CD101
Carrier
Demodulator

INSTRUCTION MANUAL

MODEL CD101

CARRIER DEMODULATOR

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Validyne ENGINEERING CORPORATION

WARRANTY POLICY

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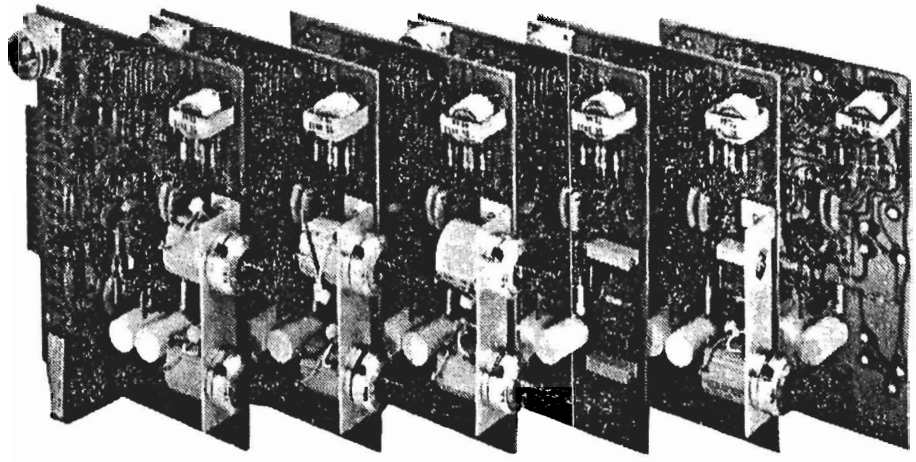
VALIDYNE will replace any component found to be defective on its return, transportation charges prepaid, within one year of its original purchase.

This warranty carries no liability, either expressed or implied, beyond our obligation to replace the unit which carries the warranty. Prices, specifications and designs subject to change without notice. This warranty is void if the product is subjected to misuse, accident, neglect or improper application, installation or operation.

MODEL CD101 CARRIER DEMODULATOR OPERATING INSTRUCTIONS MANUAL

MANUAL CONTENT



CD101 Model Family

MODEL CD101 CARRIER DEMODULATOR OPERATING INSTRUCTIONS

1. EQUIPMENT DESCRIPTION

The Model CD101 is a complete carrier demodulator, designed to be used in a large variety of individual channel or multi-channel system applications.

The unit supplies a 5 volt, 5 kHz carrier excitation for variable reluctance and variable differential transformer transducers, demodulates their output and provides a ±10-volt DC signal for static and dynamic pressure measurements.

An active filter element provides the CD101 with a flat frequency response from steady state to 1000 Hz. Low input impedance allows operation with transducers at a distance of over a thousand feet from the unit with no degradation of signal. Both input and output stages are short circuit protected thereby minimizing catastrophic failures due to connection errors.

Any one of three power sources may be used since the unit accommodates 110 or 220 V AC, 50-400 Hz power source or a ±15V DC source.

The small compact size printed circuit board construction makes it possible to package the CD101 inside recorders, behind panels, in multi-channel systems, etc. Complete adaptability to any single unit or system application is provided by optional bracket, standoff or card guide mounting; remote, board or bracket mounted zero and span control option; a choice of trimmer potentiometer or 10-turn potentiometers with calibrated dials, for zero and span controls; optional printed circuit board connector or terminal strip for

all connections, with an additional option of a circuit board mounted Cannon Connector for the transducer input. This manual covers all options available. Consequently, when reading this publication, ignore the information that does not apply to the purchased unit.

