW alarm trip point as set by the tolerance selector switch. A bottom red light indicates that the last part was formed at a force lower than the setting of the LOW tolerance selector.

The green lights above and below the center and any yellow lights represent caution. They indicate that the last part was formed at a force level that was higher or lower than the optimum, but was still within the pre-selected tolerance bands. These lights indicate that something has changed in the forming process.

RECORDER OUTPUT JACKS

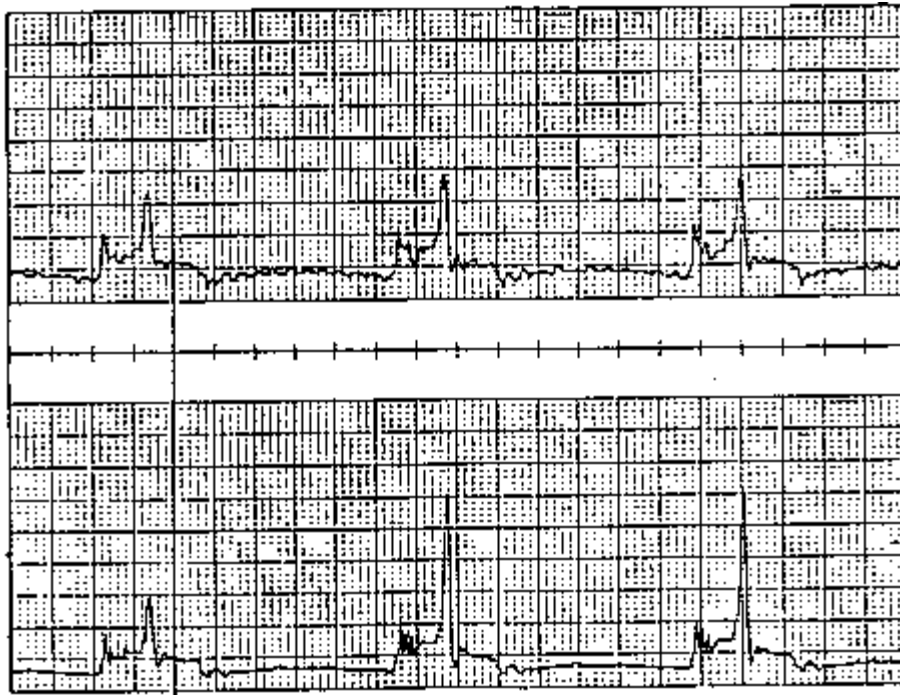
Each TREND instrument has one or two dual circuit jacks for use with HELM Ramcorder or for output to a strip chart recorder.



Corner or Side Capacity level at each jack is 2.66 volts

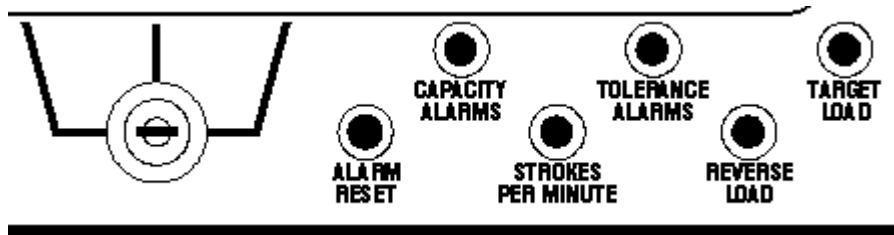
2 Channel systems: Ring = Left Tip = Right  
4 Channel systems: Tip = Rear Ring = Front

Waveform recordings provide an analytical method of determining the force being developed throughout the entire stroke of the machine. Each die has its own unique signature, similar to an electro-cardiogram. Analyzing each of the subtle peak forces developed during the stamping process and comparing current signatures to previously recorded masters can be an aid in diagnosing or forming of die problems.



Product quality and press speeds are greatly enhanced after making and analyzing waveform recordings. Many stampers make recordings as a routine part of their start-up procedures when working with a new or modified die, creating a history of recordings for each job.

## FRONT PANEL PUSH BUTTONS

**ALARM RESET**

Pressing this switch initiates a Peak reset for any alarm condition. This switch is only active when keyswitch is in SETUP or MONITOR PARTS RESET ACTIVE position.

**CAPACITY ALARMS**

Press the CAPACITY ALARMS button to any operating mode to display the capacity alarm setting on each channel. On single meter systems, press and hold the appropriate channel display button.

**STROKES PER MINUTE**

SPM is calculated and displayed when function keyswitch is in Monitor Parts position. While the machine is producing parts, press and hold STROKES PER MINUTE button to display machine operating speed on center meter. Two machine cycles are required before SPM is displayed.

**TOLERANCE ALARMS**

Press the TOLERANCE ALARMS button to display high and low tolerance setting. The first two digits represent the high tolerance setting; the second 2 digits represent the low tolerance setting. A display of 2010 represents tolerance settings of 20% high and 10% low. On single meter instruments press and hold the appropriate DISPLAY button.

**REVERSE LOAD**

With function selector in Monitor Parts position, the reverse (snap-thru) tonnage imposed on each channel plus total machine is displayed when this button is pressed.

**TARGET LOAD**

When using Job Data Control (JDC) feature, the TARGET LOAD for each channel (and total) is displayed with this push button.



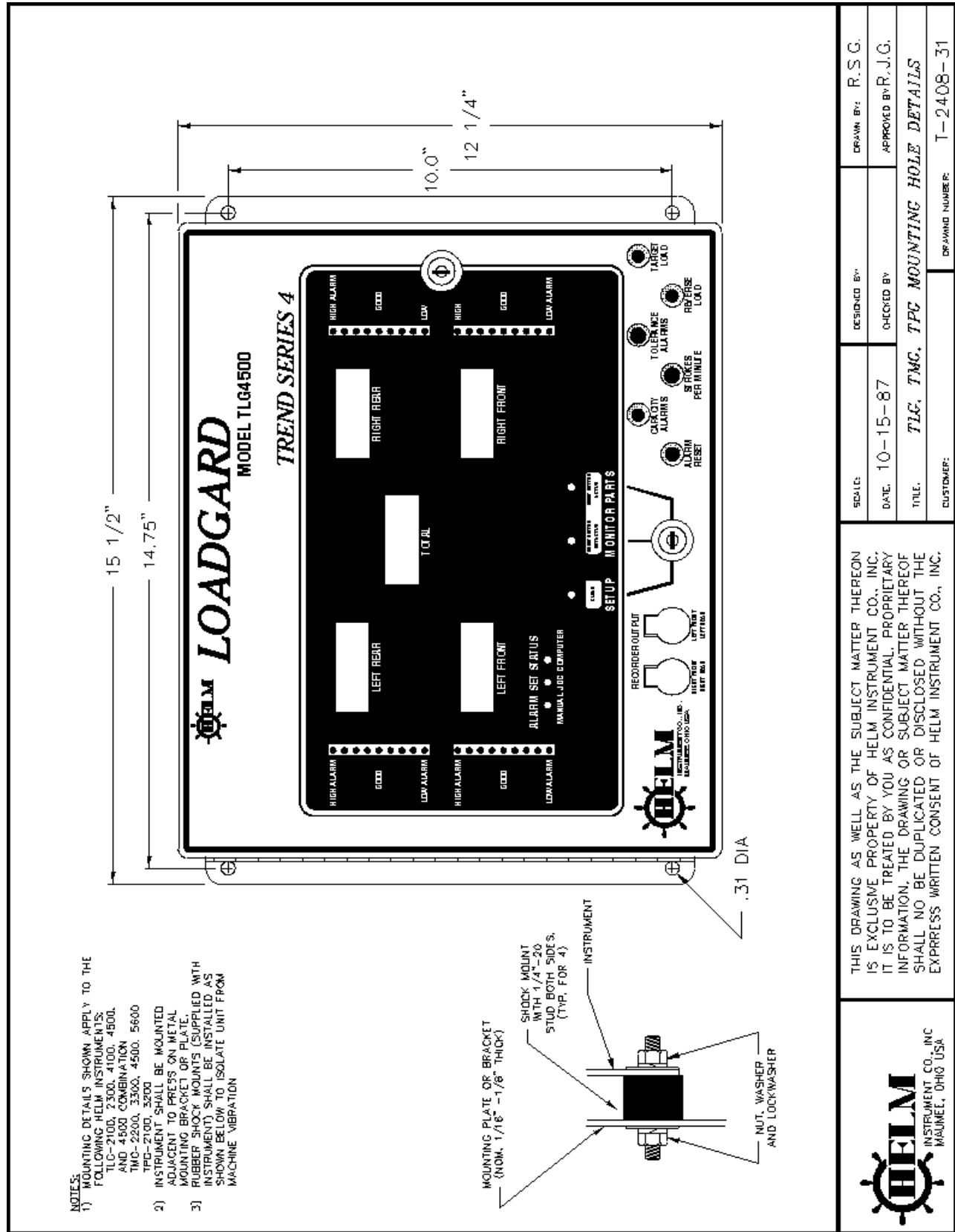
## CLEANING

External cleaning to this unit is to be with a clean cloth moistened with warm water and mild detergent only. The unit should be wiped dry then allowed to air dry before returning to service.

