INSTRUCTION
MANUAL

ECD20A
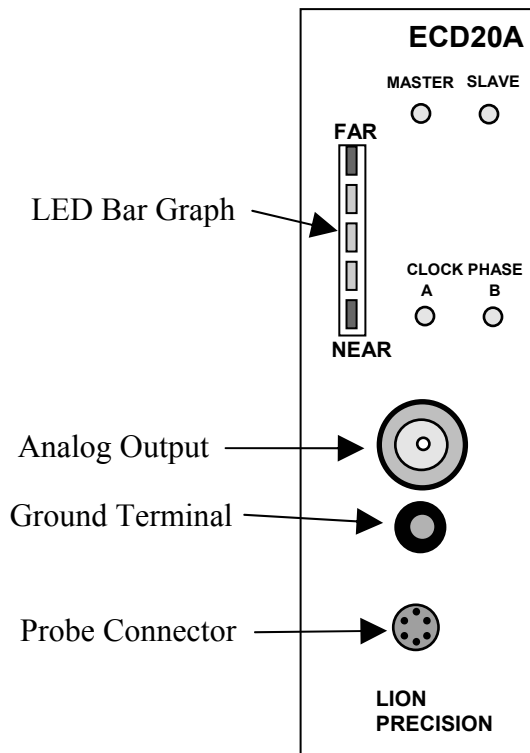
Measurement Systems
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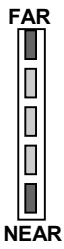LION PRECISION

ECD Driver Module

Features

The ECD Driver features include:

- **Low noise output**
- **Selectable bandwidth**
- **Temperature stability**
- **Zero Adjust Enable/Disable**
- **LED Bar Graph for easy probe setup**

Basic Operation

LED Bar Graph

The LED Bar Graph is used to identify the *calibrated range* of the probe. Green LEDs indicate the probe is in its calibrated range and the output voltage is an accurate representation of the gap. Red LEDs indicate the probe is out of range and the output voltage is not valid. At nominal standoff (center of range), the module is calibrated to output 0 volts. The zero control allows the operator to adjust the output to 0 volts when the probe is not precisely positioned at its original standoff.

It is possible to position the probe toward the end of the calibrated range and adjust the output voltage to 0 volts. In this situation, the probe can go out of its calibrated range while the output voltage continues to appear valid. The output voltage may continue to change, but the output is no longer guaranteed to be accurate.

The bar graph is independent of the zero control. The center (green) LED corresponds to the center of the probe's calibrated range. The "FAR" (red) LED will light if the maximum gap is exceeded. The "NEAR" (red) LED will light if the minimum gap is exceeded. During initial probe positioning, turn on the module and position the probe until the center green LED is activated. To precisely position the probe at the center of the calibrated range, turn off the zero adjustment and monitor the output voltage. When the output voltage is 0 volts, the probe is at the same nominal gap at which it was calibrated. Regardless of zero adjustment, the output value is valid as long as the probe is in its calibrated range (green LEDs) and the output is does not exceed 12 volts.

Analog Output

Provides connection to the analog output voltage which is directly proportional to the distance between the sensing surface of the capacitance probe and the surface of the material being measured. This voltage is also available at the connector pin C31. A typical output voltage range is ±10VDC. The specific ranges are listed on the accompanying calibration sheets.

Ground

A banana plug type cable can be connected here for grounding the target. In most cases, separate grounding of the target is not necessary. If the target is completely isolated from ground by an insulator, grounding the target may be necessary.

Target grounding will usually reduce the noise in the output signal. When low noise operation is critical separate grounding is recommended even if the target is well grounded through another path.
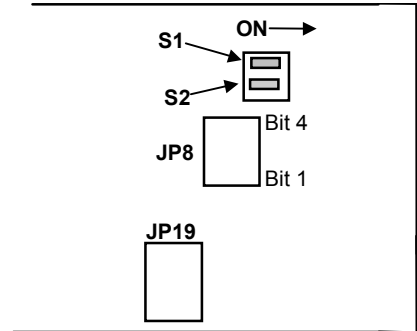
Probe Connector

ECD20A Driver modules use a Lemo type connector for connecting to the probe. Connect the probe by aligning the red dots on the connectors and inserting the probe connector. To disconnect, pull on the knurled barrel of the probe connector to release it. DO NOT pull on the cable.

