WATER SPECIALTIES™
PROPELLER METER

INDICATOR-TOTALIZER TRANSMITTER

MODEL TR12-2

OPERATION AND MAINTENANCE MANUAL
PARTS LIST

FEATURING:
*SEALED HOUSING
*MAGNETICALLY ACTUATED REED SWITCH
*MECHANICAL DRIVE INDICATOR AND TOTALIZER FUNCTIONS

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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.

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INDICATOR-TOTALIZER-TRANSMITTER
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I. DESCRIPTION

MODEL TR12-2 INDICATOR-TOTALIZER-TRANSMITTERS provide an instantaneous flow rate indication, totalization of flow volume, and a pulse rate output signal of one contact per totalizer hand revolution when mounted on any McCrometer propeller meter (some meters must be equipped with a special adapter ring, part #2-4108). Construction of the indicator-totalizer-transmitter features a hermetically sealed housing. The indicator-totalizer-transmitter is mechanically driven by the meter mechanism and features a full 4 inch diameter, 250 degree sweep dial with a six digit, straight reading type totalizer and sweep test hand. The indicator drive mechanism is temperature compensated so the indicator will be accurate at all points on the dial when operated between 32° and 160° F. The indicator dial can be furnished in GPM, CFS, MGD, or any standard liquid measuring units with choice of standard totalizer measuring units. The transmitter utilizes a durable magnetically actuated reed switch. The bonnet, with padlock hasp, is o-ring sealed to the meter head.

II. SPECIFICATIONS

ACCURACY Plus or minus 2% of actual flow within the range specified for each meter size.

TEMPERATURE RANGE 160° F maximum. Consult factory for special construction for higher temperature.

FLOW RANGE Acceptable for each indicator-totalizer-transmitter unit is the same as that for the meter to which the unit mounts. Flow conditions above the maximum indicator scale are recorded accurately by the totalizer.

OUTPUT SIGNAL Pulse rate: one contact per revolution of totalizer sweep hand.

SWITCH RATING

Contact Rating	10 watts
Switching Voltage	200 Vdc-Max.
Switching Current	0.5 Amp.-Max.
Carry Current	1.2 Amp.-Max.
Initial Contact Resistance	.100 Ohms-Max.
Capacitance	0.2 Picofarads-typ.

Note: Switch contact normally open.

*** For Conversion From Standard Totalizer to TR12-2 Only.**
**** For Conversion From CN06 to TR12-2 Only.**
(Serial # 821935 and Lower, .100 Dia. Shaft Tip)

MATERIALS Used in construction are chosen for their durability and immunity to the corrosive effects of atmospheric moisture and the liquids measured by the meter assembly.

SHIPPING WEIGHT 4 pounds.

ORDERING INFO Must be specified by the customer and includes:

Serial number of meter on which unit is to be mounted, change gear and type of dial on totalizer that is going to be replaced, indicator dial units, totalizer units.

MODEL TR12-2 INDICATOR-TOTALIZER-TRANSMITTER INSTALLATION

III. UNPACKING. When unpacking the unit, 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 damage in return shipment due to improper packaging. The shipping carton contains the following items:

Model TR12-2 1
Mounting Equipment as required ..... -
Operation and Maintenance Manual 1

IV. INSTALLATION is normally made at the factory when the meter is assembled, but may be made in the field. Depending on what situations exist, various steps for installation apply and the procedures are outlined below.

1. REMOVE BONNET from existing meter head by removing mounting screws. Remove existing totalizer or indicator from meter head by removing mounting screws and lifting unit off.

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

***3. TOTALIZER DRIVE MAGNET** can now be removed from the vertical shaft by loosening the set screw in the side of the magnet hub and sliding the magnet assembly off the vertical shaft.

***4. ADAPTER PLATE** (2-4108) and gasket (1-1558-3) must be attached to the top of the meter head on the old style McCrometer Model LP21 (3 hole bolt circle) and all McCrometer Models ML45, 47 and 49. Adapter plate can be secured to the meter head by three mounting screws (1-1116-8-6) after the gasket has been centered on the head. Throughout the manual the top of the adapter plate will be referred to as the top of the meter head.

