DAYTRONIC

MODEL 3163 with options C & G ANALOG CONDITIONER

INSTRUCTION MANUAL

3000
Instrument Series

Model 3163 Instruction Manual, v. SB.5
Pub. No. 3163M.5, Issued 10/96
Part No. 91125

DAYTRONIC

MODEL
3163
ANALOG CONDITIONER

INSTRUCTION MANUAL

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

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

PLEASE NOTE: Sections 6 and 7, Figures 8 and 9, and Table 2 have been removed from this manual.

If you need information regarding specific 3163 components and circuitry, please contact the Daytronic Service Department at (937) 293-2566.

INSTRUCTION MANUAL
MODEL 3163 ANALOG CONDITIONER

1. DESCRIPTION

The Model 3163 Analog Conditioner accepts and conditions inputs from dc-to-dc lvdt's, potentiometer-type sensors, Hall-effect devices, photocells, current shunts, and other analog voltage sources with various grounding configurations and voltage and impedance levels. The output is the standard Five-Volt Data Signal Level of the *3000 Series* Instruments and is available at three different output terminals, each having a different bandpass: (1) dc to 2 kHz, (2) dc to 200 Hz, and (3) dc to 2 Hz. Active low-pass filters are used to achieve the 200-Hz and 2-Hz cutoff frequencies. The filtered outputs provide averaging or smoothing of signals containing noise or other dynamic components to allow a stable digital indication and precise, jitter-free control action. The Model 3163 is shown in Figure 1 and the specifications are given in Table 1.

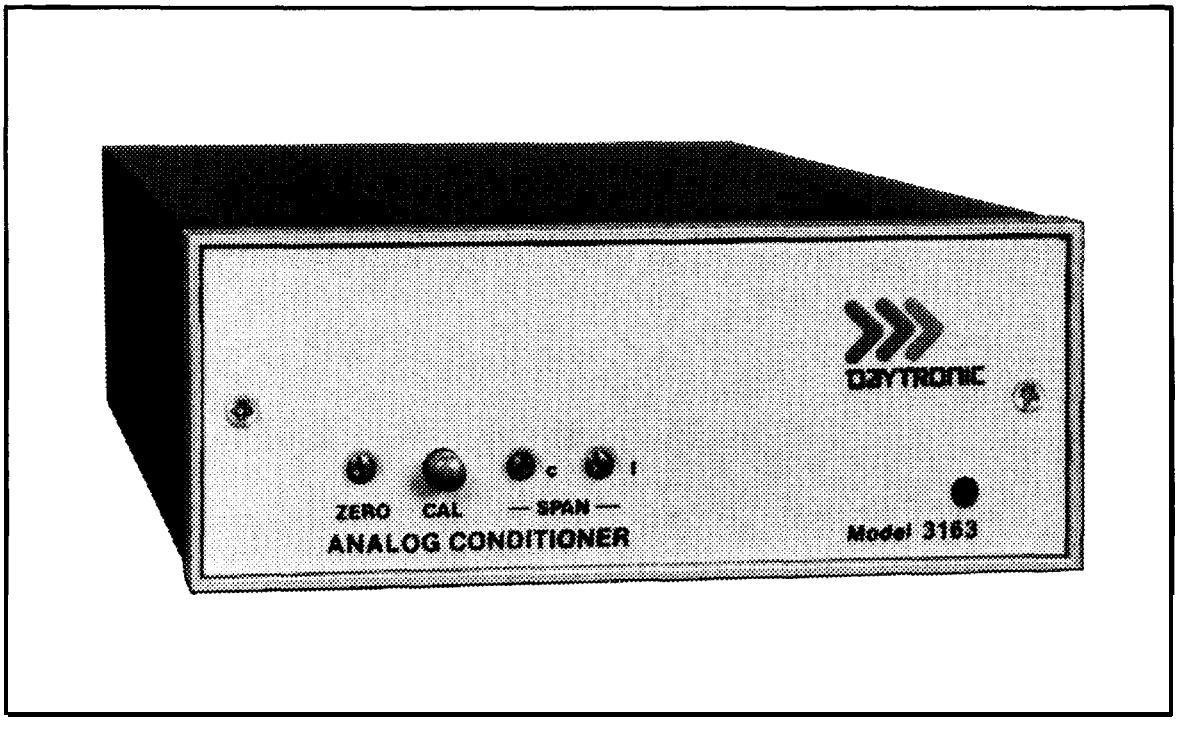


Figure 1. Model 3163 Analog Conditioner

Table 1. Specifications

Input Type: Floating differential; 2, 3, or 4 wire.

Input Sensitivity: Continuously adjustable in four jumper selectable ranges: 50 to 500 millivolts, 500 millivolts to 5 volts, 5 to 50 volts, and 50 to 250 volts.

Input Impedance: One megohm.

Common-Mode Range: ± 100 volts dc.

Common Mode Rejection Ratio: 70 dB, dc to 60 Hz.

Excitation Supply: Regulated 10 volts (±0.02%), 20 milliamperes max.

Analog Outputs: Three analog outputs available; 0 to ± 5 volts with 50% overrange, 5 milliamperes maximum. Bandpass is dc to 2 kHz, dc to 200 Hz, or dc to 2 Hz, depending on output selected. Active low-pass filters provide for rolloff of 60 dB per decade above cutoff frequency. Full-scale slew time is 1.4/f seconds, where f is the cutoff frequency.

Accuracy: 0.1% of full scale for 60 days ("hands off") following initial calibration by user.

Dimensions: 1.7 x 4.41 x 8.5 (HWD inches).

Operating Temperature Range: 0 to 130 degrees F.

Power Requirements: 105 to 135 volts ac, 50 to 400 Hz at 5 watts maximum.

The Model 3163 has an isolated, floating differential input with wide common-mode range and excellent common-mode rejection. This allows even low-level signals to be obtained, essentially free from common-mode offset problems of either an ac or dc nature, from off-ground sources.

The signal source configuration can be either 2-, 3-, or 4-wire, as shown in Figure 2. A regulated 10-volt power supply is contained within the 3163 to permit the excitation of potentiometers, dc-to-dc lvdt's, and similar devices. A half-bridge terminal allows zero-center operation of potentiometers. Zero adjustment of tare input values is also included.

The input range is adjustable from ±50 millivolts to ±250 volts, full scale, to accommodate virtually any level requirement. Front-panel *Coarse* and *Fine* SPAN controls allow convenient scaling of the output signal for digital display in the appropriate engineering units.

Calibration of the 3163 is accomplished by replacing the input signal with a precise, internally-generated reference voltage. The *calibration* mode can be entered either by pressing the front-panel CAL pushbutton or by shorting terminals at the instrument I/O connector with an external switch, transistor turn on, or similar technique.

