FC268
Frequency to Voltage Converter

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Validyne
ENGINEERING CORPORATION

REVISION PAGE

DATE REVISED	PAGES REVISED	DESCRIPTION OF REVISION	REVISED BY
12/79	Schematic	Power ground and signal ground now joined at power supply (PS171 or PS176)	J.H.

SECTION I

DESCRIPTION

1.1 INTRODUCTION

This technical manual contains installation and operating instructions for Model FC268 Frequency-to-Voltage Converter Plug-in Module for a Multi-Channel Transducer Control System. The module is manufactured by Validyne Engineering Corporation, Northridge, California 91324.

1.2 DESCRIPTION

The Model FC268 is a Frequency-to-Voltage Converter Plug-in Module to Validyne Engineering Corporation's MC170 Modular System. It is used to convert electrical frequency signals to a proporational DC voltage.

Any frequency between 250 Hz and 10 kHz may be adjusted to produce 10 VDC output from the FC268 by means of the 6-position range switch and a range trim control. This signal can be from magnetic pickup, photocells, oscillators, or any other signal source that produces a polarity change of ±15 mV or more.

The speed of the response of the output signal is controlled by the 3-position low-pass filter selector switch. For high frequency input signals, an output frequency response of up to 200 Hz may be used to measure rapid changes in input frequency. For lower input frequencies, a low-pass filter may be selected as low as 0.5 Hz to smooth the output signal.

The high output current of the FC268 is 10 mA. The output may be monitored from the front panel test point.

Zero crossing or logic level input detector thresholds are switch selected. AC or DC operation is also available by switch selection.

SECTION II

2.1 ELECTRICAL SPECIFICATIONS

Frequency Range:	6 ranges 250 Hz full scale to 10 kHz full scale 0 - 250 Hz 0 - 500 Hz 0 - 1 kHz 0 - 2.5 kHz 0 - 5 kHz 0 - 10 kHz
Tracking or Switching Accuracy:	2%, top-to-bottom
Input Sensitivity:	10 mV rms minimum to 20 V rms maximum, automatic Gain control (with 5 Hz or greater in AC mode)
Input Modes:	AC, DC or logic (selectable; logic level or zero crossing)
Output A:	0 to 10 V, 0 to ±10 mA less than 1Ω source impedance, short-circuit proof
Range Trim:	Adjusts output to provide 10 VDC output for any frequency from 100% of selected range to 40% of selected range
Output Frequency Response:	Three (3) ranges: 0 - 0.5 Hz 0 - 10 Hz 0 - 200 Hz
Linearity:	±0.1% (typ. ±0.05%)
Operating Temperature:	0 to 160°F
Temperature Sensitivity:	Span 0.005%/°F (typ.) Zero 0.001%/°F (typ.)
Power Requirements:	+15 VDC at 50 mA -15 VDC at 28 mA Supplied by module case

2.2 MECHANICAL SPECIFICATIONS

Width:	.3 inches
Height:	2.74 inches
Weight:	Less than 7 ounces

Plugs into Validyne's MC170 Module Case.

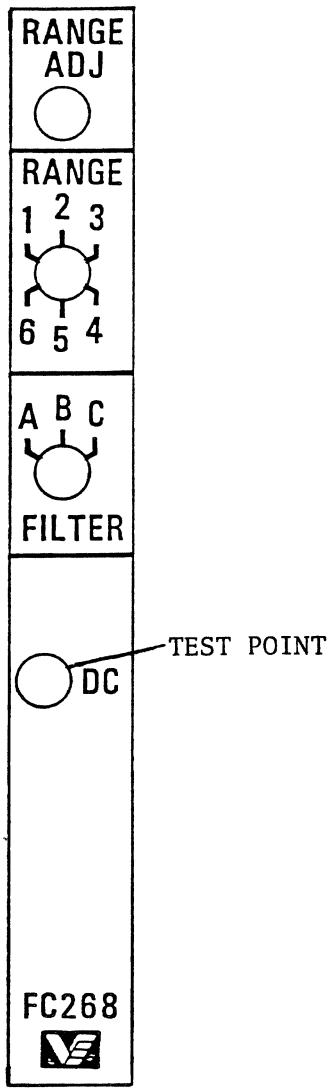


FIGURE 2-1

FRONT PANEL ADJUSTMENTS

SECTION III

INSTALLATION AND OPERATION

3.1 INSTALLATION

The Model FC268 Frequency-to-Voltage Converter may be plugged into or out of any available channel of the MC170 Module Case while power is on without damage and without affecting adjacent channels.

