

***289 SERIES***  
***FLOW METER TRANSMITTERS***

# ***INSTRUCTION MANUAL***

## ***289 SERIES TRANSMITTER***

289-763 Pickup Coil/Amplifier, Amphenol Connector  
289-773 Pickup Coil/Amplifier, Weather-Tight, Explosion-Proof\*

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\*U.L.Class I, Group C & D  
Class II, Group E, F & G

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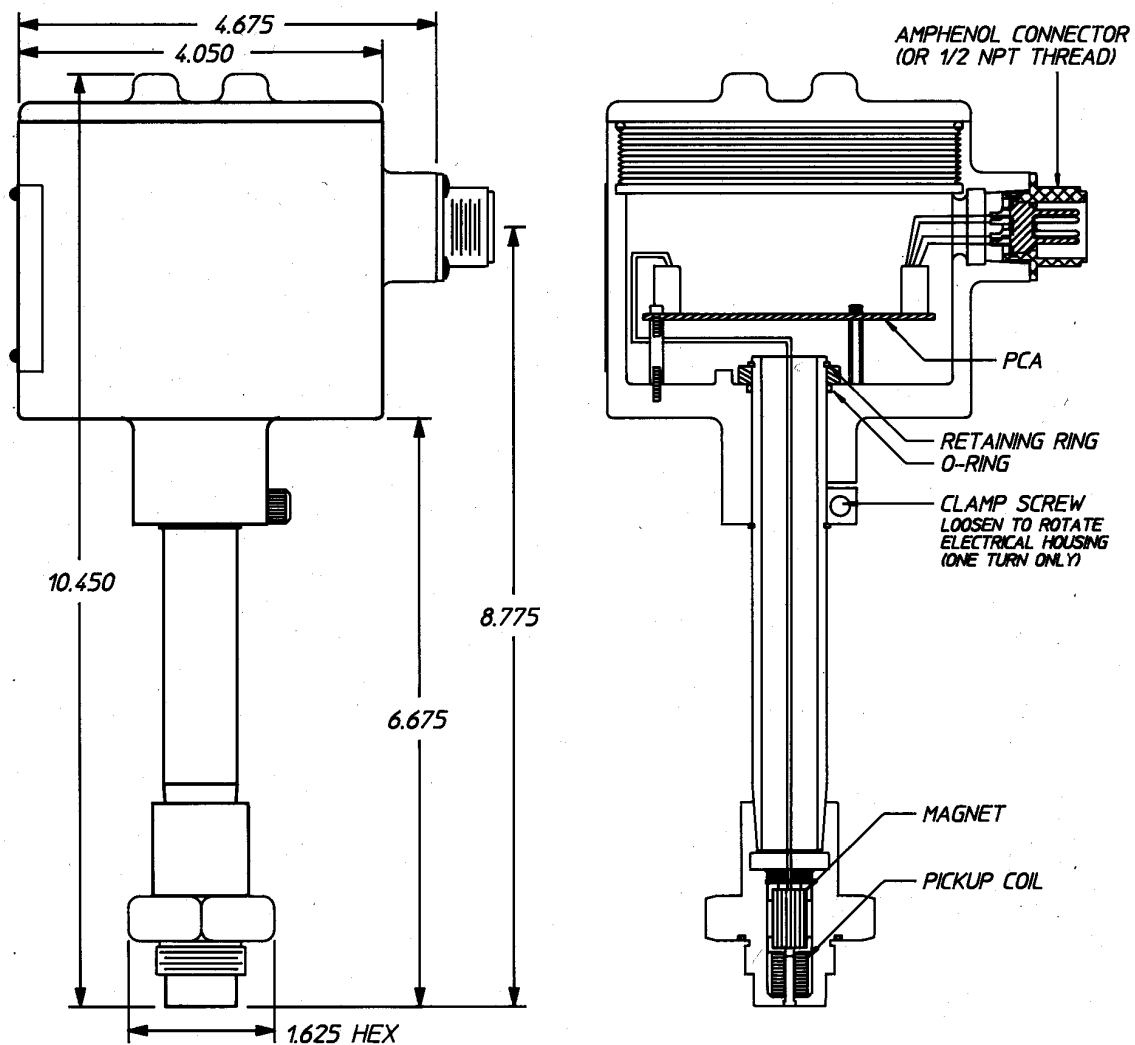
*Max Machinery, Inc.* reserves the right to make changes to the product in this Instruction Manual to improve performance, reliability, or manufacturability. Consequently, contact *MMI* for the latest available specifications and performance data.