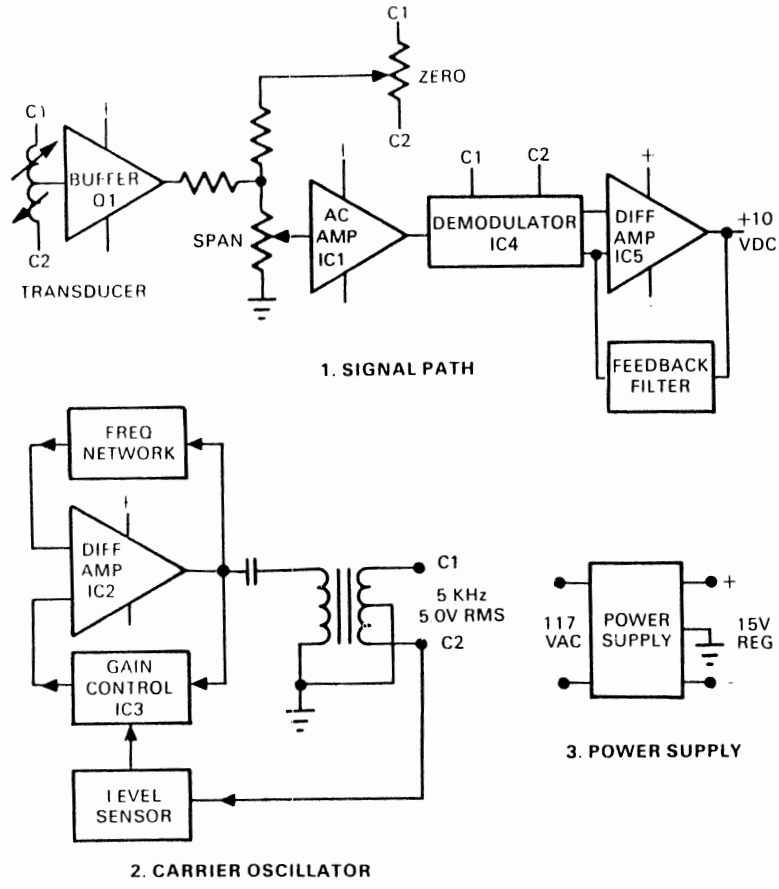


Figure 1-1. CD101 Functional Block Diagram

2. SPECIFICATIONS

The following paragraphs define the unit electrical and mechanical specifications.

2.1 Electrical

The electrical specifications for the unit are listed in Table 2-1

TABLE 2-1. UNIT SPECIFICATIONS

Input Sensitivity:	Min. 15 mV/V for 10V DC output
Maximum Input:	2.5V RMS
Span Control:	Continuous control of input, from min. 15 mV/V, for 10V DC output
Bridge Excitation:	5V RMS, 5 kHz
Bridge Configuration:	2 arm variable reluctance, variable differential transformer
Zero Control:	±10 mV/V
Output:	0 to ±10V DC; 10 mA to 1K ohm load, protected against short circuit
Output Ripple:	10 mV peak-peak maximum
Output Impedance:	10 ohms nominal
Frequency Response:	Flat ±10%, 0 to 1000 Hz
Linearity:	±0.05%
Stability:	±0.1% long term
Temperature Range:	0-185°F
Thermal Effects:	Zero: 0.005%/°F Span: 0.01%/°F
Power Requirements:	110/220V AC 50-400 Hz, at 2.5 watts maximum or ±15V DC, at +17 mA, −25 mA

2.2 Mechanical Specifications

Figure 2-1 and Figure 2-2 provide dimension information as well as identify the mechanical variations between options. Additional information on mechanical variations are listed in Tables 2-2, 2-3 and 2-4.

TABLE 2-2. MODEL FAMILY LIST

CD101-3:	Bracket mounting and 10-turn potentiometers and dials
CD101-4:	Stand off mounting and trimmer potentiometers
CD101-5:	Bracket mounting, 10-turn potentiometer dial (Span), and trimmer potentiometer (Zero)
CD101-6:	Basic Unit

TABLE 2-3. CD101 OPTIONS

OPTION DESCRIPTION		CODE
Electrical Connections —	Transducer input connector WK-4-32S:	C
	Terminal strip:	T
Input Power —	±15V DC only: (Supplied less Transformer, T)	842

TABLE 2-4. CD101 ACCESSORIES

Mating Printed Circuit Board connector P/N 8152

Mating transducer input connector WK-4-21C

Transducer interconnecting cables (additional cable lengths available):

P/N 7110, WK-4-21C to WK-4-21C, 10 ft. standard
P/N 8153, WK-4-21C to spade lug, 10 ft. standard

2.3 Model Numbering Specifications

Model numbering can provide some information about the units in the field even if no data is available. A sample model number is listed here with a table (Table 2-5) that illustrates the structure of the numbering system and the way to obtain data from the model nomenclature.

Example: CD101-3C-842 is a CD101 with bracket-mounted 10-turn potentiometers and dials, a WK-4-32S transducer input connector and operates from ±15V DC only.