3.2 INPUT/OUTPUT CONNECTIONS (See Figure 3-1)

3.2.1 Input Connections

Inputs to the FC268 are by means of the wire wrap terminal on the back of the MC170 Module Case.

Pin 19 or 20 - signal input

Pin 21 or 22 - signal ground (system ground)

3.2.2 Output Connections

FC268 output comes from the wire wrap terminals on the back of the MC170 Module Case. Pin functions are as follows:

Pin 25, 26
15 or 16 - output

Pin 23 or 24 - output ground (system ground)

Pin 9 or 10 - chassis ground

3.3 OPERATION

To operate the FC268 set the Threshold Switch to the appropriate position. Use the zero crossing position of the switch for AC signals. The Logic positin provides a +2 volt threshold for logic signals which go from either 0 to +5 V or 10 V. Adjacent to the threshold switch is the switch for selecting AC or DC operation. The switch may be in the AC or DC position when selecting zero crossing operation. The switch should be in the DC mode when selecting Logic level operation.

Connect the frequency source to the input, turn the range selector switch to a range as high as the maximum frequency expected, and the low-pass filter switch on at least 100 X lower range than the maximum input frequency. Adjust the range adjust control to produce 10 V output for any frequency between 40% and 100% of the selected range.

3.3 OPERATION (Continued)

The front panel test point allows the FC268 to be monitored and calibrated from the front. The tip jack marked "DC" is connected to the output, the 10 volt output.

3.4 CALIBRATION

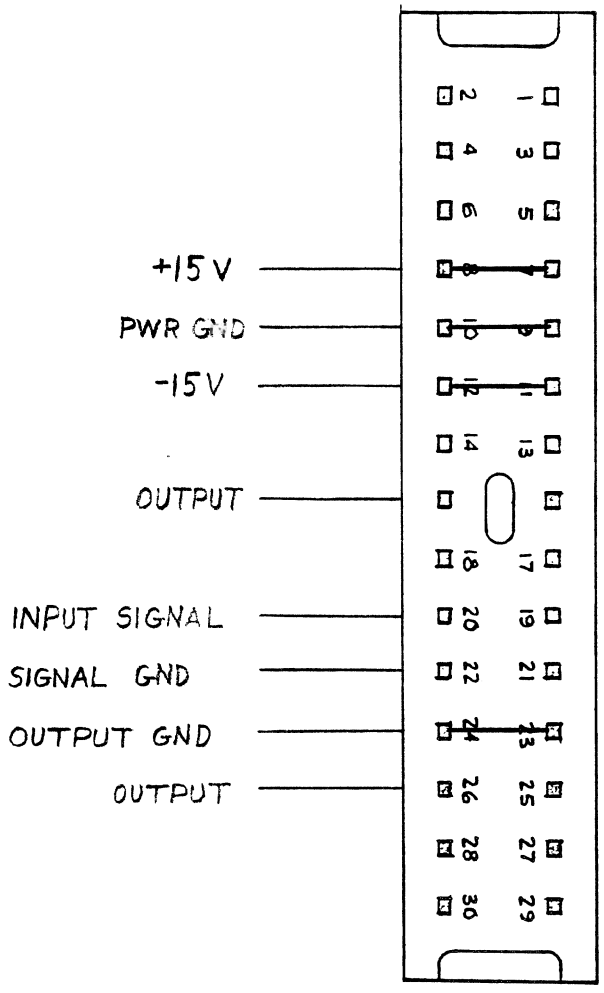
If it should become necessary to calibrate the FC268 proceed as follows:

(1) Set the unit up as noted in paragraph 2.3 "Operation".

(2) Connect the input signal from a signal source or pulse generator.

(3) Adjust the "Range Adjust" control to the proportional DC output voltage.