Internal printed circuit board cleaning is accomplished by removing individual boards and cleaning with an approved printed circuit board cleaner. Dry boards are to be replaced before returning unit to service.



**All cleaning is to be done with main power OFF!**



- NOTES:
- 1) MOUNTING DETAILS SHOWN APPLY TO THE FOLLOWING HELM INSTRUMENTS: TLG-2100, 2300, 4100, 4500, AND 4500 COMBINATION TMC-2200, 3300, 4500, 5600 TPC-2100, 3200
  - 2) INSTRUMENT SHALL BE MOUNTED ADJACENT TO PRESS ON METAL MOUNTING BRACKET OR PLATE.
  - 3) RUBBER SHOCK MOUNTS (SUPPLIED WITH INSTRUMENT) SHALL BE INSTALLED AS SHOWN BELOW TO ISOLATE UNIT FROM MACHINE VIBRATION.

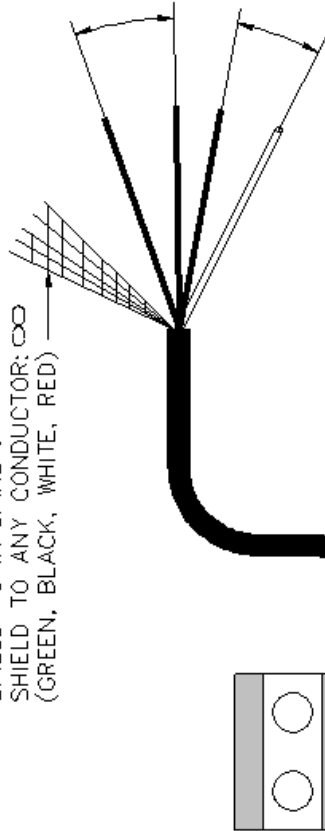
SCALE:	DESIGNED BY:	DRAWN BY:
DATE: 10-15-87	CHECKED BY:	R.S.G.
TITLE: TLG, TMC, TPC MOUNTING HOLE DETAILS		APPROVED BY: R.J.G.
CUSTOMER:	DESIGN NUMBER:	T-2408-31

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ILLUSTRATION

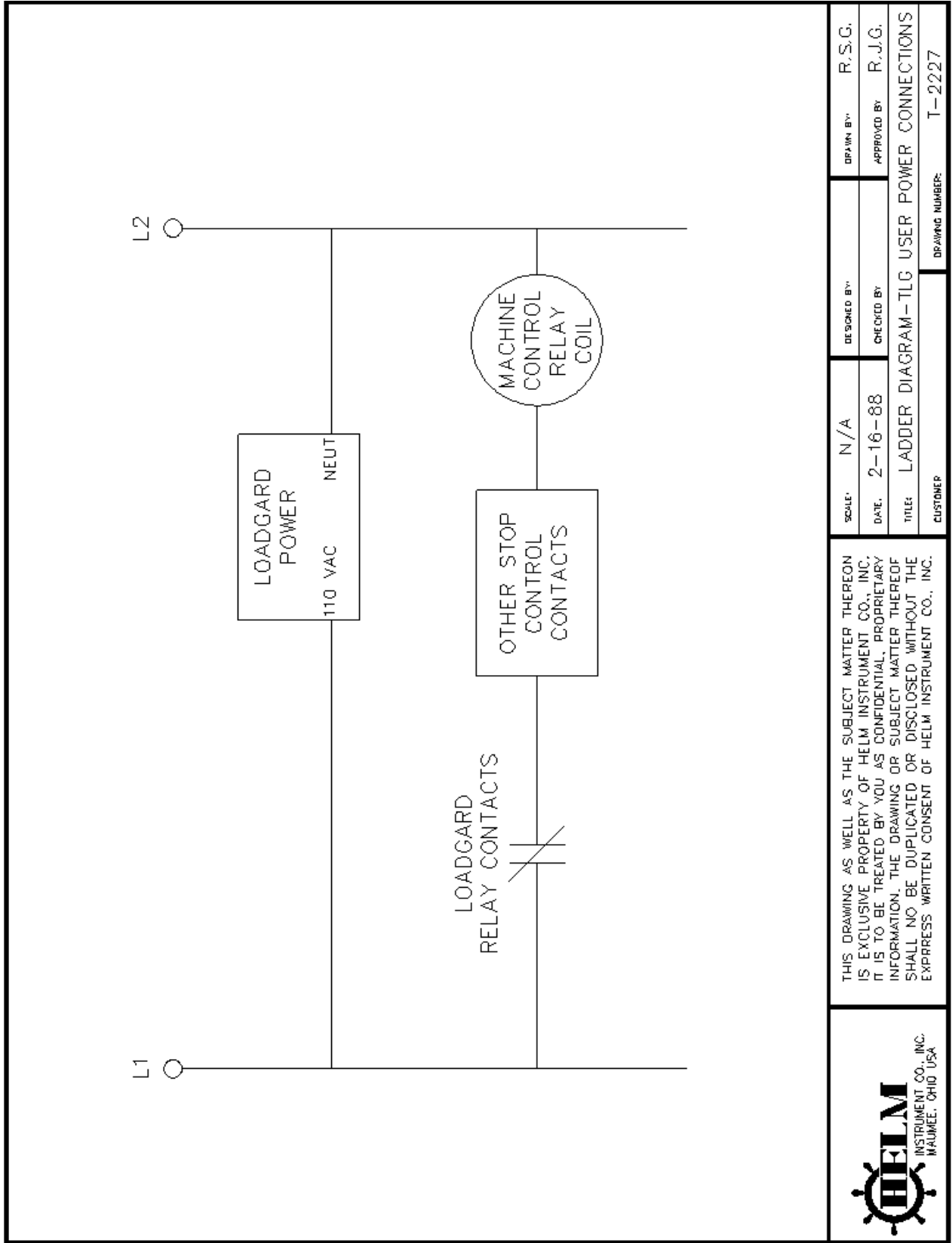
SHIELD TO MACHINE : ∞  
 SHIELD TO ANY CONDUCTOR: ∞  
 (GREEN, BLACK, WHITE, RED)



GREEN - BLACK : 350 OHMS  
 WHITE - RED : 350 OHMS  
 GREEN - RED : 263 OHMS  
 WHITE - BLACK : 263 OHMS  
 BLACK - RED : 263 OHMS

NOTE:  
 ABOVE RESISTANCE VALUES SHOULD  
 MEASURE WITHIN  $\begin{matrix} +10 \\ -0 \end{matrix}$  OHMS FOR CABLE  
 LENGTHS UP TO STANDARD 35 FT.

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	DATE: 8-31-88		CHECKED BY:	APPROVED BY: R. T. W.	
TITLE: HT-400 NOMINAL SENSOR RESISTANCE VALUES			CUSTOMER:		
DRAWING NUMBER: T-2344-51					