Bandwidth Settings

The ECD Driver Modules provide a 2 position dip switch for setting bandwidth.

Be careful to only change switches and jumpers as directed in this manual. any other changes will affect the calibration of the module.

This dip switch is located as shown in the drawing. The following table shows the bandwidths available and their associated dip switch settings. The bandwidth listed on the accompanying calibration sheets is measured in the 20KHZ setting.

These control bits are available on the DIN connector pins C20 and C21. When S1 and S2 are in the off position, the bandwidth can be controlled externally through these pins.

Bandwidths listed are approximate. Actual value depends on the probe being used and the calibration.

	S1	S2
20KHZ	OFF*	OFF*
10KHZ	ON	OFF
1KHZ	OFF	ON
100HZ	ON	ON

*Standard factory configuration

Digital Output Bits

JP8 provides jumpers for setting four TTL logic bits that can be read on the DIN connector pins C16-C19. These settings have no effect on the performance of the driver. They are provided as a convenience for the end user for setting a four bit board identifying code to be read by a devices connected to the driver. Each bit is tied high by default.
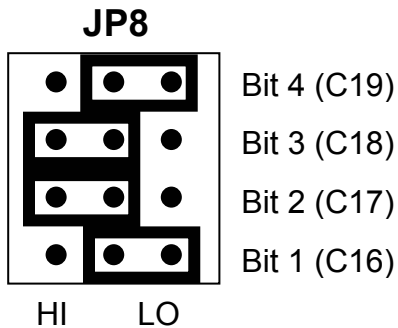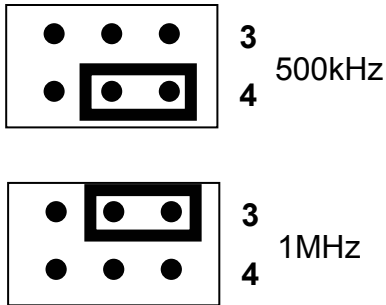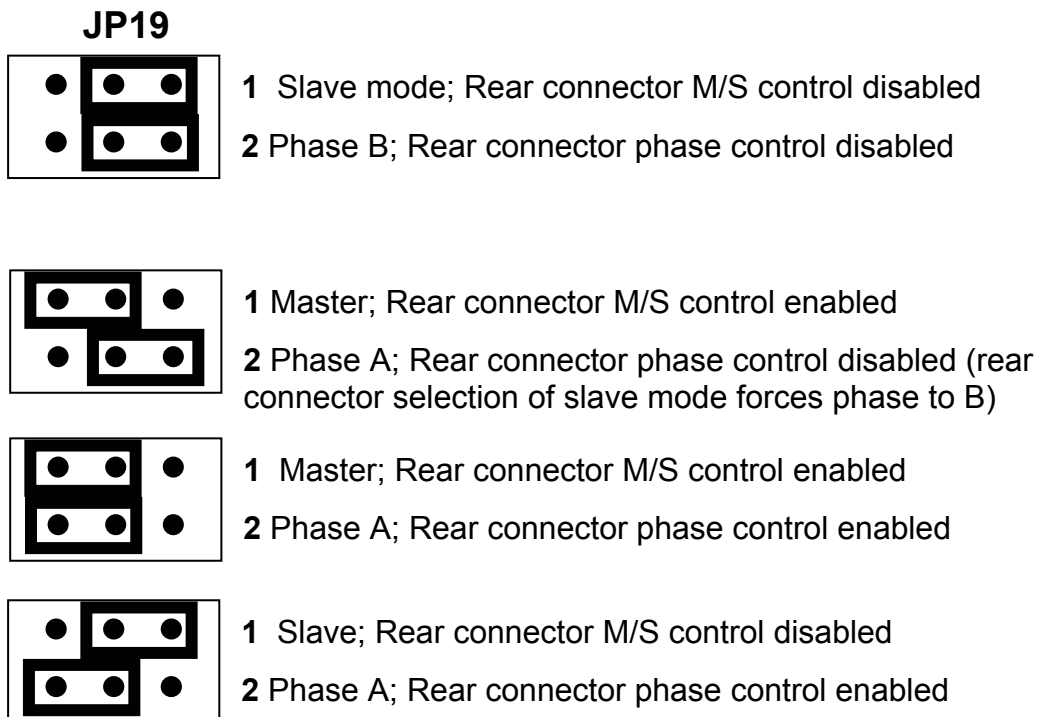
Multiple Drivers