TABLE 2-5. MODEL NUMBER DECODING

CD101-3C-842

Basic Model Number

Additional electrical connections (See Table 2-3)

Operation with ±15V DC input power only

3. INSTALLATION

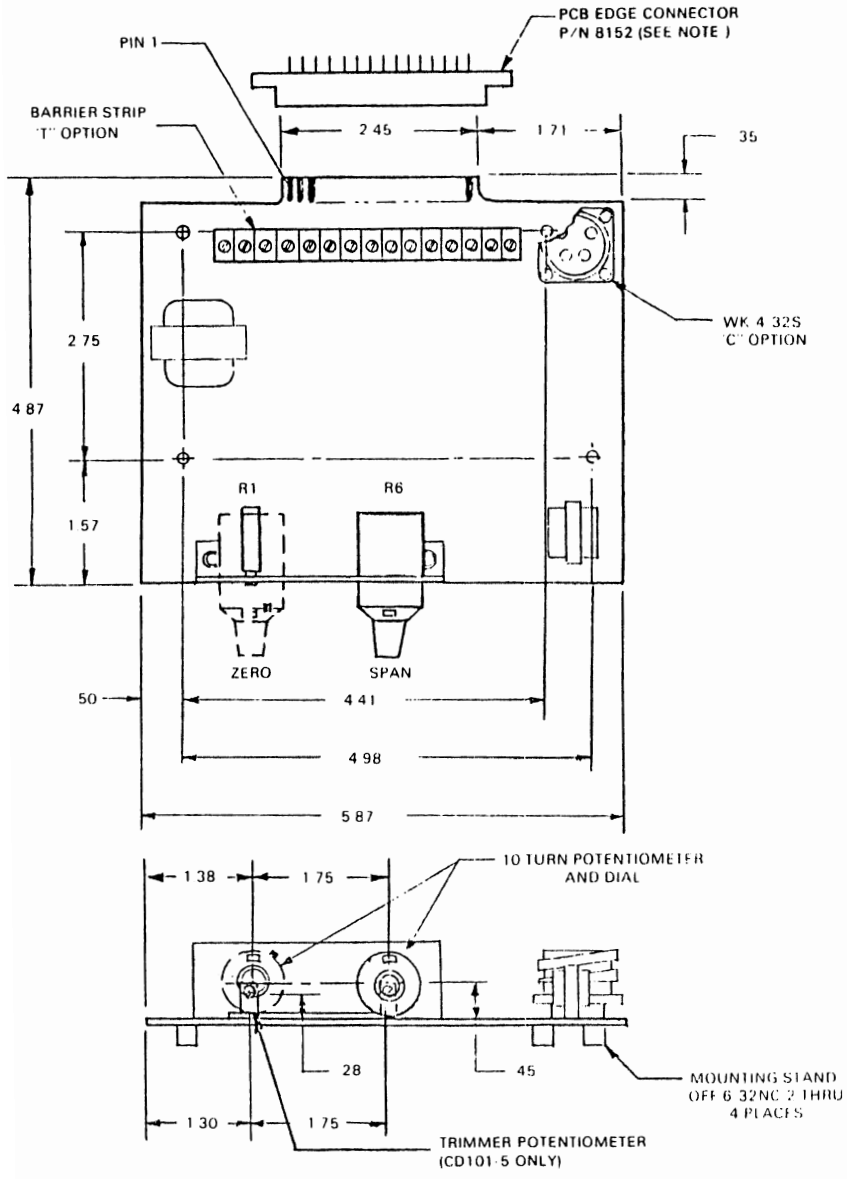
This section contains mounting and connection information.

3.1 Mounting

The CD101 may be installed in several different ways. The following paragraphs describe the most common methods used to mount the unit.