The Model 3163 Analog Input Conditioner is also available in two additional forms. The Model 3263 contains a Digital Indicator to view the analog output of the

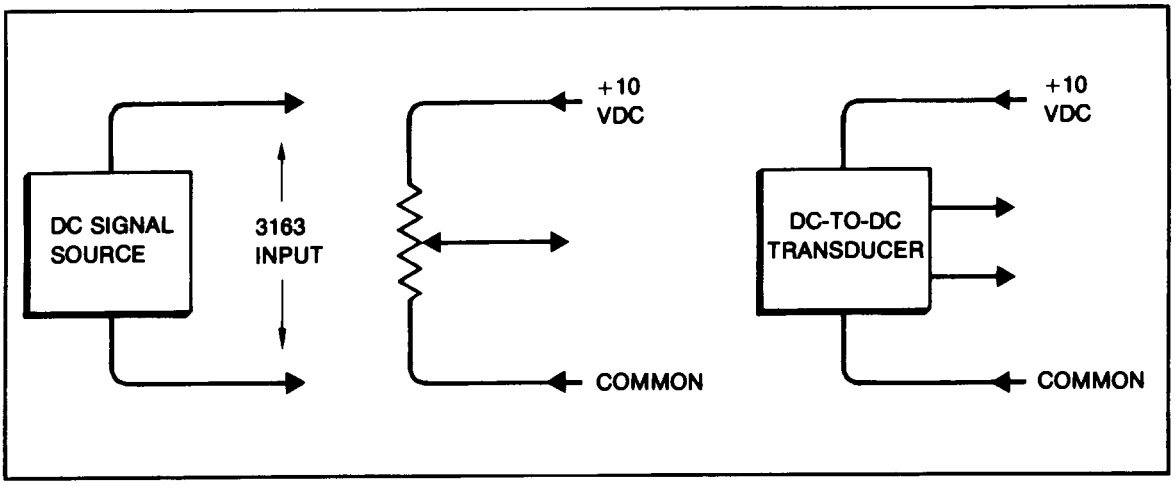


Figure 2. Signal Source Wiring

conditioner. The Model 3363 includes a Limit section (in addition to a Digital Indicator) which provides High/OK/Low indications and outputs. The Digital Indicator and Limit features are standard to all *3000* Instruments and are covered in separate instruction manuals.

2. INSTALLATION AND CABLING

The following paragraphs provide the instructions for instrument installation and cabling.

MOUNTING. The *3000 Series* Instruments can be operated as bench-top units or they can be rack- or panel-mounted. Clearance dimensions for a bench-mounted instrument are given in Figure 3. Panel cut-out dimensions for panel mounting are also shown in Figure 3. From one to four 3000 Series Instruments can be mounted in a 19-inch rack using the 1 3/4 inch high Model 3004 Rack Adaptor. Rack-mounting dimensions are also given in Figure 3. To panel mount an instrument, proceed as follows. Refer to Figure 4.

(a) Remove the front panel by removing two 2-56 x 3/8 flat-head screws.

(b) Remove the front bezel by removing the four 6-32 x 5/8 fillister-head screws.

(c) Make the panel cutout and drill the screw clearance holes indicated in Figure 3. The front bezel can be used as a template to define the rectangular cutout and locate the clearance holes.

(d) Hold the instrument enclosure behind the panel and reattach the front bezel to the enclosure from the front of the panel with the four mounting screws.

(e) Reinstall the front panel.

(f) Tighten the two securing screws of the rear-panel instrument I/O connector to ensure that the connector is seated and that the conditioner printed-circuit board is pushed fully forward so that the front-panel screwdriver adjustments and pushbuttons are accessible. These screws give approximately 1/8 inch of adjustment; consequently, this is the maximum panel thickness that should be used.

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).

CAUTION

Do not overtighten the connector securing screws or resultant damage may occur to the printed circuit board.

AC POWER CONNECTION. To protect operating personnel, the *3000 Series* Instruments are equipped with a three-conductor power cord. When the cord is plugged into the appropriate receptacle, the instrument is grounded. The offset pin on the power cord is ground. To maintain the safety ground when operating the instrument from a two-contact outlet, use a three-prong to two-prong adaptor and connect the green pigtail on the adaptor to ground.

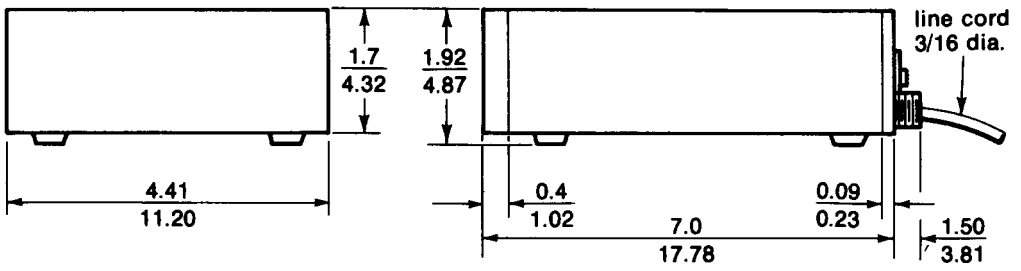
To prepare the instrument for operation, connect the power cable to a 105-135 volt ac, 50-400 Hz power source. The instrument can use up to 5 watts of power.

RANGE SELECTION. The input range of the Model 3163 is determined by jumper connections made at the instrument I/O connector. The full-scale input ranges provided are: (1) 50 to 500 millivolts, (2) 500 millivolts to 5 volts, (3) 5 to 50 volts, and (4) 50 to 250 volts. The jumper connection(s) used for each full-scale range are indicated in Figure 5(A).

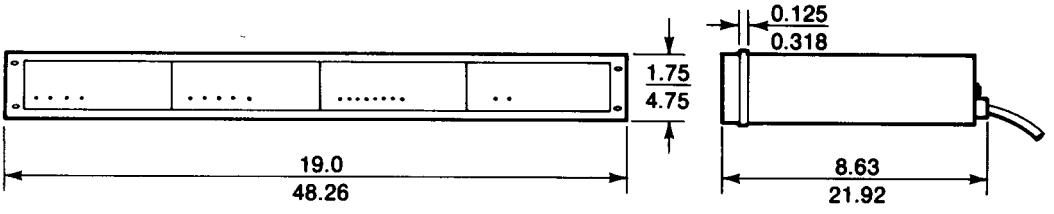
INPUT CABLING. Cabling from the external analog source to the 3163 is accomplished via the supplied instrument I/O connector. The I/O connector pin numbers and functions are given in Figure 5. The 3163 has a floating differential input, and two-wire shielded cable is normally used for the input cabling. See Figure 5(B).

AUXILIARY SUPPLY CONNECTIONS. A 10-volt regulated power supply capable of delivering up to 20 milliamperes is included in the 3163 to power dc-to-dc transducers, potentiometers, and other such devices. Figure 5(C) shows a potentiometer connected to provide a zero-to-full scale output as the potentiometer wiper is moved. Figure 5(D) shows a potentiometer connected to provide a bipolar output (zero center). Figure 5(E) gives the wiring configuration for connecting the 3163 to a dc-to-dc transducer.

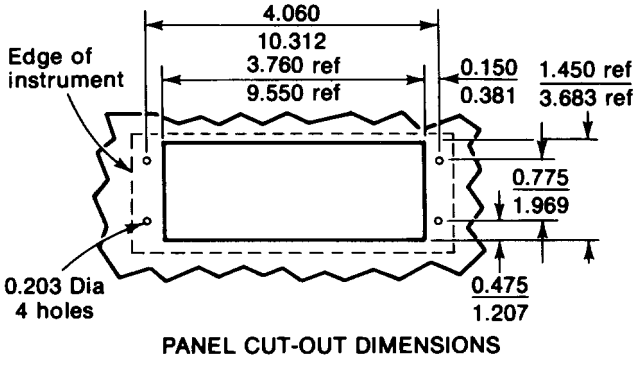
ANALOG OUTPUTS. Three different analog outputs are available at the instrument I/O connector. Each output has a different passband: dc to 2 kHz, dc to 200 Hz, and dc to 2 Hz. The 200-Hz and 2-Hz cutoff frequencies are achieved with