Although every effort has been made to ensure accuracy of the information contained in this Instruction Manual, *MMI* assumes no responsibility for inadvertent errors.

## General Description

The 289 Series Transmitter has an inductive pickup which senses the motion of an internal flow meter gear. As the tooth of a gear moves under the core of the pickup, a voltage is induced in a coil wound around the core. The gear is fastened to the rotor shaft of the 240 Series meter, which allows its rotational rate to be directly proportional to the flow rate.

The output of the pickup coil is amplified and squared before being sent to the output terminals. The resulting pulse train is relatively insensitive to interference and can be transmitted as far as generally required.



# Specifications

## 289-763/773 5V Square Wave Output:

### **Power Requirements:**

Voltage (5V regulator on PCA) .....5-24VDC  
Nominal (3.5-30V Max)

Current (No Load)

<u>Supply Voltage</u>	<u>Operating</u>	<u>Calibrating</u>
3.5V	1.1mA	1.6mA
5.0 - 24.0V	1.8mA	3.0mA

### **Output Signal**

Shape .....Square Wave  
Amplitude .....5V  
Rise and Fall Time .....3 $\mu$ S  
Output Impedance .....<200ohms  
Maximum Frequency .....5kHz  
Minimum Frequency .....1/50Hz  
Output vs Load: (Supply > 5.2V)

<u>Load mA</u>	<u>Output Low</u>	<u>Output Hi</u>
0.1mA	0V	5.00V
1.0mA	0V	4.85V
5.0mA	0V	4.25V
10.0mA	0V	3.45V

## Temperature Limits (All Models):

### **Operating**

Electronics .....-5 to 150F (-20 to 65C)  
Pickup Coil .....-148 to 450F (-100 to 232C)

