

# MOOG

## N123-140 Series

### Snap Trac

## Frequency to Voltage Converter and General Purpose Amplifier

### SPECIFICATIONS

#### F-V Converter

##### Input: (between terminals 5 and 6)

Output direction control at terminal 4  
No connection or +5VDC at terminal 4: output voltage increases with increased frequency.  
Grounding terminal 4: output is inverted. Direction control is TTL compatible.

##### Input frequency range –

Jumper selectable:  
0 to 1.0 KHz, or 0 to 10.0 KHz.

##### Input amplitude:

±60 mVp-p to ±40 Vp-p

#### Performance:

##### Ripple:

Model 123A140:  
<400 mVp-p @ 50 Hz  
<200 mVp-p @ 1KHz

Model 123B140:  
<150 mVp-p @ 500 Hz  
<75 mVp-p @ 10 KHz

##### Non-linearity <±1.0% for:

Model 123A140 with >0.01VDC/Hz  
or

Model 123B140 with >0.001VDC/Hz

##### Time constant ≈ R11 C4 seconds

Temperature drift ≤±0.04%/°C

##### Output: (at terminal 7)

Output signal ≤±10VDC

Output load ≥5 KΩ

The N123-140 Frequency to Voltage Converter and General Purpose Amplifier provides an output voltage proportional to a wide range of frequencies.

A direction control provides signal inversion to give a bi-directional output.

This circuit module is typically used with a magnetic or optical pulse pickup to obtain a DC voltage proportional to speed, such as engine RPM or motor speed. The general purpose amplifier may be used for low level amplification of a signal, or may be custom modified if desired.

### SPECIFICATIONS

#### Amplifier

##### Inputs:

Two individual inputs at terminals 8 and 9 or differential input between terminals 8 and 9.

Input signals may range from ±0.1VDC to 100VDC.

##### Output (at terminal 10):

Output at terminal 10.

Load impedance ≥ 5 KΩ.

±10VDC maximum output.

##### Gain:

General expression for amplifier gain with R30 = R34, R31 = R33, R32 = R35 = Jumper and R40 full CW:

$$e_{10} = (e_9 - e_8) (R_{31}/R_{30}) \left( 1 + \frac{R_{39} + R_{40}}{R_{38}} \right)$$

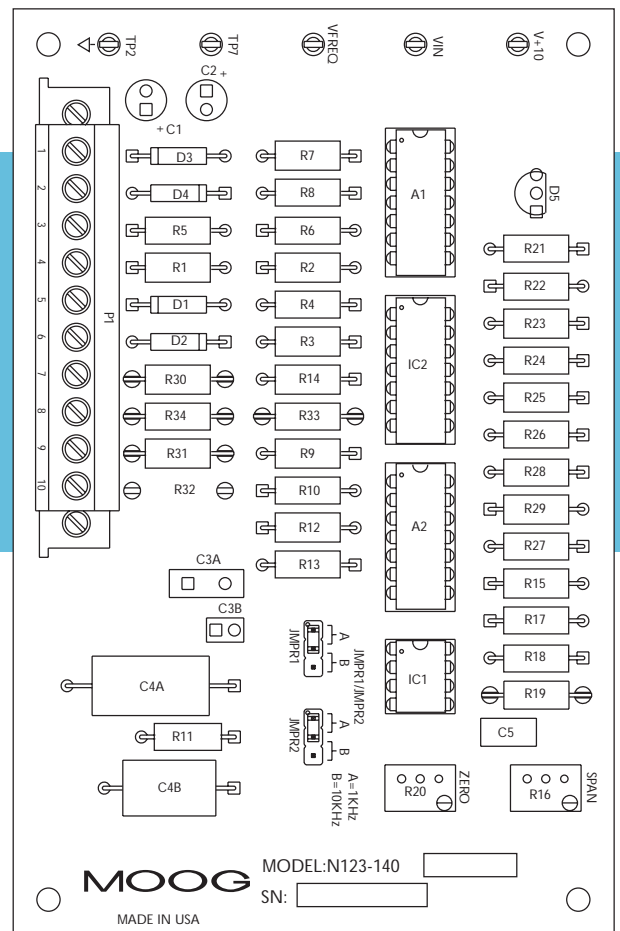
##### Temperature Range:

-20°C to 50°C (-4°F to 122°F).

##### Power Required:

±15.0VDC at ±15/-8 mADC, regulated, 3-wire (±E) at terminals 1, 2, & 3.

This power is available from Model N121-132A Snap Trac Servocontroller.



