

**PREFACE**

**SCOPE OF THE MANUAL**

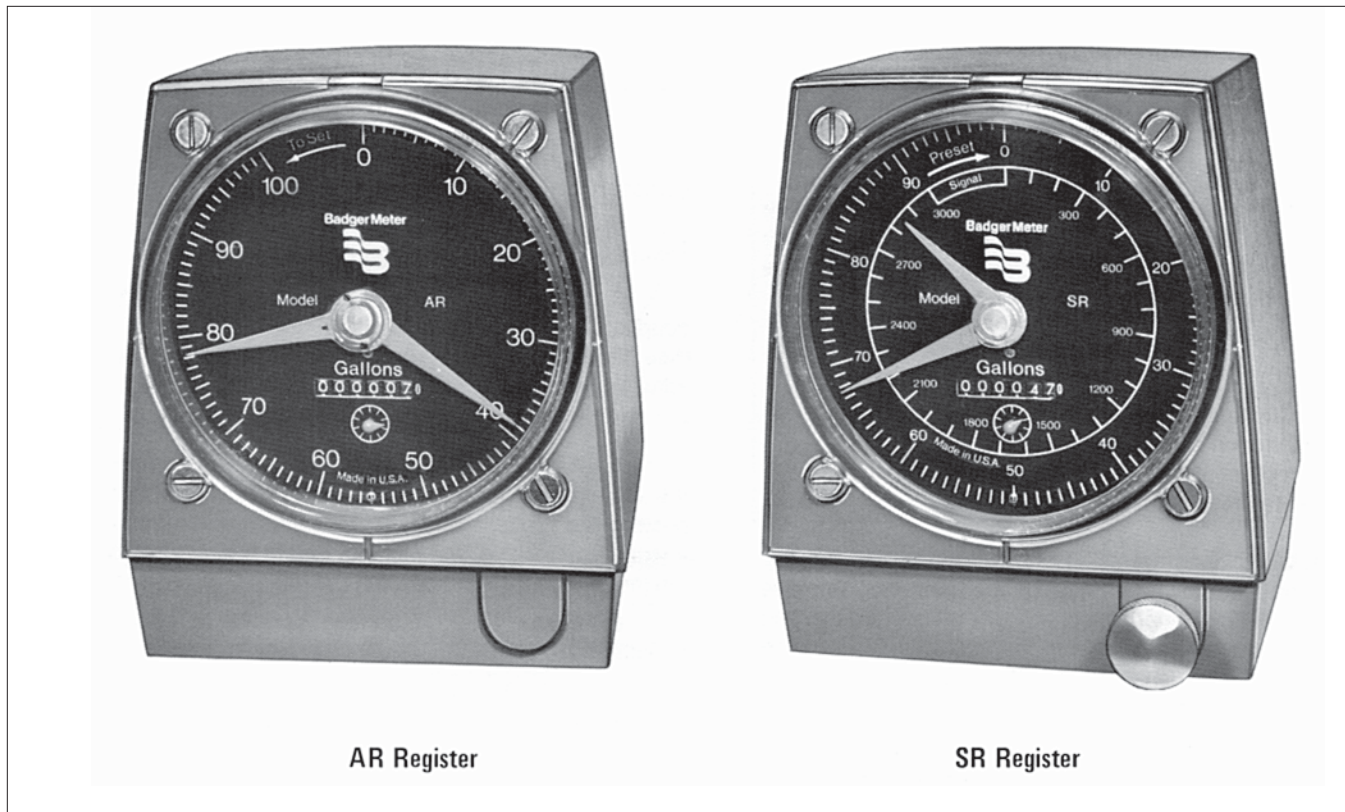
This manual contains information pertaining to the installation, operation and maintenance of Badger Series 76, Models AR and SR Meter Registers. Before attempting installation, operation or maintenance, read the instructions presented to become familiar with the procedures involved. Retain the manual in a readily accessible location for future reference

**CHANGES IN THE MANUAL**

Changes or additions to the original edition of this manual will be covered by a "CHANGE NOTICE" supplied with the manual. The change notice will explain any differences between the register received and the registers covered in this manual.

**Table 1-1. Technical Specifications**

DRIVE .....	Mechanical 2-pin direct coupling (Adapter must be used for magnetic drive meters)
MOUNTING .....	4 holes equidistant on 3.665 in. diameter circle
<b>DIMENSIONS</b>	
Height .....	8-7/8 in.
Width .....	7-1/2 in.
Depth .....	7-1/2 in. SR 6-3/4 in. AR
WEIGHT .....	8 lbs.
OPERATINGTEMPERATURE .....	250°F, with proper adapter
<b>DIAL</b>	
Diameter .....	5-3/4 in.
Display .....	White on black
<b>TOTALIZER COUNTER</b>	
Type .....	Non-resettable
Display .....	Six-digit (to 999,999)
Numerals .....	5/32 in. high - white on black
TESTCIRCLE .....	10 increments each equal to 1/10 of last totalizer digit
<b>ENCLOSURE</b>	
Type .....	Moistureproof and dustproof
Housing and base .....	NEMA-4, foam molded polycarbonate, glass filled
Bezel .....	Clear polycarbonate
<b>MODEL AR - AUTOMATIC REGISTER</b>	
Accuracy and repeatability .....	Signal within ± 2% of dial capacity
Pointers .....	Two, nickel-plated outer reset and red inner reading
Switch and relay contact rating .....	7 amps, 125-250 vac
Motor and relay (one of the ratings listed) .....	24 vac, 60 Hz, 20 rph 110 vac, 60 Hz, 20 rph 1 1 0 vac, 60 Hz, 4 rph 220 vac, 50 Hz, 20 rph
<b>MODEL SR SIGNAL REGISTER</b>	
Accuracy and repeatability .....	Signal within ± 1 % of outer circle
Pointers .....	Two, nickel-plated inner and red outer
Contact rating .....	7 amps, 1 1 0 or 220 vac, 118 hp at 1 1 0 vac, 1/4 hp at 220 vae, 112 amp at 125 vdc, 114 amp at 250 vdc



AR Register

SR Register

## Section 1 GENERAL INFORMATION

### 1-1 GENERAL DESCRIPTION

The Badger Model AR Automatic Reset Register and Model SR Signal Register are designed primarily to control the regeneration cycle of water softeners. (See Figure 1-1.) Models AR and SR employ electrical switching to provide the signal for external control, and both are equipped with a 6-digit non-reset totalizer. The basic configuration and mounting of the instruments is the same. The registers are available in a wide range of dial capacities and units of measurement.

The Model AR is an automatic reset unit for repetition of the same preset metered cycle. The instrument may be preset to any quantity within the dial capacity by positioning the nickel-plated outer reset pointer. The housing must be removed to preset. The red pointer indicates the amount of liquid remaining to be delivered. At the end of a cycle when the red delivery pointer reaches zero, the motor-driven reset pointer is turned one complete revolution to return the red pointer to the preset point in readiness for the next cycle. End of cycle and reset switching are cam actuated. The AR can be automatically reset any time prior to the completion of the cycle by an external momentary contact.