### **Storage**

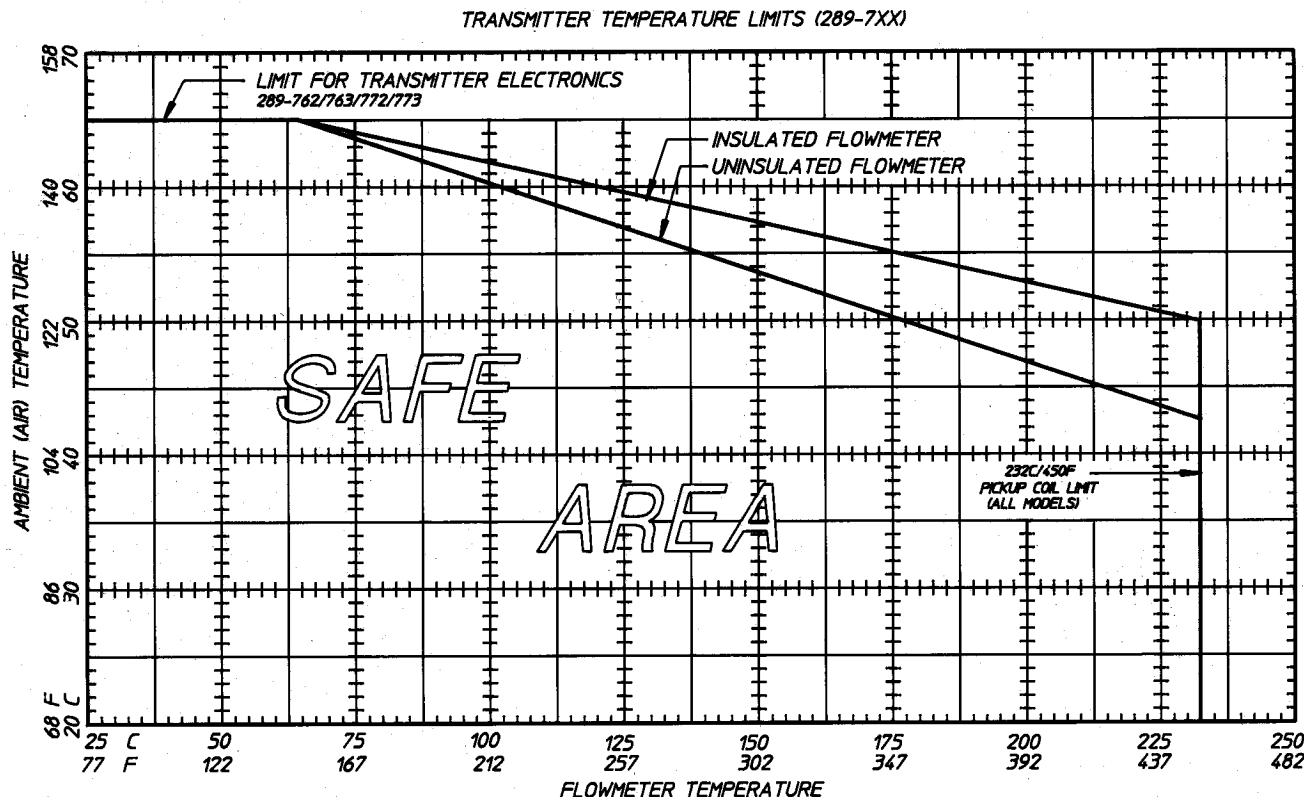
Electronics .....-40 to 175F (-40 to 80C)  
Pickup Coil .....-148 to 450F (-100 to 232C)

# Installation

**Mounting:** The Model 289 transmitter screws on and off of the flow meter. Because of the random location of the starting point of the threads, one transmitter will probably not line up with the "in" and "out" ports of the flow meter like another will. The electrical outlet of the transmitter can be rotated **one turn** by loosening the clamping screw. (See drawing, page 2)

**Moisture Protection:** The electrical circuitry of the weather-tight, explosion proof transmitter is enclosed in a liquid and vapor tight enclosure. All joints are sealed by welding or by "O"-rings. If this sealed condition is to be maintained, the conduit connection to the enclosure should be made liquid and vapor tight by using pipe dope or a potting fitting (U.L. requires a potting fitting within 18" of the transmitter.). If a transmitter is located outside and this precaution is not taken, moisture may form inside the housing. This will cause the circuitry to give an inaccurate output or possibly no output at all. In the long run it will cause corrosion and failure. The amphenol connector versions of the 289 Series Transmitter offer moderate protection from moisture and dust but are not totally sealed.

**Temperature Considerations:** High ambient temperatures (120°F/50°C) should be avoided if possible. It is a good idea to locate the transmitter away from hot spots such as steam pipes, ovens and heaters. The electronics of the 289 Series Transmitters are rated for operation up to 65°C or 150°F. **Because some heat travels from the flow meter to the transmitter electrical enclosure, the temperature the electronics see is a function of both the ambient and the flow meter temperature.** The graph below shows the relationship between the maximum ambient transmitter temperature and the fluid temperature through the flow meter. The pickup coil of the 289 Series Transmitter is insulated with an epoxy that is rated to 232°C/450°F. This is the maximum flow meter fluid temperature.