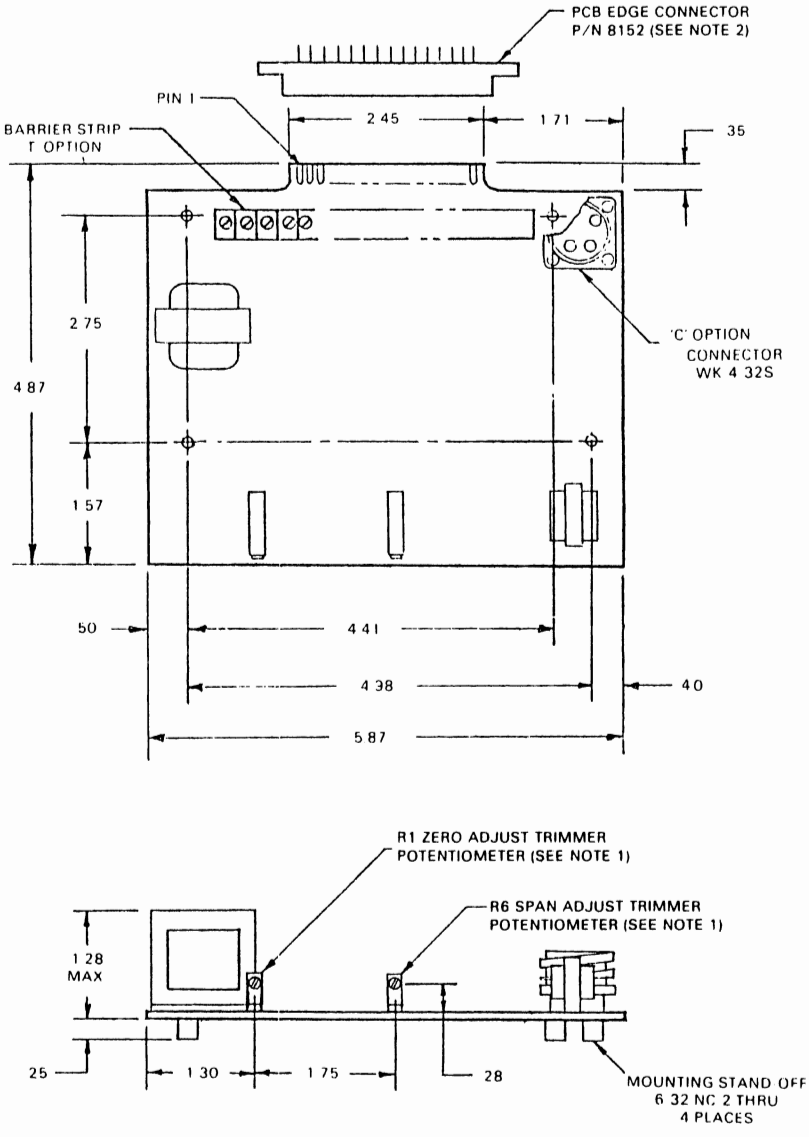
Rack Installation. The printed circuit board may be inserted into a cabinet provided with PC board guides. Be sure that the board is firmly engaged into the PC board receptable on the wiring side of the rack.

Stand-Off Mounting. Clearance holes for 6-32 mounting screws should be drilled in the desired mounting surface. Spacing and clearance dimensions are shown in the outline drawings, Figure 2-1 or Figure 2-2.



NOTE: PCB EDGE CONNECTOR NOT FURNISHED

Figure 2-1. CD101-3 and CD101-5, Outline and Dimensions



NOTES

1 Omitted on CD101 6

2 PCB Edge Connector Not Furnished

Figure 2-2. CD101-4 and CD101-6, Outline and Dimensions

Bracket Mounting. Models issued with potentiometer mounting bracket option may be mounted to panel or other surfaces using the potentiometer mounting hardware and the following procedure. Potentiometer assemblies are prepared for mounting by loosening the setscrew in the knob and disassembling as shown in Figure 3-1. The hole pattern necessary for bracket mounting is shown in Figure 3-2.

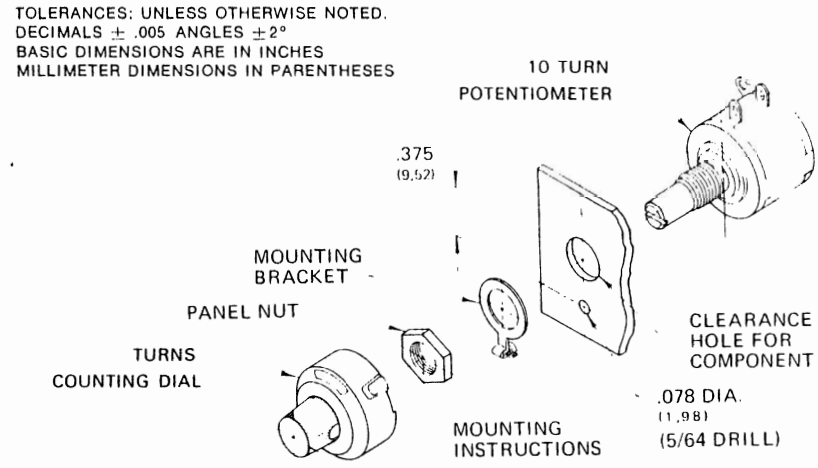
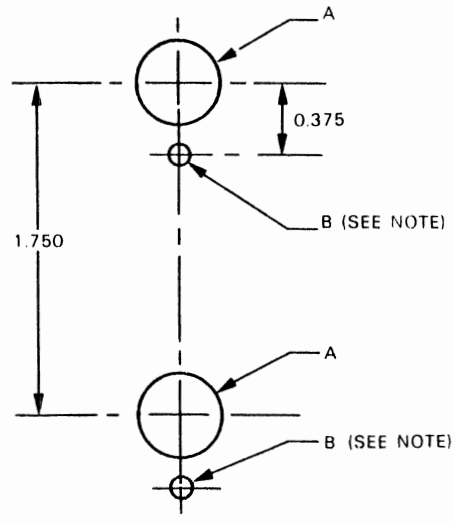


Figure 3-1. Potentiometer Assembly Parts Breakdown



NOTE: Drill pattern shown is for vertical mounting only. Hole B position may be rotated as required. Refer to step (a) for correct hole B location for other mounting positions.