The Model SR is a manual preset register with two pointers. The pointers are preset with the control knob on the front of the unit. When both pointers

reach zero, the internal cam-actuated microswitch closes to provide the control signal.

External electrical connections are made to the rear of the instrument. The housings are easily removed for internal access required for wiring, gear changes, settings and adjustments.

### 1-2. INSTRUMENT CONFIGURATIONS

The Model AR is available with an internal relay for use in multiple register systems. The relay may be connected into the control circuit to lock out one register reset motor until a second register regeneration cycle is completed.

### 1-3. APPLICATIONS

The Model AR and SR Registers are well suited for control of industrial water softener installations, whether single manual regeneration or multiple automatic regeneration. All Series 76 registers can be used interchangeably on Badger disc, oscillating piston, turbine, turbo and propeller meters, both mechanical and magnetic drive. These registers are ideal replacements for older similar registers.

## Section 2 INSTALLATION

### 2-1. UNPACKING AND INSPECTION

The Model Series 76 Registers are shipped to the customer in a special shipping container to avoid damage during transit. Upon receipt of the instrument, perform the following unpacking and inspection procedures:

#### NOTE:

If damage to the shipping container is evident upon receipt of the instrument, request a representative of the carrier to be present when the instrument is unpacked.

a. Carefully open the shipping container, following any instructions that may be marked on the container. Remove all cushioning material surrounding the instrument and carefully lift the instrument from the container. Retain the container and all cushioning material for possible use in storage or reshipment.

b. Check the contents of the shipping container against the packing list to verify that all equipment has been received.

c. Visually inspect the instrument for physical damage such as dents, scratches, loose or broken parts or any other signs of physical damage that may have occurred during shipment.

#### NOTE:

If damage is found, request an inspection by the carrier's agent within 48 hours of delivery. Then file a claim with the carrier. A claim for equipment damaged in transit is the responsibility of the customer.

### 2-2. INSTALLING THE REGISTER

Installation of the register in areas of high temperature or severe vibration should be avoided. When used on oscillating piston meters, turbine meters and SOT meters with flow temperatures over 1400F, use finned mounting adapter to dissipate heat. Use P/N 31278-1 for oscillating piston meters and P/N 31 728 for SOT and turbine meters.

a. **MOUNTING THE REGISTER.** (See Figure 2-1.) The register mount will fit a 3/4 inch hood base. The instrument is mounted with four or two 1/4-20 screws. The mounting holes on existing meters may have to be drilled to 17/64 inch dia. to accept the 1/4 inch screws.

1. Remove the existing register if meter is so equipped.
2. Check the mounting holes on meter. Re-drill to 17/64 inch to accept 1/4 inch screws if necessary.

3. Check the position and alignment of pin drive coupling. Surface A must be 3/32" to 1/8" below Surface B (See Figure 2-1). Be sure to tighten the set screw after adjustment.
4. Place the square section gasket in the mounting set.
5. Align the drive holes in the base of register with the drive coupling pins as closely as possible. Carefully position the register on the meter mount or magnetic drive adapter so the drive pins engage. Rotate the register to align the mounting holes and position the register as desired.
6. Install 1/4-20 mounting screws to secure the register.

b. **ELECTRICAL CONNECTIONS.** All electrical (power and signal) connections to a register are made to a terminal strip located inside the instrument enclosure. Remove the four housing cover screws in the base and lift off the cover to gain access. Caution must be exercised in cover removal to avoid bending the pointers. When the screws are removed, lift the cover in a slightly forward motion. It is recommended that flexible conduit be used for a distance of at least 2 feet from the register to allow access to the meter.

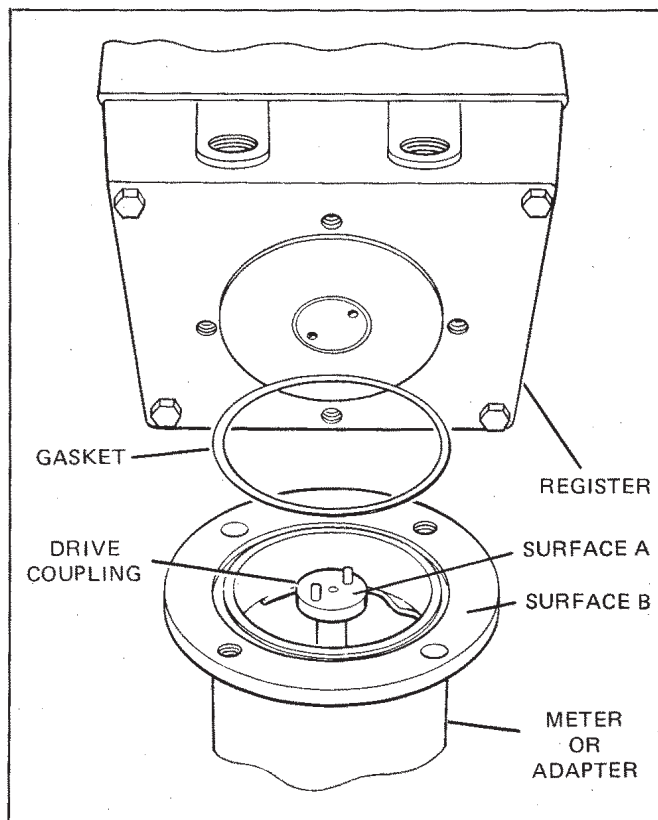
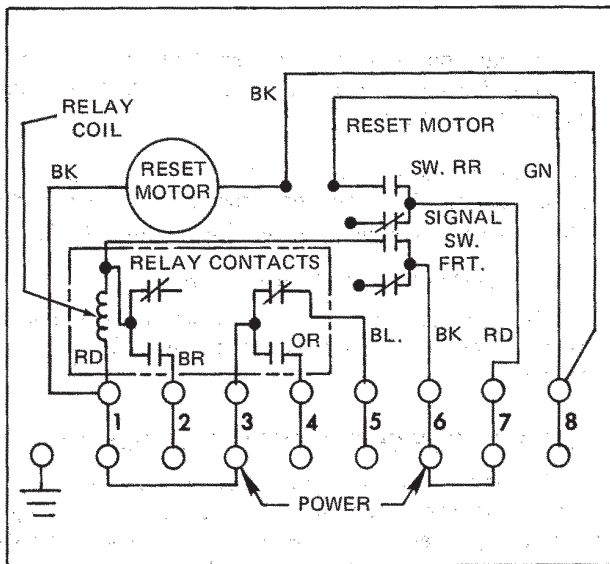
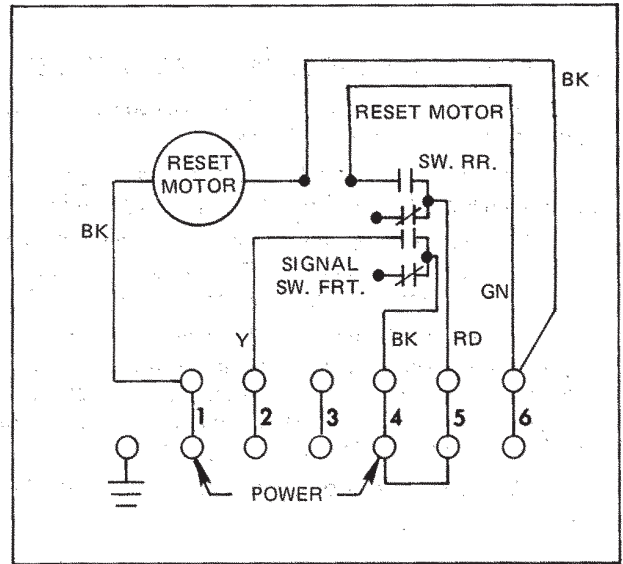