# User Options & Adjustments

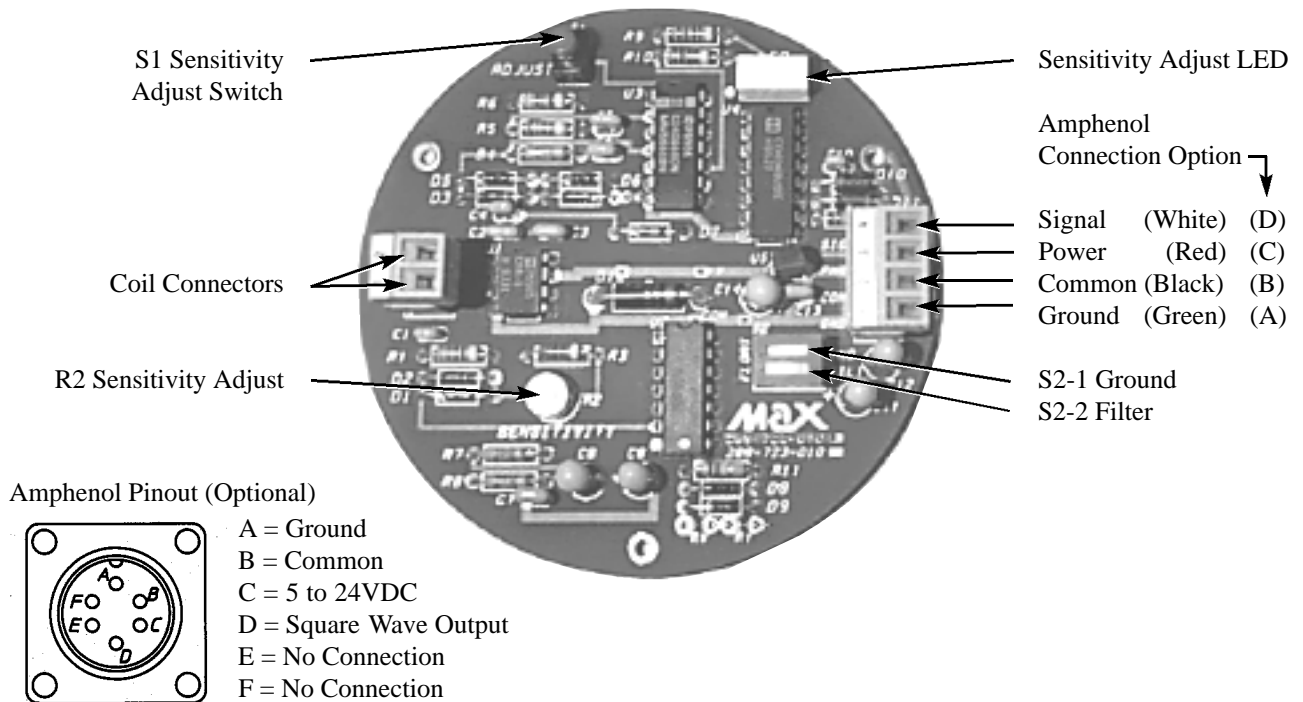
## 289-763/773 TRANSMITTER

**Grounding:** S2-1 connects Common and Case directly together. S2-2 connects Common and Case through 4.7  $\mu$ F capacitors. By using either switch the effects of electrical noise on the transmitter can be reduced. If the system is not grounded at the indicator or if the flow meter is not physically grounded through its plumbing, use S2-1. If the system is grounded at the indicator, use S2-2. This allows electrical noise between the case and the circuitry of the transmitter to be reduced without causing ground loop problems. To activate either switch, depress the side of the switch that is numbered.

**Sensitivity Adjustment R2, S1, LED:** For best results, the transmitter amplifier sensitivity should be adjusted to match the output voltage of the particular pickup and flow meter it is mated to. This is typically factory calibrated, but should be checked if the coil or circuit board is changed or if the transmitter is switched from one flow meter to another.