A. Bench Mounting



B. Rack Mounting



C. Panel Mounting

Figure 3. Instrument Mounting Dimensions

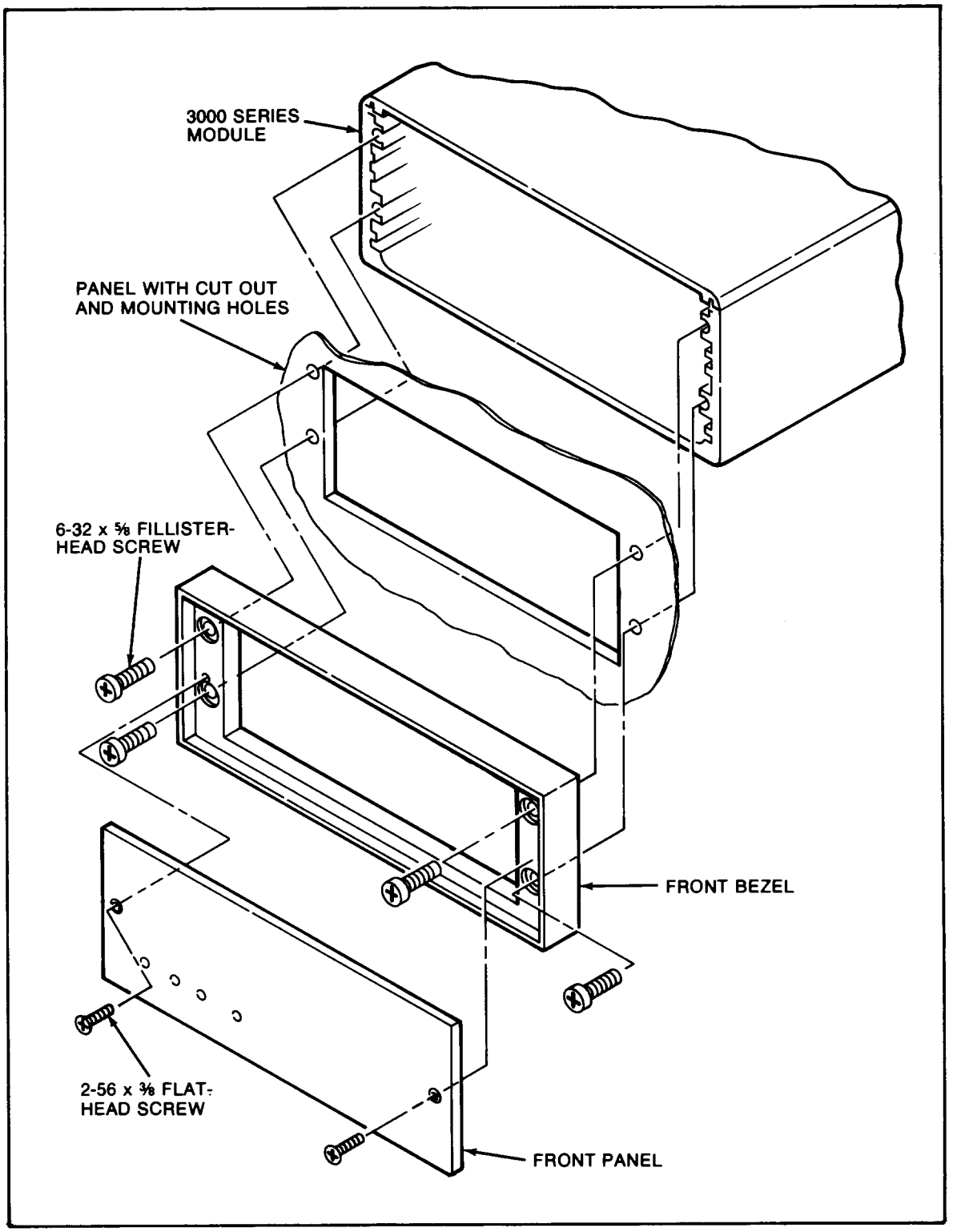


Figure 4. Instrument Panel Mounting

active low-pass filters. As the cutoff frequency is lowered, a trade off is made between noise elimination and increased time-to-answer or slew time. Each output has a 60-dB rolloff a decade from the cutoff frequency. The filter characteristics are given by the following equations.

$$A_{out} @ f_0 = 0.7\ A_{in}$$
$$A_{out} @ 10f_0 = 0.001\ A_{in}$$

where A_{out} = output amplitude
A_{in} = input amplitude
f_0 = selected cutoff frequency
T = time-to-answer in seconds (output of filter within 0.1% of final value after step function is applied).

REMOTE CALIBRATION CHECK. The instrument can be placed in the *calibration* mode by shorting pins 10 *(Signal Common)* and 8 *(Remote Cal)* of the I/O connector. Figure 5(F) indicates three methods of remotely entering the calibration mode (external switch, transistor, or TTL source). The *Remote Cal* function provides a convenient means for periodically monitoring calibration of the instrument from a remote location without pressing the front-panel CAL button.

3. CALIBRATION

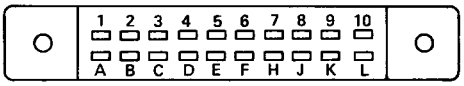
This section contains the instructions for calibrating the Model 3163. Included is a functional description of the instrument front panel (see Figure 6). To perform calibration, proceed as follows.

(a) Turn power ON by placing the rear-panel slide switch in the ON position. The front-panel indicator should light to indicate the application of ac power.

(b) With the external device in a zero output condition, set the 3163 output to zero using the front-panel ZERO control. In some instances, an integral digital indicator will be used to display the conditioner output (Model 3263 or 3363). When only the conditioner is supplied (3163), an external indicator must be used to monitor the conditioner output.

Fig. 5 I/O Wiring Data

DAYTRONIC 3X63 INSTRUMENT I/O
CONNECTOR W/PIN DESIGNATIONS
(X=1, 2, or 3, e.g. 3163, 3263, or 3363)



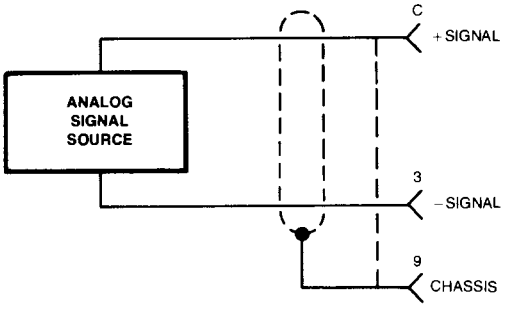
AMPHENOL 225-21021-103 REARVIEW

PIN		PIN	
1	1/2 BRIDGE (+5 V)	A	POWER COMMON (10 V AUXILIARY SUPPLY
2	ISOLATED COMMON	B	+10 V AUXILIARY SUPPLY
3	−SIGNAL INPUT	C	+SIGNAL INPUT
4	50 MV/500 MV RANGE	D	50 MV/500 MV RANGE
5	500 MV RANGE	E	500 MV RANGE
6	5 V RANGE	F	5 V RANGE
7	50 V RANGE	H	50 V RANGE
8	REMOTE CALIBRATION	J	ANALOG OUTPUT, ±5 V-DC TO 2 HZ
9	CHASSIS	K	ANALOG OUTPUT, ±5 V-DC to 200 HZ
10	OUTPUT SIGNAL COMMON	L	ANALOG OUTPUT, ±5 V-DC TO 2 KHZ