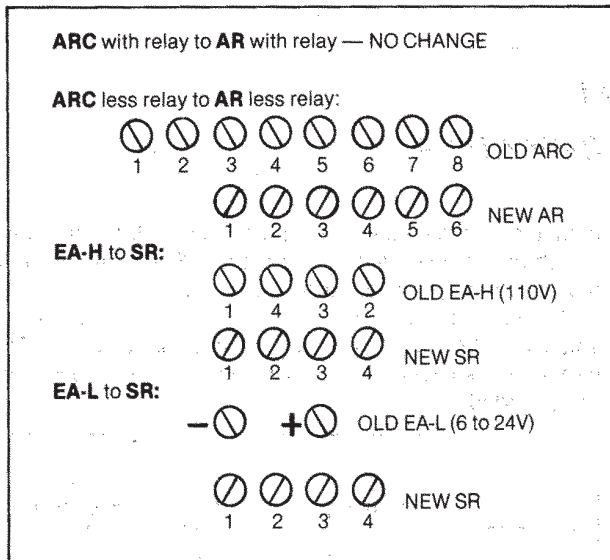
Figure 2-1. Register Mounting



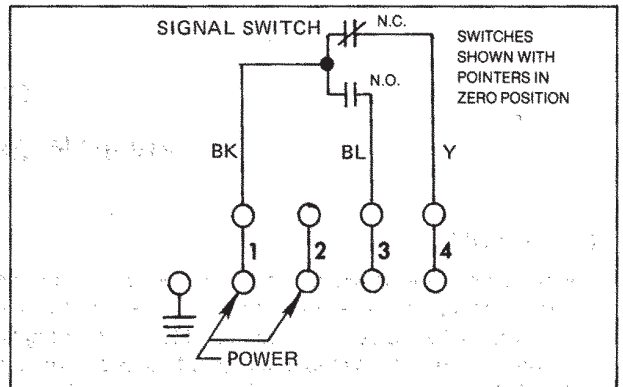
**Figure 2-2. Internal Wiring Diagram — Model AR with Relay**



**Figure 2-3. Internal Wiring Diagram — Model AR less Relay**



**Figure 2-5. Wiring Changes for Register Replacement**



**Figure 2-4. Internal Wiring Diagram — Model SR**

The basic internal wiring diagrams are shown in Figures 2-2 thru 2-4. If additional information or assistance is required to make a specific installation, contact Badger Meter, Inc., Flow Products Division, Industrial Sales Department, or the local representative. Make sure that all wiring to the instrument (both power and signal) conforms with the local electrical code.

### 2-3. PERFORMANCE CHECK

Although the registers are factory adjusted for switch actuation and pointer alignment, it is advisable to check the operation of a register before actual use. For AR registers the reset pointer is set at 50 per cent of the scale. The user may require a different operating point. Complete adjustment and test information is given in Section V.

### 2-4. REGISTER REPLACEMENT

Model AR and SR registers can be used to replace Model ARC, EA-H and EA-L registers. The necessary wiring changes are shown in Figure 2-5.

## Section 3 OPERATION

### 3-1. CONTROLS AND INDICATORS

a. **CONTROL KNOB.** The single control knob for Register SR is used to preset the desired flow quantity as indicated by the pointers. Pushing the knob in and turning counterclockwise moves the pointers to the desired batch quantity. The inner pointer moves one graduation for each complete revolution of the outer pointer.

b. **DIALS.** The 5-3/4 inch dial is calibrated in units of measure marked on the dial face. The small test circle is marked with 10 divisions. One revolution of the test circle pointer is equivalent to one digit change on the lowest (right side) position of the totalizer.

### 3-2. OPERATING PROCEDURE - SR REGISTER

At the end of a flow cycle the pointers will both be at zero. To preset the unit, proceed as follows:

- a. Push in the control knob which will engage the coupling on the preset shaft with the register gear train.
- b. Turn the knob counterclockwise to the desired quantity as indicated by the pointers. Release the knob. Spring tension will return the knob to the out position.
- c. The register will start when flow starts and continue to indicate the remaining quantity until the pointers reach zero at the end of the cycle. At this time the signal switch opens or closes to operate external alarms or functions. The pointers move counterclockwise during operation.
- d. After regeneration preset the register as described above.

### 3-3. OPERATING PROCEDURE - AR REGISTER

To preset the register, remove housing cover and proceed as follows:

- a. Rotate the reset pointer until it picks up the red pointer and continue until the switch arm drops into the notch in the motor cam.
- b. Loosen two screws in the reset pointer hub and position both pointers to the desired preset quantity. Be sure the motor cam remains stationary during pointer positioning.
- c. Tighten the reset pointer hub screws.
- d. Run the register through one cycle to check preset. The instrument must stop with both pointers at the preset position.

### 3-4. OPERATOR EMERGENCY MAINTENANCE

If the register does not start or stops prematurely, check the power source. If the power source checks out, the register may require adjustment. Refer to troubleshooting data and adjustment procedures in Section V.

If a register fails to stop at zero, turn off the power to the instrument. Investigate the cause of malfunction (Section V).

## Section 4 PRINCIPLES OF OPERATION

### 4-1. GENERAL

Whenever there is liquid flow, the movement of the meter's measuring element is coupled to the register and transferred to the indicating pointers and totalizer through a gear train. The exact makeup of the gear train is determined by the dial capacity, unit of measure and meter application. Each instrument incorporates a set of change gears which allows some variation in overall gear train ratio to compensate for differences in liquids and conditions.

In an automatic system the end of cycle or zero point signal is used to start the regeneration cycle. The switch is cam actuated off the pointer shaft(s). The actuation of the switch(es) and position of the pointer(s) are adjustable to permit exact correlation between the pointers and switch action.

### 4-2. MODEL SR

A coupling is mounted on the control knob shaft. With the knob in, the coupling engages the gear train and allows the pointers to be moved when the knob is rotated.

