DAYTRONIC

MODEL 3140A with options C & G

FREQUENCY CONDITIONER

INSTRUCTION MANUAL

3000
Instrument Series

Model 3140A Instruction Manual, v. SB.5
Pub. No. 3140AM.5, Issued 10/96
Part No. 91122

DAYTRONIC

MODEL
3140A
FREQUENCY CONDITIONER

INSTRUCTION MANUAL

Daytronic Corporation
Dayton, OH • Tel (800) 668-4745
www.daytronic.com

DAYTRONIC CORPORATION

Model 3140A Frequency Conditioner
Instruction Manual

The Model 3140A Frequency Conditioner accepts any type of AC or pulse input signal, irrespective of waveform. It produces a standard five-volt analog output, with low-pass corner frequency of 2 or 10 Hz, depending on the input frequency range selected. This output is precisely proportional to the *frequency* of the source.

I. Specifications: Table 1

Input Type: Any AC signal, single-ended or differential, irrespective of waveform.
Input Sensitivity: Continuously adjustable from 0.1 to 200 V via front-panel control. Input Sensitivity decreases above 10 KHz by 0.01 V/kHz to 0.5 V at 50 kHz.
Input Threshold Level: Automatic triggering of squarer at 75 and 25 percent of the input amplitude.
Input Frequency Ranges: Full-scale frequency ranges are selected with internal switches. *Ranqe* switches of 100, 1000, and 10000 and *Multiplier* switches of xl, x2, and x5 provide nine frequency ranges (see Table 2).
Analog Output: 0 to ±5 V, with 50% overrange, 5 mA max. Active low-pass filtering provides for rolloff of 60 dB per decade above corner frequency. Corner frequency is 2 Hz for input ranges of 100, 200, and 500 Hz; it is 10 Hz for all other ranges (1000 to 50000 Hz).
Output Ripple and Noise: Less than 0.1% of full scale from 20 to 100% of the selected range.
Step-Function Response: Response time (to 99.9% of final value) is 1.8 seconds for 100-, 200-, and 500-Hz ranges, and 350 milliseconds for all other ranges.
Accuracy: 0.05% of full scale.
Dimensions: 1.7 x 4.41 x 8.5 (HWD inches).
Operating Temperature Range: 0 to +130 degrees F.
Power Requirements: 105 to 135 W-AC, 50 to 400 Hz at 5 W max.

The Model 3140A is also available in two other forms. The *Model 3240A* contains a Digital Indicator to display the analog output. The *Model 3340A* is identical to the 3240A, except that it also includes high-low limit monitoring. See separate *Model 3200/3300* and *Model 3300 Instruction Manuals.*

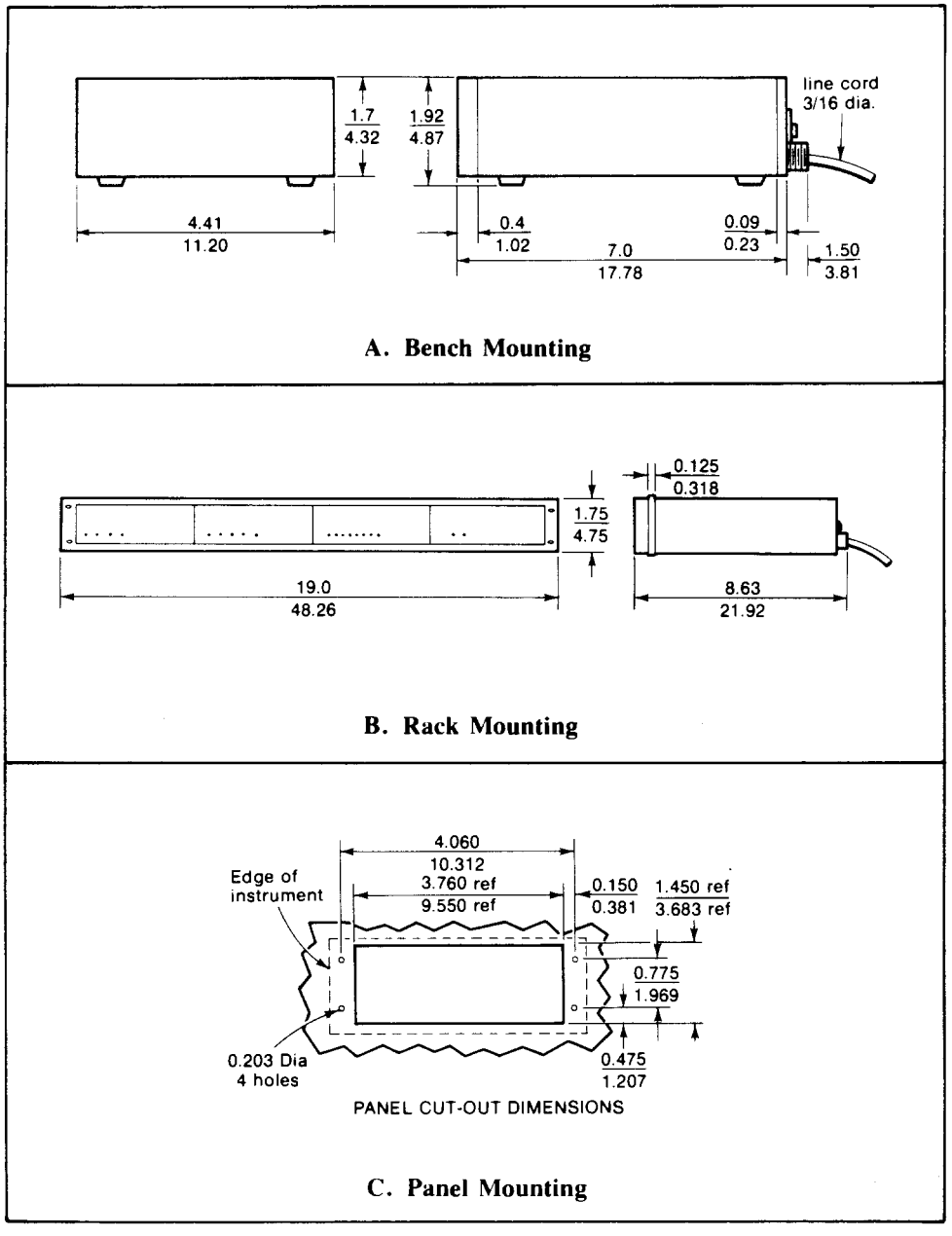
II. Installation and Cabling

1. MOUNTING: 3000 Series instruments can be operated as bench-top, rack-mounted, or panel-mounted units. See Fig. 1. Up to four 3000 Series instruments can be mounted in a standard 19-inch rack, using the 1-3/4" high *Model 3004 Adaptor*. The following reassembly procedure lets you quickly mount any 3000 Series unit in your own precut panel (see cutout dimensions in Fig. 1C).