To adjust the sensitivity, set the flow rate through the flow meter to approximately midrange. Press the Sensitivity Adjustment Switch (S1): One or both sides of the LED should come on. Turn the Sensitivity pot (R2) FCW then turn it CCW just until both sides of the LED show equal brightness or are on for about equal periods of time (if the frequency is low).

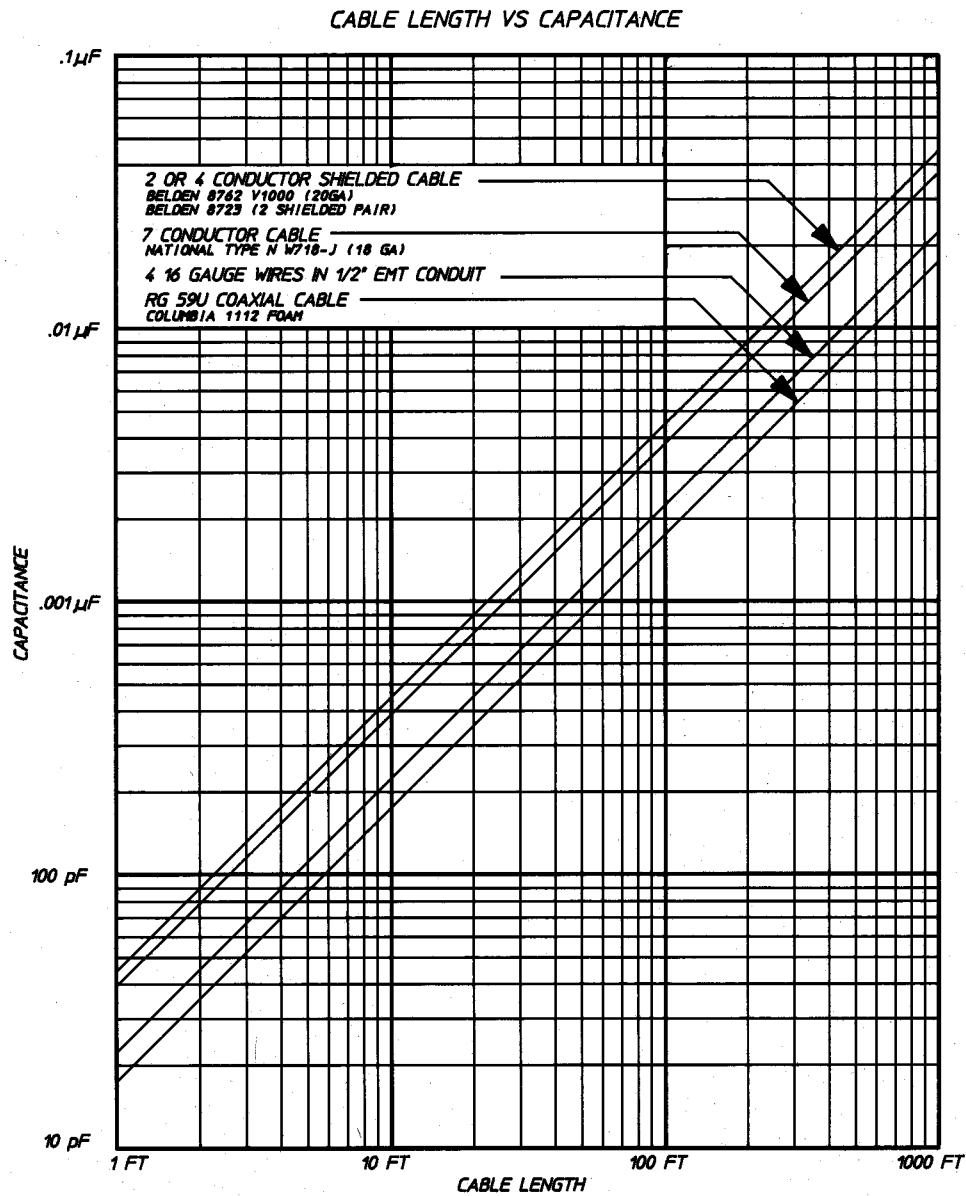
**Outputs:** The Model 289 transmitter output is generally sent to a signal conditioner display such as the Max 120, which provides signal dampening, scaling, and rate/total displays; as well as supplying power to the transmitter. A complete line of LCD display instrumentation is also available from MAX for flow rate, total, batching, and flow control .