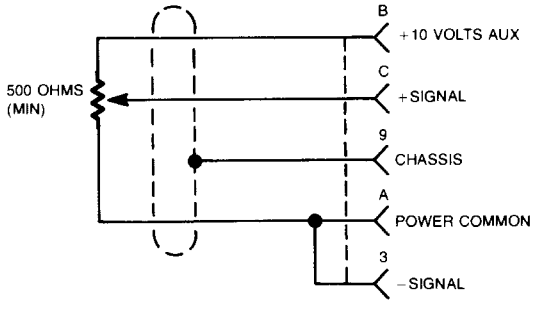
RANGE SELECT JUMPER CONNECTIONS

RANGE	JUMPER
50 TO 500 MV	D TO 4
500 MV TO 5 V	D TO 4 AND E TO 5
5 TO 50 V	F TO 6
50 TO 250 V	H TO 7

A. I/O Pin Assignments and Range Selection

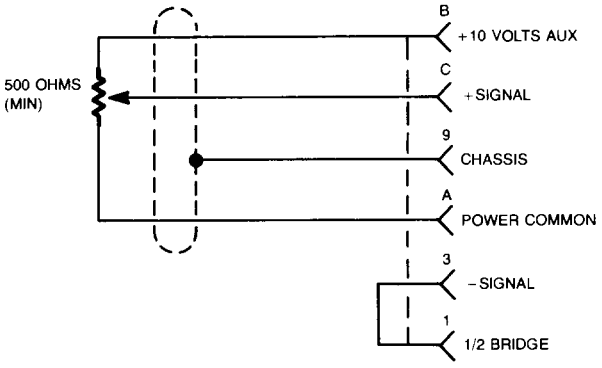


B. External Analog Signal Source

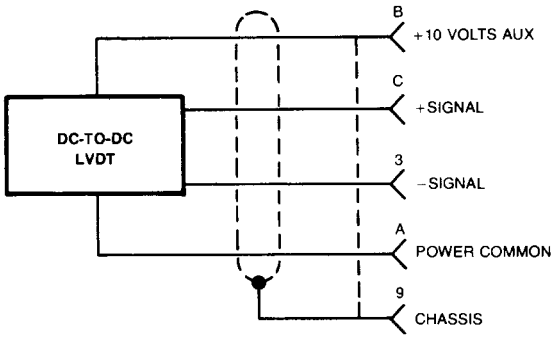


C. External Potentiometer, Zero to Full Scale

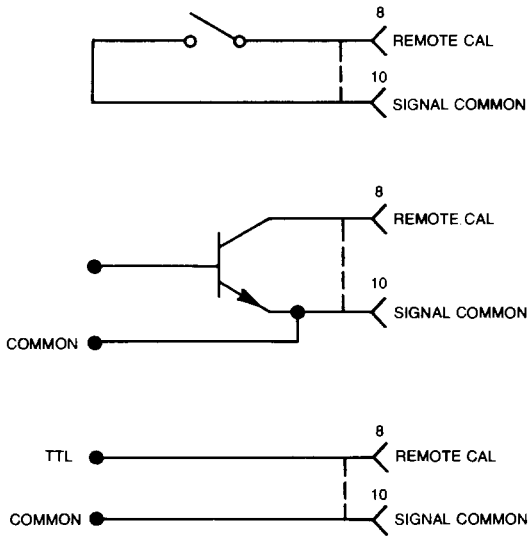
Fig. 5 (cont'd)



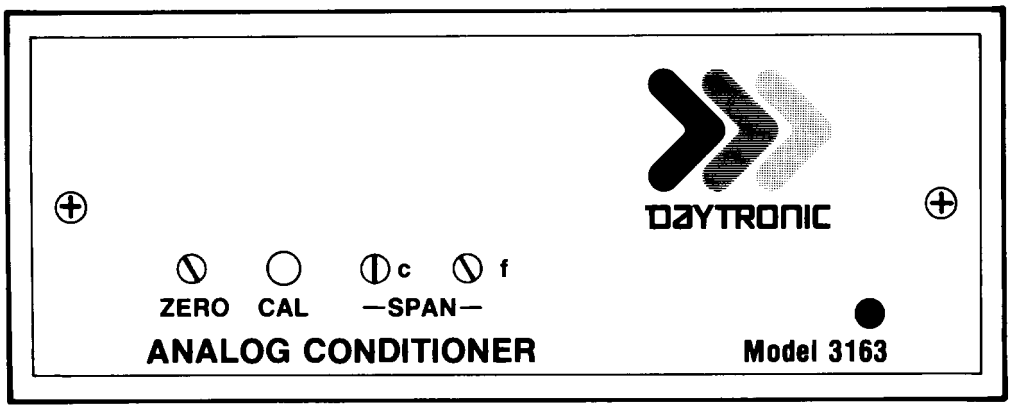
D. External Potentiometer, Zero Center



E. DC-to-DC LVDT



F. Remote Calibration Connections



ZERO Control: Sets the instrument output to zero with a zero input signal applied.

CAL Pushbutton: When pressed, the CAL pushbutton causes the input signal to be replaced by an internally-generated dc reference level. This level can be adjusted by an internal ***Cal Level*** switch so that the analog output of the instrument is equal to or less than the value obtained with a full-scale input. This output is called the full-scale calibration value. The CAL push-button is used with the ***Coarse*** and ***Fine*** SPAN controls to calibrate the instrument.

SPAN Controls: The ***Coarse*** and ***Fine*** SPAN controls are used to set the instrument output to the full-scale calibration value or the full-scale value produced with an equivalent input.

Figure 6. Front-Panel Description

(c) Arrange for the input device to produce a known up-scale output that is greater than one-half of full scale. Adjust the *Coarse* and *Fine* SPAN controls until the output signal causes a reading equivalent to the input value.

(d) Remove the front panel as described in Section 2. Press the CAL pushbutton and set the internal *Cal Level* switch for the output reading nearest to, but not exceeding, the full-scale output of the 3163. Since this reading is related to the proper SPAN control settings for a known input, it can be recorded for use in future calibration checks or recalibration.

To calibrate the instrument in the future, simply press the CAL push-button and adjust the SPAN controls to obtain the reading recorded during the initial calibration.

(e) Replace the front panel of the instrument.

4. BLOCK DIAGRAM DESCRIPTION

The purpose of this section is to explain how the Model 3163 works by using a simplified block diagram of the conditioner. This is not intended to be used as a detailed theory of operation discussion for personnel untrained in electronic technology, but as a simplified explanation of the detailed schematic diagram provided with this manual. Throughout the following, refer to Figure 7.

POWER SUPPLIES. Primary power (115 volts ac, 50-400 Hz) is applied to the instrument by means of a rear-panel ac connection point and the supplied three-conductor power cord. A rear-panel slide switch is used to turn ON primary power. Overload protection is provided by a 0.25 ampere fuse mounted near the ac connection point. When the slide switch is ON, primary power is applied to the power transformer which provides the necessary power-line isolation and the low ac voltages required to develop the regulated dc voltages used in the 3163. The secondary of the power transformer has a grounded center tap, and a diode bridge functions as two full-wave rectifiers to produce ±9 volts regulated dc. Two three-terminal integrated-circuit *Regulators* are used to develop these regulated voltages. The reference terminal of each *Regulator* is biased with one or two diodes to make certain that a minimum regulated voltage of 9 volts is achieved. The proper diode biasing is accomplished at factory check out.

A dc reference voltage of +2.5 volts is further developed from regulated +9 volts by the use of a third three-terminal *Regulator*. This precision dc reference is used in the *Auxiliary Power Supply* circuit and, when the instrument is so equipped, in the *Digital Indicator* and *Hi/Lo Limits* circuits. The *Auxiliary Power Supply* circuit is discussed in a following paragraph.

The -9 volts regulated is used to light the front-panel indicator (LED) which indicates the application of ac power to the instrument.

The + unregulated voltage from the diode bridge is used to develop the +10 volt output of the *Auxiliary Power Supply*. In addition, this voltage is routed to the

Digital Indicator and *HI/LO Limits* circuit boards where it is used to develop +5 volts regulated for the TTL logic employed in these circuits. Refer to the *Digital Indicator* and *HI/LO Limits Instruction Manuals.*

Another transformer secondary is used to develop a regulated ±10 volts isolated supply (isolated from the output *Signal Common*). The use of this supply in the signal conditioner input circuitry makes possible the high common-mode range of the 3163.