IMPORTANT: The unit is shipped with two spacer washers on the securing screws of the rear-panel I/O Connector. When panel-mounting the unit, you MUST REMOVE THESE WASHERS, so that the printed-circuit board may move forward about 1/8" during Step f, below.

a. Remove the front panel (one small flat-head screw near each edge--see Fig. 2).

Fig. 1 Instrument Mounting Dimensions



b. Remove the front bezel (four fillister-head screws fasten it to the metal housing--see Fig. 2).

c. Make the panel cutout and drill the screw clearance holes shown in Figs. 1C and 2. The front bezel can be used as a template to define the rectangular cutout and to locate the clearance holes.

d. Hold the instrument behind the panel and use the four mounting screws to reattach the front bezel to the metal housing, from the front of the panel.

e. Reinstall the front panel.

f. Tighten--BUT DON'T OVERTIGHTEN--the two securing screws of the rear-panel I/O Connector. This will push forward the printed-circuit board and all front-panel buttons and controls by about 1/8"--which is consequently the maximum panel thickness allowed.

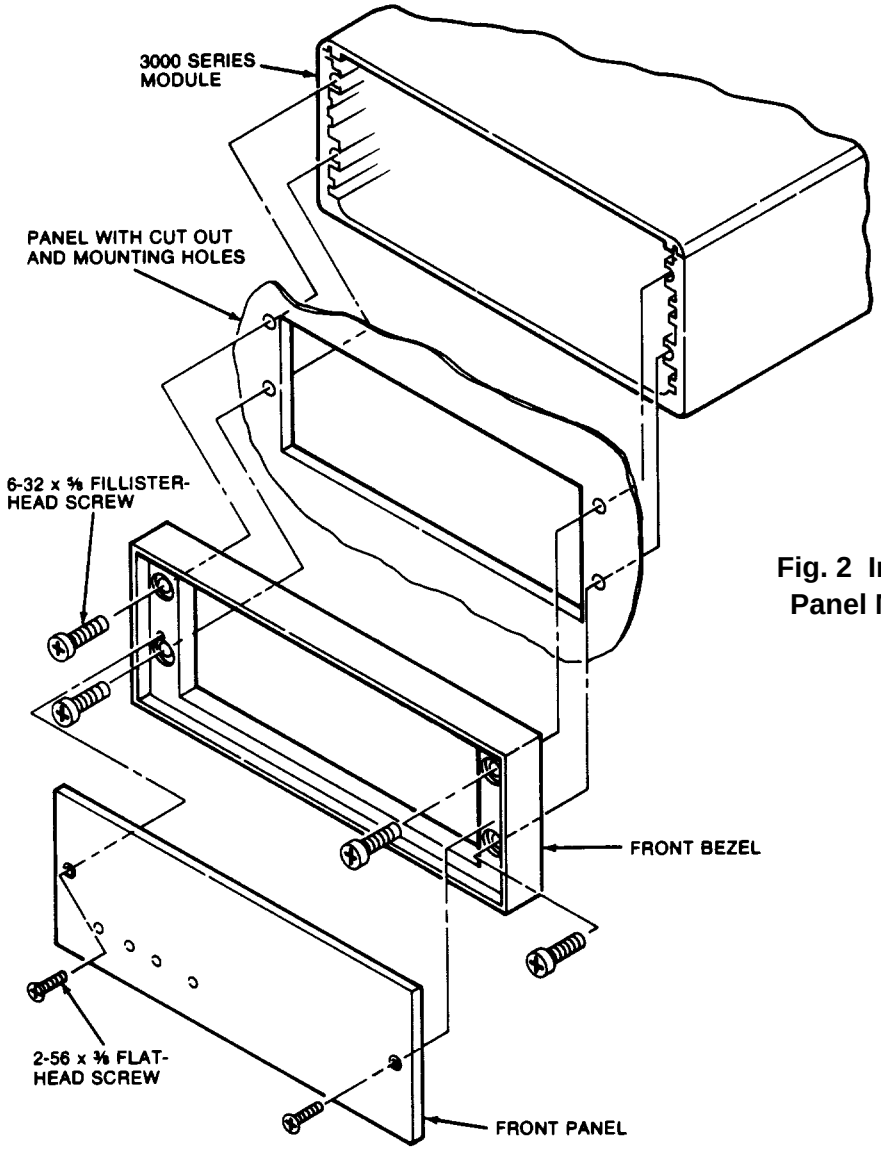
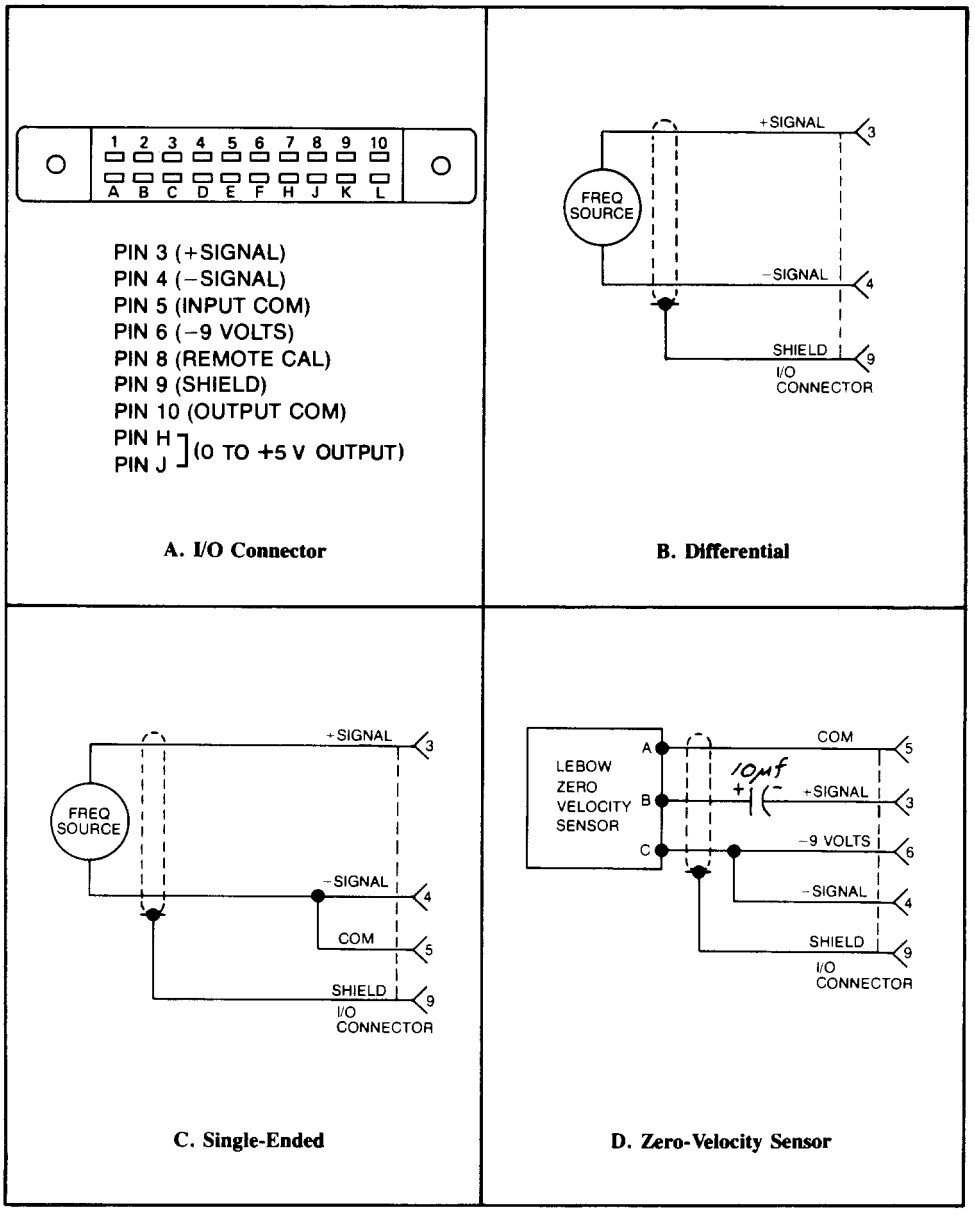


