ACC-42
RF Coil Flow Rate Conditioner
Frequency to Analog Voltage
(DC Powered Version)

USER’S MANUAL

HP-248
September 2004

HOFFER
Flow Controls

Perfecting Measurement™

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Please review the complete model number of each item to be connected and locate the appropriate manual(s) and/or drawing(s). Identify all model numbers exactly before making any connections. A number of options and accessories may be added to the main instrument, which are not shown on the basic user wiring. Consult the appropriate option or accessory user manual before connecting it to the system. In many cases, a system wiring drawing is available and may be requested from HOFFER FLOW CONTROLS.

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# TABLE OF CONTENTS

**SECTION I**  
INTRODUCTION AND SPECIFICATIONS ................................................................. 1.1

**SECTION II**  
INSTALLATION ...................................................................................................... 2.1

**SECTION III**  
CALIBRATION ....................................................................................................... 3.1

**SECTION IV**  
OPERATION ......................................................................................................... 4.1

**SECTION V**  
MAINTENANCE AND SCHEMATIC ................................................................. 5.1
SECTION I

ACC42 MODULATED CARRIER CONDITIONER/VOLTAGE CONVERTER

The ACC42 Modulated Carrier Conditioner/Converter is an active pickoff accessory for the turbine flowmeter which provides a pulse output and an analog voltage output proportional to flowrate.

The Modulated Carrier principle eliminates the pickoff drag, associated with conventional magnetic pickoffs, resulting in a significant increase in the usable range of a turbine flowmeter at lower rates.

The ACC42 excites a series MCP pickup mounted on the turbine flowmeter. Sensed through the flowmeter body, the motion of the turbine rotor modulates the coil field, subsequent conditioning provides a pulse output signal where each pulse is representative of a discrete volume of fluid and where the frequency is proportional to flowrate.

The analog output is generated by passing the pulse output frequency signal to a frequency to the voltage converter to generate a voltage proportional to flowrate.

Flowmeters compatible with the ACC42 are available in nominal sizes below two inches. Larger flowmeters do not require a modulated carrier pickup.

SPECIFICATIONS

INPUT
- Pickup Type - Compatible with Series MCP pickoff.
- Transmission distance 100 feet (maximum).
- Cable type Beldon 8422.
- Modulation frequency range 10 Hz - 3500 Hz.

PULSE OUTPUT
- Open collector VMOS transistor 2N6660.
- Maximum OFF state voltage 60 VDC.
- Maximum ON current 1.0 amps.
- TTL/CMOS fanout of 5 TTL loads.
- AC capacitively coupled square wave, 12 Vp-p.

ANALOG OUTPUT
- The analog output is generated by passing the pulse output frequency signal to a frequency to voltage converter to generate a voltage proportional to flowrate.
- Range 0 to 5 VDC.
- Controls - Non-interacting zero and span adjustments.
- Accuracy ±0.1% F. S. 200ppm/°C.
- F.S. Frequency Range 75 Hz to 2500 Hz (DIP SWITCH SELECTABLE).
- Impedance less than 50 ohms.
- Response time 0.5 to 2 seconds for 10 to 90%. Adjustable.
PULSE OUTPUT CHAR. TTL/CMOS COMPATIBLE OPTION
LOGIC 1  2.4V at -.800mA
LOGIC 0  0.4V maximum at 100mA

OPEN COLLECTOR OPTION
TYPE VMOS 2N6660
V Max. (Abs.) 60 VDC
I Max. (Abs.) 100 mA

AC OPTION
5Vp-p Square Wave

POWER REQUIREMENTS
115 VAC 50/60 Hz
(Optional)
15 - 35 VDC
220/240 VAC 50/60 Hz

TEMPERATURE
0° to 70°C Standard

ENCLOSURE OPTIONS
Standard enclosure Style -2 Case.
(See outline drawing)
Explosion Proof Enclosure.
Explosion Proof Enclosure with ‘O’ ring seal.
NEMA -4 Enclosure.

CONTROLS AND ADJUSTMENTS

FUSE
A circuit protection device located inside of case.

SENS.
A multiple turn control used to set the threshold sensitivity level above the ambient noise pickup.

RANGE
A dual in-line (DIP) switch located on the board which is used to program the module to accept an input frequency range.

SPAN
A multiple turn adjustment which is used to set the voltage output signal to the desired span corresponding to the equivalent flow range (i.e., 0 to 5V corresponding to 0-100 GPM).

