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LOADGARD

Model SCM-EU4
Load Module

Instruction Manual

Revised April 5, 2000

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HELM MODEL SCM-EU4
FOUR CHANNEL LOAD MODULE SYSTEM

SYSTEM COMPONENTS

A.) Four (4) channel load module board with control panel.
Note: A two (2) channel system is also available.
B.) Panel-mount card cage for module board.
C.) Helm Strain Gage force transducers (4 max.).

COMPONENT OVERVIEW

A.) **Model SCM-EU4 Signal Conditioner/PLC Interface Board**
The SCM-EU4 signal conditioner board is installed in a panel mount card cage which is designed to be mounted to a backplate within a machine control cabinet. The module is designed to perform force-monitoring functions using output signals from strain gage force transducers. The module requires an external 24VDC power source from within the control cabinet. Since the output signal from the Strain Gage transducer must be properly conditioned before it can be utilized, the model SCM-EU4 module performs the following signal conditioning functions:

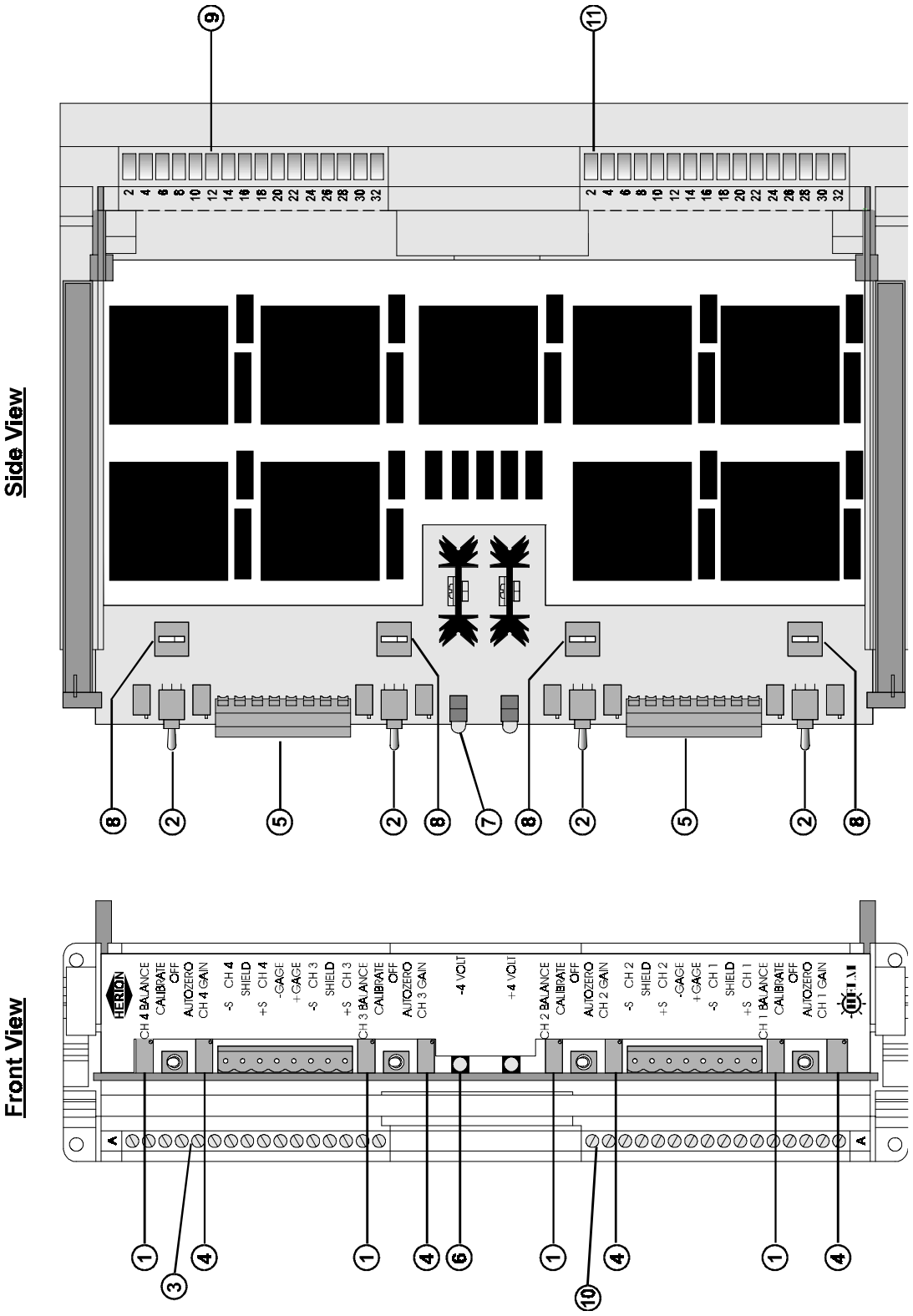
1.) Filters the incoming transducer signal.
2.) Significantly amplifies the transducer output signal.
3.) Shunt balances the strain gage bridge of the transducer.
4.) Calibrates the transducer to the module using a shunt calibration resistor.
5.) Provides an analog DC voltage output signal suitable for transmission to a PLC for load data display.
6.) Allows transducer output to be monitored as track output or peak voltage.
7.) Provides automatic zero balance (Auto-Zero) between load cycles when module is used with an external timing window input (switch or PLC), for track or peak functions.