Fig. 2 Instrument Panel Mounting

2. AC POWER CONNECTION: Connect the supplied power cable to a 105-135 V-AC, 50-400 Hz source (for "F" versions, 210-260 V-AC; for "B" versions, there is no external power connection). This is a three-conductor cord, plugging into the AC power connector at the rear of the unit; the offset pin connects to earth ground. To maintain the safety ground when operating from a two-contact outlet, use a 3-prong-to-2-prong adapter and connect the green pigtail on the adapter to earth ground.

3. TRANSDUCER CABLING: The transducer is connected via the 3140A's rear-panel I/O Connector. For pinout, see Fig. 3A, below. The frequency input can be single-ended or differential, as shown in Fig. 3C and 3B, respectively. Shielded, twisted-pair cable is recommended. Fig. 3D gives the required cabling when the 3140A is used with Lebow Zero Velocity Sensors.

Fig. 3 I/O Wiring Data



4. RANGE SELECTION: To access the internal bank of ten numbered range-selection switches, remove the 3140A's front panel (two screws near each edge--see Fig. 2). To select the desired full-scale frequency range, place in the ON (i.e., *downward*) position the switches indicated in Table 2, below.

Table 2. Frequency Range Selection

Range Switches:		Multiplier Switches:	
Range	Switch(es)	Factor	Switch(es)
0 to 100 Hz	# 1,2,3,4	x1	# 10
0 to 1000 Hz	# 5	x2	# 8,9
0 to 10000 Hz	# 6	x5	# 7

TO SET A FULL-SCALE RANGE OF:	PLACE THESE SWITCHES ON*:
100 Hz	# 1,2,3,4,10
200 Hz	# 1,2,3,4,8,9
500 Hz	# 1,2,3,4,7
1000 Hz	# 5,10
2000 Hz	# 5,8,9
5000 Hz	# 5,7
10000 Hz	# 6,10
20000 Hz	# 6,8,9
50000 Hz	# 6,7

* ON = switch closed (downward position)

5. REMOTE CALIBRATION CHECK: The 3140A can be placed in the REMOTE CAL mode by connecting Pin 5 of the I/O Connector (Signal Common) to Pin 8. This provides a means of periodically monitoring the instrument from a remote location without pressing the front-panel CAL button. When the Remote Cal input (Pin 8) is brought to a 0-volt (ground) level through the action of an external switch, transistor driver, etc. (see Fig. 4), the effect is the same as when the CAL button is pushed (see Section III, below).

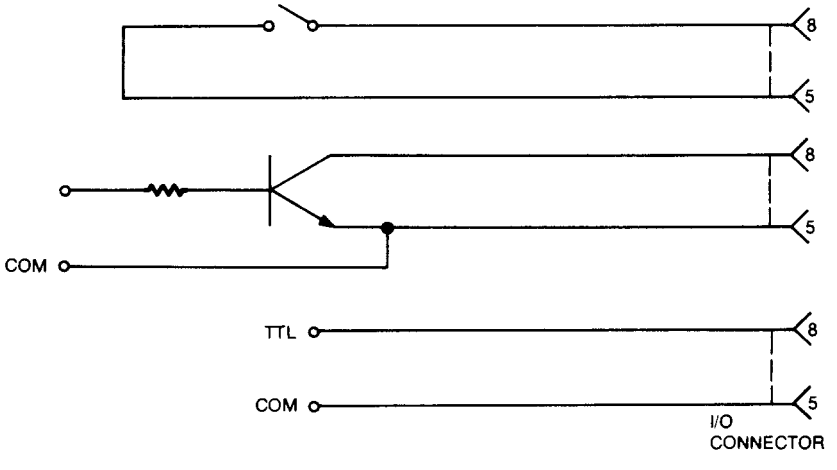


Fig. 4 Remote Calibration Connections

III. Calibration

1. Turn power ON by placing the rear-panel slide switch in the upward position. With application of AC power, the front-panel red LED indicator should light.

