TOTALIZER-TRANSMITTER
MODEL TR01-1

INDICATOR-TOTALIZER
TRANSMITTER
MODEL TR06-1

INSTRUCTION MANUAL
PARTS LIST

FEATURING:
* P/C CARD MOUNTED OPTIC SWITCH
* SOLID STATE CONSTRUCTION
* PULSE RATE OUTPUT SIGNAL
* CUP TYPE ACTUATOR
* SEALED HOUSING
WARRANTY

This Warranty shall apply to and be limited to the original purchaser consumer of any McCrometer product. Meters or instruments defective because of faulty material or workmanship will be repaired or replaced, at the option of McCrometer, free of charge, FOB the factory in Hemet, California, within a period of one (1) year from the date of delivery.

Repairs or modifications by others than McCrometer or their authorized representatives shall render this Warranty null and void in the event that factory examination reveals that such repair or modification was detrimental to the meter or instrument. Any deviations from the factory calibration require notification in writing to McCrometer of such recalibrations or this Warranty shall be voided.

In case of a claim under this Warranty, the claimant is instructed to contact McCrometer, 3255 W. Stetson Ave., Hemet, California 92545, and to provide an identification or description of the meter or instrument, the date of delivery, and the nature of the problem.

The Warranty provided above is the only Warranty made by McCrometer with respect to its products or any parts thereof and is made expressly in lieu of any other warranties, by course of dealing, usages of trade or otherwise, expressed or implied, including but not limited to any implied warranties of fitness for any particular purpose or of merchantability under the uniform commercial code. It is agreed this Warranty is in lieu of and buyer hereby waives all other warranties, guarantees or liabilities arising by law or otherwise. Seller shall not incur any other obligations or liabilities or be liable to buyer, or any customer of buyer for any anticipated or lost profits, incidental or consequential damages, or any other losses or expenses incurred by reason of the purchase, installation, repair, use or misuse by buyer or third parties of its products (including any parts repaired or replaced); and seller does not authorize any person to assume for seller any other liability in connection with the products or parts thereof. This Warranty cannot be extended, altered or varied except by a written instrument signed by seller and buyer.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

McCrometer reserves the right to make improvements and repairs on product components which are beyond the Warranty period at the manufacturer’s option and expense, without obligation to renew the expired Warranty on the components or on the entire unit. Due to the rapid advancement of meter design technology, McCrometer reserves the right to make improvements in design and material without prior notice to the trade.

All sales and all agreements in relation to sales shall be deemed made at the manufacturer’s place of business in Hemet, California and any dispute arising from any sale or agreement shall be interpreted under the laws of the State of California.
MODEL TR01-1
TOTALIZER-TRANSMITTER

MODEL TR06-1
INDICATOR-TOTALIZER-TRANSMITTER

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I. DESCRIPTION

MODEL TR01-1 TOTALIZER-TRANSMITTERS provide a
totalization of flow volume and pulse output.

MODEL TR06-1 INDICATOR-TOTALIZER TRANSMITTERS provide an instantaneous flow rate indication and
totalization of flow volume. Both transmitters provide a
pulse rate output signal proportional to the rate of flow
when mounted on our propeller meters.

II. SPECIFICATIONS

ACCURACY plus or minus 2.0% of actual
flow within the range specified
for each meter size.

TEMPERATURE RANGE 140° F maximum. Consult fac-
tory for special construction for
higher temperatures.

POWER SUPPLY 10-30 VDC as supplied by our
Model IN36-1, P/A converter card
Model IN07/IN08, and instru-
ment Models IN03, IN11,
IN40, IN62.

NOTE: Maximum current con-
sumption of transmitter is 30
mA.

FLOW RANGE acceptable for each transmitter
unit is the same as that for the
meter to which the unit mounts.

MATERIALS used in construction are chosen
for their durability and immunity
to the corrosive effects of atmos-
pheric moisture and the liquids
measured by the meter assembly.
**OUTPUT SIGNAL**
The TR01-1 has four output configurations.
1. npn, "open collector" type.
2. 0-8 VDC powered square wave.
3. npn, "open collector" type with total input/output isolation.
4. 0-8 VDC powered square wave with total input/output isolation.

Open collector ratings:
- Maximums are for signals between P2 and P13
- Voltage: 18 VDC
- Current: 60 mA DC
- Power dissipation: 100 mW

Powered pulse ratings:
- Output voltage amplitude = 8 VDC (min.)
- Output load = 1500Ω (min.)
- For other voltage or load requirements, consult factory.