ZERO
A multiple turn adjustment which is used to set the output signal with no flow to the desired zero value (i.e., 0.000 VDC).

RESPONSE
An internal multiple turn adjustment which is used to adjust the response time of the analog output.
## ORDERING INFORMATION

<table>
<thead>
<tr>
<th>PULSE OUTPUT</th>
<th>ANALOG OUTPUT</th>
<th>INPUT POWER</th>
<th>OPTIONAL FEATURE</th>
<th>ENCLOSURE STYLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL ACC42-(A)-(B)-(C)-(D)-(E)</td>
<td>OPTION (A)</td>
<td>(1) OPEN COLLECTOR (2) TTL/CMOS (3) AC SQUARE WAVE (4) 0-10 V SQUARE WAVE</td>
<td>OPTION (B)</td>
<td>X) NONE (V) 0-5 VDC (V10) 0-10 VDC</td>
</tr>
<tr>
<td></td>
<td>OPTION (B)</td>
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<tr>
<td></td>
<td>OPTION (C)</td>
<td>(A) 115 VAC 50/60 HZ (B) 220 VAC 50/60 HZ (D) 15-35 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPTION (D)</td>
<td>(PS) DIP SWITCH SELECTABLE</td>
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<td>OPTION (E)</td>
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<td>(2) STYLE 2 CASE, GENERAL PURPOSE</td>
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<td></td>
<td>(4/O) STYLE 4 CASE, EXPLOSION-PROOF WITH WATER TIGHT ‘O’ RING MEETS</td>
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<td>CLASS I, GROUP C, D (ADALET CASE, XJS WITH FLAT COVER), STOCK #200-0733</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>CLASS II, GROUPS E, F &amp; G</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>CLASS III</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** INSERT (X) IN MODEL NUMBER FOR EVERY OPTION NOT SPECIFIED.
SERVICING PROCEDURES

TO REMOVE COVER/PRINTED CIRCUIT SUBASSEMBLY
1. TURN POWER TO ACC42 OFF.
2. REMOVE TWO MACHINE SCREWS FROM SIDES OF CASE
3. LIFT COVER/PRINTED CIRCUIT ASSEMBLY OUT.

REPLACING FUSE
1. REMOVE COVER/PRINTED CIRCUIT SUBASSEMBLY
2. LOCATE FUSE ON SUBASSEMBLY
3. PULL FUSE FROM SOCKET USING RINGERS
   (PLIERS ARE NOT RECOMMENDED)
4. INSTALL NEW FUSE (30mA FUSE)
5. REASSEMBLE INTO LOWER CASE

RANGE SELECT / PULSE SCALING PROGRAM
1. REMOVE COVER/PRINTED CIRCUIT SUBASSEMBLY
2. TURN ON DESIRED RANGE AND PULSE SCALING
   POSITION USING A BALLPOINT PEN OR SIMILAR OBJECT.
   SEE RANGE SELECT / PULSE SCALING DETAIL.
3. REASSEMBLE INTO LOWER CASE

RANGE SELECT / PULSE SCALING DETAIL

SWITCH 2 IS SHOWN DEPRESSED FOR ILLUSTRATION ONLY
NOTE: SELECT ONE SWITCH ONLY. ALL OTHER SWITCHES
MUST BE OFF.

RANGE SELECT
SELECT SWITCH

1 75-150
2 150-300
3 300-600
4 600-1200
5 1200-2400
6 NOT USED

PULSE SCALING
SELECT SWITCH

1 2
2 4
3 8
4 16
5 32
6* 64/128 OR 256

* DIVIDE BY 64, 128 OR 256 IS FACTORY TYPED.
CONSULT FACTORY IF CHANGE IS DESIRED.
SECTION II

FLOWMETER INSTALLATION

GENERAL

Proper application of the turbine flowmeter requires a suitable piping installation in order to achieve accurate and reliable operation.

The piping configuration immediately preceding and following the flowmeter is termed the meter run. Refer to the manufacturer’s outline and installation instructions when installing the flowmeter and meter run.

RELATIVE - The performance of the turbine flowmeter is affected by the fluid swirl and non-uniform velocity profiles. The following recommendation will reduce such flow irregularities.