### FEATURES

#### Construction

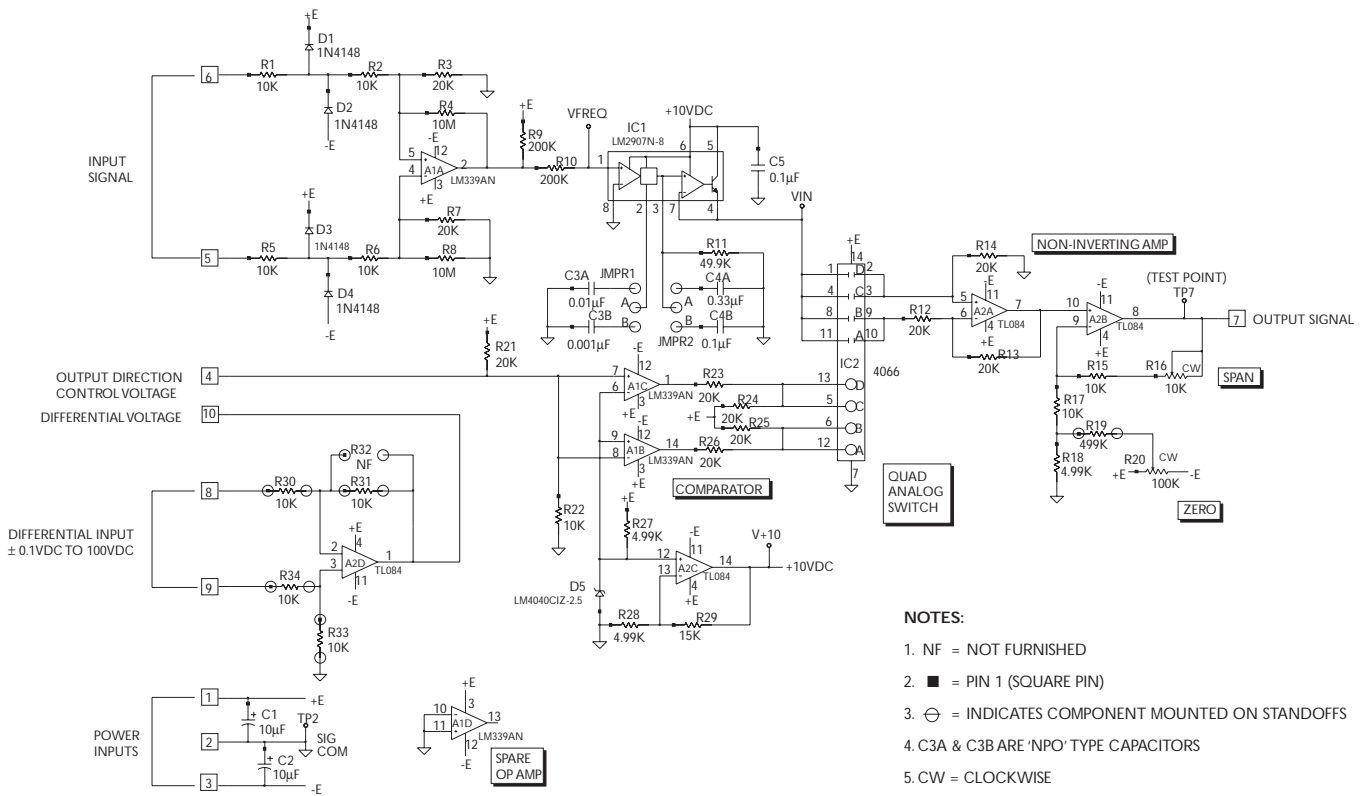
- Plug-in connectors for quick installation of board.
- Test points on all critical signals.
- Component standoffs on all user-configurable components.
- Twenty-turn potentiometers for all adjustable controls.
- Rugged construction with solder mask.

### DIMENSIONS

3.25 in x 5.10 in long

Maximum Component Height: 0.69 in

# N123-140 FREQUENCY TO VOLTAGE CONVERTER AND GENERAL PURPOSE AMPLIFIER



- NOTES:**
1. NF = NOT FURNISHED
  2. ■ = PIN 1 (SQUARE PIN)
  3. ⊕ = INDICATES COMPONENT MOUNTED ON STANDOFFS
  4. C3A & C3B ARE 'NPO' TYPE CAPACITORS
  5. CW = CLOCKWISE

## CIRCUITRY

The input signal applied between terminals 5 and 6 is conditioned by A1A. This conditioned signal is applied to IC1, which converts the input frequency to a proportional analog voltage. Capacitor C3A or C3B and resistor R11 set the gain of IC1; plug-in capacitor C4A or C4B determines the output ripple.

A1B, A1C, IC2, and A2A provide inversion of the output in accordance with the control voltage at terminal 4. IC2, a quad analog switch, is controlled by the voltage at terminal 4 and at comparators A1B and A1C. When this voltage is greater than 2.6VDC, switches A and B are closed (C and D open).

This condition arranges A2A as a non-inverted amplifier. Non-inverting amplifier A2B provides signal ZERO (R20) and SPAN (R16) adjustments. If terminal 4 is disconnected, the voltage at pin 8 of A1B is biased to approximately +5VDC by R21, R22. This also provides a non-inverted output. If terminal 4 is pulled below 2.3VDC; that is, by grounding, then IC2 switches C and D are closed, and simultaneously, A and B are opened. This provides signal inversion at A2A and output terminal 7.