Input and Output Connections: (Accessible through Printed Circuit Board Connector at Rear of MC170 Module Case.)



Printed Circuit Board Connector

As Viewed from Rear of MC170 Module Case

FC 268
(WIRE-WRAP TERMINAL VERSION)

FIGURE 3-1

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SECTION IV

4.0 PRINCIPLES OF OPERATION

Mode switches provide input signal modes:

(1) AC or DC input coupling

(2) Logic (+2 V) or Zero crossing threshold

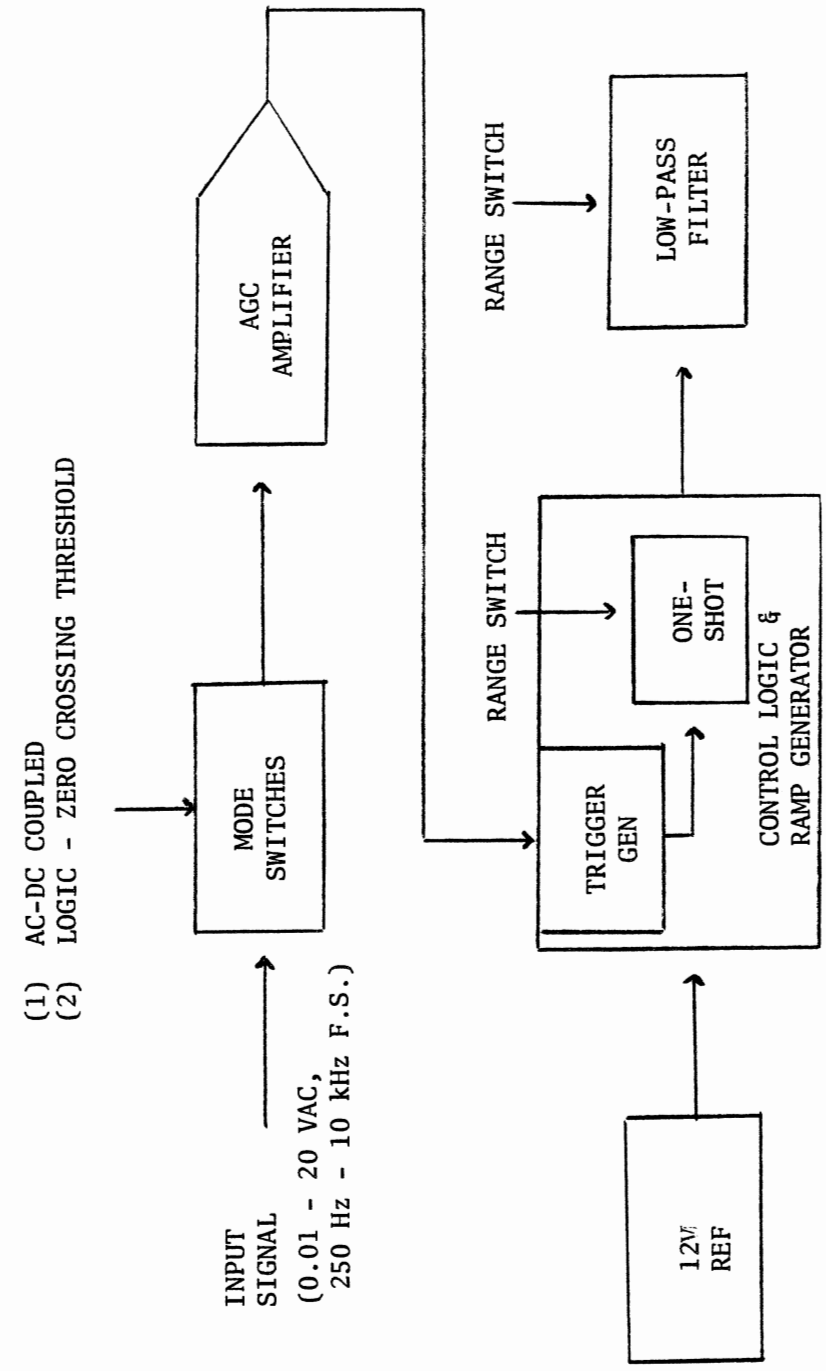
The selected input mode couples the input signal to an automatic Gain-controlled amplifier which serves to provide a normalized signal amplitude to the zero crossing comparator. The output signal is differentiated and buffered to trigger a latch circuit.