A third transformer secondary supplies 5 volts ac to the *Digital Indicator* circuit board (when supplied). This ac voltage is used to develop an unregulated +6 volts dc. Refer to the *Digital Indicator Instruction Manual.*

The +10 volts *Auxiliary Power Supply* is developed from the + unregulated voltage as previously stated. The +10 volts *Auxiliary* is available at the instrument I/O connector for use as excitation for dc-to-dc transducers or external potentiometers. In addition, a *Half-Bridge* output is available. The connection point of two equal resistors (Rl-R2) placed across the power supply output is the *Half-Bridge* output (+5 volts). When the *Half-Bridge* output is connected to the *–Signal* input, the wiper of a potentiometer connected across the *Auxiliary Power Supply* can vary from +5 volts to -5 volts. This wiring arrangement is illustrated in Figure 5.

Transistor Ql functions as an emitter-follower series regulator, with an operational amplifier providing the regulation control. The plus terminal of the *Control Amplifier* is biased from the +2.5 volt Reference. The minus terminal is normally at +2.5 volts through the dividing action of resistors R3 and R4. As the output of the Auxiliary Power Supply varies, the Control Amplifier output varies accordingly and provides a base drive to Ql to maintain the supply output at +10 volts. A Zener diode in series with the output of the Control Amplifier acts as a *Level Translator* so that the amplifier can operate near its mid-range.

Transistor Q2 functions as a *Current Limiter* in the event that the supply output is accidentally shorted or otherwise overloaded. When the current through resistor R5 becomes great enough to forward bias Q2, transistor Q2 is turned on, and current is shunted through R6 and Q2, with the raw dc voltage now being dropped across R6.

CALIBRATION CIRCUIT. The *calibration* mode is entered when either the front-panel CAL button is pressed or the *Remote Cal* line is shorted to *Signal Common* at the Instrument I/O connector. Either of these conditions cause the output state of a *Comparator* to change. An *Optical Isolator* is controlled by the *Comparator* output, and its output controls *Analog Switches* Sl, S2, and S3. The *Optical Isolator* is required since the 3163 input circuitry is powered from the isolated power supplies to allow operation from sources having off-ground or common mode voltages on their outputs.

When the 3163 is in the *calibration* mode, the input signal is disconnected from the *Input Amplifier* and replaced by an internally generated calibration voltage. This voltage is developed by a three-terminal *Regulator* from the +10 volts isolated. The output of the *Regulator* (+2.5 volts isolated) can be divided by a series of parallel resistances which are connected to the *Regulator* through switches. These switches in actuality are a single internal switch termed the *Cal Level* switch. The switch is a rotary type switch with ten positions, each of which yields up to four contact closures corresponding to the four weights of binary-coded decimal (BCD), that is, 1, 2, 4, and 8. The ten positions allow various combinations of contact closures, thus providing various *Cal* Levels to the *Input Amplifier* via *Analog Switch* Sl. The user selects the *Ca1 Level* that provides a full-scale output indication less than, but closest to, that observed when a full-scale input signal is applied. The indication can then be used as a calibration value for future calibrations.

Analog Switch S2 is used during calibration to remove any offset imposed on the *Input Amplifier* by the ZERO control. *Analog Switch* S3 is used during calibration to remove a gain factor incorporated when the 500 millivolt-to-5 volt full-scale input range is selected. These functions are more completely described in the following paragraphs.

SIGNAL CONDITIONER. The input signal is applied to a resistance divider arrangement that has various taps to the *Input Amplifier.* The full-scale input range is determined by the tap used, and tap selection is accomplished with jumper-wire connections at the I/O connector. However, two of the available ranges (5 mv to 500 mv and 500 mv to 5 v) use the same tap point. The difference in signal levels encountered for the two ranges is compensated by changing the gain of the *Input Amplifier*. This is accomplished by installing a second jumper when the 500 millivolt-to-5 volt range is selected. This jumper places a short across a feedback resistor (R8) in the *Input Amplifier* circuit, increasing feedback, thereby decreasing gain. When the calibration mode is used, the gain correction is removed via *Analog Switch* S3.

The *Coarse* SPAN control also affects the gain of the *Input Amplifier* and is used for scaling the instrument output. The ZERO control provides a means of offsetting the output of the *Input Amplifier*. This zero offset voltage is eliminated during calibration by *Analog Switch* S2.

The *+Signal* input, after being properly divided, is applied to the plus terminal of the *Input Amplifier*, a non-inverting operational amplifier which is powered from the ±10 volt *Isolated Supplies.* The minus terminal of the amplifier is returned to the *Isolated Common* through resistor R7. This arrangement allows the *Input Amplifier* to be totally referenced to the *Isolated Common* which is also the *–Signal* input to the conditioner. Common-mode or offset voltages up to 100 volts can be tolerated by the *Input Amplifier.*

The output of the Input Amplifier is applied to an inverting operational amplifier through resistor R9. The values of resistors R9 and R10 are such that the gain of the amplifier is approximately 1/200. In addition, the amplifier is powered from ± 9 volts regulated, and the plus terminal of the amplifier is returned directly to *Signal Common.* To comply with the summing point restraint of the amplifier, its output must go to the value which allows the minus terminal to be at the same potential as the plus terminal. An offset voltage of 10 volts at the output of the *Input Amplifier* would take the output of the inverting amplifier to -0.05 volts, and the offset would be dropped across resistor R9.

A second inverting amplifier with a gain of 200 is used to reamphfy the signal to its original level and return the proper signal polarity. It has the same configuration as the first amplifier, but the values of R11 and R13 are such to provide again of 200. Also, resistor R12 is returned to the *Isolated Common* so that the R11 and R12 junction is held at 0 volts or *Signal Common.* Since the plus terminal of the amplifier is tied to *Signal Common*, the output of the amplifier is quiescently at 0 volts also, the desired condition with an offset input but no signal input.

The net result of the two inverting operational amplifiers is to provide a gain of unity and the proper conditioning to eliminate offset or common-mode voltages. Only the input signal differential is passed through the amplifiers to the output filtering circuits of the conditioner. The *Fine* SPAN control is located in the feedback circuit of the second amplifier to provide a fine gain adjustment during calibration.

Three analog outputs of the conditioned signal are available at the module I/O connector. The three outputs provide three different passbands of dc to 2 kHz, dc to

200 Hz, and dc to 2 Hz. Output selection is a trade off between eliminating unwanted signals caused by vibration or increasing the time-to-answer (slew rate) of the conditioner. The 200-Hz and 2-Hz cutoff frequencies are achieved with the use of active low-pass filters. The rolloff of each output is 60 dB within a decade of the cutoff frequency.

5. VERIFICATION OF NORMAL OPERATION

It is the purpose of this section to aid the user in determining, in the event of a malfunction to which the Model 3163 is suspected of contributing, whether the instrument is functioning normally or whether it is the source of the observed trouble. In the event the unit requires repair, a complete parts list, schematic diagram, and component location drawing are included in this manual. The user may also contact the factory Service Department or the local Daytronic Representative for assistance.

If the instrument is suspected of faulty operation, observe the following steps.

(a) If the unit is totally inoperative (front-panel power indicator does not light), check the primary power fuse (Fl) located on the standup board which forms the power cord connection point. If the fuse is blown, replace it with a 0.50 ampere fuse (see Table 2 for part number). Before reapplying power, visually inspect the power cord and the input power connections for any discrepancy which could have caused the overload.

(b) Disconnect the normal input source and make a jumper connection between pin C (+*Signal*) and pin 3 (–*Signal*) at the instrument I/O connector.

(c) Adjust the front-panel ZERO control and verify that the instrument output can be set to zero.

(d) Press the front-panel CAL button and observe an up-scale output indication. Set the module output to the full-scale calibration value using the *Coarse* and *Fine* SPAN controls. Steps (b) thru (d) verify the ability of the amplifier circuitry to adjust to zero and respond to the internal calibration signal. If this check is passed, the conditioner amplifier circuits are functioning normally. Check the instrument I/O connector for proper wiring of the input before proceeding. See Figure 5.