The maximum recommended distance for transmission of an unamplified pulse signal is 500 feet.

**SHIPPING WEIGHT**
4 pounds

**OPTIONAL EQUIPMENT**
- includes non-reversing ratchet, special outputs, dual output, and adapters for other manufacturers’ meters. (Consult factory for special application.)

**ORDERING INFO**
Must be specified by the customer and includes:
- Serial number of meter on which unit is to be mounted;
- Maximum scale range required for pulse output;
- Change gears and type of dial on totalizer that is going to be replaced.

III. **UNPACKING.** When unpacking the transmitter, any damage due to rough or improper handling should be reported to the transportation firm and McCrometer. If for any reason it is determined that the unit or parts of the unit should be returned to the factory, please contact McCrometer for clearance prior to shipment. Each unit must be properly packaged to prevent any further damage. The factory assumes no responsibility for equipment damaged in return shipment due to improper packaging. Proper paperwork must be enclosed with any returned material.

IV. **INSTALLATION**

1. **REMOVE** the existing totalizer or indicator or transmitter by removing all the mounting screws and lifting the unit off the meter head.

2. **CLEAN METER HEAD** of all dirt, glue, gaskets and other foreign material.

3. **TOTALIZER DRIVE MAGNET** must be removed from the vertical shaft tip of meters equipped with a totalizer so that the transmitter drive clevis (#35) can be installed on the vertical shaft tip. The totalizer drive magnet can be removed by loosening the set screw in the side of the magnet hub and sliding the assembly off the vertical shaft.

4. **INDICATOR DRIVE GEAR** must be removed from the vertical shaft tip of meters equipped with indicator-totalizers so that the transmitter drive clevis (#35) can be installed on the vertical shaft tip. The indicator drive gear can be removed by loosening the set screw in the side of the gear hub and sliding the assembly off the vertical shaft.

5. **TRANSMITTER DRIVE GEAR** must be removed from the vertical shaft of meters equipped with an old style TR01 or TR06. The transmitter drive gear can be removed by loosening the set screw in the side of the gear hub and sliding the assembly off the vertical shaft.

6. **VERTICAL SHAFT** assembly must be removed from the meters equipped with an old style CN06 indicator, TR01, or TR06 transmitter (.100" dia. vertical shaft tip) and replaced with a vertical shaft that has a 3/16" diameter tip. Vertical shaft removal can be accomplished by removing the two vertical shaft collar bearing mounting screws in the meter head and pulling the vertical shaft directly out the top of the meter. Remove the vertical shaft collar and bearing assembly from the vertical shaft by loosening the set screw in the side of the collar and sliding the assembly off the vertical shaft.

7. **REPLACEMENT VERTICAL SHAFT** for meters with old style CN06 indicators, TR01, or TR06 transmitters should be inspected to be sure it is not bent or damaged. Install the vertical shaft collar and bearing assembly on the new (3/16" diameter tip) vertical shaft, but do not tighten the collar bearing set screw yet. Insert the vertical shaft assembly, plastic tip first, into the meter head and rotate the shaft gently until it is engaged in the driven miter gear.
V. MCCROMETER

Products have been carefully designed to be as maintenance free as possible. Periodic preventive maintenance, however, is highly recommended and should be practiced according to schedule to ensure continuous accuracy and trouble free performance of your transmitter. The maintenance and inspection procedure can also be used as a guide to locating a problem in the unit that may be the cause of abnormal operation.

1. TRANSMITTERS WITH STANDARD TOTALIZERS.
EVERY FIVE YEARS an inspection should be made on all transmitters, but should not require complete disassembly of the unit. It should, however, include cleaning and inspection of the totalizer. (See steps VI, VII-1 through 4, IX and X-1 through 3.)

‡2. TRANSMITTERS WITH INDICATOR-TOTALIZERS.
YEARLY INSPECTION should be practiced on all transmitters, but should not require complete disassembly of the unit. It should, however, include cleaning and inspection of the indicator. (See steps VI, VIII-1 through 5, IX and X-4 through 6.)

VI. WORKING AREA

chosen for cleaning and inspection of the internal components should be clean to reduce the chance of dust or dirt particles being introduced into the transmitter mechanism.

