

Model 3130-D1A  
4-channel, Variable Current Driver  
**INSTRUCTION MANUAL**

December, 1992

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**\*\*\*Special Option\*\*\***

Model 3130-S001

4-channel Variable Current Drive

December, 1994

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*Model 3130-S001*

**\*\*\*Special Option\*\*\***

Model 3130-S001

The Model 3130-S001 is the same as Model 3130-D1A except the current output has been increased to  $\pm 350\text{mA}$ .

December 9, 1994

*Model 3130-D1A*

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Bill of Material for 3130-D1A

Schematic Drawing #222250-C-6522

Component Drawing #026250-C-6523

## 4-channel Variable Current Drive

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### FEATURES

- Four channel
- Variable output to  $\pm 260$  mA
- Internal test
- Instrument amplifier per channel for measuring output current

### APPLICATIONS

- Valve testing
- DC motor drive

### GENERAL DESCRIPTION

The Model 3130 is a single-width CAMAC module designed to provide four channels of variable current. Each channel is capable of delivering  $\pm 260$  mA into 80 ohms.

Internal test capability is provided for each channel. Test mode is enabled by energizing a relay which passes the output current through an on-board 82 ohm test resistor.

Current control is via an external D/A through a front panel connector.

An on-board sense resistor and instrumentation amplifier is provided, per channel, to measure current flowing in the load (or through the test resistor).

The  $\pm 10$  volt bipolar output of the instrumentation amplifiers are brought out through a front-panel connector.

The Model 3130 has no CAMAC commands and uses the CAMAC Dataway only for power.

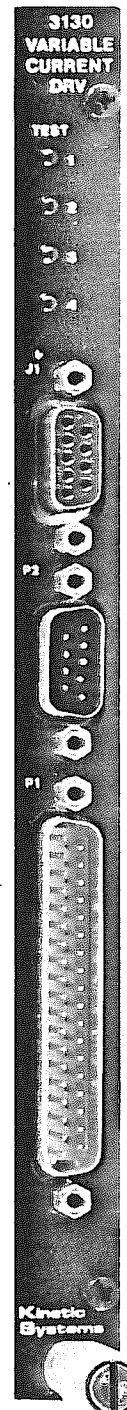
### POWER REQUIREMENTS

- +6 volts — 1225 mA max
- 6 volts — 1100 mA max
- +24 volts — 1100 mA max
- 24 volts — 1175 mA max

### ORDERING INFORMATION

Model 3130-D1A — 4-channel Variable Current Amplifier

Weight: 8 kg. (1lb. 8 oz.)



Model 3130-D1A

**INTRODUCTION**

The Model 3130-D1A is a single-wide IEEE 583 (CAMAC) module designed to provide four channels of variable current. Current control is through the J1 connector of the front panel.

The current output of each channel flows through normally closed contacts of a relay to connector P1. CHxTEST\_TTL, on connector P1, switches the current flow through the normally open relay contact and through an on-board 82 ohms test resistor.

Each of the four current channels has a precision instrumentation amplifier which measures the current flowing through the external load or through the on-board test resistor.

The  $\pm 10$  volt outputs of the instrumentation amplifiers are through the P2 connector on the front panel.

The overall system voltage gain is equal to approximately minus one.

**ELECTRICAL SPECIFICATIONS**

**CURRENT AMPLIFIER**

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
OUTPUT Current Continuous				$\pm 260$	mA
Voltage	$\pm VCC = \pm 29VDC$	$\pm 21$	$\pm 24$		volts
Dynamic Response					
Full Power Bandwidth		15	23		KHz
Input Offset Voltage					
vs Temperature			$\pm 10$	$\pm 65$	$\mu v ^\circ C$
vs Supply Voltage	$-25^\circ C < T_{case} < 85^\circ C$		$\pm 35$		$\mu /v/v$
Input Impedance					
Differential			4		K $\Omega$

**CURRENT MEASURING INSTRUMENTATION AMPLIFIER**

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
OUTPUT VOLTAGE	Current amp output -260 ma 0 ma +260 ma		-10 0 +10		volts volts volts
OUTPUT CURRENT	$\pm 10$ volt output		$\pm 50$		ma
CAPACTIVE LOAD STABILITY				1	$\mu$ f
GAIN			7.5		

**FUNCTIONAL DESCRIPTION**

**Power Supply Section** (refer to drawing 222250-C-6522).

The Model 3130-D1A requires five DC voltages +5,  $\pm 15$  and  $\pm 29$  volts.

The +5 volt supply is derived from the +6 volt CAMAC Dataway supply and dropping diode D1.

The  $\pm 15$  volt supplies are produced from the  $\pm 24$  volt Dataway voltages with 3-terminal regulators U10 and U11.