****5. VERTICAL SHAFT REMOVAL** can be accomplished by removing the two screws inside the meter head which secure the vertical shaft collar and bearing assembly to the meter head. Remove the A-drive gear (#5) from the vertical shaft after loosening the set screw in the gear hub. Spin the vertical shaft collar and bearing assembly gently, checking for any sign of wear. If collar and bearing assembly are all right, remove it from shaft by loosening set screw in hub and sliding off. Collar and bearing assembly will be used on the new vertical shaft.

****6. REPLACEMENT VERTICAL SHAFT** should be inspected to be sure it is not bent or damaged. Insert new shaft gently into the gearbox through the opening in the top of the meter head. Rotate the shaft gently until it is engaged in the driven miter gear shaft of the miter gear frame assembly. Replace the collar & bearing assembly and secure the two screws that hold it in place. Do not overtighten the screws as this can cock the bearing and bind the vertical shaft. Tighten set screw in the hub. Turn the top of the vertical shaft to check for any bind or drag. Should any bind or drag be apparent, it can usually be corrected by adjusting the vertical shaft collar and bearing assembly. Loosen the set screw in the hub and slide the shaft downward until it rests firmly against the driven miter gear shaft, then lift up about 1/64". Tighten set screw.

7. A-DRIVE GEAR (#5) can now be placed on the vertical shaft, hub down (A-drive gear will be in place already if replacing a model CN06-1 or CN06-2). Position the gear so the top face is 1/8" below the top surface of the meter head. Tighten set screw in the side of the hub.

8. B-DRIVEN GEAR (#6) should be checked and adjusted, if necessary, to position the top face of the gear (#6) 1/8" below the bottom of the indicator-totalizer-transmitter base. Tighten set screw in the side of the hub.

9. INDICATOR-TOTALIZER-TRANSMITTER (#9) mechanism should be placed on the meter head with the mounting screws and shakeproof washers (#7 & #8). Do not tighten mounting screws until the gear mesh has been properly adjusted. To adjust gear mesh, make sure gears are at the proper elevation, slide the indicator-totalizer-transmitter mechanism towards the A-drive gear (#5) until the unit stops because of full gear mesh. Now back off the indicator-totalizer-transmitter mechanism 1/64" and tighten mounting screws (#7).

*** For Conversion From Standard Totalizer to TR12-2 Only.**

**** For Conversion From CN06 to TR12-2 Only. (Serial # 821935 and Lower, .100 Dia. Shaft Tip)**

10. BONNET ASSEMBLY should be placed over the indicator-totalizer mechanism after removing the cap from the watertight connector (#57), removing the rubber bushing from inside the connector, and pushing the transmitter cable (#55) through the connector (#57). Inspect the bonnet o-ring (#4) and screw o-rings (#3) for any damage and cover with a thin coat of silicone grease. Secure the four bonnet mounting screws (#2) located beneath the bonnet lid. Do not overtighten the mounting screws as this will result in damage to the small screw o-rings (#3).

11. TRANSMITTER CABLE (#55) should be pulled out of the bonnet (#1) until it stops, then push 1/8" of the cable (#55) back into the bonnet (#1).

12. WATER TIGHT CONNECTOR (#57) can now be reassembled. Hold the cable (#55) in place while sliding the rubber bushing over it and into the connector (#57). Replace the connector washer and tighten the cap onto the connector body.

13. TRANSMITTER WIRING can be accomplished by following the wiring diagram on page 7.

INDICATOR -TOTALIZER-TRANSMITTER OPERATION AND MAINTENANCE MANUAL

V. MCROMETER 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 assure 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.

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. INDICATOR-TOTALIZER-TRANSMITTER 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. TRANSMITTER CABLE (#55) must be disconnected from the instrument to avoid any possible damage to the instrument circuits during cleaning of the transmitter. Remove the watertight connector cap and rubber bushing to allow the transmitter cable (#55) to slide through the connector (#57) when the bonnet (#1) is removed.