2. ZERO ADJUSTMENT: Establish a zero input to the 3140A by bringing the transducer frequency to zero or by disconnecting the transducer from the 3140A I/O Connector. Then adjust the front-panel ZERO control (see Fig. 5, above) to produce an output of zero.

3. SPAN ADJUSTMENT: Press the front-panel CAL button. The input signal is now replaced by a digitally divided, crystal-controlled frequency equal to 80% of the full-scale value of the input ranqe selected in Step 4, Section II, above. Now adjust the Coarse and Fine SPAN controls to produce an output equal to 80% of the selected range. The 3140A is normally scaled for a full-scale output of +5 volts.

4. TRIGGER LEVEL ADJUSTMENT: Turn the front-panel INPUT SENSITIVITY control fully counterclockwise. Then, using the transducer as a frequency source, apply the lowest-valued input signal for which a valid reading is required. Then turn the INPUT SENSITIVITY control clockwise until a stable output is observed.

FOR MODELS 3240A AND 3340A ONLY:

1A. POWER-UP and ZERO ADJUSTMENT: as in Steps 1 and 2, above.

2A. SCALE SELECTION: Determine the full-scale output of the transducer in terms of the desired unit of measurement. For example, the full-scale output for a flowmeter might be 5000 Hz, which corresponds (in units of flow) to a measurement of, say, 728.2 cfm. Then select the full-scale frequency ranqe, as explained in Step 4 of Section II. In our example, this would be the 5000-Hz setting.

Now select the Digital Indicator scale that accommodates the full-scale output of the transducer in the desired unit of measurement. In our example, this scale would be ± 10000, with decimal point to the left of the last zero, giving a full-scale reading of 1000.0, to accommodate a full-scale measurement of 728.2 cfm. For the setting of scale and decimal-point location, refer to the *Model 3200/3300 Instruction Manual*.

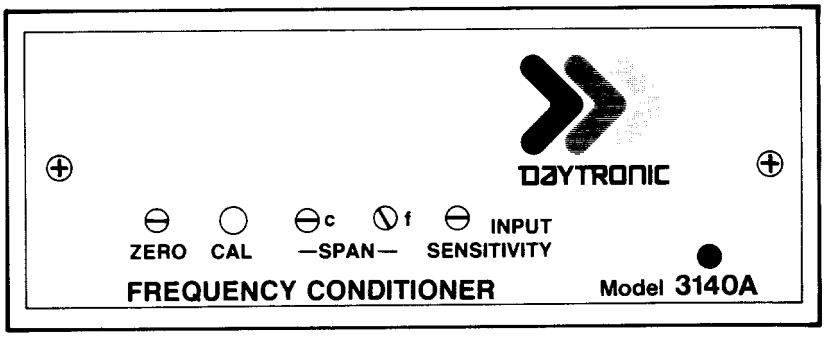


Fig. 5
Model 3140A
Front Panel

3A. SPAN ADJUSTMENT: Apply an input signal with a frequency equal to the rated full-scale output of the transducer. Then adjust the Coarse and Fine SPAN controls to produce a readout on the indicator of the value determined in Step 2A, above--that is, of the full-scale transducer output in terms of the desired unit of measurement (e.g., 728.2 cfm).

4A. TRIGGER LEVEL ADJUSTMENT: as in Step 4, above.

IV. Verification of Normal Operation

If the Model 3140A is suspected of faulty operation, you should do the following:

1. If the unit is TOTALLY INOPERATIONAL (front-panel LED indicator does not light), first check the primary power fuse (F1) located on the standup board which forms the power-cord connection point. If this fuse is blown, replace it with a 0.50-amp fuse ("F" version, 0.125-amp but not before determining the cause of overload (inspect the input power connections for any short-circuiting, etc.).

2. Push the front-panel CAL button, and observe the analog output. If it is stable, noise-free, and adjustable via the Coarse and Fine SPAN controls, then you can assume that all circuits--with the exception of the front-end amplifier and trigger circuits--are functioning normally.

3. To check the front-end circuitry, replace the transducer and cable with a transducer and cable known to be in good condition and operating reliably. If the 3140A works properly with this different input source, then the problem most likely lies in the original transducer/cable. However, if the observed malfunction persists after this substitution, repairs to the 3140A are probably indicated.

3000 "C" Option Instruction Manual, v. SB.2
Pub. No. 3000CM.2, Issued 10/96

DAYTRONIC

3000 SERIES

"C" Option

4-20 mA CURRENT OUTPUT

INSTRUCTION MANUAL

Daytronic Corporation

Dayton, OH Tel (800) 668-4745

www.daytronic.com

1. General Description

Operating in this mode, any 3000 Series instrument can transmit high-accuracy measurement data as *process signals for supervisory monitoring and control*.[1] Each "C" unit produces two kinds of analog output simultaneously: (1) its normal voltage output and (2) a current output continuously proportional to the voltage signal to within ±0.05%.

As normally shipped, this option generates a current output within the ISA standard signal range of 4 to 20 mA, corresponding to a range of 0 to +5 V. Bipolar ranges of ±16 mA and 4 to 12 to 20 mA are also available, each corresponding to -5 to +5 V. Voltage compliance is +5 V relative to Signal Common.