VII. TOTALIZER ASSEMBLY (#4) service procedure should include cleaning and inspection of the unit, noting any excessive wear on the change gears (#7 & #8) that may lead to operational problems in the unit.

1. BONNET MOUNTING SCREWS (#3) should be removed and the entire bonnet (#1) lifted off the meter.

2. TOTALIZER is contained within the totalizer bonnet (#1) and held in place by a base cup (#5). It should not be necessary to remove the totalizer (#4) during inspection; however, removal of the base cup (#5) is necessary for inspection of the totalizer change gears (#7 & #8). Removal of the base cup (#5) can be accomplished by inserting a small screwdriver into the two cutouts and prying upward under the edge.

3. TOTALIZER CHANGE GEARS (#7 & #8) should be inspected for any sign of wear. Both the A-(drive) gear and B-(driven) gear are attached to the lower portion of the totalizer assembly (#4). Spin the floating totalizer driven magnet in the center of the totalizer bottom (#4) to make certain it spins freely without bind or drag. The bottom of the totalizer has the letter “A” molded next to the A-drive gear shaft, and the letter “B” next to the B-driven gear shaft.

4. TOTALIZER DRIVE MAGNET ASSEMBLY (#9), located in the transmitter base (#10) at the top of the driven clevis shaft (#28), should be checked and adjusted, if necessary, to position it 1/16” below the top surface of the transmitter base (#10). Adjustments can be made by loosening the socket head set screw in the side of the

‡ For Indicator-Totalizers Only
totalizer drive magnet assembly (#9) and sliding it up or down the driven clevis shaft (#28) as desired. Always be sure the set screw is tightened into the flat on the driven clevis shaft (#28).

### VIII. INDICATOR-TOTALIZER

Service procedure should be practiced every year and should include removal, cleaning, and inspection of the unit, noting any excessive wear on the gears and other wear points that may lead to operational problems in the unit.

#### 1. Bonnet Mounting Screws (#2)

Located beneath the indicator-totalizer bonnet lid, should be removed and the entire bonnet (#1) lifted off the transmitter. Replace the o-ring seals around each of the four screws (#3) and at the bottom of the bonnet (#4) and cover each of the new o-rings with a thin coat of silicone grease.

#### 2. Indicator Mounting Screws (#6) and self-proof washers (#7)

Holding the indicator-totalizer unit (#5) to the transmitter base (#10) should be removed and the unit lifted off, exposing the A-drive gear (#8) attached to the top of the driven clevis shaft (#28).

#### 3. Meter Change Gears (#8 & #9)

Should be inspected for any sign of wear. The A-drive gear (#8) is attached to the top of the driven clevis shaft (#28), and the B-driven gear (#9) is attached to the bottom of the indicator (#5). The position of the A-drive gear should be checked and adjusted, if necessary, to position the top face of the gear 1/8" below the top surface of the transmitter base (#10). The position of the B-driven gear top face should be 1/8" below the bottom of the indicator-totalizer unit.

#### 4. Indicator-Totalizer Unit (#5)

Should be cleaned thoroughly using a mild soap and a soft brush. Under no circumstances should the entire unit be immersed in the soap or should any metal object be used when cleaning and inspecting the internal parts of the indicator-totalizer unit.

#### 5. Gears

Within the indicator-totalizer unit (#5) should be inspected carefully. If any excessive wear is visible on the gear teeth and other wear points, the unit must be returned to McCrometer for repair.

### IX. Inspection

Of all internal parts that may be replaced in the field has been accomplished at this point. Should any of the parts, upon inspection, appear to be damaged or excessively worn, they must be replaced to ensure proper operation and prevent further damage.

### X. Reassembly

Is necessary at this point. Before reassembling, make certain that the unit is cleaned of any dust or dirt. Costs for replacement parts not covered by warranty are available from current parts and price list. If it is determined that the unit should be returned for repair, please notify McCrometer prior to shipment. Each unit must be properly packaged to prevent damage to the unit in shipment.

**For Indicator-Totalizers Only**

### XI. Troubleshooting

The transmitter is necessary if it is apparent that the instrument being controlled by the transmitter is not receiving a proper pulse signal from the transmitter, and/or the totalizer or indicator-totalizer is not functioning. Before beginning, it is important to be sure that the problem is with the transmitter, therefore the following checks should be made. 1) Check to be sure that water is flowing through the meter at flows above the minimum flow rate for the given size meter. 2) Check the instrument to be sure it has the required power being supplied to it. 3) Check the junction box to be sure the communication lines from the transmitter to the instrument are making good contact and that the transmitter is wired properly to the instrument. (See wiring diagram page 10.)