A one-shot precision amplitude pulse is generated in response to a timing signal generated via the Frequency Range Switch and level detected by comparator. U1 provides the 12 volts reference signal.

The low-pass filter, U3, is set at 0.5 Hz to 200 Hz by switch S3, and provides a smoothed DC signal equal to the average value of the U3 one-shot output.

A Frequency Range Adjust Control following the low-pass filter enables the circuit to provide 10 VDC at the output for an input frequency between 40 and 100 percent of the range selected.

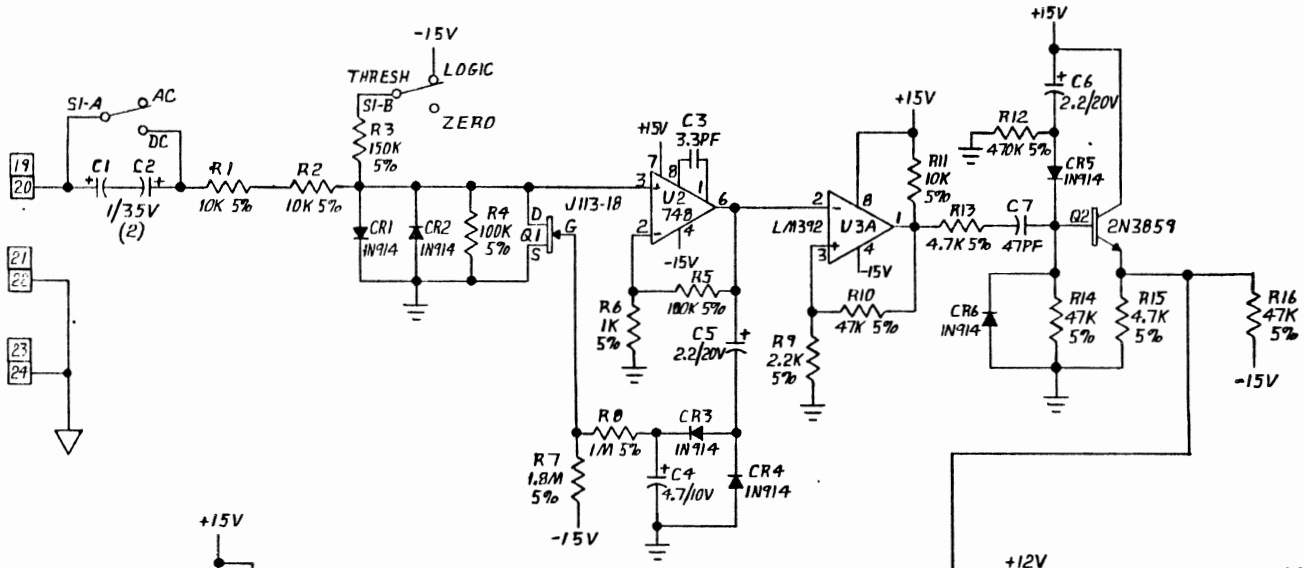
U5 contains internal current limiting and thermal-sensing protection so that short-circuit load conditions will not injure the amplifier, and normal operation will be resumed automatically after an output fault is cleared.



FC268 - SIMPLIFIED BLOCK DIAGRAM

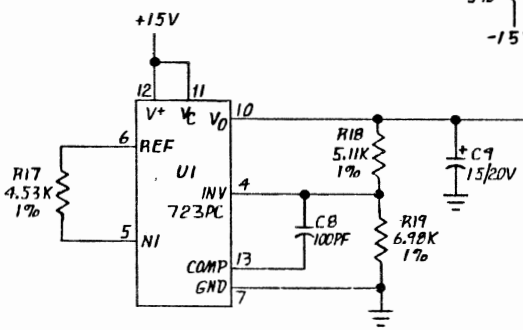
FIGURE 4-1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	SEE DCN	11-20-77	G WE ED