## ADJUSTMENTS

### Frequency to Voltage Converter

**Zero (R20)** – sets zero output for zero input frequency.

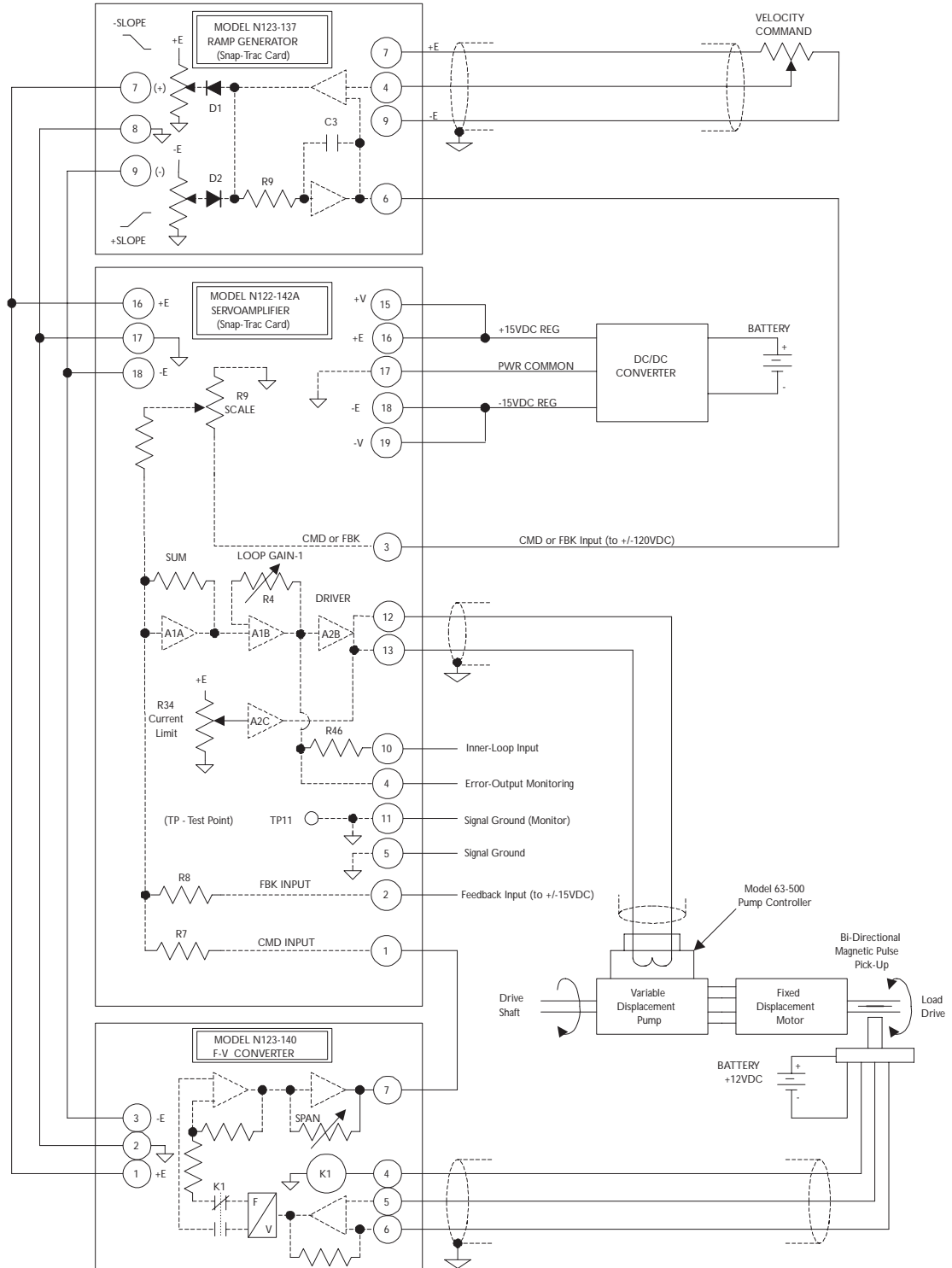
**Span (R16)** – sets output sensitivity; for example, ±10VDC for maximum input frequency.

Component	Model Description	
Designation	123A140 1kHz	123B140 10kHz
C3A	0.01 μF	–
C3B	–	0.001 μF
C4A	0.33 μF	–
C4B	–	0.1 μF
R11	49.9k	49.9k

**MOUNTING:**  
Mount using Curtiss type TR-3 plastic track (Moog P/N 65419-1)

## CLOSED-LOOP CONTROL OF A HYDROSTATIC DRIVE WITH LIMITED ACCELERATION & VELOCITY

Model N123-140 Frequency to Voltage Converter can be used to process signals from a bi-directional magnetic pulse pick-up for velocity feedback from a variable displacement pump and fixed displacement motor. Magnetic pulse pick-ups are often used in rugged harsh environments such as used in off-road vehicles. A DC/DC converter can be used to supply the required 3-wire,  $\pm 15\text{VDC}$  regulated power source from a power supply such as a 'battery'. Model N123-137 Ramp Generator Card provides necessary acceleration / deceleration control in velocity feedback control.



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