#### 1. THE TROUBLESHOOTING GUIDE

Is provided to help isolate any problem that may occur with the transmitter. Follow the instructions and test procedures listed for each problem.

**For Indicator-Totalizers Only**
A. If the meter totalizer or indicator-totalizer does not work, but the remote instrument does operate (receiving the proper pulse signal), then see section VI, VII-1 through 4, IX and X-1 through 3 for checking the totalizer or section VI, VIII-1 through 5, IX and X-4 through 6 for checking the indicator-totalizer.

B. If the meter totalizer or indicator-totalizer does work, but the remote instrument does not operate (not receiving proper pulse signal), then use troubleshooting procedures #2 through #4 and #8 through #11.

C. If the meter totalizer or indicator-totalizer and remote instrument do not operate, then use trouble-shooting procedures #2 through #11.

2. WORKING AREA chosen for testing and inspection of the internal components should be clean to reduce the chance of dust or dirt particles being introduced into the transmitter mechanism.

3. TOTALIZER OR INDICATOR-TOTALIZER must be removed from the transmitter base (#10) and inspected for damage. (See section VII for removal and inspection of the totalizer or section VIII for removal and inspection of the indicator-totalizer.)

4. MOISTURE should not be apparent within the transmitter base (#11) chamber. All o-rings should be inspected for breaks or presence of foreign materials that allow leakage to occur. Check to be sure water is not coming up through the meter head. If water is coming up through the meter head then the meter should be checked. (See meter service manual.)

5. RIVEN CLEVIS SHAFT (#28) should be turning if water is flowing (above min. flow rates) through the line. If water is not flowing through the line, then the transmitter base assembly (#10) must be removed from the meter head and the driven clevis shaft (#28) turned by hand. If water is flowing but the driven clevis shaft is not turning then the transmitter base assembly (#10) must be removed from the meter head and the drive clevis (#35) must be checked.

6. TRANSMITTER BASE (#10) can be removed by removing the four transmitter base mounting screws (#37). Lift the unit carefully off the meter. (Sometimes the transmitter sticks to the meter so it may be necessary to separate the joint by using a sharp knife or putty knife as a pry.) Be sure not to damage the transmitter base (#10) or the clevis (#35). NOTE: After the transmitter base (#10) has been removed, the meter assembly should be inspected thoroughly to be sure it is operating properly (vertical shaft turns when water is flowing through the line) and is not the cause of the problem. (Refer to your meter service manual for instructions on inspection of the meter.)

7. DRIVE CLEVIS (#35) and the drive clevis coupling (#36) should be checked for damage and checked to be sure they are at the proper elevation and are engaging properly with the driven clevis shaft (#28). (See section IV-9.) If the clevis (#35) or coupling (#36) is damaged then they are the likely cause of the problem and must be replaced. (See section IV-9 for installation of new clevis.) If the clevis (#35) and coupling (#36) are adjusted correctly and engaged properly with the driven clevis shaft (#28) but the meter is not turning them, then the meter is the likely cause of the problem.

8. SWITCH ACTUATOR (#23) is a black plastic slotted cup located below the circuit card (#12). The actuator (#23) should be turning (with water flowing or driven clevis shaft turned by hand) when the driven clevis shaft (#28) is turning. If the actuator (#23) does not turn when the driven clevis shaft (#28) turns, then the transmitter gear train is damaged and must be returned to the factory for repair. (See section XIII for return of transmitter to factory.) If the actuator cam (#23) is turning then the communication lines (#39) and printed circuit card (#12) should be checked.

9. TRANSMITTER COMMUNICATION LINES (#39) can be checked using the following procedures. Disconnect signal wire (P1 or PA) that is providing the signal to the instrument not functioning, making sure it does not touch the red wire. NOTE: A.C. power should be connected to the instrument the transmitter is controlling and the red V+ wire from the transmitter should be connected to the instrument.

WARNING: Do not disconnect the red lead (V+ power for the transmitter) or let it touch the white (P1) or black (P2) wires or damage may occur to the instrument.