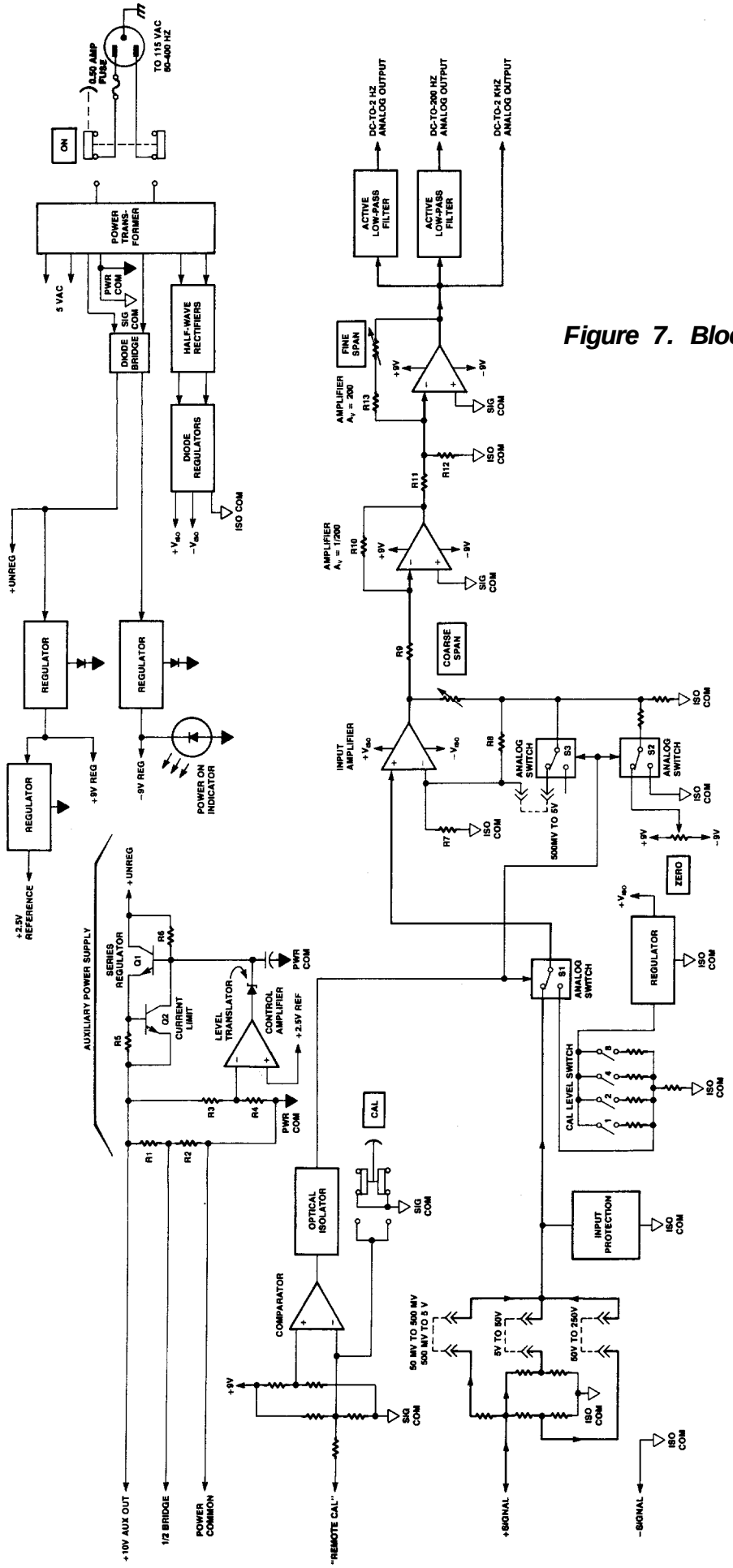


Figure 7. Block Diagram

This page intentionally blank.

(e) If an unstable digital display or excessive output noise is encountered, the problem may be in the output filter circuits. The 2-Hz and 200-Hz outputs use active low-pass filters. The 2-kHz output is provided directly from the conditioner output amplifier. In general, if a problem is encountered with either the 2-Hz or 200-Hz output, but the problem disappears when another output is used, a filter circuit is faulty.

(f) The above can be verified by checking each analog output with a test oscilloscope as a square-wave input signal is applied. The time-to-answer in seconds (output of conditioner within 0.1% of final value after step function is applied) should be 0.7 milliseconds for the 2-kHz output, 7 milliseconds for the 200-Hz output, and 0.7 seconds for the 2-Hz output.

(g) If the *Auxiliary Power Supply is* used, connect a test oscilloscope to pins A (*Power Common*) and B (*+10 volts*) at the instrument I/O connector. The oscilloscope should indicate a dc level of approximately 10 volts that is free of excessive noise and ripple.

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.