Figure 3-2. Optional Bracket Mounting Hole Pattern

a. Locate positions for holes "A" and "B" on panel for each control. Center of hole "B" for lug on locating plate is ⅜" from center of hole "A," and diametrically opposite from position of "window" on dial assembly.

b. Drill a 0.413" dia. ("Z" drill) hole ("A" of Figure 3-2) in panel for potentiometer bushing.

c. Drill a 0.078" dia. hole ("B" of Figure 3-2) in panel for lug on locating plate.

d. Line up the CD101 bracket behind the panel or mounting surface and mount the dial assembly as follows: (Refer to Figure 3-1)

1. Position "S" portion of mounting bracket lug in the 0.078" diameter hole and mount potentiometers to panel as shown.

2. Turn shaft or potentiometer against its counterclockwise stop.

3. Turn knob on the multidial so that "0" appears in window and inner scale reads higher than 10.

4. With brake off (full counterclockwise) assemble the multidial over potentiometer shaft. The locating lug on mounting bracket will engage anti-backlash clips in back of the multi-dial.

5. Turn the inner scale counterclockwise slowly until "0" of inner dial coincides with the index mark, then tighten set-screw firmly against potentiometer shaft.

3.2 Input Output Connections

All connections necessary for the operation of the unit are made through the printed circuit connector of the PC board. Figure 5 illustrates the terminal assignments for all units. Disregard the information not applicable to the unit in use. There are several optional connecting hardware available. A printed circuit board edge receptacle, part number 8152, allows the board to be plugged directly into the receptacle. When the "T" option is selected, a terminal strip is mounted on the PC board in parallel with the board edge receptacle. This feature allows direct wiring to the PC board with or without using the board edge receptacle. When the "C" option is selected, a WK-4-32S receptacle is mounted directly on the board and wired in parallel with the PC board transducer connections. This reliable connecting method minimizes malfunctions due to transducer input signal deterioration.

Transducer Connections. The transducer is connected through the PC board connector or terminal strip using the following pin or terminal assignments.

TERMINAL OR PIN	SIGNAL
9	Transducer Output
13	Carrier Excitation
14	Carrier Excitation

When the "C" option is selected, the transducer is connected through the WK-4-32S input receptacle using the following pin assignment.

PIN NO.	SIGNAL
1	Carrier Excitation
2	Transducer Output
3	No Connection
4	Carrier Excitation

When connecting the transducer to the CD101, the Carrier Excitation leads should be a shielded pair, separate from the shielded Transducer Output lead. The shields should be connected to system ground either at the PC board terminal 5 or to the system ground of the peripheral equipment.

NOTE

Care should be taken to determine, from specific application, whether the transducer case should be connected to the shield, grounded separately or completely isolated from this circuit.

Power Connections. When the unit is connected to an AC source (115/230 volts), terminals 1, 2, 3, and 4 are used as indicated in Figure 4, paying particular attention to the jumper connection arrangement. Normal line fluctuations of 95 to 125 volts, or 190 to 250 volts, and line frequencies of 50 to 400 Hz are acceptable.

When the unit is connected a DC source instead of AC, or if the "842" option is selected, power is connected to the PC board connector, or terminal strip, with the following terminal assignments:

TERMINAL OR PIN	SIGNAL
5	Power Ground
7	+15V
12	—15V

The DC source should be capable of supplying at least +17 mA and —25 mA. A source regulation of 5% is adequate.

Output Connections. The 0 to ±10V DC output is obtained from the PC board connector (as shown in Figure 4) with the following terminal assignments:

TERMINAL OR PIN	SIGNAL
5	Circuit Ground & Output Common
6	±Output

4. OPERATION

4.1 Zero Control

With zero stimulus on the transducer, the output is adjusted to zero with the 10-turn (or 15-turn "trimmer") potentiometer "zero" control. For most transducers, this will occur at approximately the mid-point of the control. Up to ±10 mV/V of transducer unbalance can be nulled out with this control.