A. Using a voltmeter on 0-20 VDC (or 30 VDC) scale, measure voltage between V+ and P2. It should be the same as the transmitter voltage supply (either contained in the instrument or external) plus or minus 0.5 VDC (depending on distance between transmitter and supply). If the voltage is correct, then check the printed circuit card as described in the next section. If the voltage is not correct, check the voltage at the supply (receiving instrument or external supply) from which it originates. If the voltage is incorrect at the supply, the problem is with the instrument or external power supply. If the voltage was correct, there is something wrong in the communication lines.

10. PRINTED CIRCUIT CARD (#12) should be checked to be sure it is functioning properly. The circuit card (#12) may be checked as follows:

WARNING: COVER TOP OF TRANSMITTER SO BRIGHT LIGHT OR SUNLIGHT DOES NOT INTERFERE WITH NORMAL OPERATION PRINCIPLES OF OPTIC SWITCH.

A. OPEN COLLECTOR CONFIGURATION

1. A McCrometer Model IN01A instrument calibrator can be used to check the pulse output. Turn the power off at the instrument or external supply. Disconnect the white (P1), black (P2) and red (V+) wires from the terminal strip.
on the printed circuit card (#12). Set the IN01A to the count function. Prepare 3 jumper wires, two 2” long 20-26 AWG wires and one 3” long, with the insulation stripped back 1/4” from the end of each. Connect them to the terminal strip on the circuit card (#12), using the 3” wire for V+. Using the count/rate input card of the IN01A, connect the red alligator clip to the jumper connected to V+, the white alligator clip to the terminal for P1, and the black alligator clip to the terminal for P2. Turn on the power to the IN01A, press reset, and check the transmitter to be sure the driven clevis rotating, the voltage level between (P1 or PA) and P2 should vary between 0-8 VDC (± 1.0 VDC). If it does not, replace the circuit card (#12).

2. If either of the above tests for the card (#12) showed that it was not functioning and the transmitter is away from direct sunlight or other high energy light source, replace the circuit card (#12). The circuit card (#12) may be replaced in the field or the transmitter may be sent to the factory for repair. (See section XIII for return of transmitter to factory.)

B. POWERED PULSE. Disconnect the signal cable (P1 or PA), making sure it does not touch P2 or V+. With the clevis rotating, the voltage level between (P1 or PA) and P2 should vary between 0-8 VDC (± 1.0 VDC). If it does not, replace the circuit card (#12).

11. REPLACING PRINTED CIRCUIT CARD (#12) can be accomplished in the following way: Turn the power for the transmitter off at the instrument. Disconnect the communication wires from the terminal strip on the circuit card (#12). Remove the three circuit card mounting screws (#15) and washers (#16) (standoffs on Model TR01-1). Lift the circuit card (#12) out of the transmitter base. If your transmitter is equipped with an indicator-totalizer then the A-drive gear (#8) set screw may have to be loosened and the A-drive gear (#8) removed in order to remove the circuit card (#12). Place the new circuit card (#12) in the same position as the old circuit card and secure it to the support posts with the three screws (#15) and washers (#16) (standoffs on Model TR01-1). Replace the indicator A-drive gear (#8), if it was removed. (See section VIII-3.) The communication lines should be attached to the terminals on the circuit card (#12). (See wiring diagram.) Be sure to route the communication lines connected to the terminal strip away from the totalizer drive magnet (#9) or indicator A-drive gear (#8). These rotating parts within the transmitter can damage the wires.

XII. INSPECTION and field testing has been accomplished at this point. Should any of the parts, upon inspection, appear to be damaged or excessively worn, they must be replaced to ensure proper operation and prevent further damage. If the transmitter still does not work, then it should be returned to the factory for repair.

XIII. REASSEMBLY is necessary at this point. Before reassembling, make certain that the unit is cleaned of any dust or dirt. Costs for replacement parts not covered by warranty are available from current parts and price list. The transmitter base should be reinstalled on the meter (if it was necessary to remove it), see section IV-10 & 11. The totalizer assembly or indicator assembly must be reinstalled on the transmitter base, see section X-1 through 3 for totalizer and section X-4 through 6 for indicator.

1. BEFORE RETURN OF TRANSMITTER TO FACTORY please notify McCrometer prior to shipment. Each unit must be properly packaged to prevent damage to the product during shipment. Should any of the unit’s parts, upon inspection, appear to be damaged or excessively worn, they must be replaced to ensure proper operation and prevent further damage. Costs for replacement parts not covered by warranty are available from current parts and price lists. Should the unit require further inspection, it must be reassembled and returned to the factory.