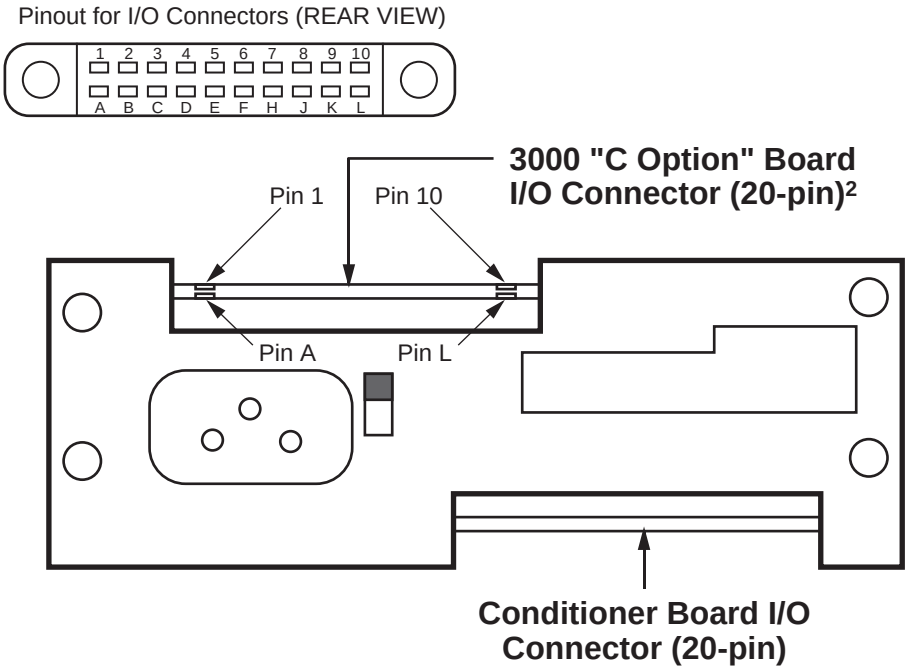


Fig. 1 Rear-Panel Location of 3000C Current Output Board

2. Connections / Output Mode Selection

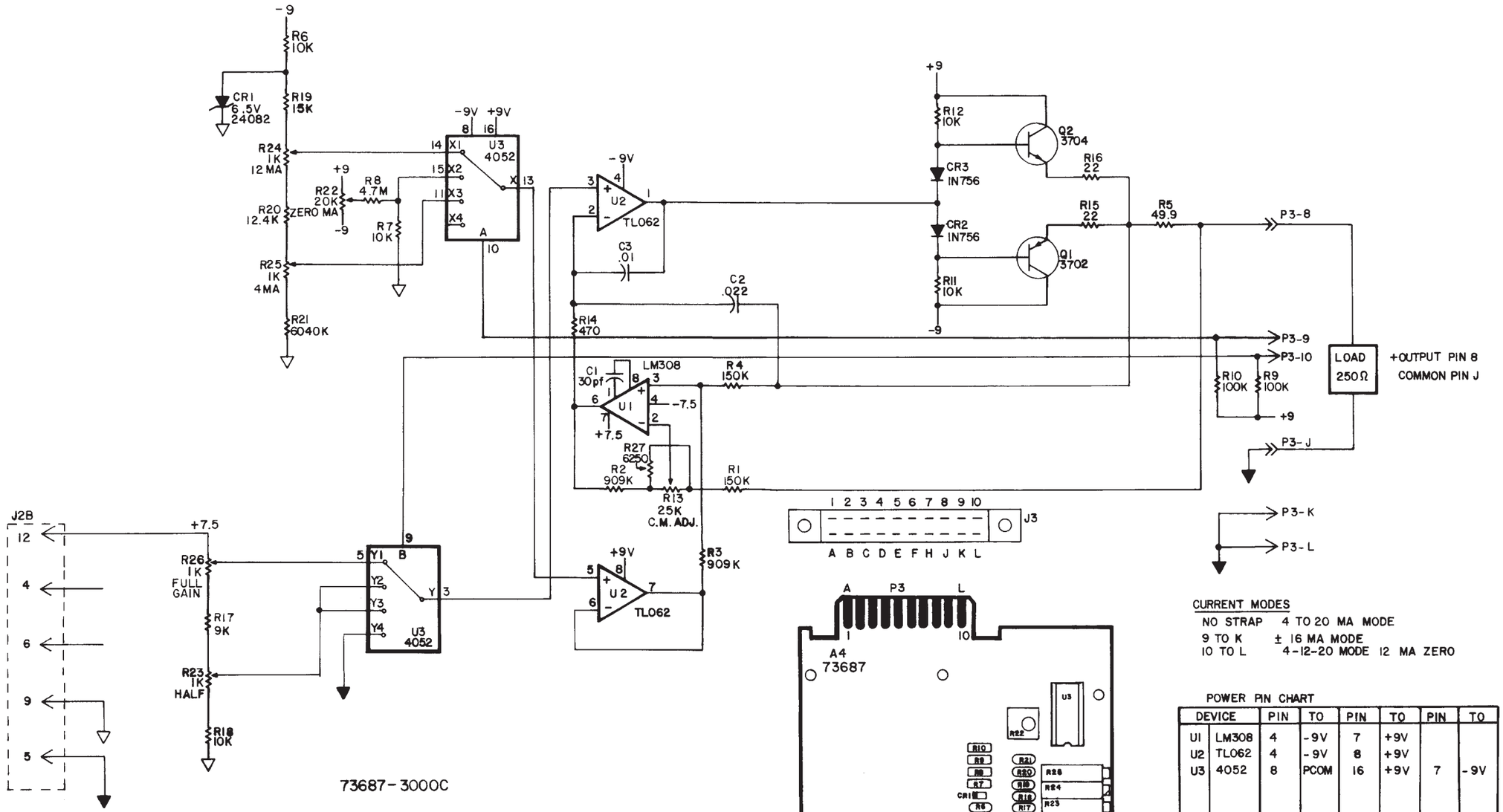
Pin assignments for the 3000C board's 20-pin I/O connector (shown in Fig. 1) are given in the following table.[3]