2. BONNET MOUNTING SCREWS (#2) located beneath the indicator-totalizer-transmitter bonnet lid, should be removed and the entire bonnet (#1) lifted off of the meter. Slide the transmitter cable (#55) through the watertight connector (#57) as the bonnet (#1) is lifted off. Replace the desiccant bag and o-ring seals around each of the four screws (#3) and at the bottom of the bonnet (#4) and cover the new o-rings with a thin coat of silicone grease.

3. TRANSMITTER MOUNTING SCREWS (#7) and shakeproof washers (#8) holding the indicator-totalizer-transmitter unit (#9) to the meter head should be removed and the unit lifted off, exposing the A-drive gear (#5) attached to the top of the vertical shaft.

4. METER CHANGE GEARS should be inspected for any sign of wear and replaced, if necessary. The A-(drive) gear (#5) is attached to the top of the vertical shaft, and the B-(driven) gear (#6) is attached to the drive shaft first worm assembly (#41). If replacement of gears (#5 & #6) is necessary, they can be removed by loosening the set screw in the side of each of the gear hubs and sliding the gears (#5 & #6) off the shafts. Install new gears hub down (see assembly drawing). Refer to section IV number 7 and 8 for proper positioning of change gears (#5 & # 6).

5. TOTALIZER CHANGE GEARS (#50 & #51) contained within the indicator-totalizer-transmitter mechanism should be checked for any signs of wear or damage and replaced, if necessary. The totalizer A-drive gear (#50) is located directly below the odometer on the 2nd worm gear shaft (#46). If the gear (#50) must be replaced, the 2nd worm gear shaft (#46) must be slid down to allow gear (#50) to be removed. Loosen set screw in the 2nd worm gear assembly (#45), slide shaft down, and remove gear (#50). Set new gear in place before sliding shaft (#46) up into position. Position shaft (#46) so that the flat for the A-drive gear (#50) is 1/64 inch to 1/32 inch above the plastic A-gear support arm, then tighten 2nd worm gear (#45) set screw into its flat on the shaft (#46). Lift the A-drive gear (#50) so that the bottom of the hub is 1/16 inch above the plastic A-gear support arm. Tighten the A-drive gear (#50) set screw into its flat on the shaft (#46). The B-driven gear (#51) can be removed from the odometer worm shaft (#11) by loosening the set screw in the side of the hub and sliding gear off the shaft. When replacing gears make sure that the set screws are tightened into the shaft flats, gears are at the proper elevation to achieve full mesh.

6. DIAL REPLACEMENT requires that the indicator sweep hand (#49) first be removed by twisting the hand counterclockwise and lifting it off at the same time. The test sweep hand (#12) can then be pulled up and off. Remove the two dial mounting screws (#48), lift the dial off of the top plate (#10), replace with a new dial, and secure with the mounting screws (#48). To replace the test sweep hand (#12), gently push the hand down on the test hand shaft (#12) until the shaft tip is flush with the top of the hand (#12). Make sure the test hand is at the

proper elevation, above the dial face but low enough to allow the indicator sweep hand (#49) to pass freely over it. Make sure the test hand (#12) is pointing in the 12 o'clock position and the last odometer wheel is on a whole number, not between two numbers. This can be done by turning the drive shaft (#41) until a number is located properly in the window, then turning the test hand (#12) to the 12 o'clock position. To replace the indicator sweep hand (#49), you must gently press the sweep hand onto the center shaft until the shaft is flush with the top of the sweep hand (#49). The hand should be pointing slightly above zero. Carefully turn the indicator sweep hand back to read zero. Spin the drive shaft (#41) so that the sweep hand (#49) rises off zero and check to be sure the hand (#49) goes back to zero after the indicator has stopped.

7. TRANSMITTER SWITCH (#52) connections should be checked to be sure they are securely in place.

VIII. TROUBLESHOOTING the transmitter is necessary if it is determined that the meter assembly and instrument are working properly but the transmitter is not functioning.

1. CONTINUITY CHECK should be performed on the transmitter, at the instrument, by using an ohm meter wired between the black and white transmitter lines (see wiring diagram). With the instrument disconnected and the meter operating (indicator movement), the ohm meter should read 0 ohms once every test sweep hand (#12) revolution. If the ohm meter responds to the test then the instrument is the probable cause of the problems.