XIV PROCEDURES FOR CHECKING INOPERATIVE INSTRUMENT SYSTEMS.

Each instrument is factory tested with the transmitter that will be operating it. When an instrument doesn’t operate and it is connected to its proper transmitter, certain procedures need to be followed to determine where and what the problem is. Most troubleshooting procedures are part of each instrument and transmitter service manual, but these suggestions may help.

1. CHECK ALL INSTRUMENTS AND TRANSMITTERS for obvious visual damage.

2. CHECK YOUR INSTRUMENT to be sure it is operating properly by following the instrument service manual. Check to be sure your instrument is operating correctly when a simulated signal is put into it. Warning: Circuit to transmitter must be disconnected when most testing equipment is used for checking your instrument. If instrument checks out, proceed with checking transmitter and communication lines.

3. WHEN THE TRANSMITTER OR COMMUNICATION LINE is suspected of being the reason the system is not functioning, it is usually easier to check out the transmitter first to be sure it is giving proper output. There are some easy troubleshooting techniques to be used. First, you must know what signal is expected from the transmitter.

A. Standard Model TR01-1 and TR06-1 pulse rate transmitters have an output of 10 PPS (600 PPM) at maximum scale of the instrument it’s operating.

B. The original purchases of the equipment should have invoices or other paperwork to inform you what the 600 PPM scale is. If not, you can phone the factory and furnish the meter serial number and the transmitter record can be pulled to give you the full scale information.
C. Let us assume you found the meter was a 12” meter and the full scale of the instrument is 3000 GPM.

4. FULL SCALE OUTPUT. Now we know what the output at full scale is supposed to be from the transmitter, so now let’s find out what it actually is.

A. We need to find out what the flow rate going through the meter actually is.

B. Time the transmitter totalizer test or sweep hand with a stop watch for 1 to 5 rotations, to give the best resolution or closest accuracy.

C. The example meter has a 1000 gallon totalizer and if you time the sweep hand for three revolutions in 150 sec, proceed as follows:

\[
150 \text{ sec} \div 3 \text{ rev} = 50 \text{ sec for 1000 gallons (1 rev)}
\]

D. To find the true flow rate:

\[
60 \text{ sec} \div \text{no sec per rev} \times \text{totalizer dial}
\]

or as shown below

\[
60 \div 50 \times 1000 = 1200 \text{ GPM true flow rate}
\]

If the meter is furnished with a Model CN06 flow indicator, now is the time to verify the indicator is accurate.

E. To determine what output the transmitter should be sending, we must now find what percent 1200 GPM is of the 3000 GPM scale stated earlier.

\[
1200 \text{ GPM} \div 3000 \text{ GPM} = 40\%
\]

Model TR01-1 & TR06-1 pulse rate transmitter output has 600 PPM at full scale

\[
40\% \times 600 \text{ PPM} = 240 \text{ PPM @ 1200 GPM}
\]

F. Pulse outputs from the transmitter can be checked by several different types of digital counters. We will explain how our standard Model IN16 remote totalizer can be used.

See the wiring diagram (page 10) to hook up your wires correctly by connecting the black wire clip to the P2 terminal (the black outlet wire) and the red clip to the P1 (white outlet wire).

If there is no pulse output from transmitter, check the power supply voltage for transmitter (12 VDC). If the voltage is present at the transmitter circuit board, then the circuit board could be faulty. If there is no voltage present, then the communication lines or power supply could be bad. Check all terminals for loose connections. Check the fuse if the power supply is fuse protected. Be sure the transmitter is wired correctly to the instrument.

Be aware power must be connected to the recorder so the 12 or 24 VDC will then power the transmitter to operate the optic switch, which we will be checking.

After the IN16 is attached and you have your stopwatch ready, it is very simple to reset the counter and hold the button down and release it at the same time as you start the stopwatch. When the stopwatch is approaching 60 seconds, be prepared to read the counter at exactly when 60 is reached or disconnect one of the IN16 wires to stop it from counting any more.

If the counted pulse rate matches with calculations done in XIV Section 4-E and the instrument checks out per XIV Section 1 & 2, then the trouble is probably the communication line.