# Maximum Transmission Distance

## MAXIMUM TRANSMISSION DISTANCE

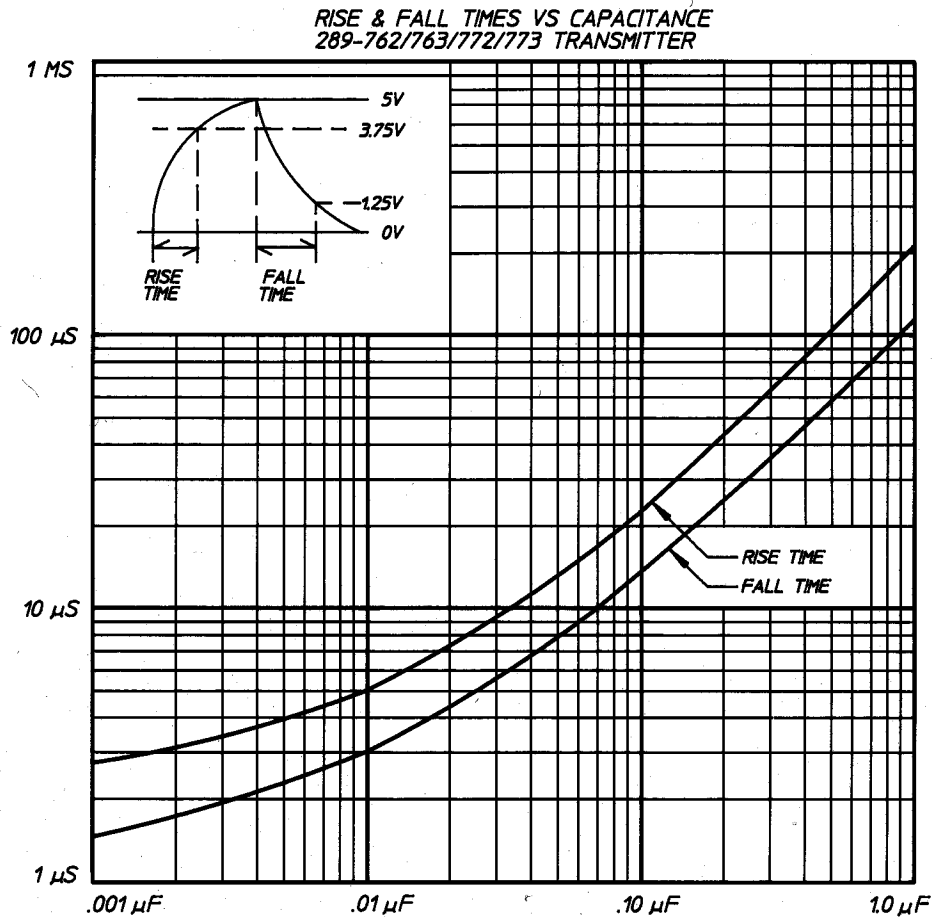
The graph below shows typical conductor capacitance load vs. cable length for several types of cable. For instance, 1,000 ft. of 7 conductor #18 gauge stranded wire will put a 0.04  $\mu\text{F}$  capacitive load on the output of the Model 289 transmitter.