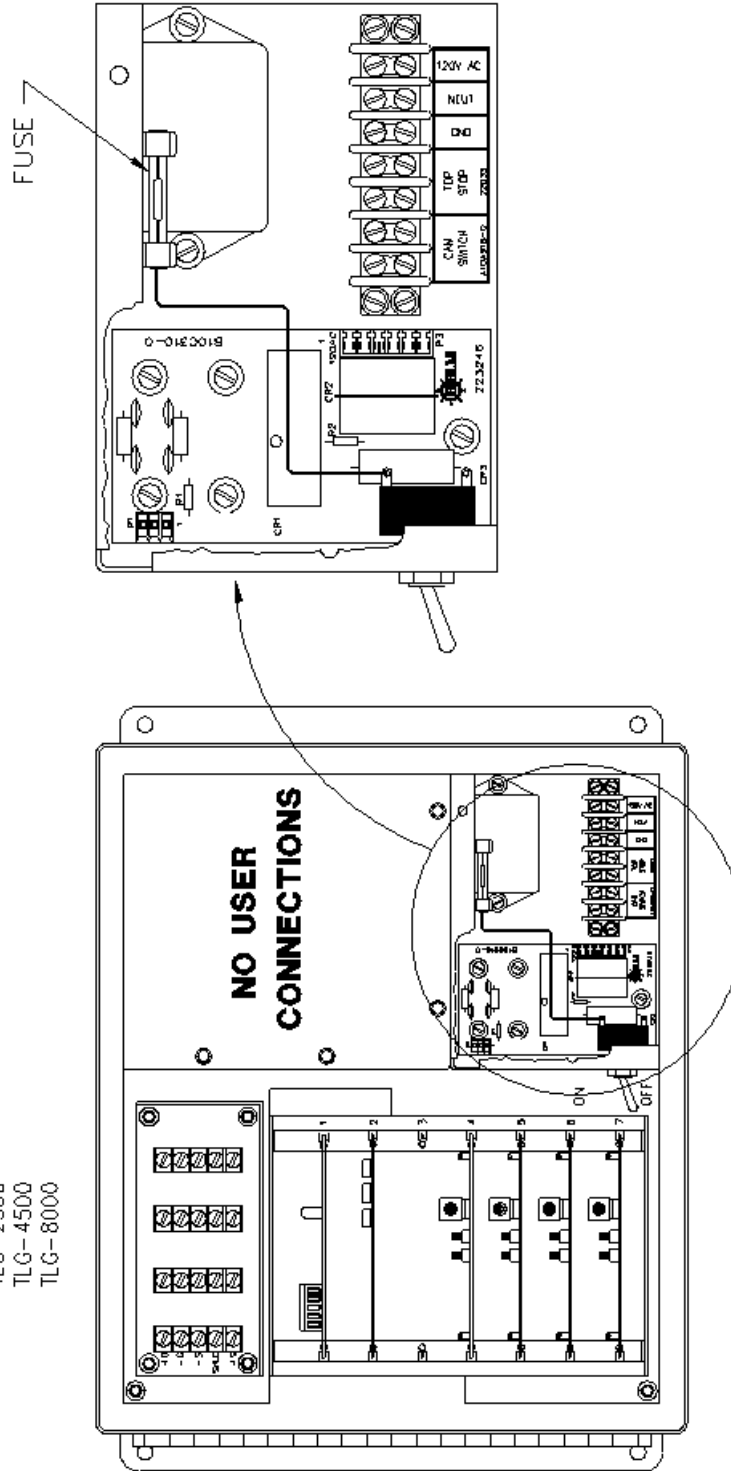


SCALE:	N/A	DESIGNED BY:	R.S.G.
DATE:	2-16-88	CHECKED BY:	R.J.G.
TITLE:	LADDER DIAGRAM-TLG USER POWER CONNECTIONS		
CUSTOMER:	DRAWING NUMBER: T-2227		

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*ILLUSTRATION*



NOTE:  
 1) USER CONNECTIONS SHOWN ARE  
 TYPICAL FOR THE FOLLOWING  
 LOADGARDS:  
 TLG-2100  
 TLG-2300  
 TLG-4500  
 TLG-8000

SCALE:	N/A	DESIGNED BY:	R.S.G.
DATE:	4/1/92	CHECKED BY:	R.J.G.
TITLE:	TLG USER POWER CONNECTIONS		
CUSTOMER:	DRAWING NUMBER: T-2286-11		

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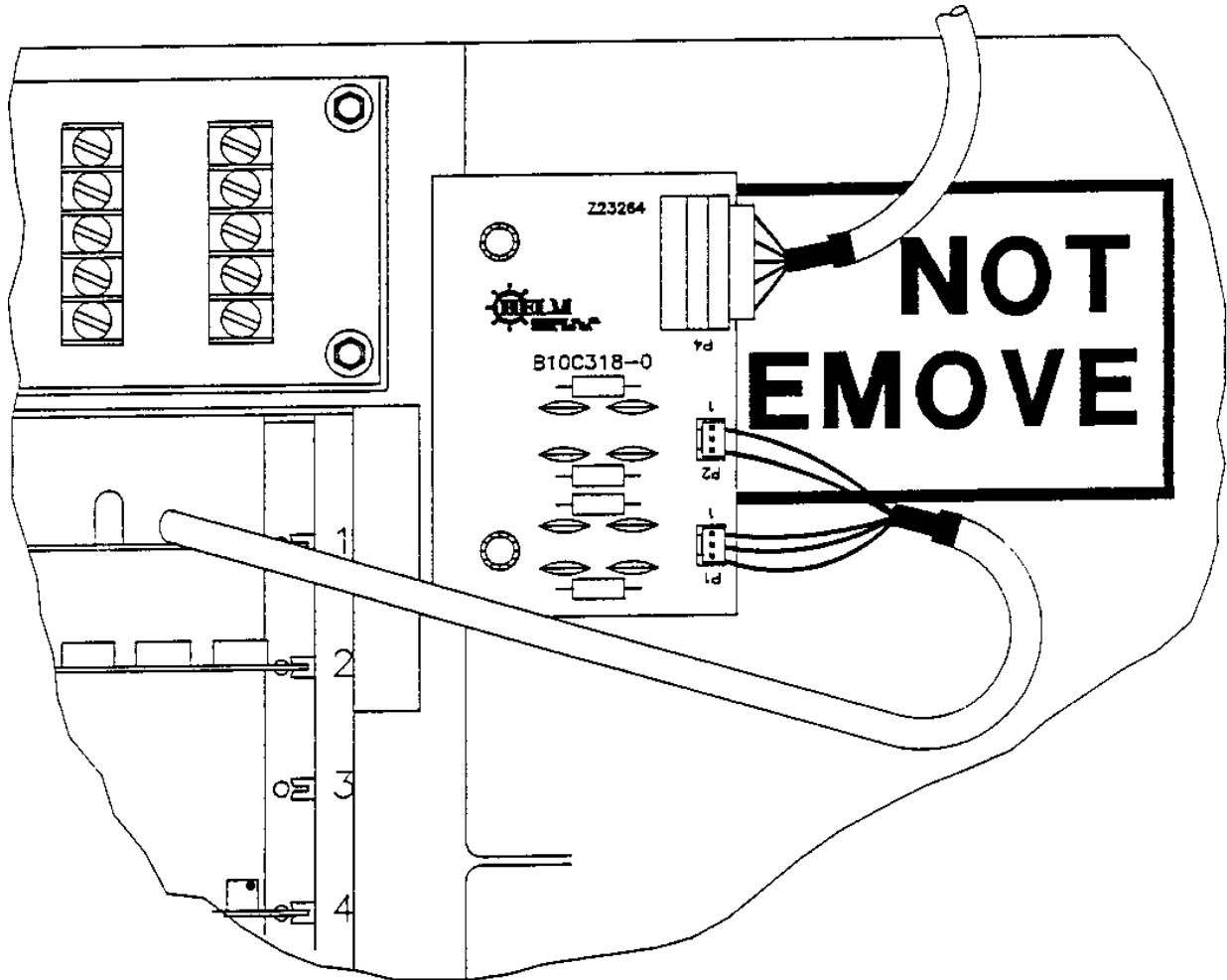


## COMPUTER INTERFACE AND FILTER CARD WIRING

The computer interface card Model EIC plugs into Slot #1 of the card rack.

Mount the filter board on the inside panel marked "DO NOT REMOVE". Use existing thumbwheel screws on left side of panel. Remove the top two screws and attach filter board on top of panel as shown below.

Route computer cable into instrument enclosure through hole marked "For Interface Cables" and wire connector P4 on filter card per wiring diagram on following page.



## DESCRIPTION OF MULTI I/O FILTER CARD

1. Computer or PLC can be either 422 or 232 communications.

**Connections for 422 communications:**

J22 on filter card should be jumpered across pins 2 and 3.

The cable coming from the EIC card plugs into J2 and J3 on the filter card.

The connector with the black and green wires plugs into J2 with the black wire on in 1 of J2.  
The connector with red and white wires plugs into J3 with the white wire on pin of J3.

The connector for computer hook-up is J1.

Connections for 232 communications:

J22 on filter card should be jumpered across pins 1 and 2.

The cable from the EIC card plugs into J2 and J3 on the filter card.

The connector with the black and green wires plug into J3 with the green wire on pin 1 of J3.  
The connector with red and white wires plug into J2 with the red wire on pin of J2.

The connector for computer hook-up is J4.

2. J14 is the connector for the sine-cosine resolver input.

Refer to drawing B10W996-1 for wiring detail.

3. There is a 422 to TTL converter on the card. 422 plugs into J8 and the TTL connects to J9.  
The normal operation of J19 should be jumpered across pins 2 and 3.