2. TRANSMITTER LINES should be checked at the junction box if the ohm meter didn't respond to the above test. Connect the ohm meter (as described above) to the transmitter lines (in the junction box) and check continuity. If the ohm meter responds to this test then the transmitter lines between the junction box and the instrument are the probable cause of the problem.

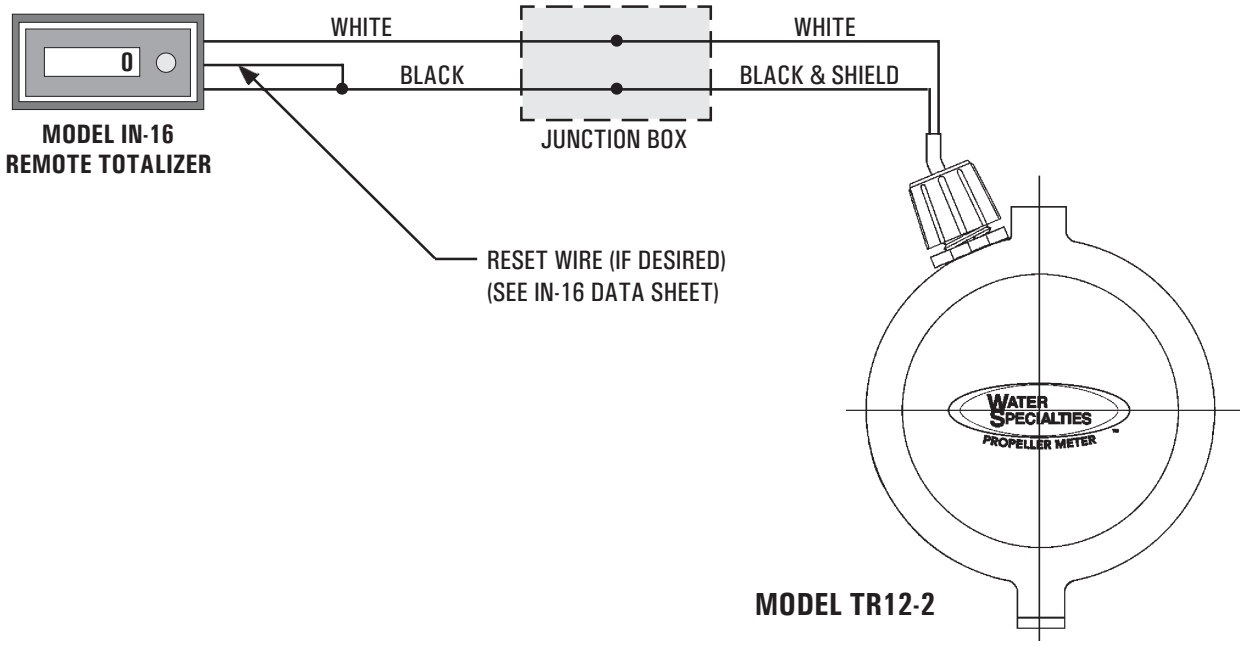
3. SWITCH POSITION should be checked if the continuity checks showed that no contact was being made. Remove the bonnet as described in section VII, 1 and 2. The reed switch and mounting block assembly (#52) should be positioned vertically directly adjacent to the actuator. As the actuator (#52) turns with the odometer worm (#11), it should actuate the reed switch (#54). If the switch and block assembly (#52) have become loose and moved away from the actuator (#54), then the mounting block must be reinstalled so that the switch actuates (closes) when the actuator passes over it. Make certain that the screws holding the reed switch to the mounting block are secure. Be careful not to damage the fragile glass switch. Tighten the switch block mounting screws (#53) snugly in place. Do not overtighten the screws (#53), as the threads in the block can be stripped.