The  $\pm 29$  volt supplies are produced using DC to DC converters which add their 5 volts output to the Dataways 24 volt supply. PS1 and PS2 are Datel UWR-5/1600-D5 converters which have a 4.7-7.0 volt input range, a nominal 5 volt DC output with a maximum output current of 1.6 amps.

Each of the CAMAC Dataway source voltages are fused at 3 amps.

**Variable Current Amplifier** (refer to drawing 222250-C-6522).

There are four variable current amplifier channels on the 3130 module. Only channel 1 will be explained, as they are electrically identical.

Because there are no trimmer devices on the board, actual output voltages and currents are dependent on device tolerance stackup. Values given in the text concerning gains and transfer functions are approximate.

### Model 3130-D1A

A bipolar voltage in the range of  $\pm 10$  VDC is brought into channel 1's current amplifier through front panel connector J1, Pin 2. Signals CH1AIS and CH1AIR are a "signal pair" with CH1AIR tied to analog ground at the input to the amplifier. CH1AIS is connected to the negative input of current amp U1, which produces a voltage inversion at its output. The combination of input resistor R8 and feedback resistor R31 sets the input impedance at approximately 4K ohms.

The positive and negative load current limits of the amplifier are set at  $\pm 500$  ma by resistors R43 and R37.

Current from U1, Pin 1 flows through the normally closed contacts of relay RY1 and out front panel connector P1 pins 22 and 23. Current returns from the external load through pins 24 and 25 of P1 through resistors R1 to analog ground.

Relay RY1 allows on module current loopback testing. Channel 1 is set to test mode by pulling signal CH1TEST\_TTL to ground. In this state, the output current is passed through the on-board 82 ohm resistor.

**Current Measurement Section** (refer to drawing 222250-C-6522).

Current returning from the load creates a voltage across R1. This voltage is proportional to the current flowing in the load (or through the test resistor). Voltage dropped across R1 is sensed by amplifier U which is an instrument amplifier. R2 and R5 sets the amplifier gain at 7.5 giving an output of  $\pm 10$  V for a load current of  $\pm 260$  ma.

Amplifier U has an output drive capability of  $\pm 50$  ma and capacitive load stability to 1  $\mu$ f. Signal CH1AOS, the output of amplifier U2, is connected to front panel connector P2 Pin 2. The reference output CH1AOR may be tied to analog ground with strap option STP1.

### FRONT PANEL INFORMATION

LED Indicators	Description
TEST	Each of the four channels has a LED to indicate when it has been placed in TEST mode.

### Connectors

The 3130 front panel has two 9-position "D" connectors and one 37-pin "D" connector. The following is a signal description and pinout of each connector.

**J1** - Is a 9-socket "D" connector used to connect control voltages to the variable current amplifier inputs.



*Model 3130-D1A*

<b>Pin</b>	<b>Signal</b>
1	CH1AIR - Return channel 1 (Analog ground)
2	CH1AIS - Control voltage channel 1
3	CH2AIR - Return channel 2 (Analog ground)
4	CH2AIS - Control voltage channel 2
5	CH3AIR - Return channel 3 (Analog ground)
6	CH3AIS - Control voltage channel 3
7	CH4AIR - Return channel 4 (Analog ground)
8	CH4AIS - Control voltage channel 4
9	Shield ground

**P1** - A 37-pin "D" connector used to connect the four current amplifiers to external loads. P1 is also used to place each of the four channels into TEST mode.

<b>Pin</b>	<b>Signal</b>
1,2	Not Used
3,4	Shield ground
5,6,7,8	
9,10,11	Not Used
12	CH1TEST_TTL placed CH1 into TEST (low true)
13	Analog ground
14	CH2TEST_TTL places CH2 into TEST (low true)
15	Analog ground
16	CH3TEST-TTL places CH3 into TEST (low true)
17	Analog ground
18	CH4TEST_TTL places CH4 into TEST (low true)
19	Shield ground
20,21	Not Used
22,23	CH1OUT
24,25	CH1OUT-TEST return for CH1 load
26,27	CH2OUT
28,29	CH2OUT-TEST return for CH2 load
30,31	CH3OUT
32,33	CH3OUT-TEST return for CH3 load
34,35	CH4OUT
36,37	CH4OUT-TEST return for CH4 load

**P2** - Is a 9-pin "D" connector used to bring the voltage and reference outputs of the instrumentation amplifiers to the front panel. A strap is provided on each reference output to tie it to analog ground.

*Model 3130-D1A*

<b>Pin</b>	<b>Signal</b>
1	CH1AOR - Channel 1 reference out
2	CH1AOS - Channel 1 voltage out
3	CH2AOR - Channel 2 reference out
4	CH2AOS - Channel 2 voltage out
5	CH3AOR - Channel 3 reference out
6	CH3AOS - Channel 3 voltage out
7	CH4AOR - Channel 4 reference out
8	CH4AOS - Channel 4 voltage out
9	Shield ground