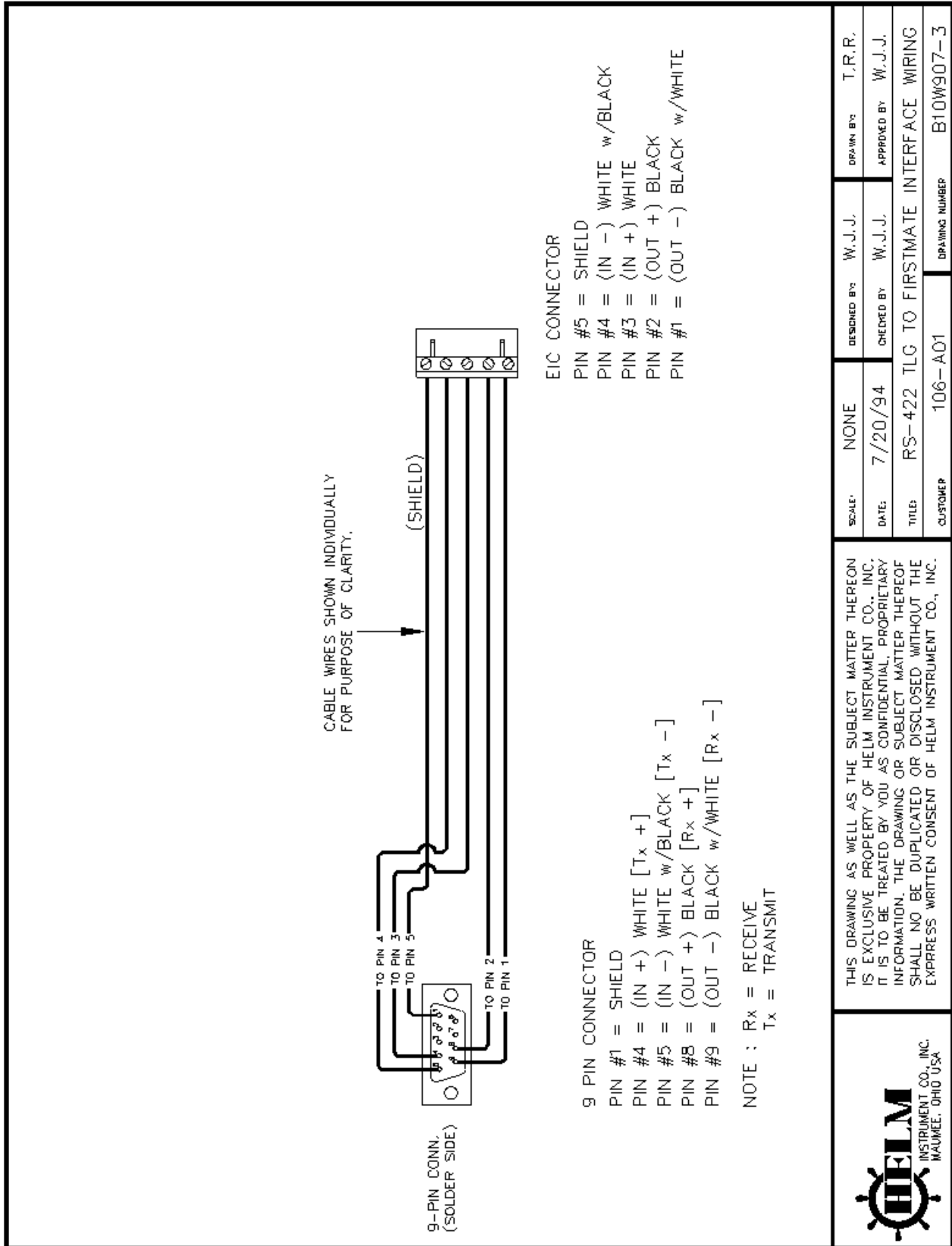
4. There is another port which can be either TTL to 422 or TTL to 232. The TTL plugs into J11. For normal operation, J20 will be jumpered across pins 2 and 3. The standard set-up will be for TTL 422 communications with U6 installed and U7 removed. In order to have TTL to 232, you must install U7 and remove U6.

5. J12 is the user connector for LDT and analog resolver connections. J17 is the connector for + and 15v power to LDT's.

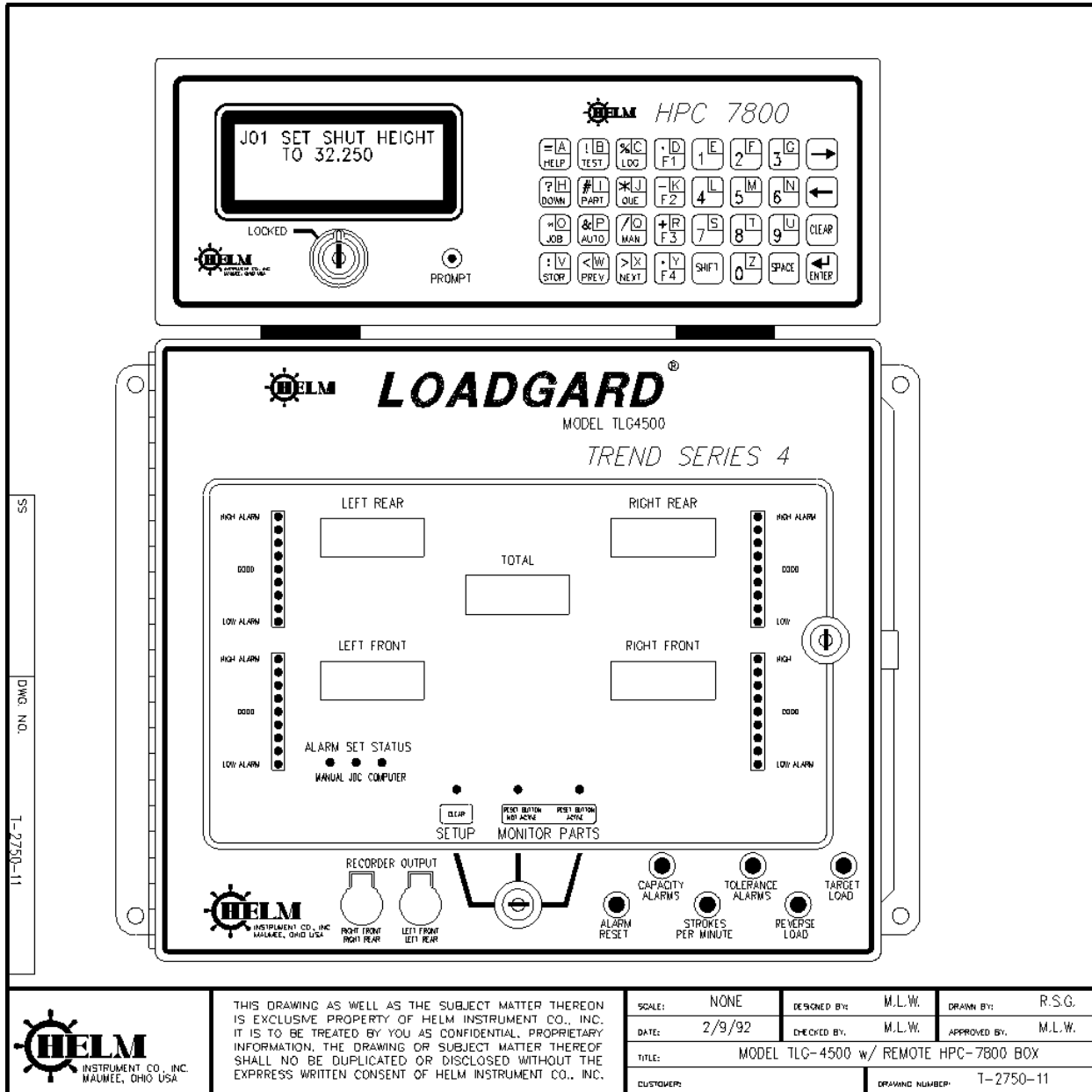
6. There are two cables which plug into J16 and J18 on the card. These two cables are power for the filter card. J16 is + and -15v. J18 is +5v and ground.

For normal 422 communications, the following settings apply:

J19 jumpered between pins 2 and 3  
J20 jumpered between pins 2 and 3  
J22 jumpered between pins 2 and 3  
U7 should be pulled out