B.) **Panel Mount Card Cage**
1.) Mounts directly to backplate inside machine control cabinet.
2.) Provides hardwire screw terminals for PLC interface connections.
3.) Includes quick-release mechanism for easy board removal.

C.) **Helm Strain Gage Force Transducers**
Includes any Helm standard or custom force transducer.

NOTE: See separate publications for transducer to machine installation procedures.

HELM MODEL SCM-EU4 COMPONENT IDENTIFICATION



DESCRIPTION OF CONTROLS AND COMPONENT FUNCTIONS

① Manual Zero Balance - Screwdriver adjustable potentiometer used to adjust the transducer bridge for zero balance under a no load condition.

Note: Panel Function Toggle Switch must be in the OFF position when adjusting the Manual Zero Balance.

② Panel Function Toggle Switch - Up: Calibrate, Middle: Off (Auto-Zero OFF), Down: Auto-Zero On.

Note: The middle (OFF) and down (ON) positions are the normal positions for monitoring transducer output during machine operation.

③ Card Cage Connections (Strip A, Top) – See page 5 for user connections.

④ Channel Gain - Screwdriver adjustable potentiometer used to adjust transducer signal gain amplification under a no load condition when Function Toggle Switch is in the Up: Calibrate position.

⑤ Transducer Input Connector - Eight (8) pin connector accepts input from two (2) transducers (one (1) transducer per channel).

⑥ Minus 4 volt LED - Verifies presence of (-4) VDC gage supply voltage for transducer.

⑦ Plus 4 volt LED - Verifies presence of (+4) VDC gage supply voltage for transducer.

⑧ High/Low Gain Switch - Selects high (1 Meg ohm shunt resistance) or low (140K Ohm shunt resistance) gain range for required transducer signal amplification.

⑨ Card Cage Connections (Strip C, Top) – See page 5 for user connections.