It is advisable not to locate the meter run immediately downstream of pumps, partially opened valves, bends or other similar piping configurations. In addition, the area surrounding the flowmeter should be free of sources of electrical noise such as motors, solenoids, transformers and power lines which may be coupled to the pickoff device.

METER RUN - In general, the meter run should be chosen to have the same inner diameter as the meter bore. A minimum of 10 pipe diameters of straight pipe upstream and 5 pipe diameters downstream are required. Where this optimum line configuration can not be implemented, it is advisable to install a flow straightener properly positioned upstream of the flowmeter. Orientation is not a critical factor, however, horizontal is a preferred orientation.

BYPASS - A properly sized bypass run with suitable blocking valves may be equipped where an interruption in fluid flow for turbine meters servicing can not be tolerated.

STRAINER - A strainer, filter and/or air eliminator is recommended to reduce the potential of fouling or damage. See table for recommended mesh size.

On initial startup of a line, it is advisable to install a spool piece purging the line to eliminate damaging the flowmeter, due to flux, tape, solder, welds or other contaminates carried along by the fluid stream.

CAVITATION - Cavitation causes measurement inaccuracies in turbine flowmeter and should be avoided by suitable line and operating configurations.

Whenever the pressure within a pipeline instantaneously falls below the equilibrium vapor pressure of the fluid, a portion of the fluid vaporizes and forms bubbles in the pipeline. This is termed cavitation. Cavitation is eliminated by maintaining adequate back pressure on the flowmeter. A downstream valve that provides the necessary back pressure is one means for preventing cavitation in the metering run. Control valves should be located downstream, if possible. Some installations may also make use of a vapor eliminator upstream of the flowmeter.

The minimum required back pressure may be estimated using Equation A:

Equation A - Back Pressure Equation

\[ \text{Min. Back Pressure} = 1.25 \times \text{Vapor Pressure} + 2 \times \text{Pressure Drop} \]
INSTALLATION WIRING LAYOUT FOR INTERCONNECTIONS USING MCP PICKUP

In considering the interconnection between the flowmeter and the flow measurement system some attention must be given to anticipated noise sources and to the coupling of these noise sources to the interconnecting wiring.

Noise signals may be coupled inductively or capacitively into the wiring between the flowmeter and the electronic measuring systems. In general, utilizing a shielded, twisted pair for the interconnection greatly reduces this coupling. The shield should be grounded on one end of the cable only. In general, grounding only on the electronic measuring system is best.

However, even with proper interconnecting cabling crosstalk with other signal lines or power lines may still occur and should be avoided. Physical isolation in the manner in which the wiring is run reduces the chances of potential problems.

The turbine flowmeter equipped with a Modulated Carrier Pickup (MCP) should not be located more than 100 feet from the Modulated Carrier Conditioner. It is recommended that the Modulated Carrier Conditioner be installed on or near the flowmeter to assure proper operation. Enclosures suitable for mounting in hazardous and wet areas are available.

INSTALLATION OF ACC42 (DC POWERED)

The Model ACC42 should be placed in a convenient location which maintains access to the unit should repairs or readjustment be required.

Refer to outline and installation drawing for the appropriate terminals for interconnections. Connections to the terminal block should be carefully dressed to avoid having bare wires extend pass the screw clamp on the terminal block. This is particularly important for units mounted within the explosion proof enclosure to assure wiring will not become fouled when the cover is installed.

Connect two conductor shielded cables from flowmeter. Connect shield to ACC42 only.

The DC power connection should be made through a circuit breaker so that power can be turned off while servicing accessory model. The input power type is factory wired 15-35 VDC based on the model number specified. An earth ground connection is also required.

Connect pulse output is used, several output pulse waveforms are available factory equipped. Wire to appropriate terminal for waveform desired and specified.

If the analog output has been equipped connect wiring to appropriate terminals and load. A shielded, twisted pair wire is recommended. Ground shield on one end only. Use some precautions as described for flowmeter input signal.
NOTES:
1. FACTORY RECOMMENDS 10" PIPE DIA. UPSTREAM AND 5 PIPE DIA. DOWNSTREAM OF SAME SIZE PIPE AS FLOWMETER. A FLOW STRAIGHTENER IS RECOMMENDED IF THIS IS NOT POSSIBLE OR FOR CUSTODY TRANSFER APPLICATIONS.