Initially with the register at zero, the signal switch is on the low part of the pointer cams. In this position the signal switch (normally open contacts) is open. When the pointers are moved off zero to preset, the cams rotate so that the signal switch is on the high part of the cams and the signal switch (normally open contacts) is closed. When flow starts, the register continues to run toward zero until both pointer cams reach the initial position to reverse the switch mode.

### 4-3. MODEL AR (See Figure 4-1)

The Model AR employs two tandem cams to actuate the signal switch and reset motor switch. The front signal cam is mounted on the delivery (red) pointer shaft; the rear motor switch on the reset motor-pointer shaft. Both cams contact the common pivoting switch arm which actuates the switches. Each switch is mounted independently on adjustable brackets to allow separate adjustment. The switch arm is latched or unlatched by a spring-loaded pawl as controlled by the cams.

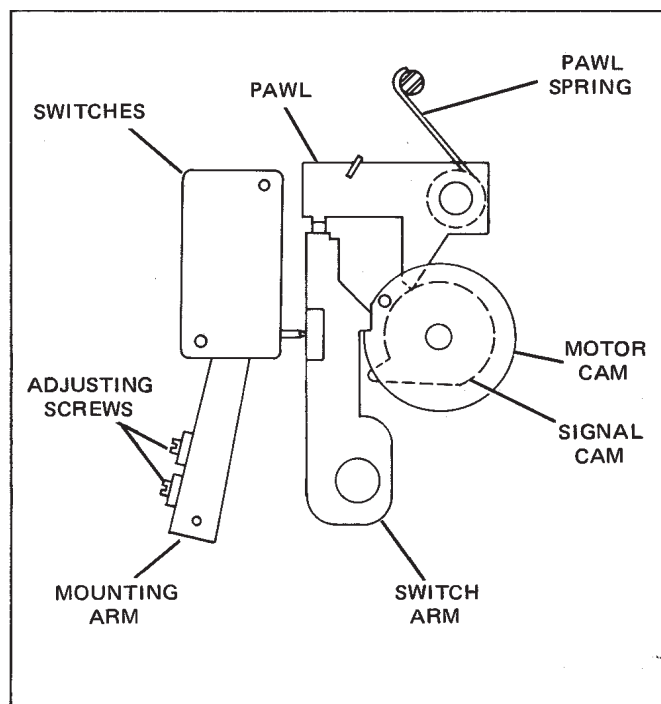


Figure 4-1. Model AR Switch Mechanism

At the end of the preset cycle, the switch arm is at rest in the notch or low point of the motor cam. Both the reset motor switch and signal switch are open. The pawl is contacting the outer edge of the switch arm as shown in Figure 4-1.

When flow starts, the red pointer and signal cam are driven around until the high point of the signal cam moves the switch arm to close the switches at zero. This allows the pawl to engage the notch in the switch arm to lock the switches in close position. The reset motor is energized through the motor switch and drives the reset pointer and reset motor cam. The signal switch closure is used to start the regeneration cycle either directly or

through a relay and external circuitry provided by the water conditioning equipment manufacturer. The motor cam continues to rotate and the reset pointer picks up the red delivery pointer to return to the preset position. As the cam nears the end of its full revolution, the pin on the motor cam pushes the pawl out to unlatch the switch arm but the switch arm is on the high part of the motor cam so the switches remain closed.

When the notch in the motor cam reaches the switch arm, the arm drops into the notch and opens the switches. This stops the reset motor and interrupts the regeneration signal. The register is now ready for another cycle.

## Section 5 MAINTENANCE

### 5-1. GENERAL

This section of the manual provides information pertaining to maintenance of the registers. The information consists of preventive maintenance, troubleshooting and corrective maintenance procedures.

#### NOTE:

Maintenance of the registers requires adequate test equipment as well as personnel experienced in the checkout and repair of electromechanical equipment.

### 5-2. MAINTENANCE EQUIPMENT

The test equipment and tools required for checkout and maintenance of the registers are listed below. Besides those items listed, the only other maintenance equipment required is the usual complement of hand tools used by service technicians.

a. Voltmeter or test lamp for continuity checks and tests.

### 5-3. PREVENTIVE MAINTENANCE

The purpose of preventive maintenance for the registers is to ensure efficient, trouble-free operation and to discover and correct conditions that can result in damage or instrument failure. Perform the following preventive maintenance procedures on a routine basis.

a. **CLEANING.** Clean all dust, dirt, moisture or grease from the front panel and housing of the instrument. Use a clean cloth dampened with detergent and water. Wipe dry with a clean cloth.

b. **INSPECTION.** Visually inspect the instrument for breaks, cuts, wear or deterioration in the power interconnecting wiring and signal wiring. Replace any defective wiring.

#### NOTE:

The operator should always note any erratic indications and unusual noises. These are cause for instrument checkout.

c. **LUBRICATION-**Apply a soft grease such as Lubriplate sparingly to the following points every 6 months.

1. Drive bevel gears.
2. Resets haft(SR only).

### 5-4. TROUBLESHOOTING

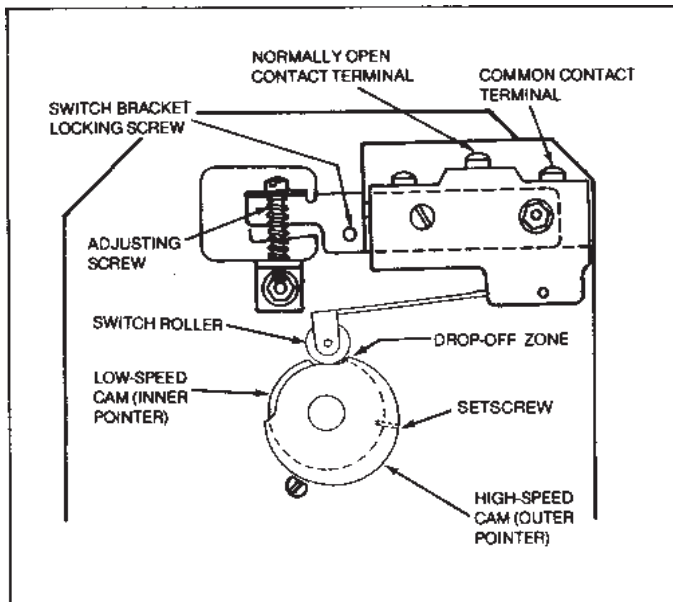
Should a register fail to operate properly, the first step in troubleshooting the instrument is to try to localize the malfunction to a component. The trouble symptoms listed in the troubleshooting chart, Tables 5-1 and 5-2, will aid in determining and locating the difficulty. The chart lists possible troubles, probable causes and remedies. Use the wiring diagrams in Section 11 as a further aid in isolating the fault.

### 5-5. ADJUSTMENTS - MODEL SR

#### a. SIGNAL SWITCH, SECOND STAGE

Use a test light or an ohmmeter with the power off. Connect to the common and normally-open signal switch terminals. See Figure 5-1.