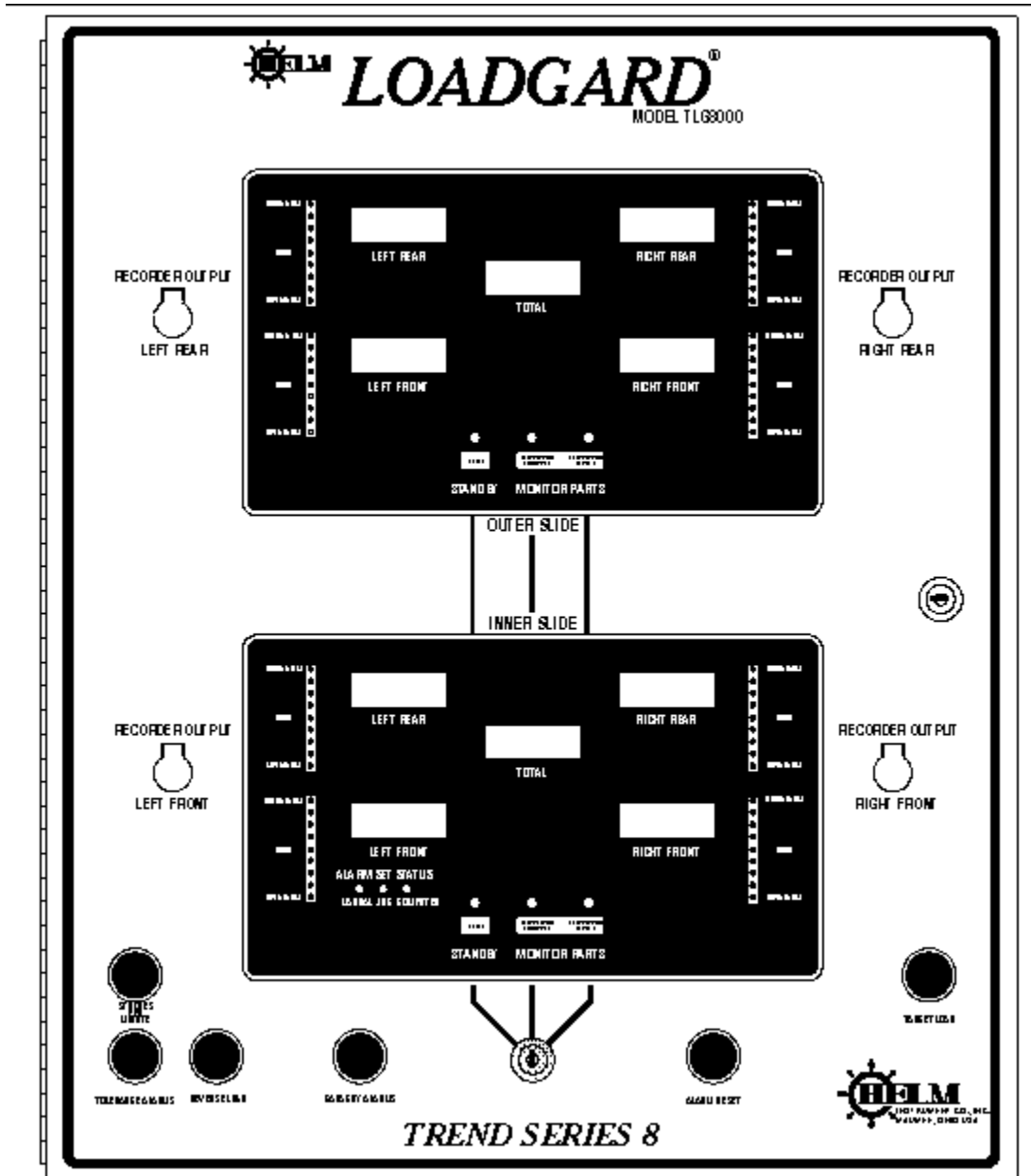
SS  
DWM  
DN  
1-2750-11



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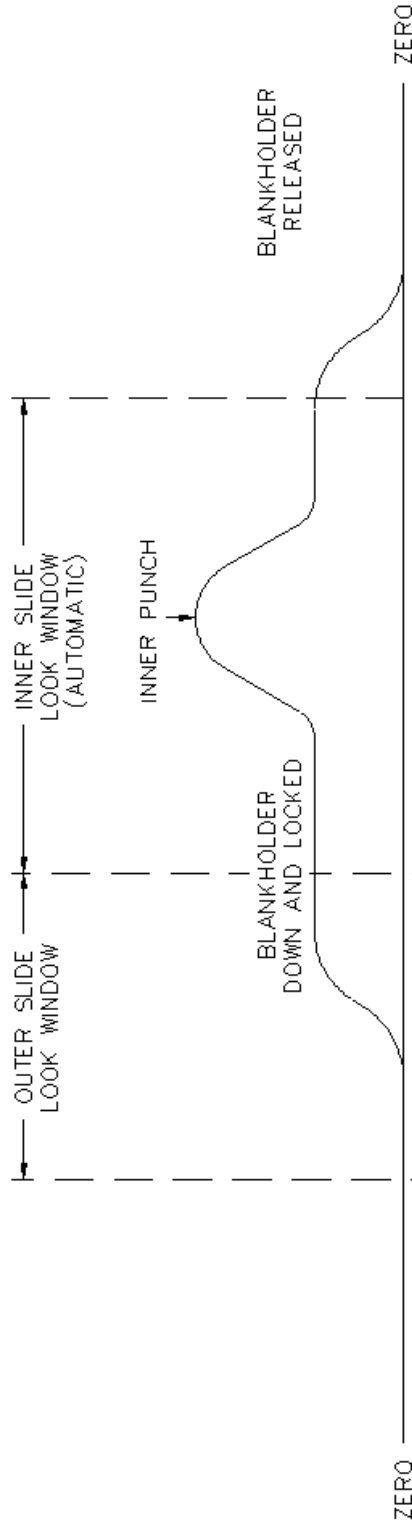
SCALE:	NONE	DESIGNED BY:	M.L.W.	DRAWN BY:	R.S.G.	
DATE:	2/9/92	CHECKED BY:	M.L.W.	APPROVED BY:	M.L.W.	
TITLE:	MODEL TLG-4500 w/ REMOTE HPC-7800 BOX					
CUSTOMER:					DRAWING NUMBER:	T-2750-11

Model TLG-8000



This appendix describes additional operating instructions for the standard TLG-8000 and TLG-8000DP with Cam Limit Switch. Refer to drawings T-2435-42 and T-2435-41 following is appendix.

# CAM TIMING TLG-8000-DP



CAM TIMING PROCEDURE

- 1.) "JOG" PRESS UNTIL OUTER SLIDE IS POSITIONED HALF WAY DOWN.
- 2.) SET CAM SWITCH TO CLOSE AT THIS POINT.
- 3.) "JOG" PRESS UNTIL INNER SLIDE IS POSITIONED HALF WAY DOWN.
- 4.) SET CAM SWITCH TO OPEN AT THIS POINT.
- 5.) SETTING IS COMPLETE.

CLOSE CAM CONTACTS  
(WHEN OUTER SLIDE IS HALF WAY DOWN)

OPEN CAM CONTACTS  
(WHEN INNER SLIDE IS HALF WAY DOWN)

NOTE:

"OUTER" LOOK WINDOW WILL OCCUR DURING THE "CLOSED" PERIOD. THE INNER LOOK WINDOW WILL START AUTOMATICALLY WHEN CONTACTS OPEN AND CONTINUE FOR ONE AND ONE-HALF TIMES THE DWELL OF THE OUTER LOOK WINDOW.

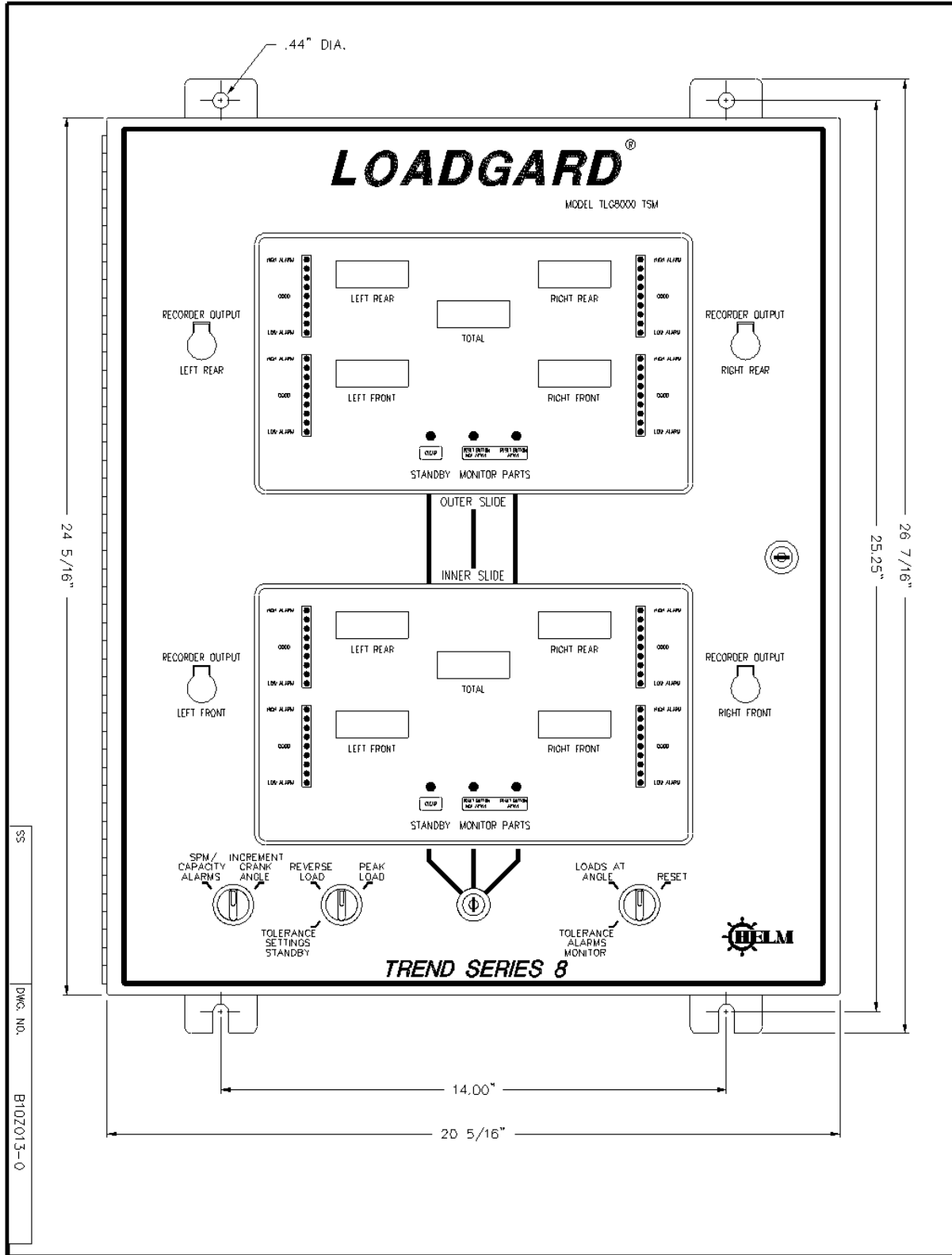
REV.	DESCRIPTION	BY	DATE
A	CHANGE CAM TIMING	R.J.G.	8/31/90

SCALE:	NONE	DESIGNED BY:	M.H.L.	DRAWN BY:	R.S.G.
DATE:	8/30/90	CHECKED BY:	R.J.G.	APPROVED BY:	R.J.G.
TITLE:	CAM TIMING TLG-8000-DP				
CUSTOMER	DRAWING NUMBER: T-2435-41A				

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SS  
DWG. NO. B10Z013-0

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	SCALE: NONE	DESIGNED BY: T.R.R.	DRAWN BY: T.R.R.
	DATE: 6/24/94	CHECKED BY: T.R.R.	APPROVED BY: R.T.W.
	TITLE: TLG-8000 TSM MOUNTING DIMENSIONS		
CUSTOMER: 105-B06	DRAWING NUMBER: B10Z013-0		

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**TLG System Troubleshooting Guide**

The following system set-up conditions should be verified prior to proceeding to block diagrams. See pages listed below, in parenthesis, in this manual for switch location in instrument.