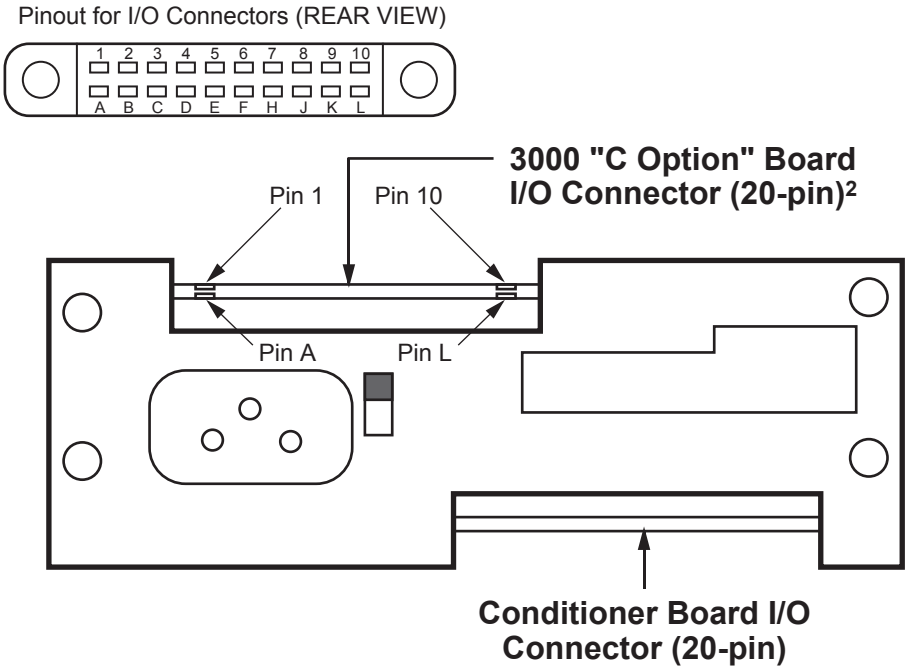


Fig. 1 Rear-Panel Location of 3000C Current Output Board

2. Connections / Output Mode Selection

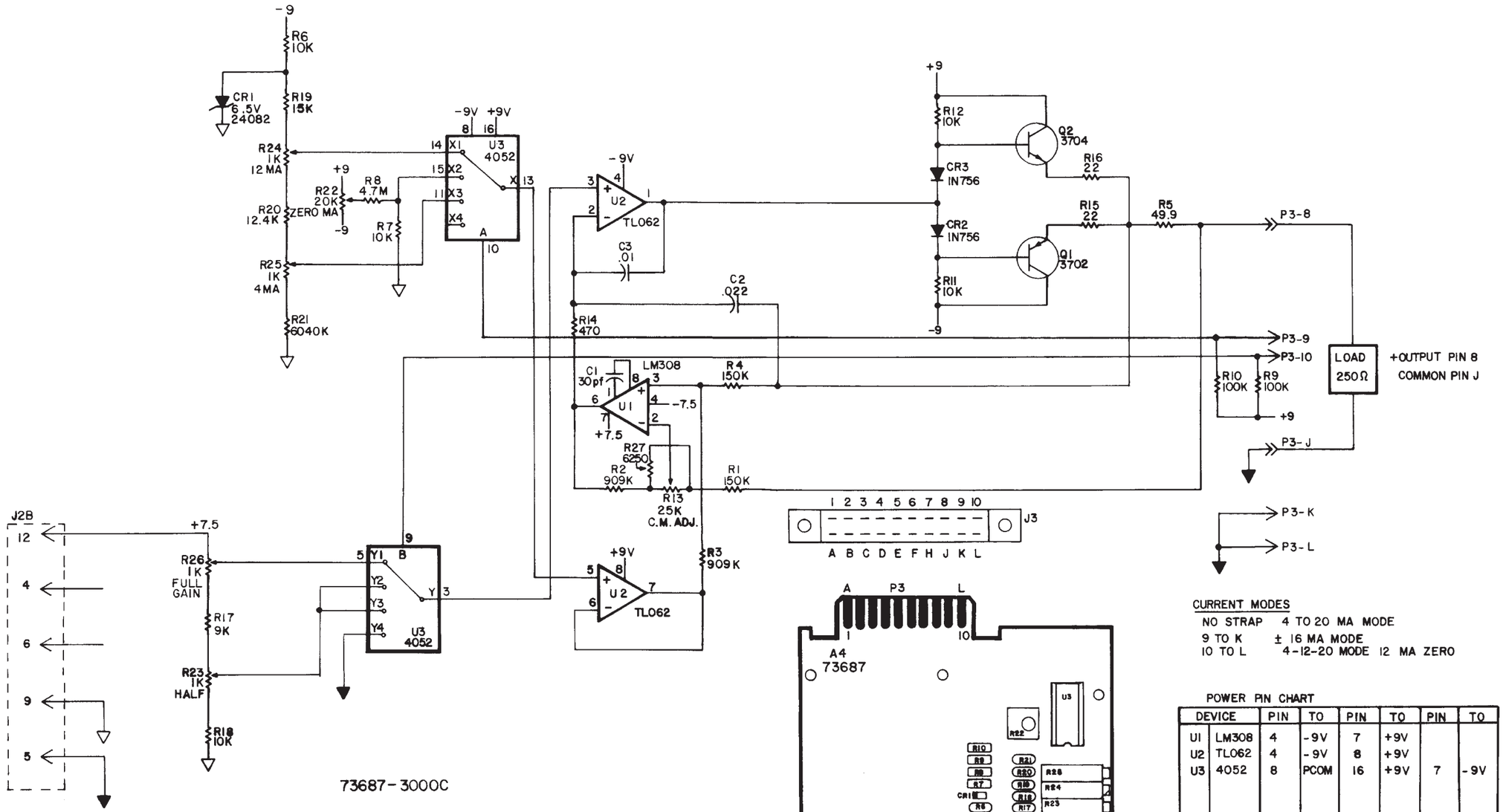
Pin assignments for the 3000C board's 20-pin I/O connector (shown in Fig. 1) are given in the following table.[3]

Pin Number	Function
8	**CURRENT OUTPUT SIGNAL** Range will be standard unipolar **4-20 mA** if Pins 9 and 10 are both unconnected; the output is single-ended, and should be returned to **Pin J** (COMMON)
9	**±16 mA MODE** Connecting Pin 9 to **Pin K** will set the current output range to bipolar ±16 mA
10	**4-12-20 mA MODE** Connecting Pin 10 to **Pin L** will set the current output range to bipolar 4-12-20 mA (with 12 mA as effective "zero")
J	**COMMON**
K, L	for **OUTPUT MODE SELECTION**

[1] NOTE: The "C" Option may NOT be used in combination with the "P," "G," "R," or "S" Option.

[2] In **Form 3 ("33XX")** instruments with the "C" Option, current-output circuitry is integrated with the **3300 HI-LO Limits Board**.