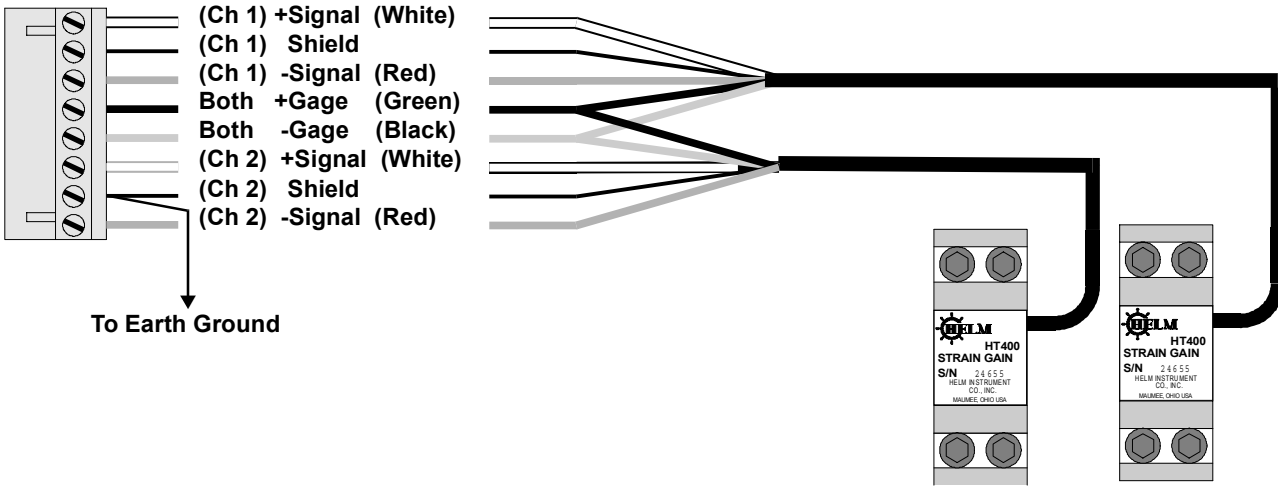
⑩ Card Cage Connections (Strip A, Bottom) – See page 5 for user connections.

⑪ Card Cage Connections (Strip C, Bottom) – See page 5 for user connections.

WIRING CONNECTIONS

SENSOR CONNECTIONS ON MOTHER BOARD

The module contains two 8-pin orange connectors for wiring strain gage transducers. One connector accepts up to two (2) transducers.



Notes:

1.) For channel 3 and 4 connections, follow diagram shown above substituting .channel 4 for channel 2, and channel 3 for channel 1. Channel 3 and 4 connections are made at the upper mating connector of load module (see page 2 and 3).

2.) Helm model HT-400 “Strain-Gain” bolt-on transducers are used for illustration. For Helm Load Cells, +Gage (Green) and -Gage (Black) wires should be reversed at the connector to yield positive output.

3.) Transducer cables must maintain a minimum distance of 24 inches (61cm) from any power or load lines.

4.) Use only factory approved wire for cable extensions.

CARD CAGE WIRING CONNECTIONS

FUNCTION		A (Top)		C (Top)	CONNECTOR		A (Bottom)		C (Bottom)
N.C.	Pin	A2		---	Chassis Gnd	Pin	A2	or	C2
LVDIN1	Pin	---		C2	STOP-A	Pin	A4	or	C4
TRACK1	Pin	A4	or	C4	STOP-B	Pin	A6	or	C6
PEAK1	Pin	A6	or	C6	AUX1	Pin	A8	or	C8
TRACK2	Pin	A8	or	C8	AUX2	Pin	A10	or	C10
PEAK2	Pin	A10	or	C10	N.C.	Pin	A12		C12
TRACK3	Pin	A12	or	C12	R2	Pin	A14	or	C14
PEAK3	Pin	A14	or	C14	R1	Pin	A16	or	C16
TRACK4	Pin	A16	or	C16	S4	Pin	A18	or	C18
PEAK4	Pin	A18	or	C18	S2	Pin	A20	or	C20
+CAM	Pin	A20	or	C20	S1	Pin	A22	or	C22
-CAM	Pin	A22	or	C22	S3	Pin	A24	or	C24
N.C.	Pin	A24		----	+IN2	Pin	A26	or	C26
Analog Gnd	Pin	----		C24	-IN2	Pin	A28	or	C28
LVDTIN2	Pin	A26		----	+OUT2	Pin	A30	or	C30
Analog Gnd	Pin	----		C26	-OUT2	Pin	A32	or	C32
Analog Gnd	Pin	A28	or	C28					
24V COM	Pin	A30	or	C30					
+24V IN	Pin	A32	or	C32					

Notes:

1.) N.C. = No User Connection.