1. Unit powered up.
2. 110V power supplied to unit (page 3).
3. Monitor/Calibrate switch in left (monitor) position (page 7).
4. Capacity alarm switch in left (off) position (page 11).
5. Auto Zero switch on each channel board in forward (on) position (pages 6-7).
6. Calibrate switch on each channel board in forward (off) position (pages 6-7).
7. If any of the above switches are in the wrong position, correct the situation and return bypass/monitor switch to left (bypass) position (page 15).
8. If problems still exists, continue to next page for list of specific problems.

**TLG Unit Voltage Checks**

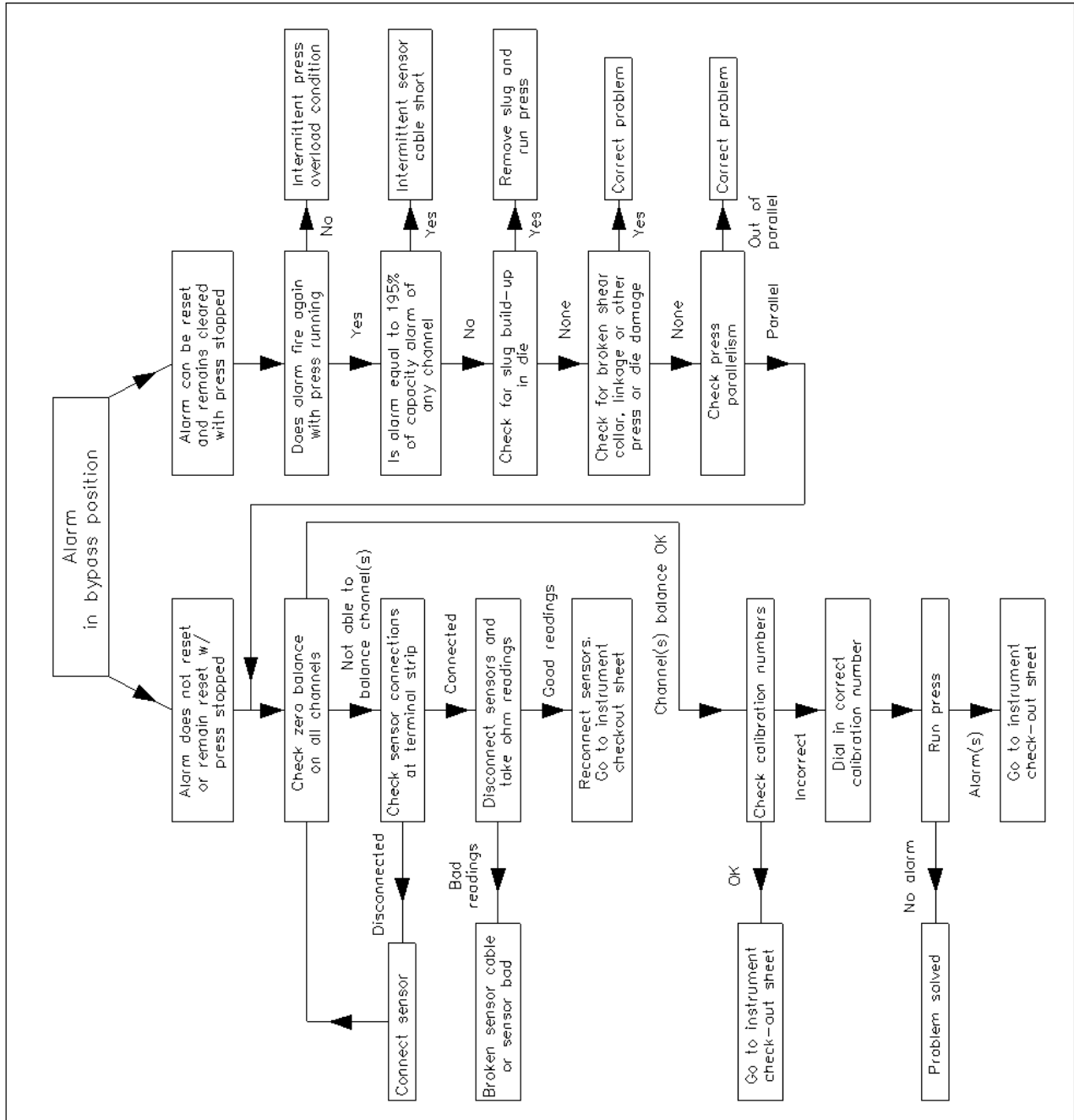
-9 pin connector located under "Do Not Remove" plate, upper LH Corner

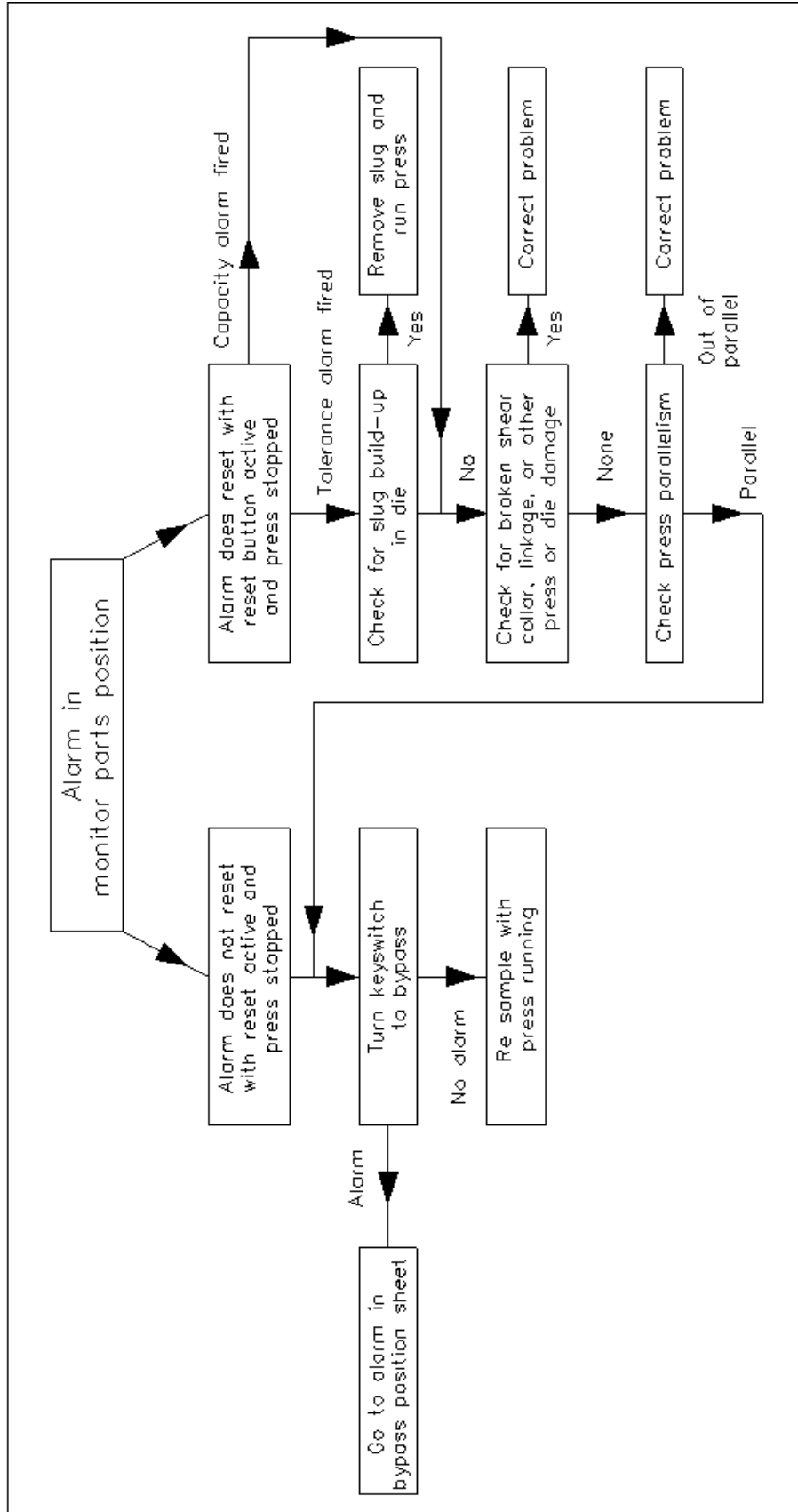
Pin	Satisfactory Voltage Range
Brown	-3.8 to -4.2 volts
Red	-3.8 to -4.2 volts
Orange	+3.8 to +4.2 volts
Yellow	-11.5 to -12.5 volts
Green	+11.5 to +12.5 volts
Blue	+3.8 to +4.2 volts
Grey	0 volts
White	+4.75 to +5.25 volts