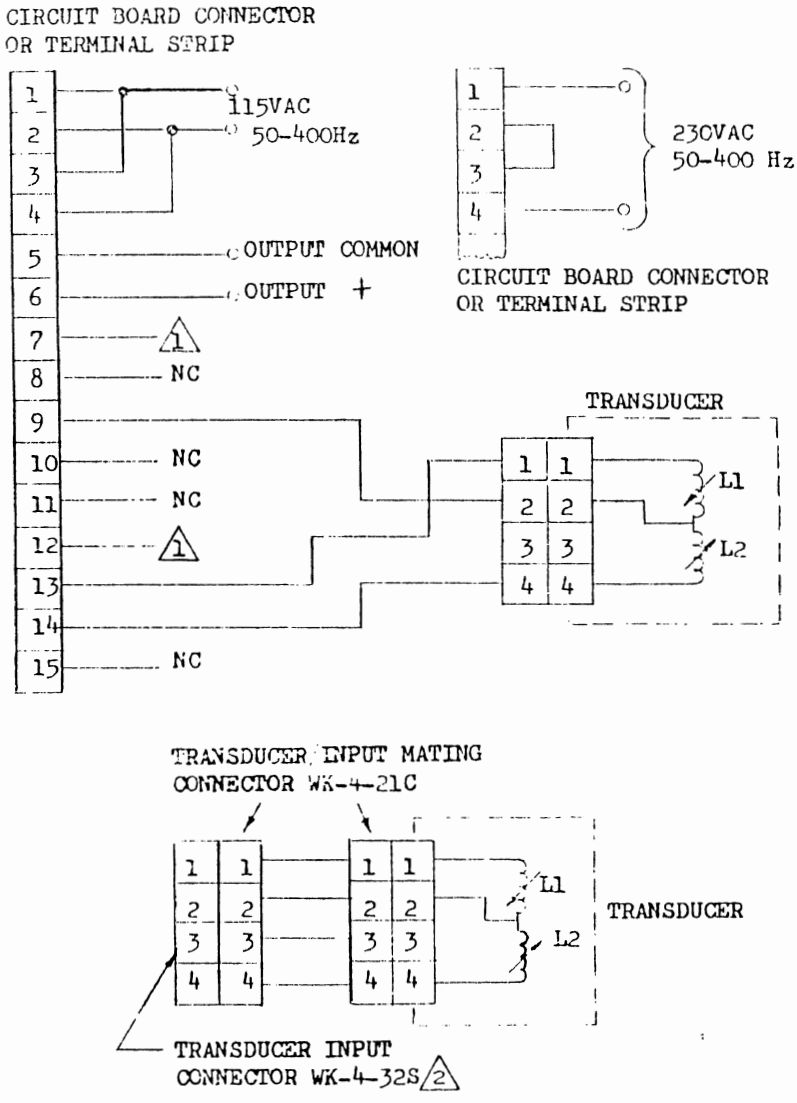
CD101-6 Zero Control. For the Model CD101-6, basic unit, where remote controls are to be supplied by the customer, a quality, 10-turn wire wound potentiometer (or 15-turn trimmer potentiometer) of 10K ohms is recommended. If you have this model, the required connections to the PC board terminal is indicated in Figure 4-2, and is as follows:

TERMINAL	SIGNAL
11	Potentiometer Wiper
13	"CW" (clockwise) end of potentiometer
14	"CCW" (counterclockwise) end of potentiometer

4.2 Span Control

With full scale stimulus on the transducer, the output is adjusted to 10 volts (or any lower voltage chosen to represent full scale stimulus) by the 10-turn (or 15-turn "trimmer") potentiometer "span" control. For a nominal transducer sensitivity of 30 mV/V fullscale, a 10-volt output is obtained at about the midpoint of the span control.

The span control is capable of adjusting the output to 10 volts with a minimum transducer sensitivity of 15 mV/V full scale.