<table>
<thead>
<tr>
<th>METER SIZE</th>
<th>MESH SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF SERIES</td>
<td>100</td>
</tr>
<tr>
<td>1/4&quot; - 1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>5/8&quot; - 1 1/4&quot;</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2&quot; - 3&quot;</td>
<td>40</td>
</tr>
<tr>
<td>4&quot; - 12&quot;</td>
<td>24</td>
</tr>
</tbody>
</table>

V1, V2 BLOCKING VALVE
S STRAINER
FS FLOW STRAIGHTENER
TFM TURBINE FLOWMETER
V3 BYPASS VALVE

REPLACES INSTL-104

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TYPICAL TURBINE INSTALLATION

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES, TOLERANCES OTHER THAN RAW MATERIAL SHALL BE HELD AS FOLLOWS:
2 PLACE DECIMAL ±.01
3 PLACE DECIMAL ±.005
FRACTIONAL ±1/64
ANGULAR ±1/2

NEXT ASSY USED ON APPLICATION
NOTES:
1. SPAN AND ZERO ARE ONLY EQUIPPED FOR ANALOG OUTPUT OPTION.
2. UNIT MAY BE MOUNTED IN NEMA 4 OR EXPLOSION PROOF ENCLOSURE.
NOTES:
1. WIRE TO 7 OR 8 DEPENDING ON TYPE OF OUTPUT WAVEFORM DESIRED AND SPECIFIED.

TO MCP PICKUP

TB1

1. OSC-1
2. OSC-2
3. SHIELD
4. VOLTAGE OUT COMMON
5. VOLTAGE OUTPUT
6. PULSE COMMON
7. CMOS/TTL PULSE OUT OR OPEN COLLECTOR
8. AC PULSE OUTPUT

RETURN
SIGNAL
COMMON

OPTIONAL WIRING SEE NOTE 1

TB2

A. +SUPPLY INPUT
B. -SUPPLY RETURN
C. CASE GROUND

DC POWER INPUT

MATERIAL

CONTRACT/UN

DRAWN
RG

DATE
3/82

CHECK
 JD

3/82

FINISH

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES, TOLERANCES OTHER THAN RAW MATERIAL SHALL BE HELD AS FOLLOWS:
2 PLACE DECIMAL ±0.01
3 PLACE DECIMAL ±0.005
4 PLACE DECIMAL ±0.0005
5 PLACE DECIMAL ±1/64
6 PLACE DECIMAL ±1/128

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INSTALLATION WIRING
ACC42

SIZE CASE CODE
A

Dwg No
ACC42-702

Revision
B

Scale None

Sheet
Sheet 1 of 1
NOTES:
1. ENCLOSURE MEETS:
   • CLASS I, GROUP C & D
   • CLASS II, GROUP E, F & G
   • NEMA 7 & 9
2. USED WHEN SIGNAL CONDITIONER IS ENCLOSED, MOUNTED OR REMOTE.

1" NPT

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ENCLOSURE,
EXPLOSION PROOF-
STYLE 3

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES OTHER THAN RAW MATERIAL SHALL BE HELD AS FOLLOWS:
1. 2 PLACE DECIMAL ± .01
2. 3 PLACE DECIMAL ± .005
3. FRACTIONAL 1/64
4. ANGULAR ± 1/2

SIZE | CAGE CODE | DWG NO | REV
--- | --- | --- | ---
A | 33321 | 500-0018 | -

SCALE | NONE
SHEET | 1 OF 1
SECTION III

CALIBRATION OF ANALOG OUTPUT - GENERAL CONSIDERATIONS
(LIQUID APPLICATIONS)

INTRODUCTION

In general, all flow measurement systems supplied by Hoffer Flow Controls have been factory calibrated as specified by the user, at the time of purchase, free of charge.

All systems which underwent such a factory calibration have a calibration card attached prior to shipment. This card contains the details of analog outputs, as well as other useful calibration data.

Field calibration is only required when a change has occurred or is sought to the measuring system. Such a change may be due to repair, replacement or recalibration of the flowmeter, or perhaps a change in the analog output span.

PROCEDURE

Begin by determining the equivalent maximum volumetric flowrate in ACFM, expected by the application, term this ACFM (MAX). ACFM (MAX) may be calculated based on the analog output scale requirements or may be the maximum flowrate listed on the flowmeter’s calibration sheet.