# Maximum Transmission Distance

## MAXIMUM TRANSMISSION DISTANCE (continued)

The graph below provides the relationship between output capacitance loading and rise and fall time for the Model 289-763/773 output signal. For instance, with 0.4  $\mu\text{F}$  the rise time of the Model 289 is about 89  $\mu\text{s}$ , and the fall time about 45  $\mu\text{s}$ . Consequently, the absolute maximum frequency the 289 could put out would be  $1/(80 + 45) \mu\text{s} = 8000 \text{ Hz}$  (frequency =  $1/\text{time}$ ). The signal would be a saw tooth pattern. Generally, the transmitter will drive 5000 feet or more of cable with no problem.





# Typical K-Factors / Typical Connections

## Typical K-Factors for 240 Series Flow Meters using the 289 Series Transmitter

### 241 Flow Meter (.062 Liter/Rev)

Pulses/Liter ..... .403  
 Maximum Rate ..... .190 L/min

### 242 Flow Meter (.182 Liter/Rev)

Pulses/Liter ..... .219  
 Maximum Rate:  
     SS Rotors ..... .450 L/min  
     AL Rotors ..... .540 L/min

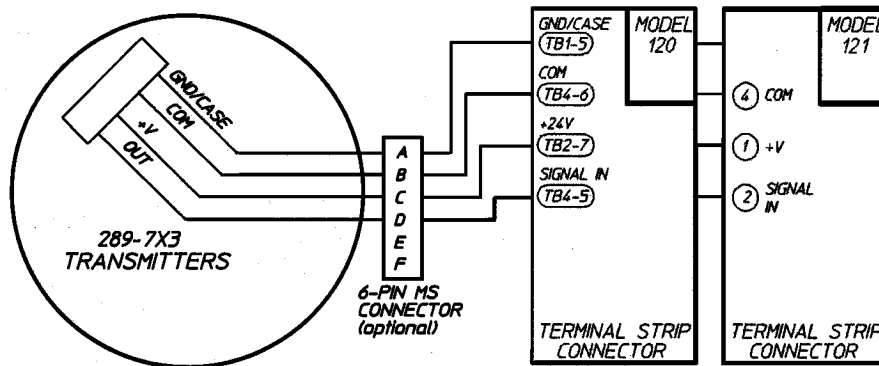
### 243 Flow Meter (.574 Liter/Rev)

Pulses/Liter ..... .104  
 Maximum Rate:  
     SS Rotors ..... .1000 L/min  
     AL Rotors ..... .1400 L/min

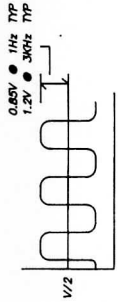
### 244 Flow Meter (1.70 Liter/Rev)

Pulses/Liter ..... .58.8  
 Maximum Rate:  
     SS Rotors ..... .2400 L/min  
     AL Rotors ..... .3500 L/min