1. Loosen the switch bracket locking screw slightly with an offset screwdriver.
2. With an Allen wrench, loosen the setscrew in the high-speed cam.
3. By hand, rotate the high-speed cam to position the switch roller in the drop-off zone of the cam.
4. Rotate the low-speed cam (by hand) to position the switch roller in the center of the drop-off zone of this cam.
5. Rotate the high-speed cam until the switch roller is on the drop-off point of the cam. Tighten the setscrew in the high-speed cam.



**Figure 5-1. Signal Switch Adjustment  
(Positioning Roller on Cams)**

6. Slowly advance the adjusting screw while slowly turning the register's reset knob to rotate the high-speed cam until only one signal is received during two revolutions of the high-speed cam past the trip point.

**NOTE:**

To obtain proper cam adjustment, carefully observe the movement of the switch roller. When the high-speed cam completes one revolution before shut-off, the switch roller must lower into the drop-off zone of the low-speed cam to activate an electrical signal.

7. Tighten the switch bracket locking screw.

8. Recheck cam adjustments by rotating the cams (turn the reset knob) until drop-off points are aligned. The switch roller must be positioned in the center of the low-speed drop-off zone.

9. Recheck operation.

b. **POINTER POSITION.** At the end of a metering cycle with the signal switch closed, the red pointer must be on zero. If necessary, loosen the screw on the hub and reposition pointer. Tighten screw after adjustment.

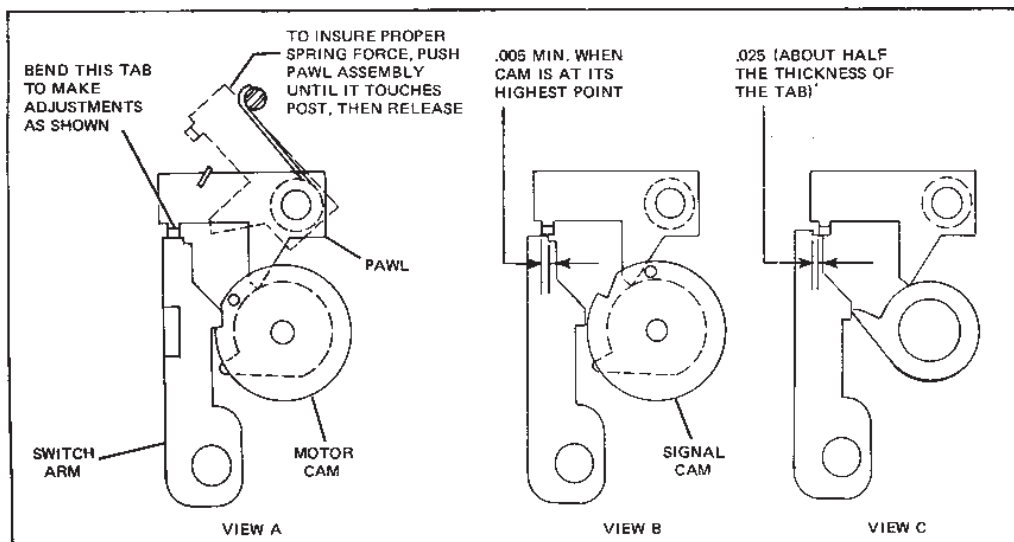
**5-6. ADJUSTMENTS - MODEL AR**

a. **SWITCH ARM PAWL.** The pawl may require adjustment if the switch arm does not latch.

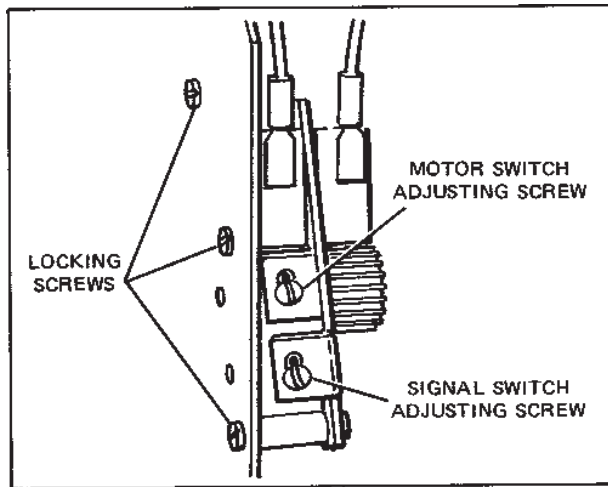
1. Set the pawl spring tension as shown in Figure 5-2, View A.
2. Bend the pawl tab to obtain latch clearance as shown in Figure 5-2, Views B and C.
3. Rotate the reset pointer so it picks up the red pointer and continues until the switch arm drops into the notch in the motor (rear) cam.
4. Rotate the red pointer (and cam) and observe latching of the switch arm by the pawl. As the high point of the signal cam passes the switch arm, the pawl must engage the notch of the switch arm and latch the arm. (See Figure 5-2, View B.) The switch arm must remain latched when the high point of signal cam is past the switch arm.

b. **SIGNAL AND MOTOR SWITCHES.** (See Figure 5-3.)

1. Slightly loosen three switch mounting arm locking screws.
2. Rotate the register drive if necessary to set the high part of the motor cam (rear) on the switch arm.
3. Back off both adjusting screws so that the signal and motor switches are open (normally-open contacts).
4. Advance the motor switch (rear) adjusting screw until the motor switch closes. Then advance the adjusting screw 1-1/3 turns for proper overtravel.
5. Advance the signal switch (front) adjusting screw until the signal switch closes. Then advance the adjusting screw 1 turn for proper overtravel.
6. Tighten the switch mounting bracket locking screws.



**Figure 5-2. AR Pawl Adjustment**



**Figure 5-3. AR Switch Adjustment**

c. DELIVERY POINTER (RED).

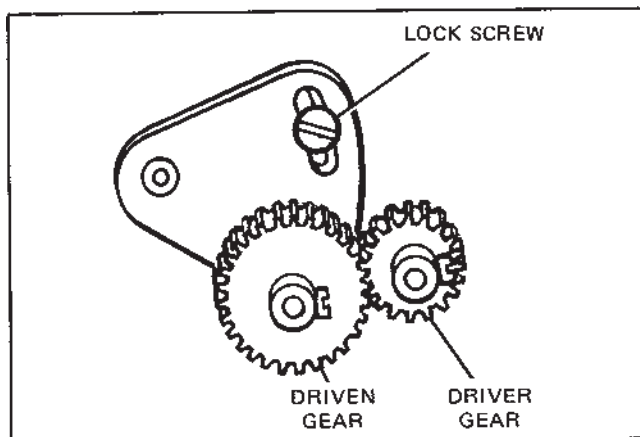
1. Rotate the reset pointer counterclockwise until the switch arm drops into the notch in the motor cam.
2. Rotate the red delivery pointer counterclockwise until the motor (rear) switch closes. With this cam position the red pointer should be at zero on the dial. If it is not, remove reset pointer and hub. Loosen the pointer lock screw, set the pointer on zero and tighten the lock screw. Do not move the signal cam during pointer position adjustment. Replace reset pointer and adjust to preset position.

d. PRESETTING. Refertoparagraph3-3.