From the calibration constant (or K Factor) listed on the data sheet for the flowmeter, obtain the frequency corresponding to ACFM (MAX) using Equation 1 and designate this frequency F (MAX).

\[
F(\text{MAX}) = K(\text{AVE}) \times \text{ACFM}(\text{MAX}) \times \frac{1}{60}
\]

FOR ANALOG OPTION

The analog output of the ACC42 may be calibrated with the aid of an external oscillator used in conjunction with a frequency counter.

The external oscillator is used to supply a test frequency. In this method, the external oscillator is connected to the signal input terminals as shown in Figure 1. The oscillator’s output frequency is set to equal F (MAX) as indicated on the frequency counter.

1. The course range adjustment is accomplished by selecting a switch position on a DIP switch located on the PCA-57 printed circuit card. See Table A to determine required switch position and set into switch as shown on the Controls and Adjustments drawing for anticipated F (MAX).
NOTE: It is necessary to open the cover of the enclosure by removing two screws on the side of the box and lifting cover. Two printed circuit cards are attached. The “RANGE” Dip Switch may be programmed with a pen. Input power should be removed during this step.

2. Connect a digital voltmeter or equivalent, across the voltage output terminals.

3. Adjust ZERO control for desired zero voltage (i.e., .001 VDC, .000 VDC).

4. Turn SPAN POT fully CCW until detent is felt or 25 turns.

5. Inject the Test Frequency equal to F (MAX) while adjusting SPAN for voltage equal to +5.000 V ±1 mV. See test setup shown in Figure 1.

NOTE: Iterate steps 3 and 4 until no change is observed.

FOR PULSE SCALING OPTION

1. An optional DIP switch is located on the PCA-57 printed circuit card. See drawing ACC-42-403 to determine required switch position and set into switch, as shown in the Controls and Adjustments drawing, for required divide by N.

2. For a required divide by 64, 128 or 256, switch position 6 must be jumpered as shown in the Controls and Adjustments drawing.

<table>
<thead>
<tr>
<th>Table A - Analog Switch Position</th>
<th>Table B - Pulse Scaling Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>F (MAX)</td>
<td>RANGE SELECT SWITCH POSITION</td>
</tr>
<tr>
<td>75 TO 150</td>
<td>1</td>
</tr>
<tr>
<td>150 TO 300</td>
<td>2</td>
</tr>
<tr>
<td>300 TO 600</td>
<td>3</td>
</tr>
<tr>
<td>600 TO 1200</td>
<td>4</td>
</tr>
<tr>
<td>1200 TO 2400</td>
<td>5</td>
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</tbody>
</table>

*NOTE: For divide by 64, 128 or 256, switch position 6 is jumpered to appropriate location on PCA-60 printed circuit board.
NOTES:
1. USE TEST AMPLITUDE OF 30mV RMS
   SINUSOIDAL WAVE FORM.
2. REMOVE ALL OTHER INTERCONNECTIONS
   OTHER THAN THOSE SHOWN.
3. OBSERVE CAUTION WHEN PERFORMING
   CALIBRATION.
4. INPUT POWER MAY BE EITHER 15–35VDC,
   115VAC OR 220/240VAC.
SECTION IV

OPERATION

INITIAL STARTUP
Perform any purging of piping with spool piece in place. Once completed, install the flowmeter and connect cabling to pickup coil. If false counting action occurs turn sensitivity control counterclockwise.

INTRODUCTION
The pulse output and analog output commence with flow through the flowmeter.
For the analog output, the span is that established by either the factory calibration or field calibration. The range is 0-5 V into a minimum of 1000 ohms of load resistance.

PRINCIPLE OF OPERATION
A simplified block diagram of the ACC42 Modulated Carrier Conditioner/Converter is given on the Block Diagram - ACC42 drawing. Key functional blocks, as well as, information flow are designated. The basic operation of the system is as follows.
The MCP on the turbine flowmeter is connected to the Model ACC42 with a shielded twisted pair signal cable. The MCP pickup coil forms part of an oscillator circuit and is excited by the ACC42. Motion of the turbine rotor modulates the oscillator output. A demodulator converts the AM signal to a signal at a frequency determined by the rotor speed. The low level demodulated signal is then passed through a signal conditioning chain where it is filtered, amplified and shaped into a train of digital pulses whose frequency is related to the volume flowrate and where each pulse represents a discrete volume of fluid.