[3] For all other (*limit-related*) I/O connections for **Form 3 ("33XX")** instruments with the "C" Option, see the *Model 3300 HI-LO Limits Instruction Manual*.



73687-3000C

NOTES:
1. ALL -9V WIRES GO TO J2B PIN 6.
2. ALL 9V WIRES GO TO J2B PIN 4.
3. ALL ▼ POW COM WIRES GO TO P3 PINS J,K,L, FROM J2B PIN 5.
4. ALL ▽ SIG COM WIRES GO TO J2B PIN 9.

CURRENT MODES

NO STRAP 4 TO 20 MA MODE
9 TO K ± 16 MA MODE
10 TO L 4-12-20 MODE 12 MA ZERO

POWER PIN CHART

DEVICE		PIN	TO	PIN	TO	PIN	TO
U1	LM308	4	-9V	7	+9V		
U2	TL062	4	-9V	8	+9V		
U3	4052	8	PCOM	16	+9V	7	-9V

ZONE	REV.	DATED	DESCRIPTION	APP.	CONTROL
CSR	C	7-1-96	WAS VERSION 003 CHG. R18 14K TO 16K. VERS. DOE TO 003	SC	
T.T	B	2-7-91	ADDED P/N CHART, J2B. MOVED P3.	MW	
	A	10-24-90		MW	

DHL DES. CHK.
CLM DFT. APP.

DAYTRONIC CORPORATION MIAMISBURG, OHIO

DATE: 7-12-83 REV: 7-1-96 REV. LEVEL: C

NAME: 4 TO 20 MA CURRENT OUTPUT CARD

NUMBER: S3000C

3000 "G" Option Instruction Manual, v. SB.2
Pub. No. 3000GM.2, Issued 10/96
Part No. 91637

DAYTRONIC

3000 SERIES

"G" Option

DUAL GALVANIC ISOLATED OUTPUT

INSTRUCTION MANUAL

Daytronic Corporation
Dayton, OH • Tel (800) 668-4745
www.daytronic.com

1. General Description

With this optional circuit board, a **Form 1 ("31XX")** or **Form 2 ("32XX")** instrument can furnish two independent *galvanic outputs*, fully isolated not only from each other but also from the 3000 instrument's "common." Each output is normally set at the factory for a full-scale range of **0-10 V-DC** (±0.2%) when the data signal from the 3000 unit's conditioner card is at its standard 5-V level. Though normally preset at "2.00," each input's gain can be adjusted within ±5%, if desired, by means of potentiometer controls on the G-option card.

The use of galvanically isolated outputs prevents ground-loop effects in interconnections with remote data-acquisition systems or controllers. The presence of two independent outputs lets you send collected data to two different systems or devices, each with its own ground.

Load limit for each output exceeds 10 kilohms. Output bandwidth is normally 40 Hz; the "G" option can be easily modified, however, for other bandwidths up to 500 Hz (contact the factory for details).

NOTE: The only other options that may be combined with the "G" option are the "B" (battery-powered) and "F" (230 V-AC-powered) options.

2. Additional 3000(G) Specifications

Output Range: ±10 V-DC full scale (2 mA max), normal; internal controls give approximately ±5% of adjustment authority on both SPAN and ZERO

Common-Mode Range: ±500 V, max

Common-Mode Rejection Ratio: DC: -120 dB; at 60 Hz: -60 dB

Linearity: ±0.1% of full scale

Maximum Zero Drift, *After Warmup of One-Half Hour*: ±0.2% of full scale*

Maximum Span Drift, *After Warmup of One-Half Hour*: ±0.2% of full scale*

* Applies to the 3000 "G" Option only and does not include possible drift contributed by the signal conditioner board of the base 3000 instrument.

3. Installation and Cabling

When viewing the 3000 instrument from the rear, the Galvanic Output Board is in the upper left of the rear panel (see Fig. 1). Access to the output signals is through a 20-pin edge card connector with a key slot between contact pads 4 and 5. The user must provide his own cable connection to the card, pinout for which is as follows:

Pin No. (see Fig. 1)	Function
2,B	SIGNAL 1 OUT
1,A,3,C	ISO COM 1
9,K	SIGNAL 2 OUT
8,J,10,L	ISO COM 2

Cabling of the isolated analog outputs is shown in Fig. 2. Each output is single-ended and returns to its own ISOLATED COMMON. Each output's SHIELD should be tied to the instrument chassis via one of the screws holding the rear panel.

4. Calibration

NO ADJUSTMENT OF THE G OPTION IS NECESSARY DURING NORMAL USE.** Follow the normal calibration procedure given in the respective *3000 Instrument Instruction Manual*.

** As mentioned above, separate ZERO and SPAN adjustment controls are provided on the G Option board for each isolated output, if it is desired to refine the "2.00" gain to which the output has been set prior to shipment. These controls, shown in Fig. 3, may be accessed by removing the 3000 instrument's front panel.