**5-7. CHANGE GEARS**

Due to differences in fluid viscosity, specific gravity, temperature, et cetera, the register may not be indicating the correct flow quantity. If this occurs, proceed as follows:

- a. Determine the exact register reading for the corresponding quantity of product delivered. Measure quantity exactly.
- b. Check the number of teeth on the driven and driver change gears on the rear of the gear plate (See Figure 5-4). The gears are stamped with the number of teeth.



**Figure 5-4. Change Gears**

c. Notify the Flow Products Division of Badger Meter of the data in a and b above. Badger Meter engineering will advise you of required changes to be made.

d. To adjust or interchange the gears, loosen the lock screw and pivot the driven gear away. Replace the change gears if required. Align the gear teeth and setscrews. Swing the driven gear until it meshes with the driver gear and tighten the lock screw.

**NOTE:**

Be sure gear teeth mesh fully without any tightness.

**5-8. PERFORMANCE CHECK - MODEL AR**

To test for proper actuation and relay operation (if so equipped), perform an operational performance check. A set of test lights should be used. Different color lamps with corresponding color test leads are suggested for simplicity.

Connect the power source per unit rating with an external switch to the terminals as shown on the applicable wiring diagram in Section II. The external power switch must be open.

a. MODELARWITHRELAY(Normally-Open)

1. Connect test lights to the terminal strip as follows:
  - Test Light No. 1 - to terminals 2 and 3
  - Test Light No. 2 - to terminals 4 and 6
  - Test Light No. 3 - to terminals 5 and 6
  - Test Light No. 4 - to terminal 3 and the normally- closed terminal of the reset motor switch (rear switch - unconnected terminal).
2. Rotate the pointers to the preset position where the switch arm drops into the notch of motor cam.
3. Turn on the power. As the power is turned on the test lights No. 3 and No. 4 must light up.
4. Turn the red pointer counterclockwise to a position close to zero on the dial.
5. Slowly advance the red pointer further by rotating the register drive shaft. As the red pointer reaches zero the test light No. 4 will go out and the reset motor will start. Do not rotate any further.
6. The motor will turn the motor cam and raise the switch arm until it rides on the O.D. of the motor cam. This will close the front or signal switch and energize the relay. Test light No. 3 will go out and test lights No. 1 and No. 2 will light simultaneously. Test light No. 4 must go out when the red pointer indicates zero on the dial and before test light No. 3 goes out.
7. The reset pointer (nickel-plated) will pick up the delivery pointer (red) and reset it to the preset position and turn the motor off. This completes the cycle and the test.

b. MODEL AR LESS RELAY (Normally-Open Signal Switch).

1. Connect test lights to the terminal strip as follows:
  - Test Light No. 1 - to terminals I and 2
  - Test Light No. 2 - to terminal 1 and the normally-closed terminal of the reset motor switch (rear switch - unconnected terminal).
2. Rotate the pointers to the preset position where the switch arm drops into the notch of motor cam.
3. Turn on the power. As the power is turned on the test light No. 2 must light up.
4. Turn the red pointer counterclockwise to a position close to zero on the dial.
5. Slowly advance the red pointer further by rotating the register drive shaft. As the red pointer reaches zero the test light No. 2 will go out and the reset motor will start. Do not rotate any further.
6. The motor will turn the motor cam and raise the switch arm until it rides on the O.D. of the switch cam. This will close the front or signal switch and test light No. 1 will light up.

**NOTE:**

Test light No. 2 must go out when the red pointer indicates zero on the dial and before the test light No. 1 lights up.

7. The reset pointer (nickel-plated) will pick up the delivery pointer (red) and reset it to the preset position and turn the motor off. This completes the cycle and the test.

**5-9. PARTS REPLACEMENT**

Normal parts replacement includes the microswitches, relay, and possibly gears or cams which are worn. Mounting of these parts is shown in the exploded views in Section VI.

**Table 5-1. Model AR Troubleshooting Chart**

**NOTE:**

Since the AR register is usually a part of a larger control system not supplied by Badger Meter, Inc., it is necessary that the system is checked to be sure it is installed properly and wired in accordance with the manufacturer's recommendations before changing any adjustments or troubleshooting is done on the AR register.

POSSIBLE TROUBLE	PROBABLE CAUSE	REMEDY
Pointers do not return to proper preset.	<ol style="list-style-type: none"> <li>1. Loose reset pointer screws.</li> <li>2. Malfunctioning or faulty motor switch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-adjust preset and tighten screws.</li> <li>2. Check switch actuation and mounting. Adjust if required. Replace if defective.</li> </ol>
Register does not stop at zero.	<ol style="list-style-type: none"> <li>1. Loose delivery pointer screw.</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-adjust position of pointer.</li> </ol>
Register does not stop.	<ol style="list-style-type: none"> <li>1. Malfunctioning or faulty signal switch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check switch actuation and mounting. Adjust if required. Refer to para. 5-6 a.</li> </ol>
Register does not reset.	<ol style="list-style-type: none"> <li>1. Malfunctioning motor switch.</li> <li>2. Faulty motor switch.</li> <li>3. Loose motor cam.</li> <li>4. Broken pawl spring.</li> <li>5. Faulty reset motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check switch actuation. Re-adjust if required. Refer to para. 5-6 a.</li> <li>2. Check operation of switch. Replace if defective.</li> <li>3. Secure motor cam. Re-adjust.</li> <li>4. Replace spring and adjust pawl.</li> <li>5. Replace motor.</li> </ol>
Delivery pointer does not move.	<ol style="list-style-type: none"> <li>1. Loose gear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check setscrews in gears for looseness. Tighten.</li> </ol>

**Table 5-2. Model SR Troubleshooting Chart**

POSSIBLE TROUBLE	PROBABLE CAUSE	REMEDY
Switch does not close or open.	1. Malfunctioning or faulty signal switch.	1. Check switch actuation and mounting. Adjust if required. Replace if defective.
Register pointer(s) do not move.	1. Loose gear.	1. Check setscrews on gears for looseness. Tighten.

For other malfunctions of the system check external equipment as recommended by the manufacturer.

## Section 6 ILLUSTRATED PARTS LISTS

### 6-1. PART LOCATION ILLUSTRATIONS

The location and identification of the assemblies and parts comprising Models AR and SR are shown on the exploded view illustrations. Each assembly or part shown on the illustrations is identified by an index number that is cross-referenced to an associated parts list.