ANALOG OUTPUT
The signal entering the frequency to analog converter is passed through a combination of a divide by N and a DIP switch MATRIX. The QN output is chosen whose pulse rate is between 75 and 150 Hz at the maximum flowrate to be measured. This scaled pulse rate is fed to a precision monostable circuit. The output of the monostable is then filtered into an analog voltage that is proportional to volumetric flowrate.
The output amplifier is a voltage to voltage amplifier. It offers zero and span available in a standard process range of 0 to 5 VDC.

POWER SUPPLY
The power supply provides for operating bias voltage for all internal circuitry.

PULSE OUTPUT
The pulse output amplifier may be configured to provide one the following:
1. High level AC square wave (Capacitively coupled).
2. Open collector transistor.
3. TTL/CMOS compatible square pulse of 5 volt amplitude.
The output amplifier is buffered from the signal driving the analog output. An optional divide by N may be equipped if pulsing scaling is required.
SECTION V

MAINTENANCE, GENERAL

Hoffer Flow Controls Flow Measurement Systems are constructed to give a long service life in the targeted measuring field and service environment. However, problems do occur from time to time and the following points should be considered for preventive maintenance and repairs.

The bearing type used in the flowmeter was chosen to give compromise between long life, chemical resistance, ease of maintenance and performance. A preventive maintenance schedule should be established to determine the amount of wear which has occurred since last overhaul. See user's manual for flowmeter for further instructions.

A spare parts list has been provided which at the discretion of the user, may be user stocked. Consult with the manufacturer if an abridged spare parts list is sought. The recommended spare parts list may be found following this section and in the user's manual for the flowmeter.

In case the flow measurement system malfunctions or becomes inoperative, a troubleshooting procedure is enclosed.

Factory consultation is available to assist in diagnosing problems. In addition, factory repair parts and service are available for individuals who wish to utilize this service.

A complete set of schematic diagrams for all printed cards is available from Hoffer Flow Controls for users who wish their own personnel to service the measuring systems.

NOTE:
♦ All printed circuit cards are warranted for one year after date of sale.
♦ All printed circuit cards may be factory repaired at a nominal fee for parts and labor after warrantee period.

TROUBLESHOOTING AND MAINTENANCE

INTRODUCTION

In case of an inoperable or malfunctioning system the following procedures can be used to isolate the faulty wiring, printed circuit boards and/or alternate causes. The majority of repairs can be made in the field thereby reducing the time a unit is out of service.

A recommended spare parts list is given immediately following the troubleshooting portion of this manual. The necessary documentation is contained with this manual with the exception of the calibration data sheet for the turbine flowmeter. This calibration is supplied separately.

Factory consultation is available to assist in diagnosing problems. Note that in some cases factory repairs can be performed more easily than can be accomplished in the field.

GENERAL INSPECTION TO DETERMINE IF UNIT IS OPERATING PROPERLY

Proper operation of the ACC42 can be assumed when with power applied to the unit:
1. The pulse output produces a pulse train of the desired amplitude when flow through the flow transducer occurs.
2. The analog output produces a voltage output signal of 0-5V with a span corresponding to that established by the calibration procedure.
OBSERVED CONDITION | PROBLEM/CORRECTIVE ACTION
--- | ---
A. NO PULSE OUTPUT | 1. Inspect terminal strip wiring for conformity to the installation instructions and for acceptance workmanship.
 | 2. Verify proper polarity of DC power voltage.
 | 3. Determine if flowmeter rotor is fouled.
 | 4. Defective pickup coil. Replace MCP.
 | 5. Defective cable. Replace.
 | 6. Defective ACC42. Repair or replace.
B. PULSING OUTPUT WITH NO FLOW | 1. Low power voltage.
 | 2. Defective pickup coil. Replace.
 | 3. Defective cable. Replace.
 | 4. Defective ACC42. Repair or replace.
C. ANALOG OUTPUT MALFUNCTION | 1. Improper wiring termination. Correct wiring.
 | 2. ACC42 improperly calibrated. Recalibrate.
 | 3. Defective circuitry with the ACC42. Factory repair ACC42.

**NOTE:** Refer to flowmeter user's manual for repair instructions for the turbine flowmeter.

Table C - Recommended Spare Parts List

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC42-XX</td>
<td>Modulated Carrier Conditioner/Converter</td>
<td>1</td>
</tr>
<tr>
<td>MCP</td>
<td>Modulated Carrier Pickup</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE:** Additional spare parts may be recommended for the turbine flowmeter. See user's manual for turbine flowmeter for details.