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

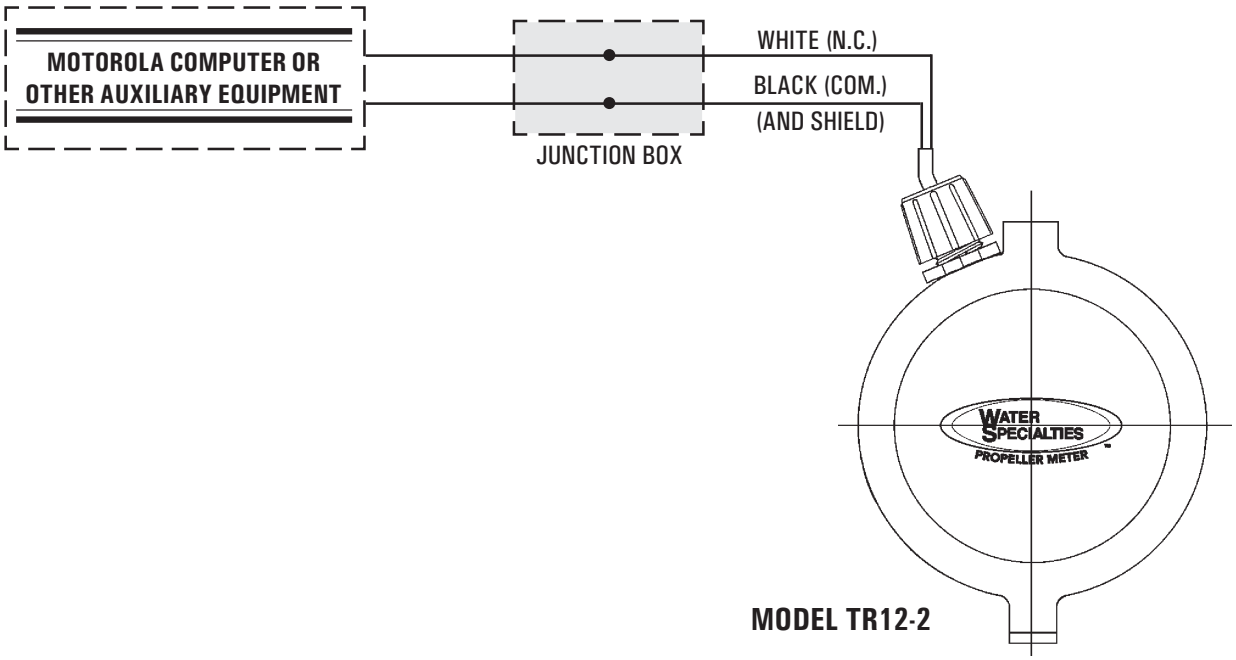
X. REASSEMBLY is necessary at this point. Before reassembling make certain that the unit is cleaned of any dust or dirt. Cost for replacement parts not covered by warranty are available from current parts and price list. If it is determined that the unit should be returned for repair, please notify McCrometer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