2.) Track Connections = PLC connections for sensor signal track output (D.C. Voltage).

3.) Peak Connections = PLC connections for sensor signal peak output (D.C. Voltage).

4.) Cam = External timing window input (Switch, PLC).

5.) Resolver Wiring : R1 = Reference R2 = Reference Gnd
S3 = Sine S1 = Sine Gnd
S2 = Cosine S4 = Cosine Gnd

6.) RS422 Interface Wiring: +IN / -IN +OUT / -OUT

7.) Input Options: AUX1, AUX2 +24VDC (Switched)

8.) Output Options: STOP-A, STOP-B Output Load (+24V Source) to -24V Return

9.) On some card cages, the lower connectors A (Bottom) and C (Bottom) are labeled B and D. Therefore, A (Bottom) = B and C (Bottom) = D for those card cages.

SYSTEM SET-UP

1.) Verify proper termination of all system connections (see page 4 and 5).

2.) Verify cam switch (S9 on load module board) is in the normal (C1) position. Set track or peak look window timing at PLC (see Appendix A and B for typical timing diagrams).

3.) Energize system via external 24VDC, 330mA power source.

SYSTEM CALIBRATION (USING HELM FACTORY CALIBRATED FORCE TRANSDUCERS)

1.) Verify a no load condition for all transducers.

2.) Convert all transducer factory or arbitrary % calibration numbers ("Cal" Numbers) to voltage cal numbers by dividing the % cal number by 100, then multiplying the result by 2.667 volts full scale (Ex: 78.26% ÷ 100 x 2.667 = 2.087V).

3.) Refer to cal number conversion procedure (page 7) for proper cal number manipulation per application, and for high/low gain selection.

4.) Set gain switch to high; 1 meg ohm (C2 position) or low; 140k ohm (C1 position) for each channel as determined in step #3.

5.) Connect a selectable range voltmeter to channel 1 of the module as follows: positive lead to Track 1 (pin A4, Top or C4, Top), negative lead to Analog Ground (pin A28, Top or C28, Top) on card cage connectors.

6a.) Locate ch. 1 Function Toggle Switch near the bottom of module control panel. Move switch lever to the middle: Auto Zero OFF position.
b.) Adjust the ch. 1 Manual Zero Balance Pot (above Function Switch) until the voltmeter displays zero.

7a.) Move the ch. 1 Function Toggle Switch lever to the up: Calibration position.
b.) Adjust the ch. 1 Channel Gain Pot (below Function Switch) until the voltmeter displays the proper voltage cal number as determined in step #3.

8.) Repeat steps 5 through 7b for remaining channels. Remember to move the positive lead of voltmeter to the track pin which corresponds to the channel which is being calibrated.

9.) Repeat steps 5 through 8 to verify proper zero and cal value settings before operating machine. Make minor adjustments if necessary.

CAL NUMBER CONVERSION PROCEDURE

GAIN RANGE DETERMINATION

CHANNEL GAIN SWITCH POSITIONS:
- C1, Low Gain (140K ohm shunt resistance)
- C2, High Gain (1 meg ohm shunt resistance)

TYPICAL HIGH GAIN APPLICATIONS

- Straight side, Forging and C-Frame presses with HT-400 sensors mounted on the frame.

TYPICAL LOW GAIN APPLICATIONS

- Straight side pitman mounted HT-400 sensors
- Calibration and "Catalog" load cells
- Custom load cells
- Tie Bar sensors (die casting)

VOLTAGE CAL NUMBER CONVERSION BASED ON CAL RESISTOR VALUE

Note: Cal number conversion is required for any transducer or load cell with an original Cal number (established factory or arbitrary cal number) based on a cal shunt resistor value other than 1 meg or 140K ohms (refer to sensor data tag or data sheet).