In systems where multiple ECD20A Driver modules are used, it is important to synchronize the internal oscillator's frequency and phase. This is accomplished by configuring one of the modules to be a master oscillator and the others to be slaved or synchronized to the master. Configuration can be accomplished with JP19 or through the rear DIN connector.

Jumper JP19 is used for Master/Slave mode control, frequency selection and to enable or disable rear DIN connector control of these options. The figure below identifies the proper settings for all possible modes of operation.

Options for JP19 positions 3 and 4 (oscillator drive frequency):

500kHz

1MHz

Options for JP19 positions 1 and 2 (Master /Slave, clock phase):

JP19

1 Slave mode; Rear connector M/S control disabled

2 Phase B; Rear connector phase control disabled

1 Master; Rear connector M/S control enabled

2 Phase A; Rear connector phase control disabled (rear connector selection of slave mode forces phase to B)

1 Master; Rear connector M/S control enabled

2 Phase A; Rear connector phase control enabled

1 Slave; Rear connector M/S control disabled

2 Phase A; Rear connector phase control enabled

Calibrating the Module to a Replacement Probe

This procedure only applies to identical replacement probes. Calibrating to a new type of probe or cable length must be done at the factory.

Procedure:

1. Attach probe to driver and apply power.

2. Fixture probe to measure a flat surface.

3. Adjust gap to center of the measuring range.

4. Adjust R3 (Fine Zero) until output voltage is 0.000 volts. (R83 is coarse zero but should not require adjustment).

5. Decrease probe gap to minimum of measurement range.

6. Adjust R72 (Fine Gain) to achieve desired full scale output voltage. (R88 is coarse gain but should not require adjustment).

These are the only adjustments necessary. It is not recommended that any other adjustments be made except on the advice of the factory.
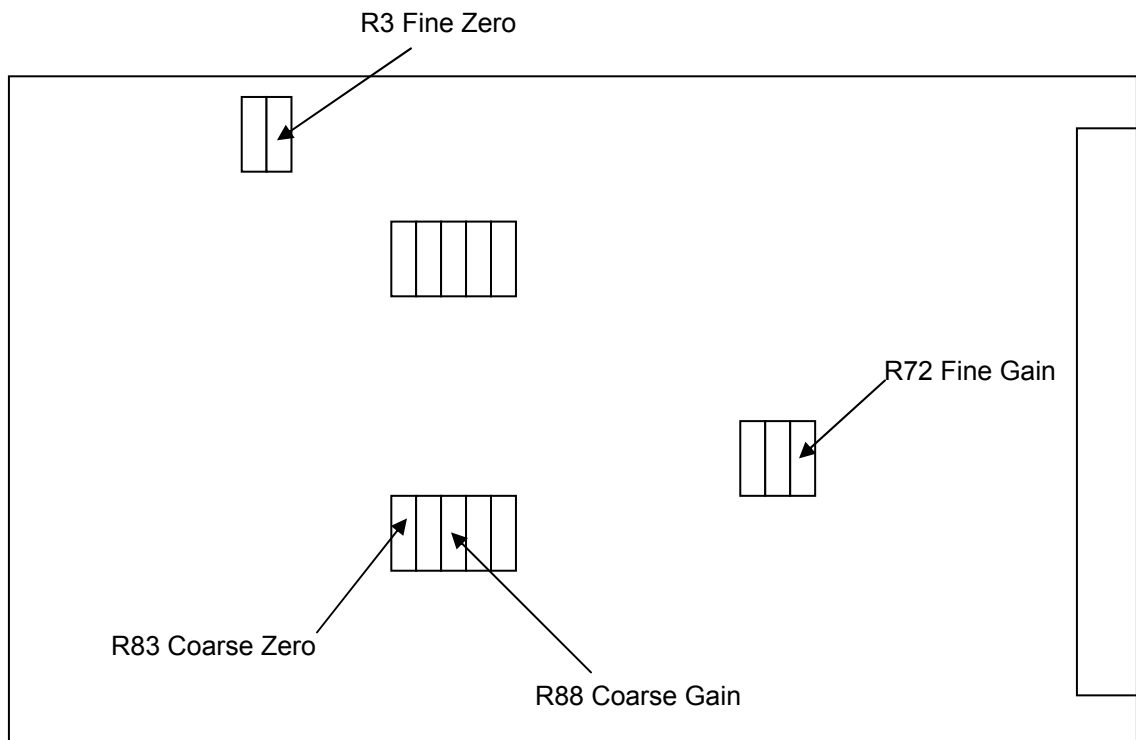
Specifications