1. REINSTALL TRANSMITTER on meter head by following steps 9 through 13 of section IV.

INDICATOR-TOTALIZER-TRANSMITTER
MODEL TR12-2
WIRING DIAGRAM
WHEN USED WITH MODEL IN16



INDICATOR-TOTALIZER-TRANSMITTER
MODEL TR12-2
WIRING DIAGRAM
WHEN USED WITH AUXILIARY EQUIPMENT

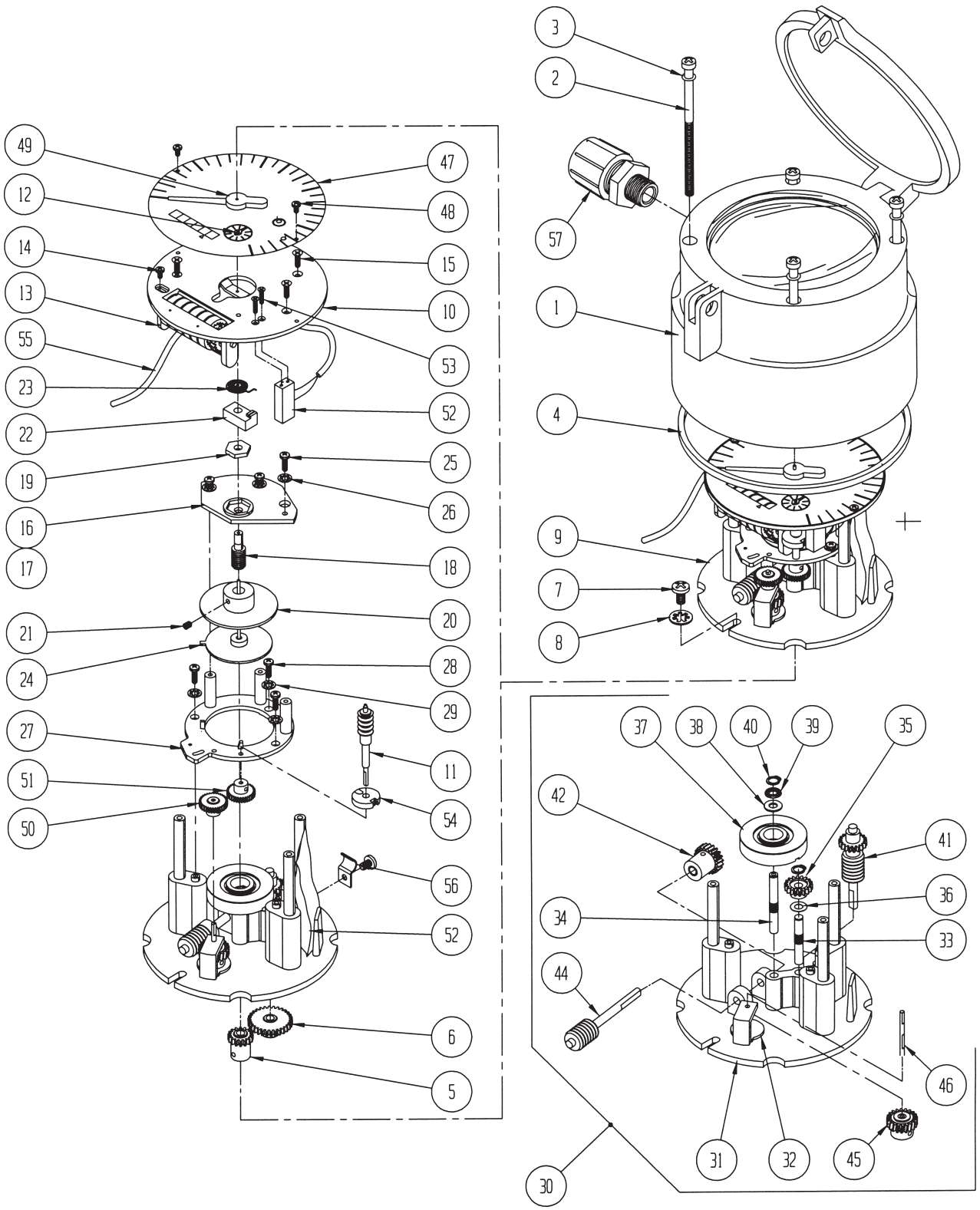


INDICATOR-TOTALIZER-TRANSMITTER
MODEL TR12-2
PARTS LIST

NO.	QTY.	PART NUMBER	DESCRIPTION
	1	7-TR12-2	MODEL TR12-2 INDICATOR-TOTALIZER-TRANSMITTER
1	1	4-4337-1	IND. -TOT.-TRANSMITTER BONNET ASSEMBLY W/ WATER TIGHT CONNECTOR
	1	1-4338	INDICATOR-TOTALIZER BONNET LID (W/PIN)
2	4	1-1115-10-56H	SCREW, BONNET MOUNTING (ea.)
3	4	1-1551-6	O-RING, BONNET MOUNTING SCREW (ea.)
4	1	1-1551-49	O-RING, BONNET
5A	1	3-2176	A-GEAR ASSEMBLY (6-15 TEETH, SPECIFY # OF TEETH)
5B	1	3-2157	A-GEAR ASSEMBLY (16-54 TEETH, SPECIFY # OF TEETH)
6	1	3-2163	B-GEAR ASSEMBLY (SPECIFY # OF TEETH)
7	2	1-1113-10-6	SCREW, IND.-TOT.-TRANSMITTER MOUNTING (ea.)
8	2	1-1302-10	SHAKEPROOF WASHER, TRANS. MTG. SCREW (ea.)
9	-	5-TR12-2	IND.-TOT.-TRANSMITTER MECHANISM (SPECIFY DIAL)
10	1	3-4345	TOP PLATE AND ODOMETER ASSEMBLY
11	1	3-4322	ODOMETER WORM AND SHAFT ASSEMBLY
12	1	1-4326	TEST HAND
13	1	1-4346	ODOMETER END SUPPORT
14	1	1-1118-3-3	SCREW, SUPPORT PLATE MOUNTING
15	3	1-1116-4-6	SCREW, TOP PLATE MOUNTING
16	1	4-4334	UPPER MIDDLE PLATE ASSEMBLY
17	1	1-4344	UPPER MIDDLE PLATE
18	3	2-4347	MAGNET FLUX ADJUSTING PLATE BUSHING
19	1	2-4357	PRESS COLLAR, FLUX ADJUSTING BUSHING
20	1	3-4348	MAGNET FLUX ADJUSTING PLATE ASSEMBLY
21	1	1-1125-2	SET SCREW, FLUX ADJUSTING PLATE ASSEMBLY
22	1	1-4349	HAIRSPRING REGULATOR
23	1	1-1604-4	HAIRSPRING
24	1	3-4354	DEFLECTION PLATE ASSEMBLY