Fig. 1
Rear-Panel Location of 3000G Galvanic Output Board

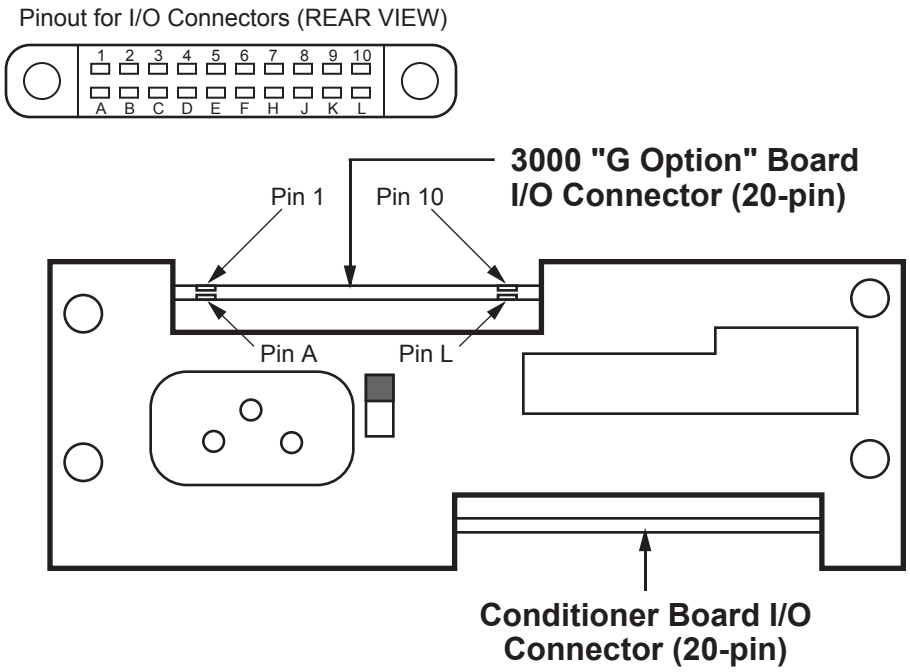


Fig. 2
Cabling of Isolated Outputs

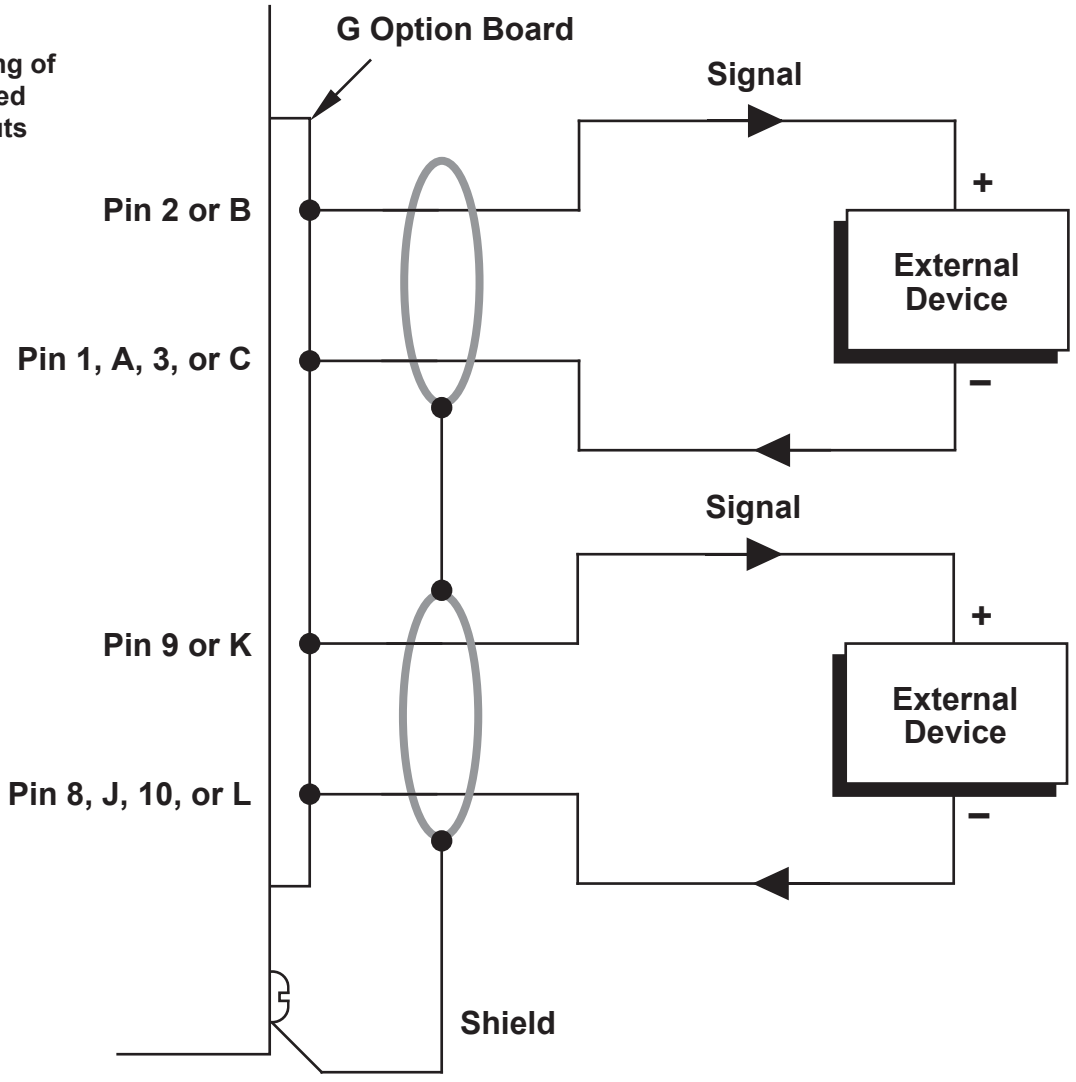
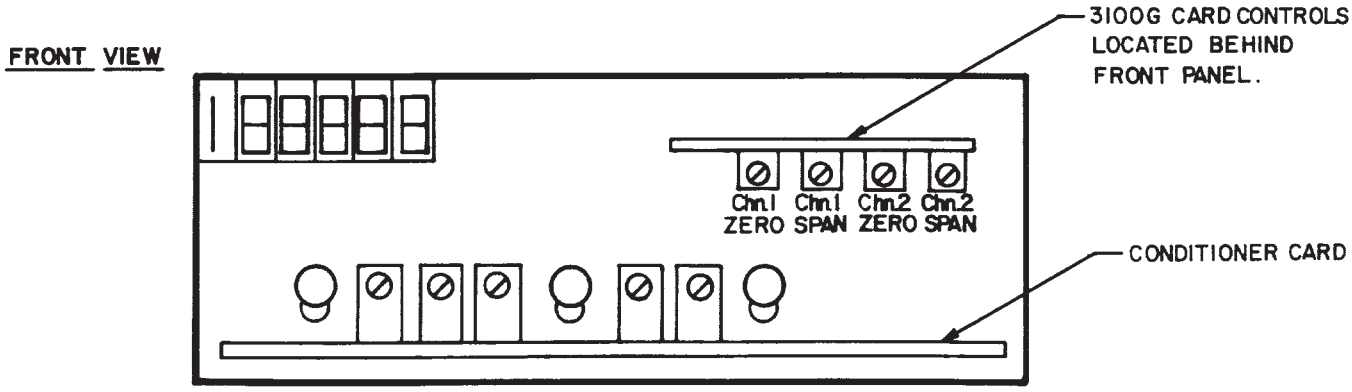
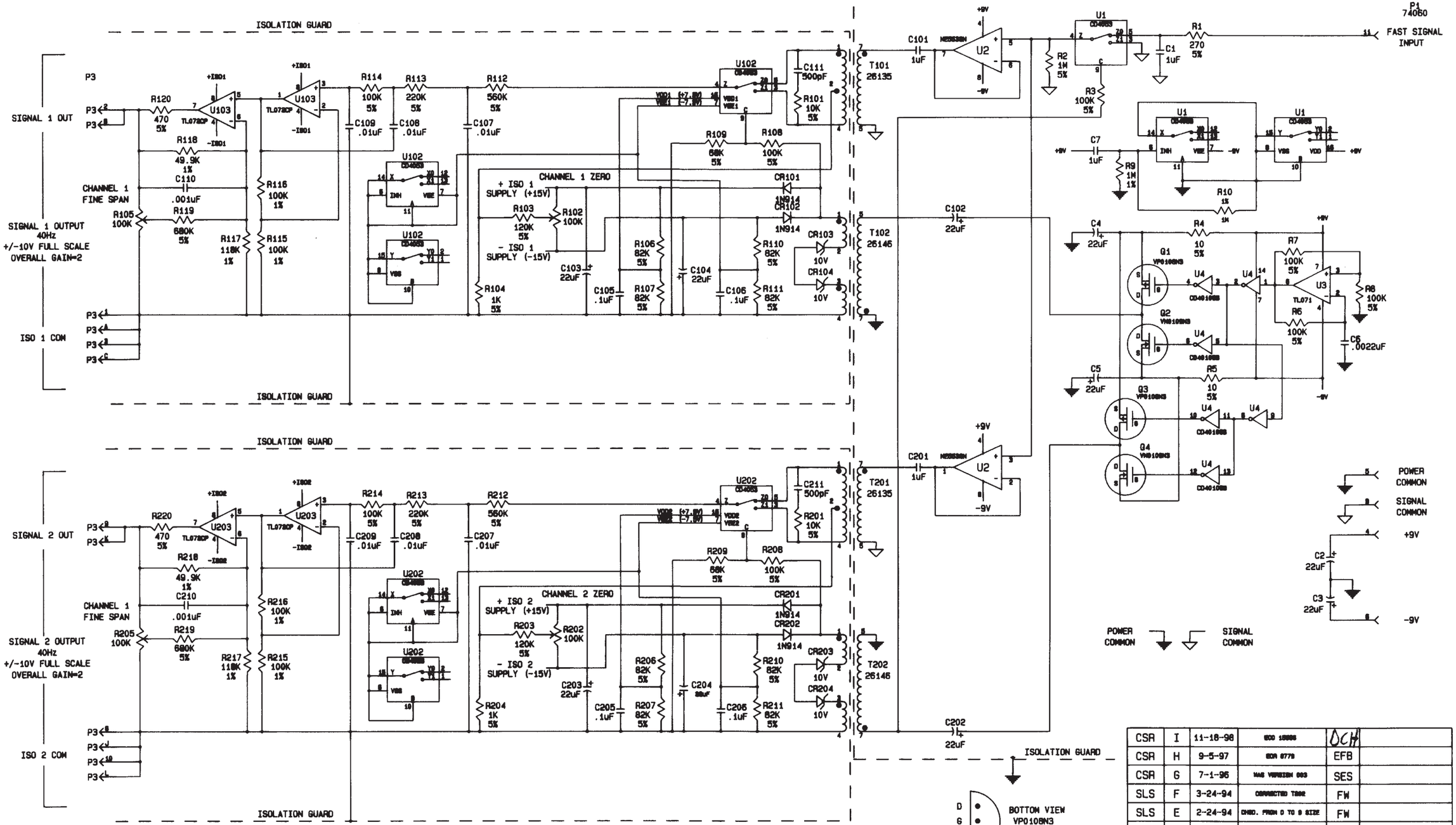
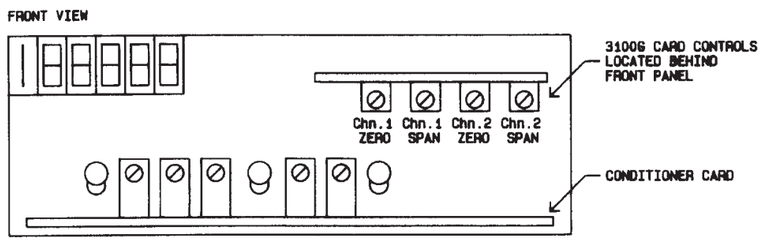