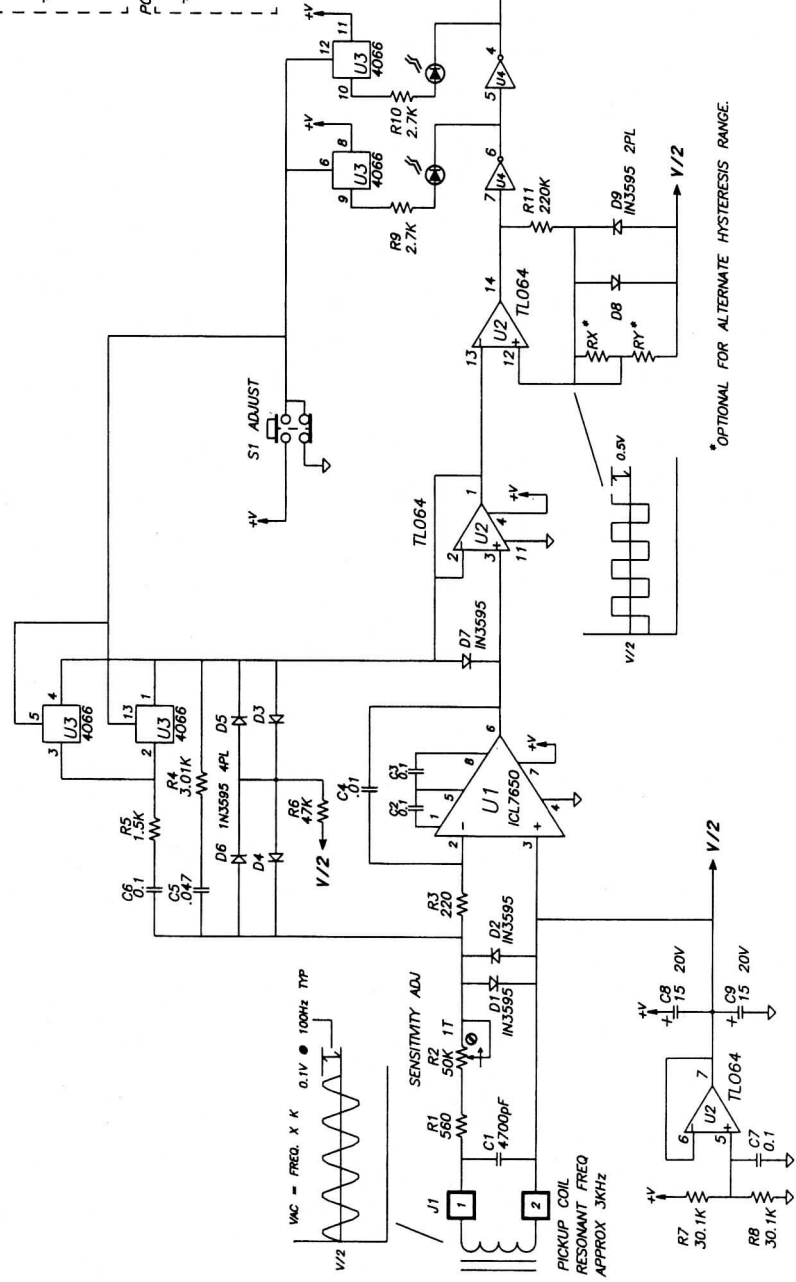
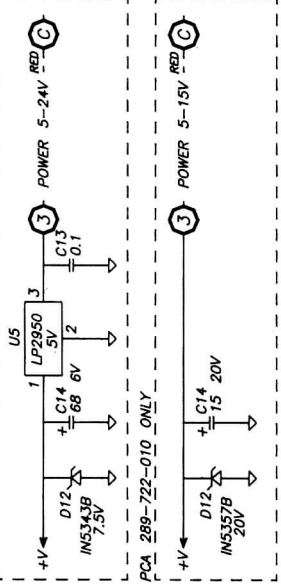
TYPICAL CONNECTION TO MAX SIGNAL CONDITIONERS & DISPLAY INSTRUMENTS



DATE	SYM	REVISION	BY
3-93	D	ADJUST 5V SUPPLY AND REGULATOR AMP CONNECTOR	JEB

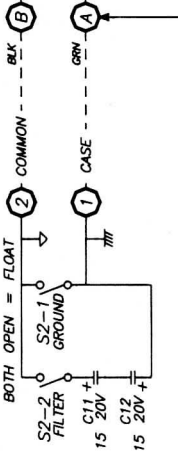


PCA 289-723-010 ONLY



\* OPTIONAL FOR ALTERNATE HYSTERESIS RANGE.

AMPHENOL CONNECTOR PINOUT (WHEN USED)



SUPPLY	RVN	2.0mA	5.0V	1.5V
ADJUST	2.7mA	3.7mA	10.0mA	

OUTPUT V. IS. I	5V SUPPLY
OUT LOW (SNK) = 0.2V	2.0mA
OUT HIGH (SOURCE) = 4.7V	2.0mA

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