Conversion Formula:

$$\text{New Cal Number} = \frac{\text{Original Cal Number} \times \text{Original Cal Resistor Value}}{\text{1 meg ohms (or) 140K ohms}}$$

High Gain Example:

Original Cal Number = 80% or 2.134V @ 499K

$$\text{New Cal Number} = \frac{2.134\text{V} \times 499\text{K}}{1000\text{K}} = 1.065\text{V @ 1 meg ohms}$$

Low Gain Example:

Original Cal Number = 65% or 1.740V @ 56.2K

$$\text{New Cal Number} = \frac{1.740\text{V} \times 56.2\text{K}}{140\text{K}} = 0.698\text{V @ 140K ohms}$$

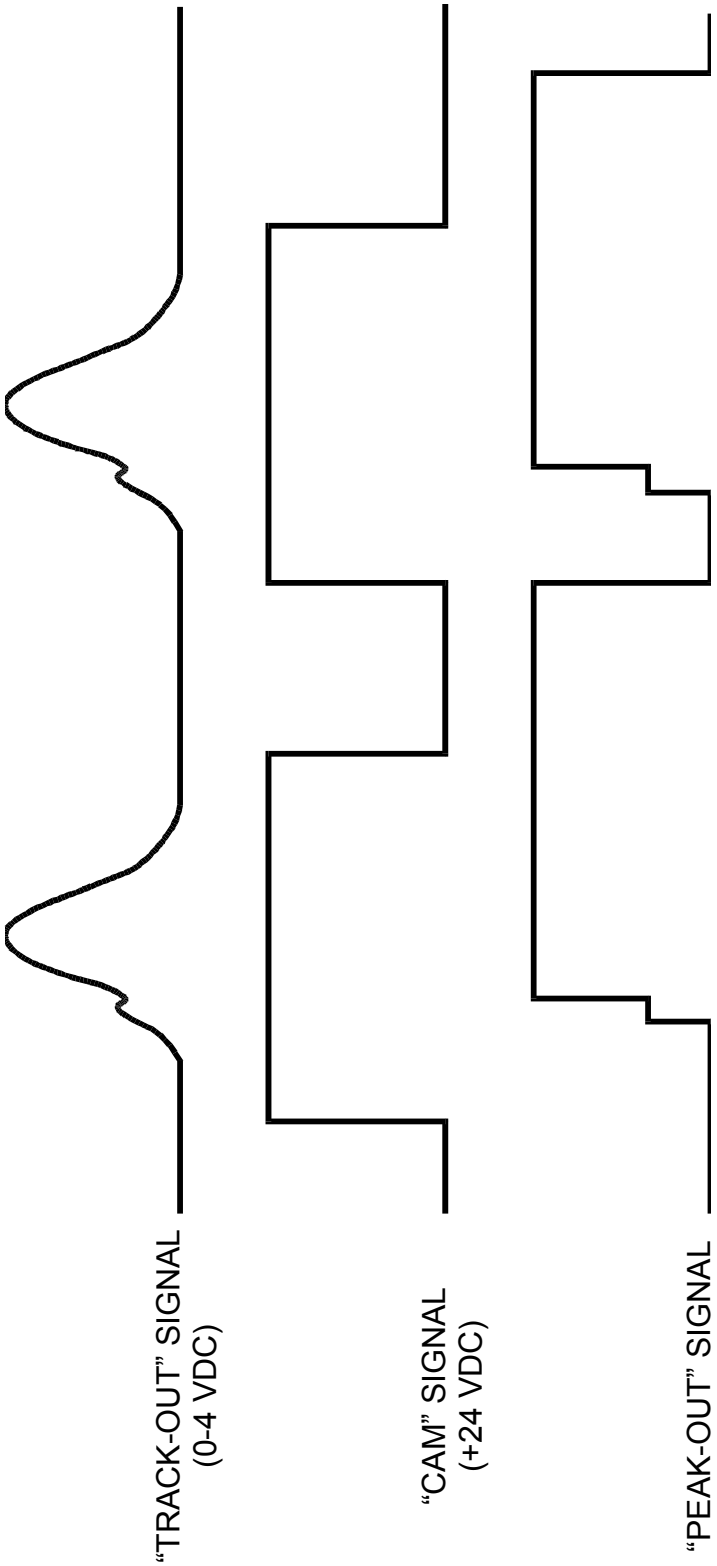
Note: Cal numbers expressed in percent require conversion to voltage units when using the SCM-EU4 module (see page 6: SYSTEM CALIBRATION, Step # 2).