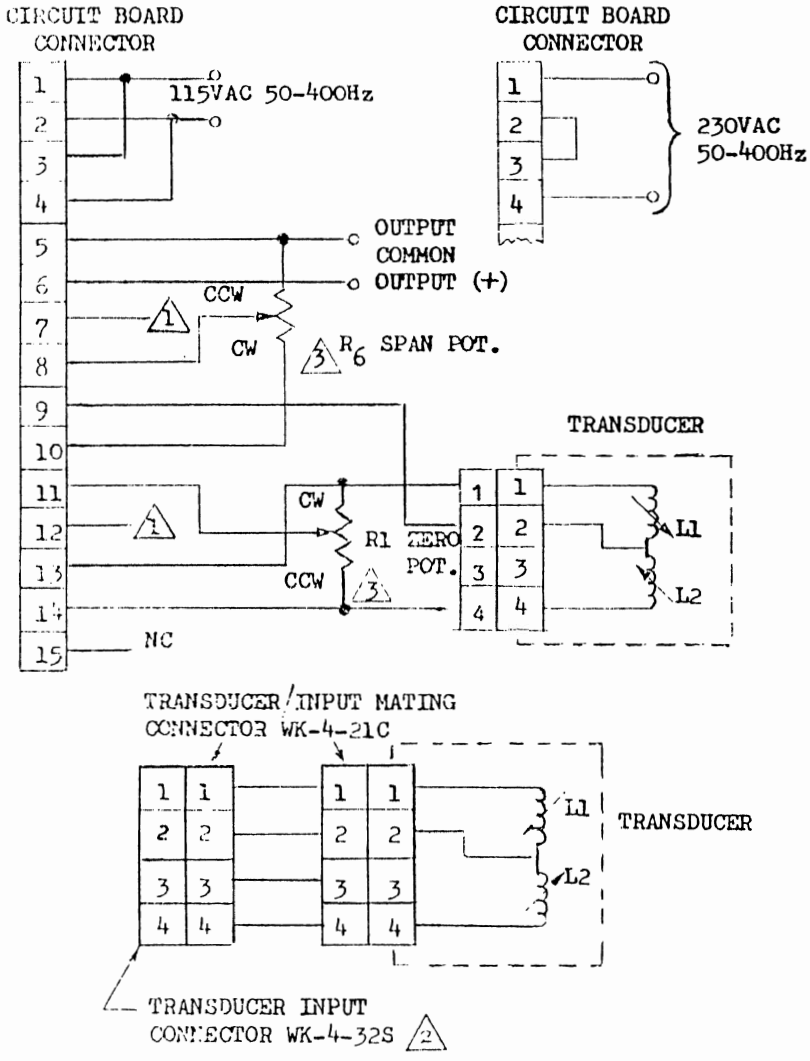


△2 CONNECTOR, "C" OPTION.

△1 FOR OPERATION FROM ± 15VDC, POWER SOURCE: #7 (+), #12 (-), #5 Pwr. Gnd.

NOTES:

Figure 4-1. CD101-3, CD101-4 and CD101-5 Connector Wiring Diagram



△3 CUSTOMER SUPPLIED POTENTIOMETER

△2 CONNECTOR, "C" OPTION

△1 FOR OPERATIONS FROM ± 15V, POWER SOURCE: #7 (+), #12 (-), #5 Pwr. Gnd.

NOTES:

Figure 4-2. CD101-6, Connector Wiring Diagram

CD101-6 Span Control. For the Model CD101-6, Basic Unit, where remote controls are supplied by the customer, a quality, 10-turn wire wound potentiometer (or 15-turn trimmer potentiometer) of 10K ohms is recommended If you have this model, or type, the required PC board terminal connections are indicated in Figure 4-2 and as follows

TERMINAL	SIGNAL
5	"CCW" (counterclockwise) end of potentiometer
8	Potentiometer wiper
10	"CW" (clockwise) end of potentiometer

4.3 External Calibration Point

Positive input can be simulated by connecting an appropriate resistor between terminals 10 and 13. A negative input can be simulated by connecting the appropriate resistor between terminals 10 and 14. A 50K ohm resistor will produce approximately 10 mV/V input and a 10K ohm resistor approximately 47 mV/V.

4.4 LVDT Transducer Connection

LVDT transducers typically have much higher output than diaphragm-type pressure transducers. To avoid saturation of the CD101 Input Amplifier, a 10 to 1 step-down transformer is connected between the excitation output and the transducer input. Further attenuation can be provided by resistors R1, R2 connected as shown in Figure 4-3.