**Miscellaneous Troubleshooting Specifications**

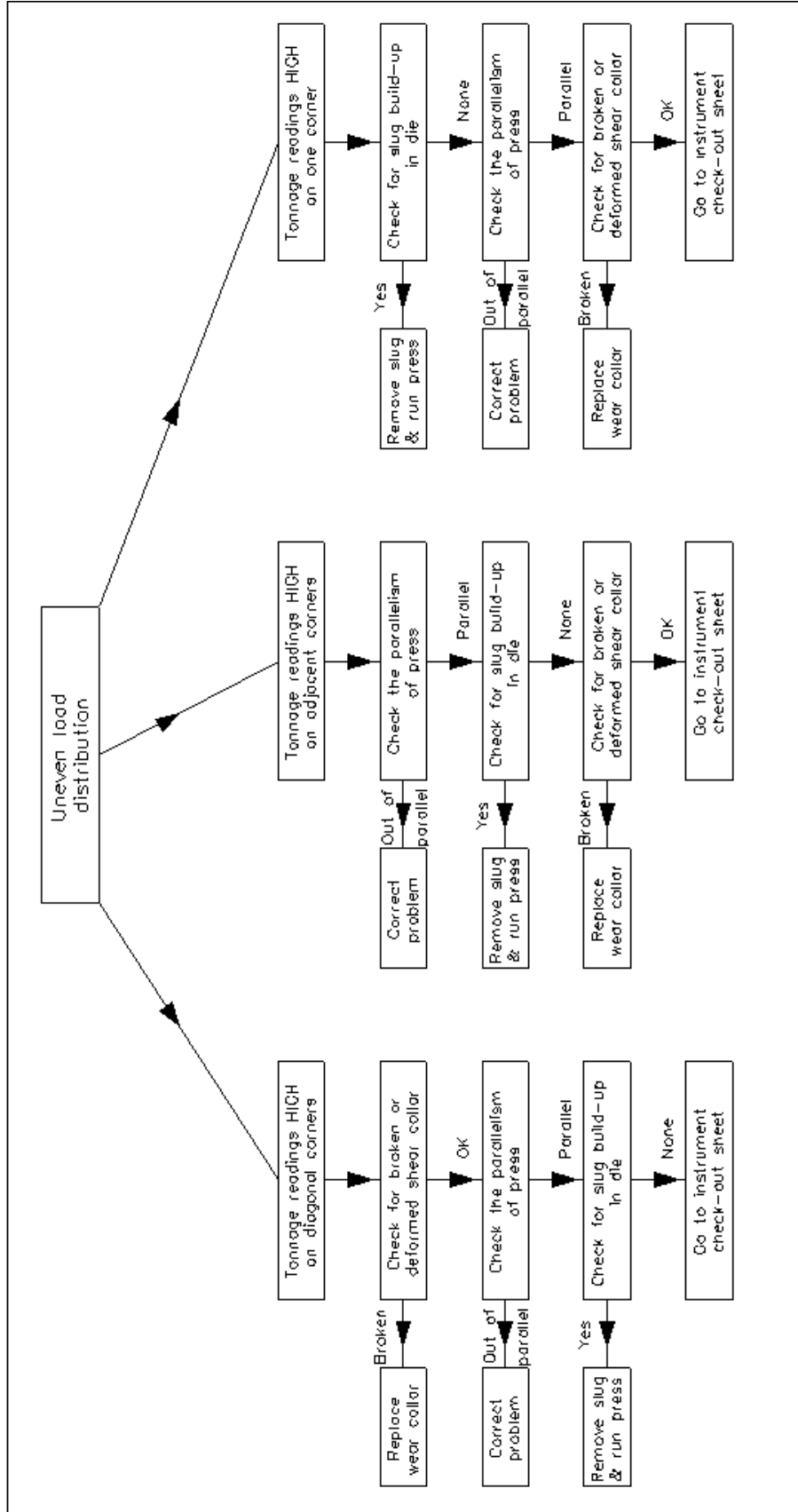
HT-400 Sensor Ohm Readings

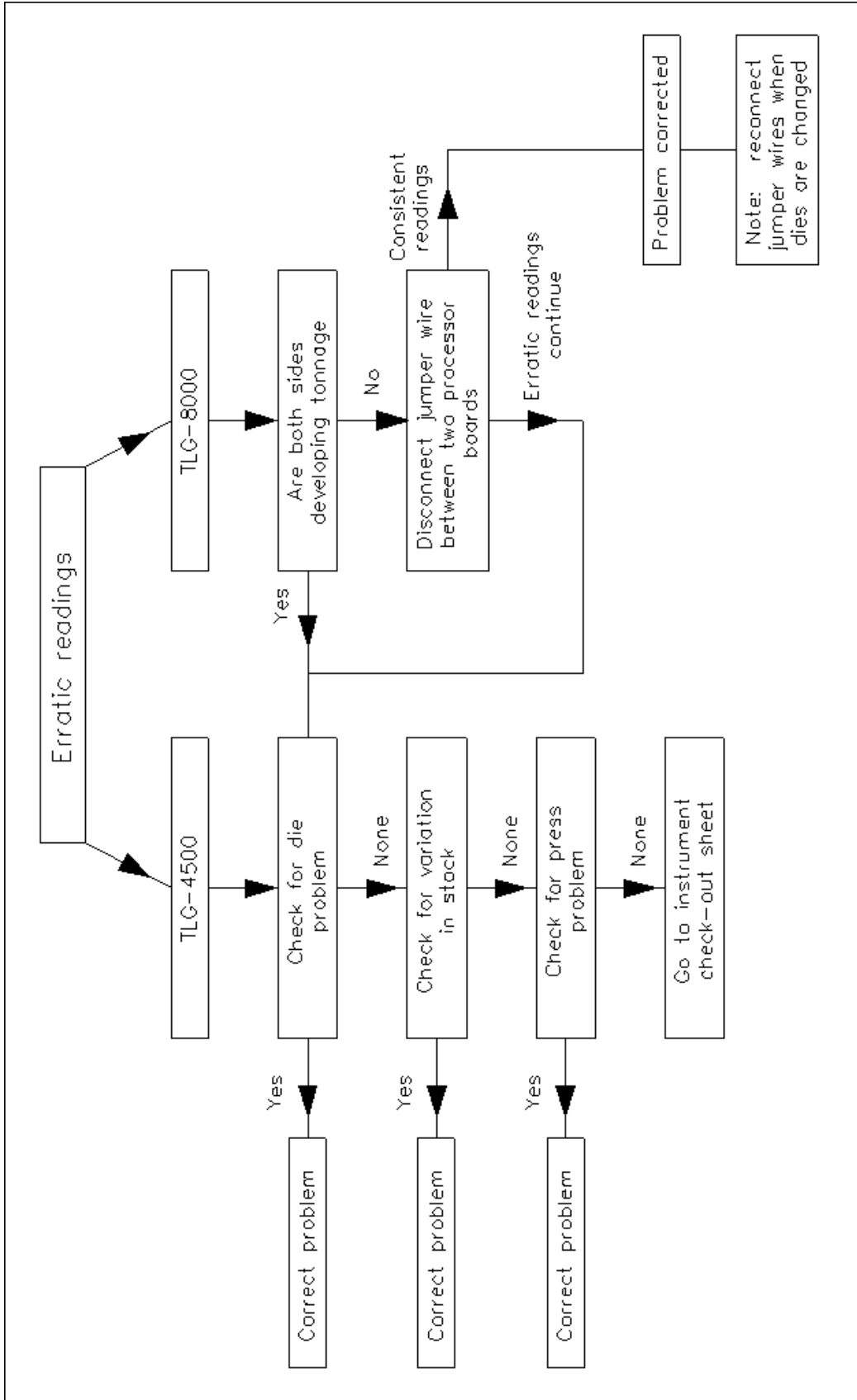
Green - Black	350 ohms
Red - White	350 ohms
All other color combinations	266 ohms
All color to Ground	open
Shield to Ground	open