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

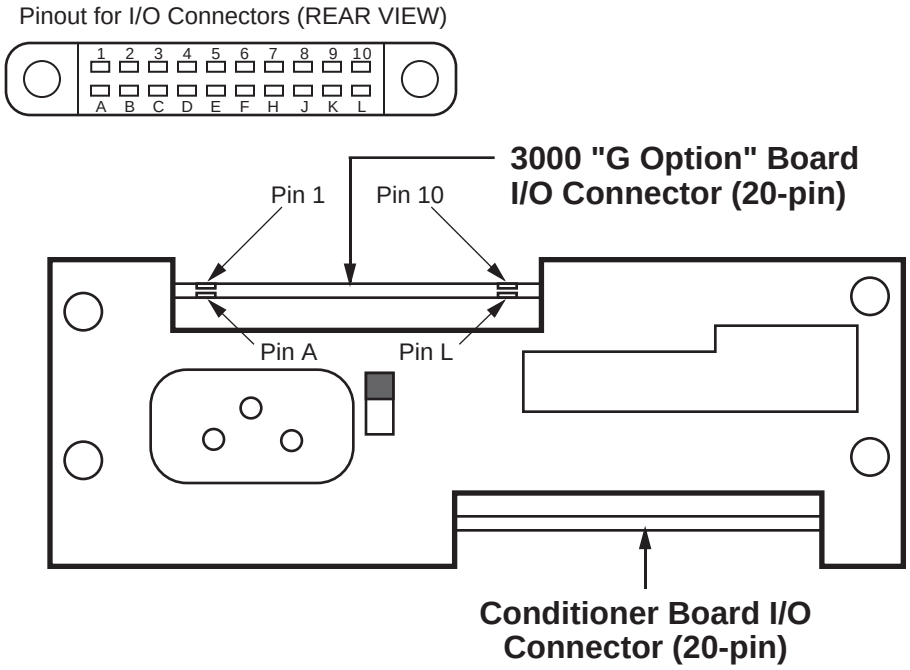


Fig. 2
Cabling of Isolated Outputs

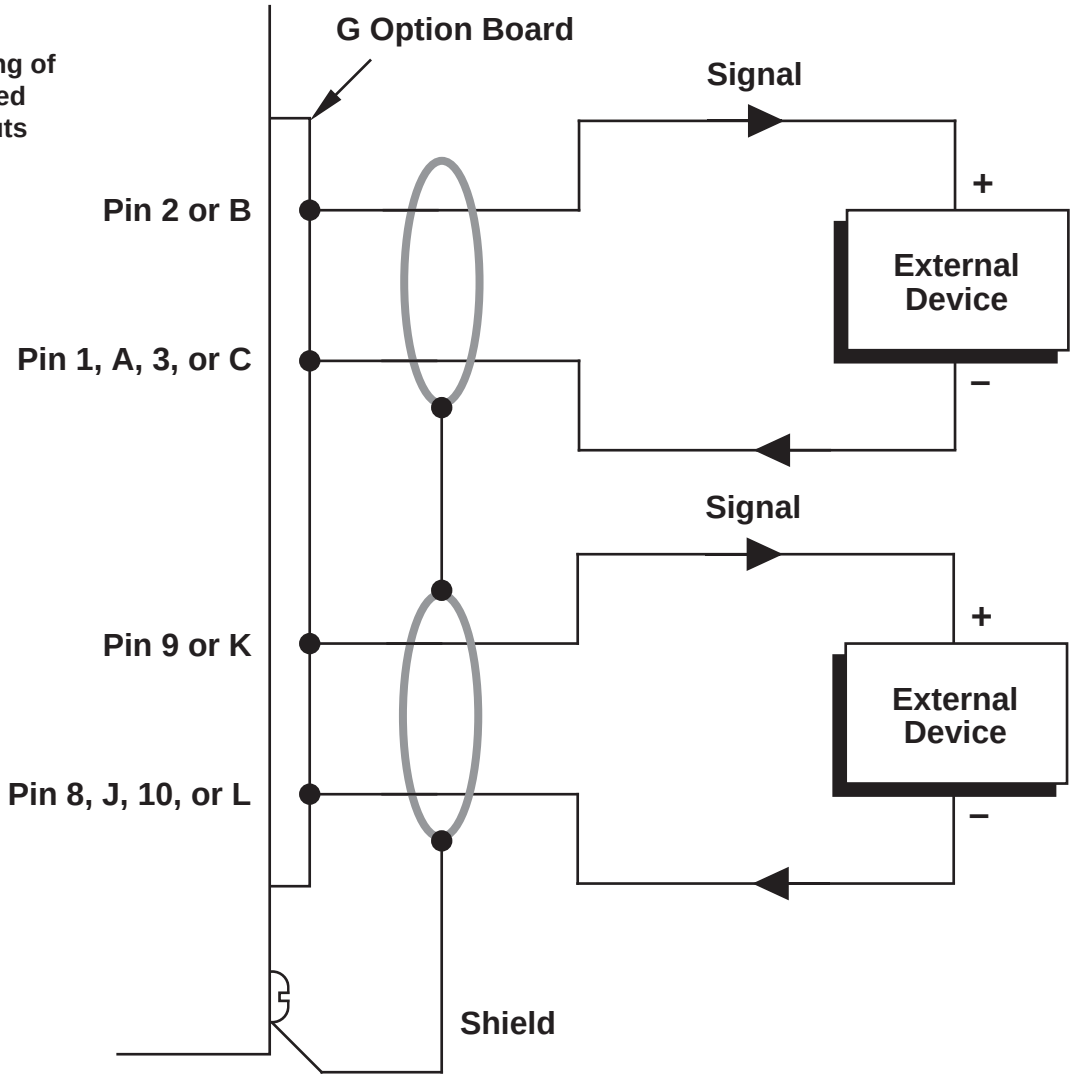
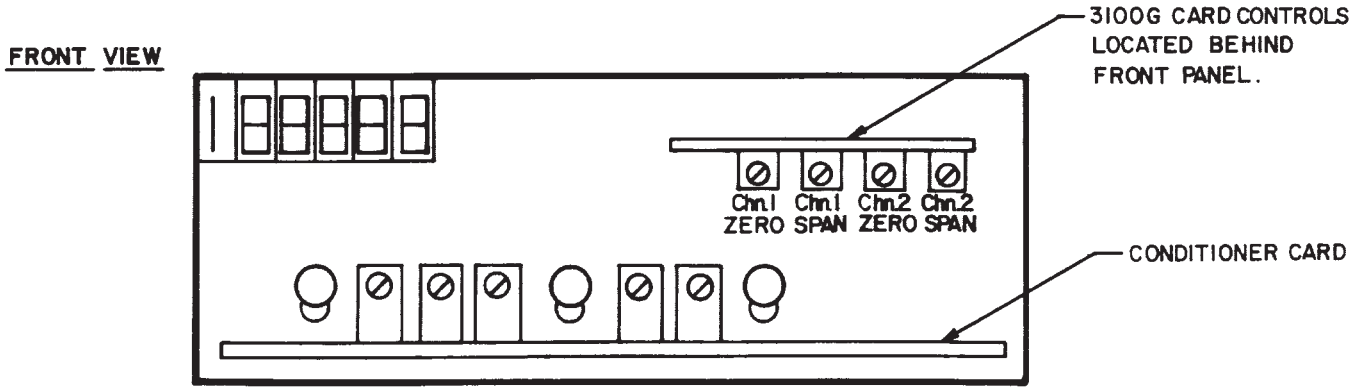
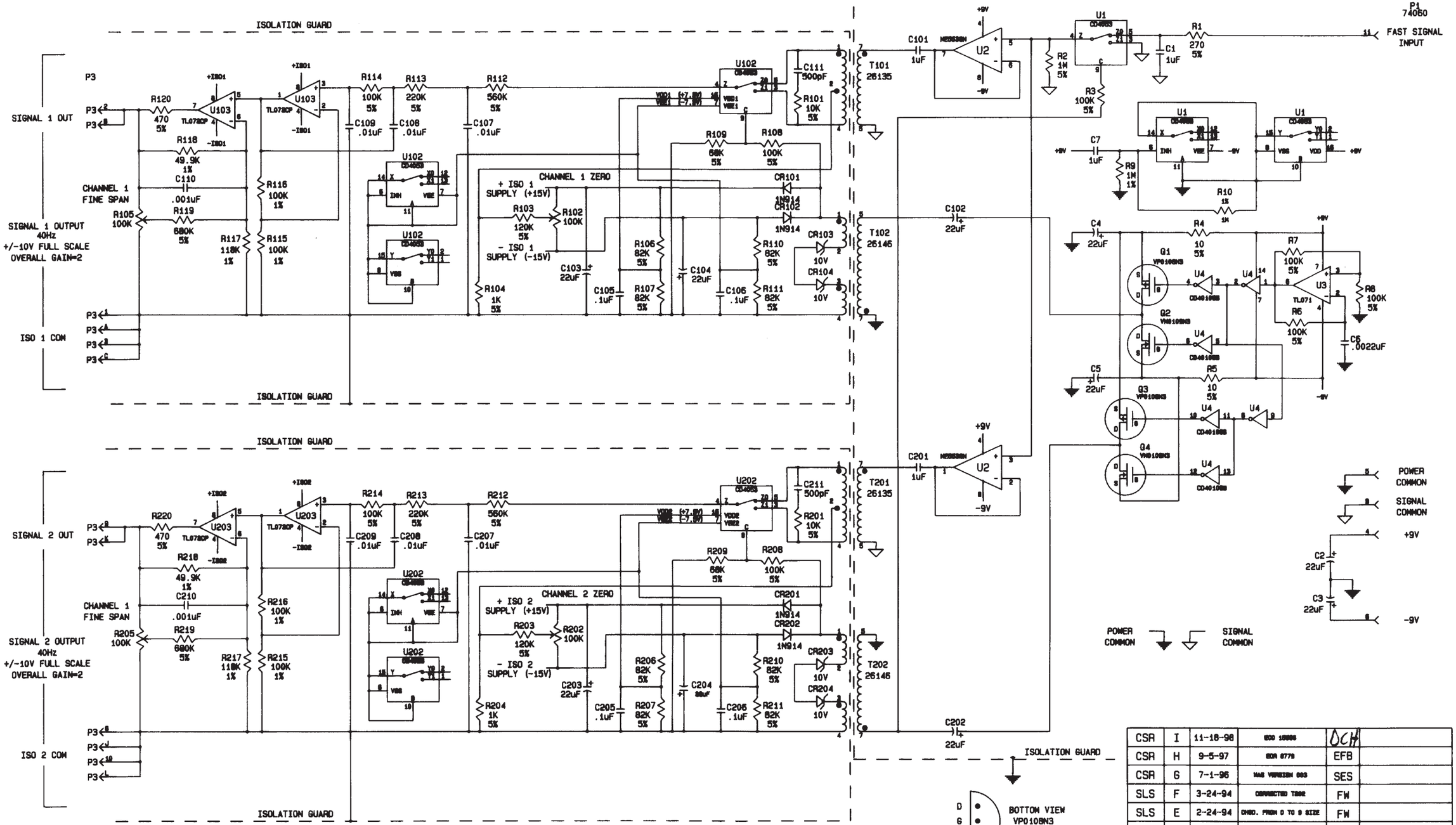
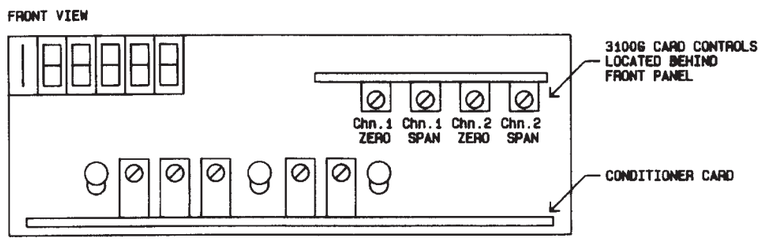


Fig. 3 Location of Internal G-Option Controls

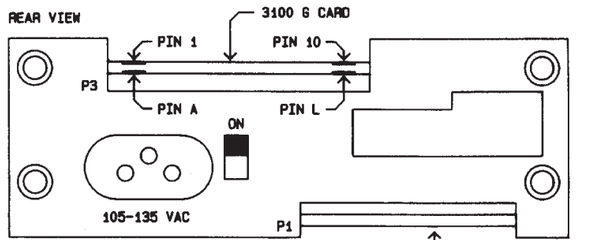




FRONT VIEW



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

Daytronic Corporation

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