Power Requirements	±15 VDC ± 10% @ 130 mA each
Linearity Error	±0.3% Full Scale or better, dependent on calibration
Bandwidth (Probe dependent)	Static to 10kHz ±5% -3dB: 20 kHz Typical
Probe Interchangeability	Typical sensitivity variation 10% for same probe model
Operating Temperature	4°-66°C 40°-150°F
Thermal Stability	0.3% F.S.
Oscillator Frequency	Probe cable: < 12 feet - 1MHz, > 12 ft - 500KHz
Output Impedance	0Ω
Noise Output	6 mV p-p @ 10KHz B.W. typical

Rear DIN Connector Pin Assignments

(Pin Columns A & B have no connections)

Pin	Signal	Description
C1	NC	
C2	NC	
C3	Clock Phase	TTL Input: Low = Phase B, High = Phase A (Note 2)
C4	Master/Slave	TTL Input: Low = Master, High = Slave (Note 2)
C5	GND	Ground
C6	+15VDC	+15VDC Power
C7	+15VDC	+15VDC Power
C8	+15VDC	+15VDC Power
C9	+15VDC	+15VDC Power
C10	GND	Ground
C11	-15VDC	-15VDC Power
C12	-15VDC	-15VDC Power
C13	-15VDC	-15VDC Power
C14	-15VDC	-15VDC Power
C15	NC	
C16	Digital Output Bit 1	User defined TTL output bit from JP8
C17	Digital Output Bit 2	User defined TTL output bit from JP8
C18	Digital Output Bit 3	User defined TTL output bit from JP8
C19	Digital Output Bit 4	User defined TTL output bit from JP8
C20	Filter Bit 0	TTL I/O Bit 0 corresponding to S1 of the bandwidth switch
C21	Filter Bit 1	TTL I/O Bit 1 corresponding to S2 of the bandwidth switch
C22	Clock	TTL 1MHz clock used for synchronizing multiple channels
C23	Reserved	**DO NOT CONNECT**
C24	Reserved	**DO NOT CONNECT**
C25	Reserved	**DO NOT CONNECT**
C26	Out of Range	TTL output bit indicating when the probe is out of calibrated range: TTL High = Out of range. This output will remain active for approximately 1 second after the probe is back in range.
C27	GND	
C28	GND	
C29	GND	
C30	GND	
C31	Analog Out	±10VDC Analog output voltage indicating probe reading. More positive = smaller gap.
C32	GND	

Note 1: All TTL inputs are pulled up to +5V through a 10K resistor

Note 2: External control of these signals must be enabled by jumpers on the PCB. See Multiple Drivers section on page 6.