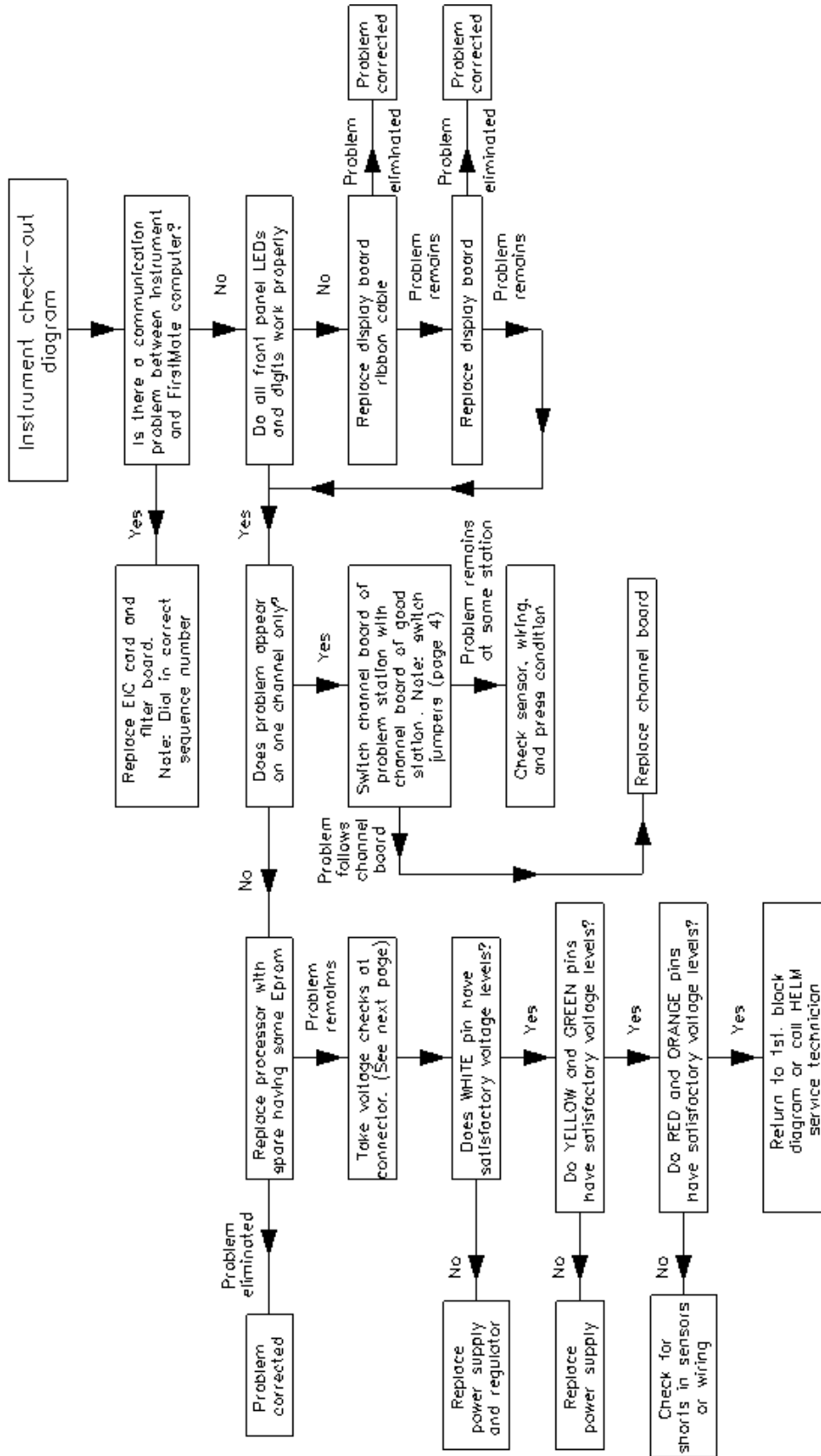


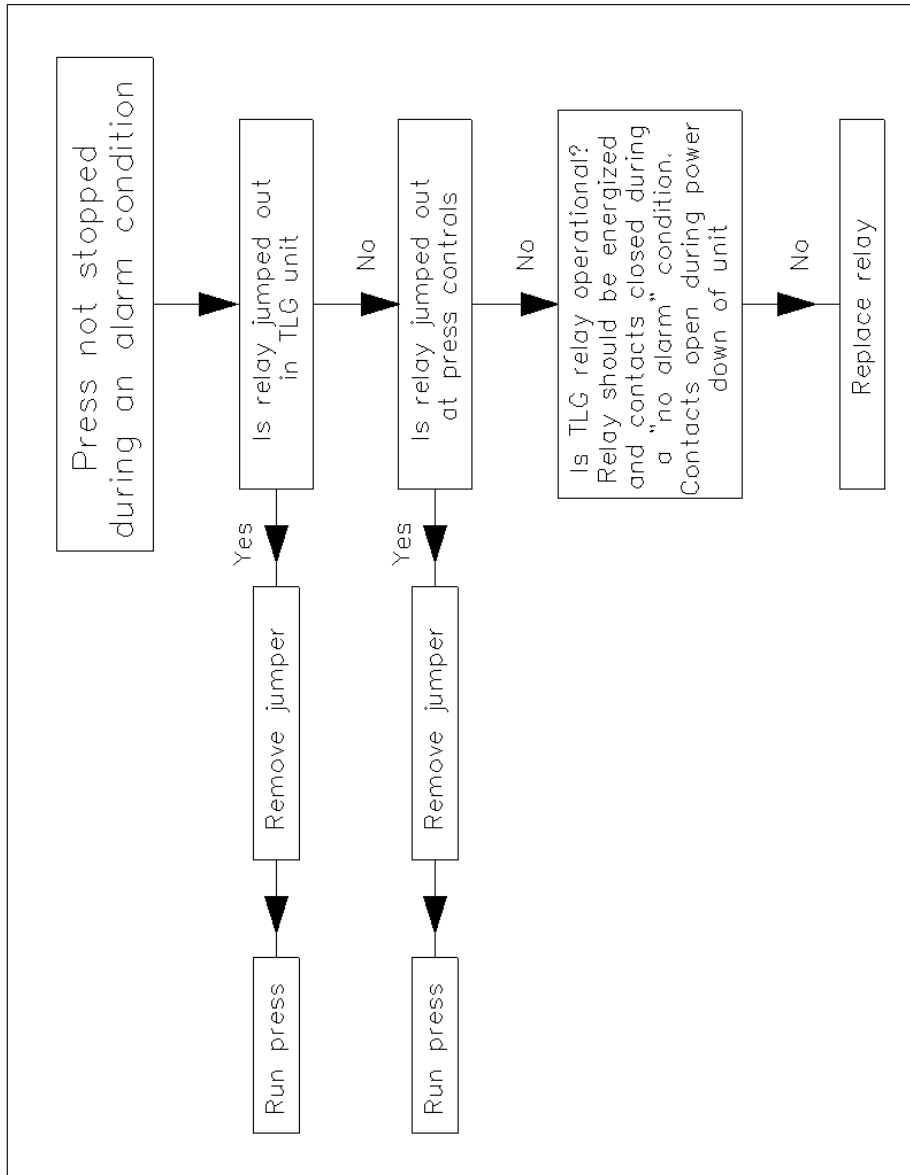












PROBLEM	POSSIBLE CAUSE	REMEDY
No front panel indications	Fuse blown. Power source.	Replace fuse. Check power.
Display flashes zeroes.	Instrument turned off/on with function switch in Monitor Parts position.	Reset instrument by turning function selector to Standby/Clear.
Bypass/Clear LED flashing. Meter display off.	Monitor/Calibrate switch (inside door) in calibrate position.	Set switch to Monitor (left) position.
Trend lights do not change. Meter does not display SPM or Tolerance settings.	Function switch in Bypass position.	Turn function switch to Monitor Parts to activate auto-timing for Strokes per minute.
High or Low Tolerance Alarms do not stop press.	Tolerance settings in OFF position.	Select tolerances from 5% to 45% to activate tolerance alarms.
Alarms will not reset.	Function selector in Monitor Parts/Reset not Active.	Turn function keyswitch to Reset Active.
	Possible open gage wire.	Check strain gage wiring and connections.
Tolerance alarms stop machine before tolerance setting is reached.	Capacity alarms settings have been activated.	Check Capacity Alarm Sets. Reset capacity alarms if required.
Alarms are fired or monitor tries to sample when machine is not running.	Strain Gain wires are run in conduit with high voltage wires.	Route sensor wires in separate conduit.
Display will not zero or unusual numbers are displayed.	Switches on individual channel boards are improperly set.	Move all channel board switches to forward position.
Display does not zero when RESET button is pressed.	Normal condition in Monitor Parts position. Display will zero only when resetting alarm condition.	With function switch in Standby, peak load display is reset. In Monitor Parts, display is not reset when RESET is pressed.
Meter display off. Press/Machine will not run.	Instrument turned off/on with function switch in Monitor parts position.	Check power.  Reset instrument by turning function switch to Standby/Clear then to Monitor Parts.
TREND alarms lit, machine machine continues to run.	Top stop wires are jumped out or press is being operated in inch mode.	Check wiring. Operate in run mode.