5. COMMUNICATION PROBLEMS can be so complex it is usually recommended the instrument contractor or electrical contractor be informed that our transmitters and indicators prove to be good units and the trouble could be elsewhere. Sometimes it is necessary to lay another line from the transmitter to instrument above ground to help prove the lines are at fault prior to pulling and replacing existing line. Communications lines should be kept from tangling up in high voltage lines inside the panel or wiring cabinet. Communication lines should be shielded cable and not run in same conduit as power lines. Sometimes the 115 VAC line used for the instrument can be causing the trouble. It is suggested the plug from the instrument be temporarily transferred to another AC outlet which is on another circuit. It has been found a fluorescent light circuit tied in with the instrument power source, or faulty parking lot vapor lights can affect the instruments if A.C. wiring is done incorrectly to give a noisy A.C. circuit.

6. SEPARATION OF SIGNAL AND POWER wiring in separate conduits is the traditional precaution; however, other measures must be taken to minimize the effects of electromagnetic interference (EMI) and radio frequency interference (RFI) on the operation of the instrument. Otherwise, if high level, short duration noise spikes are permitted to enter the digital equipment, the noise can be transferred into the systems logic networks and can be misinterpreted as signal data, resulting in erroneous system operation and other unpredictable responses. Potential noise sources:

- Relay coils
- Solenoids
- AC power wires
- Current carrying cables
- Radio frequency transmissions
PROCEDURES FOR CHECKING INOPERATIVE INSTRUMENT SYSTEMS WITH PULSE RATE OUTPUT TRANSMITTERS

TESTING TRANSMITTER POWER SUPPLY VOLTAGE
TR01-1/TR06-1 TRANSMITTER (10 PPS OUTPUT) WIRED TO A MODEL IN62

NOTE: Connections for checking transmitter power supply voltage at the transmitter. Touch the leads to the screws on top of the terminals. Connect the volt meter in parallel with circuit.

NOTE: Connections for checking power supply voltage at the instrument (12VDC)

TESTING TRANSMITTER PULSE OUTPUT
TR01-1/TR06-1 TRANSMITTER (10 PPS OUTPUT) WIRED TO A MODEL IN62

NOTE: Connections for checking pulse output of transmitter at the instrument. Connect IN16 in parallel with circuit.

NOTE: Connections for checking pulse output at the transmitter circuit board. Touch the leads to the screws on top of the terminals.
WIRING WHEN CONNECTED TO WATER SPECIALITIES INSTRUMENTS

BLACK TO P2
RED TO 12V
WHITE TO P1

MODEL IN-62 TERMINAL STRIP
12 VOLTS OUT
GROUND (-DC), INPUT COMMON
INPUT A-CNT, RATE, ANALOG IN

SHEILD TO GROUND
RED
WHITE
BLACK

OPTIONAL WIRING (USING SEPARATE POWER SUPPLY)

BLK. TO P2
RED TO 12V
GRN. TO PA
WHITE TO P1

OPTO-ISOLATOR OUTPUT SCHEMATIC (INTERNAL)

NOTE: MAX. CURRENT CONSUMPTION OF TRANSMITTER IS 60 mA.
WIRING DIAGRAM FOR 3000 V OPTICALLY ISOLATED OPEN COLLECTOR
(TWO POWER SUPPLIES REQUIRED)

OUTPUT COMPATIBLE WITH
CMOS
LSTTL
TTL
WATER SPECIALTIES P/A

MAXMUMS
$V_o = 18 \text{ V}, 60 \text{ mA}$

WIRING DIAGRAM FOR OPEN COLLECTOR OUTPUT
WIRING DIAGRAM FOR 3000 V OPTICALLY ISOLATED POWERED PULSE
(TWO POWER SUPPLIES REQUIRED)

0 - 8V VDC POWERED PULSE
0 - 10V VDC POWERED PULSE
0 - 15V VDC POWERED PULSE

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WIRING DIAGRAM FOR POWERED PULSE (0-8VDC)
1.8K RESISTOR SUPPLIED BY CUSTOMER

BLACK (+) POWER SUPPLY #1
RED (+) AUXILIARY OUTPUT SIGNAL
GREEN (+) OUTPUT SIGNAL
WHITE (+) POWER SUPPLY #2 (0 - 15 VDC)
## TOTALIZER-TRANSMITTER
### MODEL TR01-1
### PARTS LIST

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*CONSULT FACTORY FOR PRICING.*
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CONSULT FACTORY FOR PRICING.
INDICATOR-TOTALIZER-TRANSMITTER
MODEL TR06-1
# Repair Record

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**Serial Number:**

**Purchase Date:**

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**Change Gears**

- A/B

**Ratio**

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