### 6-2. PARTS LISTS

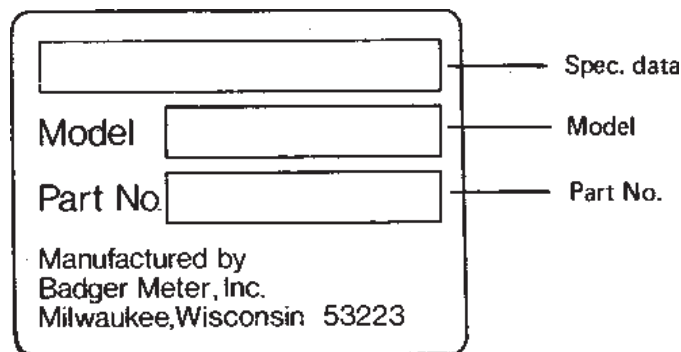
The parts lists consist of columnar lists of the assemblies and parts that are shown in the part location illustrations and provide the following information for each item listed.

- a. FIGUREANDINDEXNUMBER.
- b. PARTNUMBER.
- c. DESCRIPTION.

### 6-3. ORDERING INFORMATION

Order replaceable parts for applicable register through the local Badger Meter Sales Representative or directly from the Industrial Sales Department, Flow Products Division of Badger Meter, Inc. (address on title page). When placing an order, provide the following information:

- a. Complete name plate data.
- b. Dial capacity and number of fixed digits behind the totalizer.
- c. Complete description of the assembly or parts required.
- d. Part number of the item as indicated in the parts list.
- e. Quantity of parts required.
- f. A purchase order number and exact return and billing address.



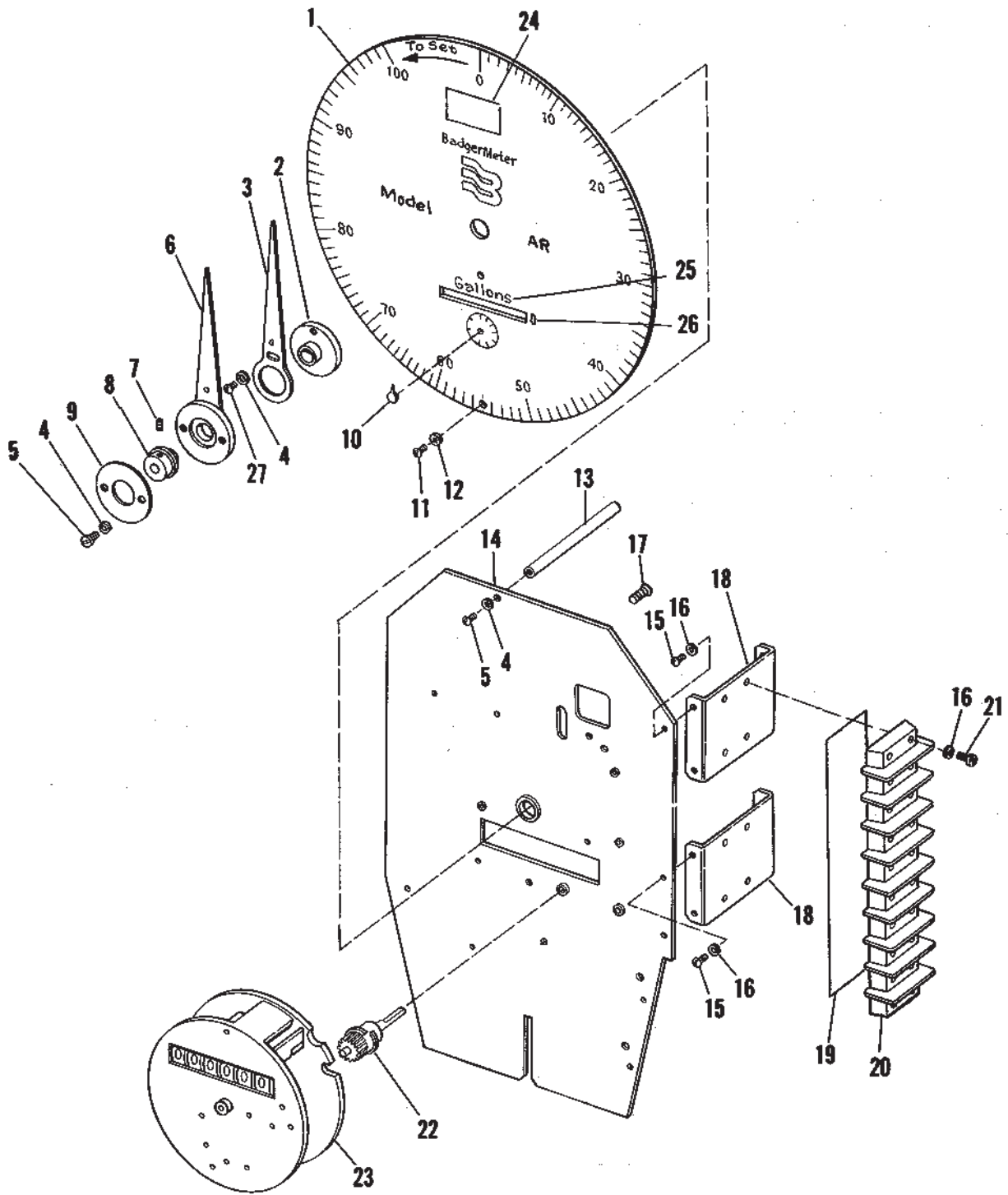
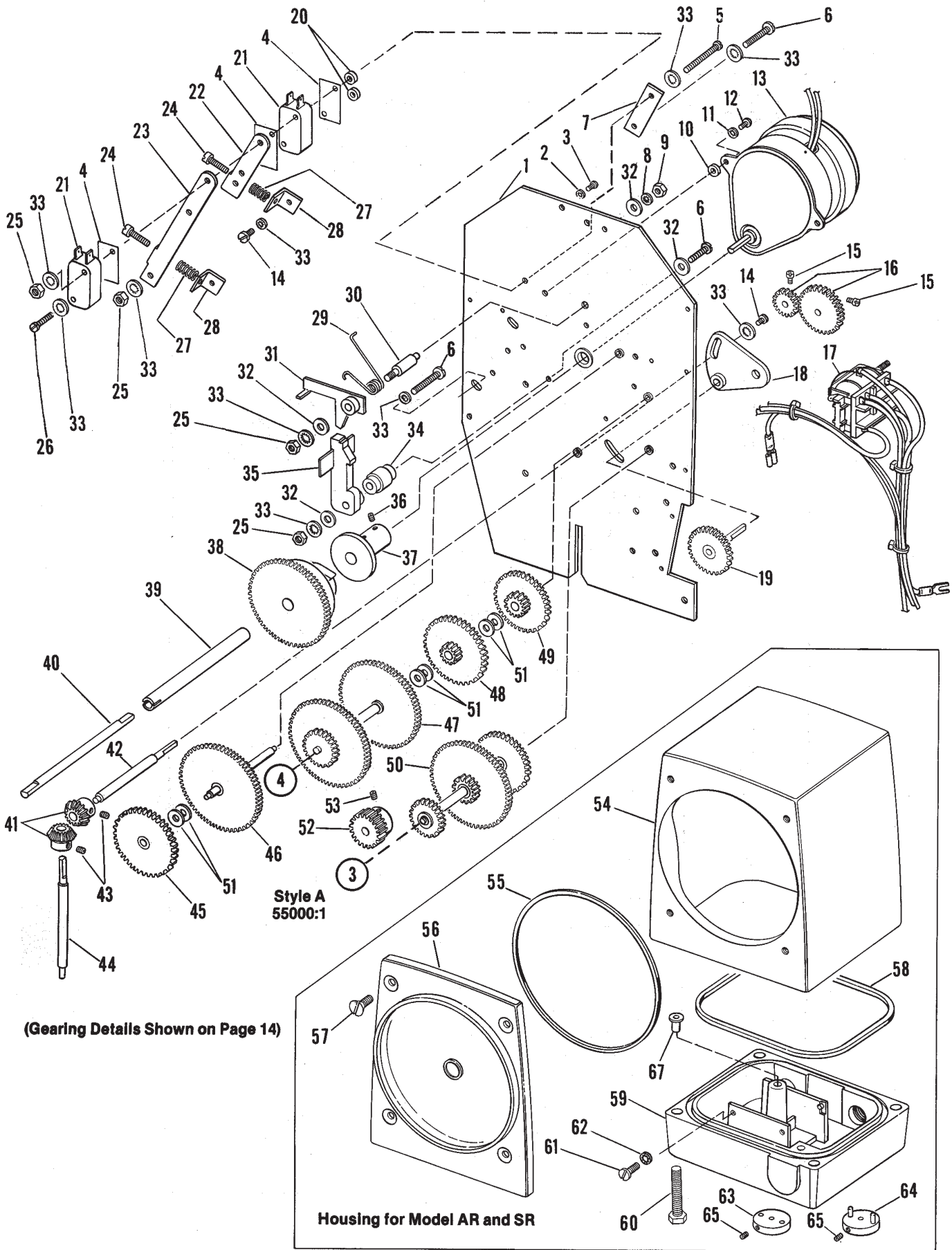