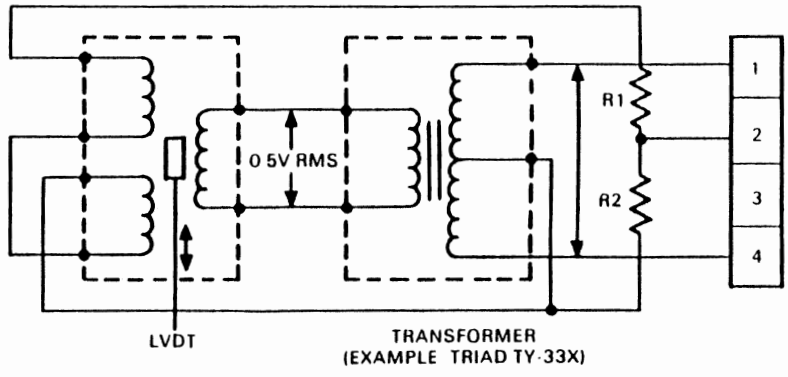
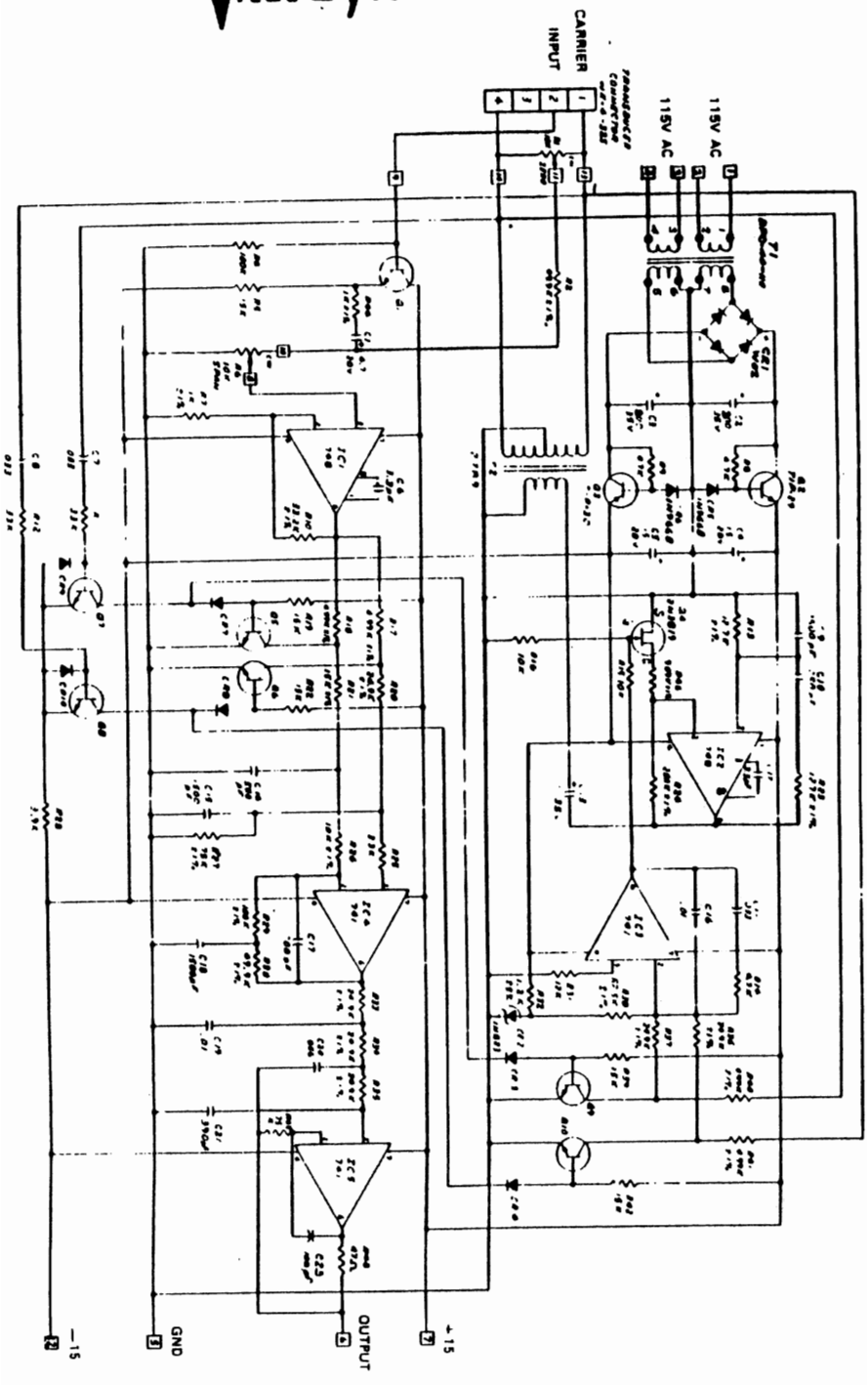


Figure 4-3. LVDT Transducer Connections Diagram

Values for R1 and R2 should not exceed 50K ohms, or be less than 10K ohms for most applications. Full scale output (the voltage between terminal 2 and the transformer center tap) should be adjusted to 30 mV/V The maximum should be 150 mV/V and the minimum 15 mV/V

5. SCHEMATIC

Drawing 7636 is attached to aid the technician in troubleshooting or signal tracing.



Model CD101 Schematic Diagram (Drawing 7636)