USEABLE CAL NUMBER RANGE BASED ON NOMINAL TRANSDUCER BRIDGE RESISTANCE

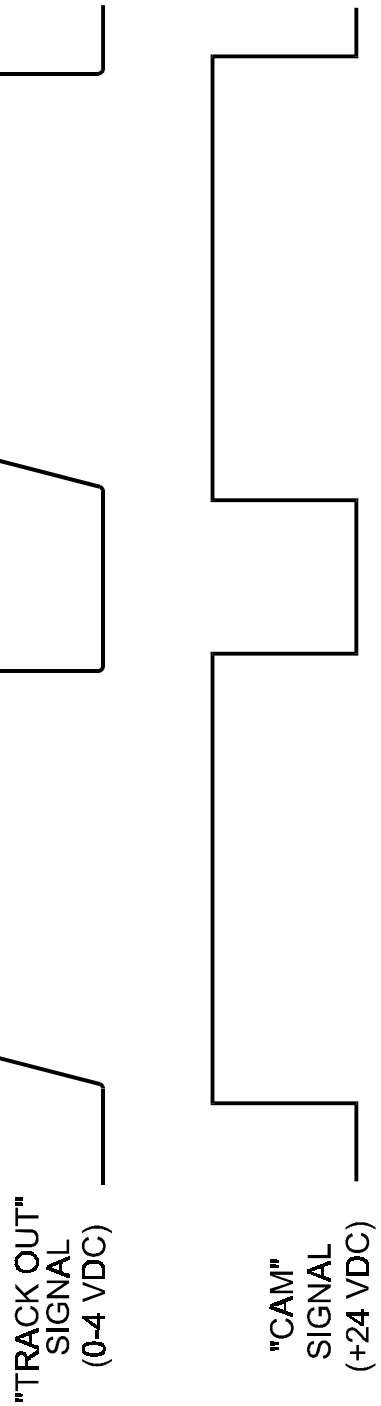
Nom. Bridge Resistance (single sensor) (Reference)	Useable Cal Number Range Volts	Percent
700 ohms	.640V - 5.201V	24% - 195%
350 ohms	.320V - 5.201V	12% - 195%
175 ohms	.160V - 2.587V	6% - 97%

Note: Nominal bridge resistance can be determined by referencing the load cell data sheet or by measuring the resistance across the (+) and (-) gage or (+) and (-) signal leads of of the force transducer. The transducer cannot be connected to a signal conditioner or be under a physical load when measuring the bridge resistance.