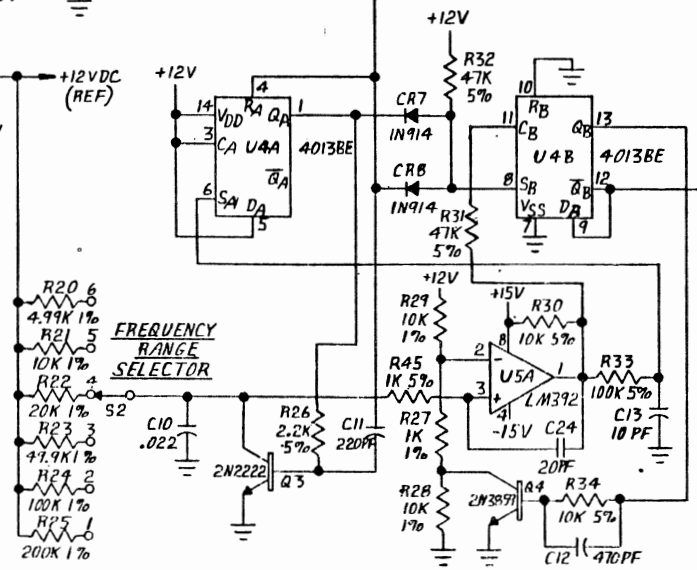
LOW PASS FILTER

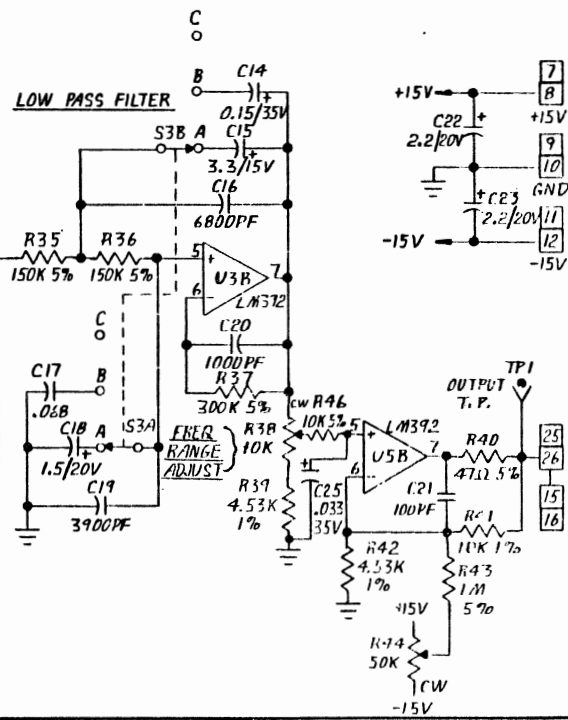
POS	CUTOFF
A	0.5 HZ
B	10 HZ
C	200 HZ



FREQUENCY RANGE

POS	RANGE
1	250 HZ
2	500 HZ
3	1000 HZ
4	2500 HZ
5	5000 HZ
6	10,000 HZ





2 SIGNAL GROUND ⏚ (PINS 21-24) CONNECT TO POWER GROUND ⏚ (PINS 9-10) AT POWER SUPPLY.

1. CIRCUIT BOARD ASSEMBLY 9488.

NOTES: UNLESS OTHERWISE SPECIFIED.

CODE IDENT NO. 33107

TOL. UNLESS NOTED
DEC. XXX ——
FRAC. & DEC. XX ——
ANGLES ± 1 2°
DIAMETERS WITH SAMC & SHALL BE CONCENTRIC WITHIN .005 TIR
SURFACES MUST BE FLAT WITHIN .002 PER IN.
MAX FILLET .015 UNLESS NOTED
DEBURR EDGES .005 MAX UNLESS NOTED.
SURFACE FINISH 63 UNLESS NOTED.
DRILLED HOLE TOL PER AND10387

SCALE —
DWN G.WE 3-7-78
CK'D
APP'D
TITLE SCHEMATIC

Validyne ENGINEERING CORPORATION
NORTHRIDGE, CALIFORNIA 91324
MODEL FC228
MAT'L
FINISH

IC 9485