25	3	1-1118-4-6	SCREW, UPPER MIDDLE PLATE MOUNTING
26	3	1-1302-4	SHAKEPROOF WASHER, UPPER PLT. MTG. SCREW
27	1	1-4343	MIDDLE PLATE
28	3	1-1118-4-6	SCREW, MIDDLE PLATE MOUNTING
29	3	1-1302-4	SHAKEPROOF WASHER, MIDDLE PLATE MTG. SCREW
30	1	4-4340	BASE ASSEMBLY
31	1	1-4340	BASE
32	1	1-4350	2ND WORM GEAR BUSHING
33	1	2-4355	IDLER GEAR SHAFT
34	1	3-4356	SPEED MAGNET SHAFT ASSEMBLY
35	1	1-4364	IDLER GEAR
36	1	1-2147	SHIM WASHER
37	1	3-4351	SPEED MAGNET ASSEMBLY
38	2	1-1303-1	THRUST WASHER
39	1	1-1503-13	THRUST BEARING, 1/16" DIA. STAINLESS STEEL
40	2	1-1402-2	RETAINING RING
41	1	3-4363	DRIVE GEAR, 1ST WORM, & DRIVE SHAFT ASSEMBLY
42	1	3-4361	1ST WORM GEAR ASSEMBLY
44	1	3-4359	2ND WORM & WORM SHAFT ASSEMBLY
45	1	3-4362	2ND WORM GEAR ASSEMBLY
46	1	2-4092	2ND WORM GEAR SHAFT
47	1	2-4013	DIAL (AS SPECIFIED)
48	2	1-1118-3-3	SCREW, DIAL MOUNTING (ea.)
49	1	1-4321-1	INDICATOR HAND
50	1	3-4045	TOTALIZER A-GEAR ASSEMBLY (SPECIFY # OF TEETH)
51	1	3-4045	TOTALIZER B-GEAR ASSEMBLY (SPECIFY # OF TEETH)
52	1	3-4111-2	TRANSMITTER REED SWITCH & MTG. BLOCK ASSEM.
53	2	1-1116-2-6	SCREW, SWITCH AND BLOCK MTG. (ea.)
54	1	3-4329	REED SWITCH ACTUATOR ASSEMBLY
55	1	1-1701-2	TRANSMITTER CABLE
56	1	3-1708-2	STRAIN RELIEF ASSEMBLY
57	1	1-1711-5	WATER TIGHT CONNECTOR
-	1	10015-00K	DESICCANT BAG

CONSULT FACTORY FOR PRICING.

INDICATOR-TOTALIZER-TRANSMITTER
MODEL TR12-2



NOTES

WATER SPECIALTIES™
PROPELLER METER

SERIAL NUMBER

REPAIR RECORD

PURCHASE DATE

SPECIFICATIONS		INDEX
METER SIZE & MODEL NO.		
REGISTRATION		
INDICATOR DIAL GEARING		

ODOMETER READING

CHANGE GEARS
A/B
RATIO

NOTES: _____

DATE	REPAIR	METER LOCATION	COMMENTS