Fig. 3 Location of Internal G-Option Controls

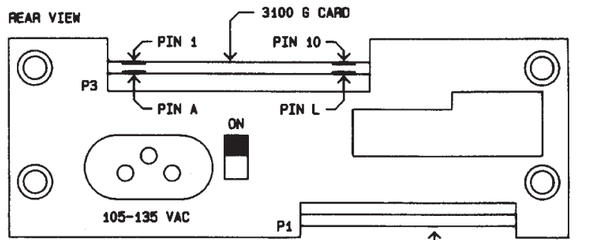




FRONT VIEW



REAR VIEW



BOARD NO.: 73871.1
BOARD DATE: 2-5-87

CSR	I	11-18-98	ECO 10886	OCH	
CSR	H	9-5-97	ECR 0778	EFB	
CSR	G	7-1-96	WAS VERSION 003	SES	
SLS	F	3-24-94	CORRECTED T202	FW	
SLS	E	2-24-94	CHNG. FROM D TO B SIZE	FW	
CLM	D	4-8-93	SEE ECR 06480	MW	
	C	11-29-90	CHG VER. R117-R118 R217-R218 ADD C111, CR11	MW	
	B	10-31-90	CHNG. FROM 031006	MW	
	A	8-2-88	ADDED C110, C210 BOTH .001uF; CHNG.VER.#	MW	
DFT.	REV.	DATED	DESCRIPTION	APP.	CONTROL

DSA DES. | DSA CHK. | KIS DFT. | FW APP.

DAYTRONIC CORPORATION MIAMISBURG, OHIO

DATE 1-12-87 | REV 11-18-98 | REV. LEVEL: I

NAME: GALVANIC ISOLATED OUPUT OPTION CARD (3100G)

NUMBER: S3000G

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Dayton, • (800) 668-4745
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