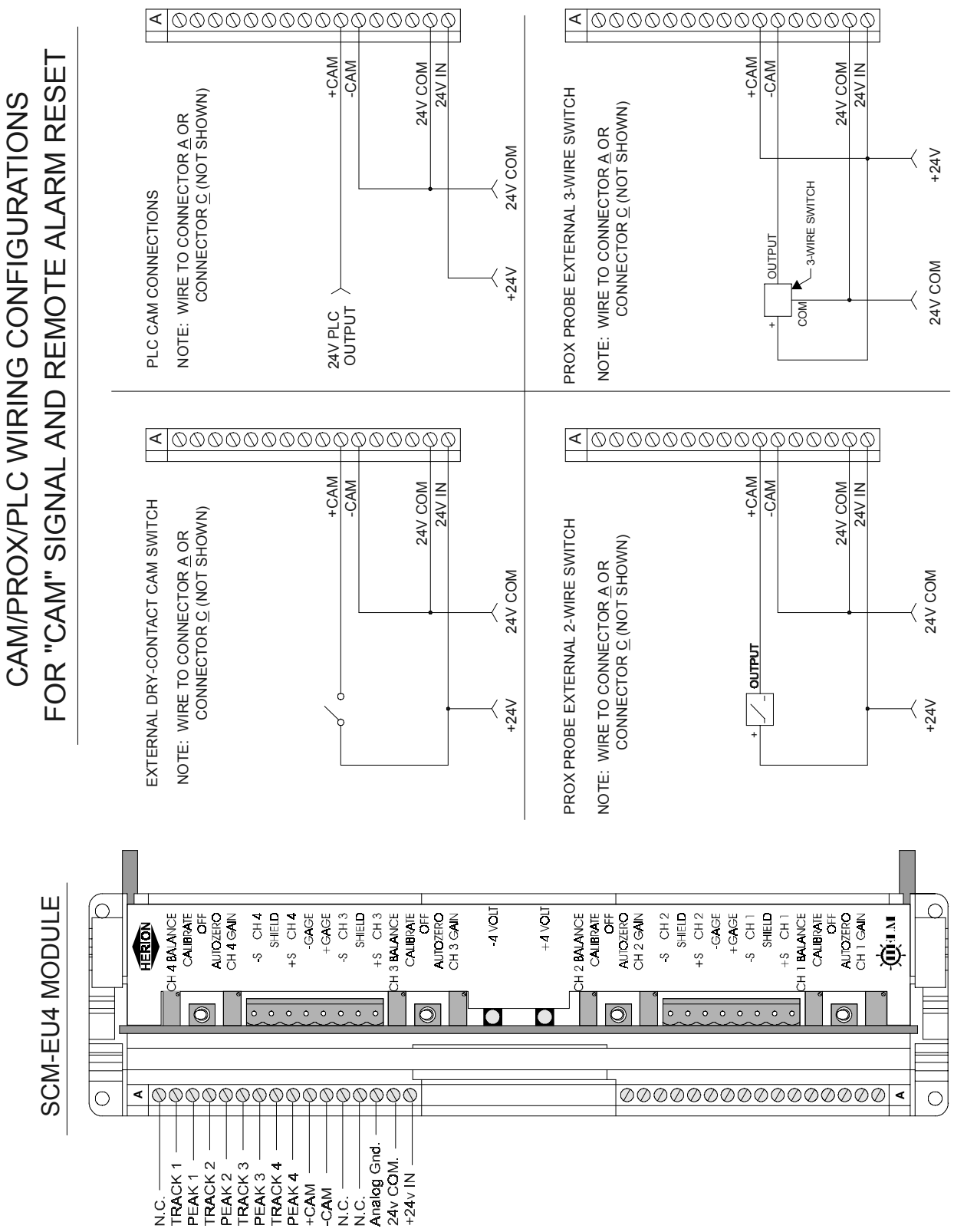
TIMING DIAGRAM – STAMPING



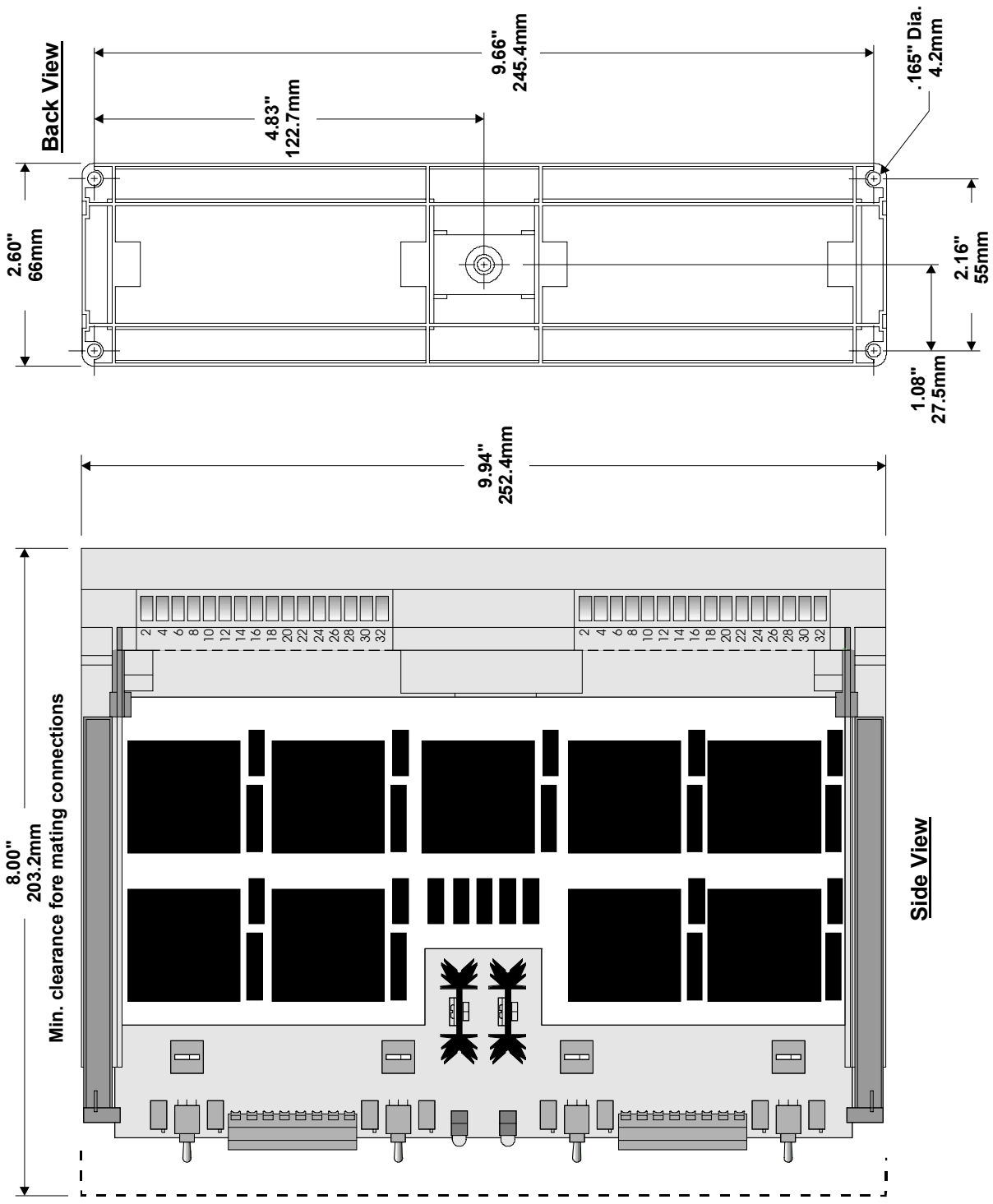
TIMING DIAGRAM-DIE CAST



CAM/PROX/PLC WIRING CONFIGURATIONS FOR "CAM" SIGNAL AND REMOTE ALARM RESET



HELM MODEL SCM-EU4 DIMENSIONS



SPECIFICATIONS

1.) 24 VDC input power source @ 660mA.

2.) Automatic Zero Balance (Auto-Zero)

3.) Four-channel load-strain gauge input utilizes 175 ohm, 350 ohm, or 700 ohm nominal bridge resistance.

4.) 24VDC-Cam/Prox/PLC input.

5.) Hi/Lo Gain Range (1 meg/140K)

6.) 24VDC I/O
2 inputs : 10-30 VDC
2 outputs : 10-30 VDC

7.) 2 Communication Ports
Autograph (422/485)
DFI/Profibus (232 only)

8.) A/D Sampling Rate: 200 usec.

9.) Resolver Input: Sine/Cosine 12 bit 0.1-degree resolution

10.) Speed Range: 0-600 SPM

11.) Recorder Output: Track signal from 0-4 volts