Figure 6-1. Model AR Front Plate

ITEM	PART NUMBER	DESCRIPTION
1	56599-00300	Dial - 1 00 Gal. Capacity
1	56599-00400	Dial - 200 Gal. Capacity
1	56599-00500	Dial - 500 Gal. Capacity
2	56948-00100	Delivery Pointer Hub Assy.
3	24349-00000	Delivery Pointer
4	20454-00000	Lockwasher#3
5	55090-08600	Pan Head Screw - 3-48 x 3/16
6	56949-00100	Preset Pointer Assembly
7	21451-00000	Set Screw - 4-48 x 1/8
8	30089-00000	Preset Pointer Hub
9	30090-00000	Pointer Retainer Plate
10	33319-00000	Pointer
11	31820-00000	Pan Head Screw - 2-32 x 5/16
12	55293-00300	Lockwasher
13	21700-00000	Spacer Post
14	56678-00300	Front Plate Assembly
15	55109-16700	Round Head Screw - 6-32 x 3
16	55294-00700	Lockwasher#6
17	31820-00400	Flat Head Screw - 2-32 x 3/8
18	56664-00100	Terminal Mounting Bracket
19	31898-00800	Marker Strip, B-Term. AR w/Relay
19	31898-00900	Marker Strip, 6-Term. AR less/Relay
20	22800-01800	Terminal Strip, 8-Term. AR w/Relay
20	22800-01700	Terminal Strip, 6-Term. AR less/Relay
21	55090-17200	Pan Head Screw - 6-32 x 1/2
22	56630-00100	Spindle and Cam Assembly
23	56950-00100	Totalizer Assembly
24	56600-00500	1 000 Capacity Label x 10
24	56600-00500	2000 Capacity Label x 10
24	56600-00500	5000 Capacity Label x 10
24	56600-00600	1 OM Capacity Label x 100
24	56600-00600	20M Capacity Label x 100
24	56600-00600	50M Capacity Label x 100
24	56600-00700	1 OOM Capacity Label x 1 000
24	56600-00700	200M Capacity Label x 1 000
24	56600-00700	300M Capacity Label x 1 000
24	56600-00800	1 OOOM Capacity Label x 1 0,000
24	56600-00800	2000M Capacity Label x 1 0,000
24	56600-00800	5000M Capacity Label x 1 0,000
24	56600-00900	1 O,OOOM Capacity Label x 1 OOM
25	56600-00200	Label - Liters
25	56600-00300	Label - M3
25	56600-01400	Label - imp. Gallons
25	56600-01000	1 00 Test Circle Label - 00
25	56600-01100	1 000 Test Circle Label - 000
26	56600-01500	.1 Test Circle Label - x .1
26	56600-01600	Blank Label
27	55109-08600	Round Head Screw - 3-48 x 3/16



(Gearing Details Shown on Page 14)

Housing for Model AR and SR

Figure 6-2. Model AR Back Plate

FIG. 6-2 ITEM NO.	PART NO.	DESCRIPTION	FIG. 6-2 ITEM NO.	PART NO.	DESCRIPTION
1	56679-00300	Back Plate Assembly	32	22562-01300	Flat Washer
2	20454-00000	Lockwasher No. 3	33	55292-00500	Lock Washer No. 4 Int. Teeth
3	55090-08600	Rd. Head Screw — 3-48 x 3/16	34	56656-00100	Post, Pivot Switch Arm
4	24579-00100	Insulation	35	24580-00100	Switch Arm
5	55089-12600	Pan Head Screw — 4-40 x 1-3/8	36	55230-16500	Set Screw No. 6-32 x 1/8
6	55089-12200	Pan Head Screw — 4-40 x 7/8	37	24336-00000	Motor Cam Assembly
7	56639-00100	Switch Retaining Plate	38	56660-00100	Clutch and Gear Assembly
8	55283-00700	Lockwasher No. 6	39	56648-00100	Shaft, Delivery Pointer
9	55002-03400	Hex Nut No. 6	40	56652-00100	Spindle No. 7 — Preset Pointer
10	23983-02800	Spacer	41	20398-00000	Miter Gear
11	55270-00500	Lockwasher	42	56634-00100	Drive Spindle
12	55046-11400	Pan Head Screw — 4-40 x 1/4	43	55230-16500	Set Screw No. 6-32 x 1/8
13	24335-00000	Motor — 110 V, 60 Hz., 20 rph	44	56649-00100	Input Spindle
13	24335-00100	Motor — 24 V, 60 Hz., 20 rph	45	56670-00100	Gear and Pinion Assy. Style A & B
13	24335-00200	Motor — 220 V, 50 Hz., 20 rph	46	56960-00400	Gear & Spindle Assy. Style A,B,C, & D
13	24335-00300	Motor — 110 V, 60 Hz., 4 rph	47	56959-00500	Gear & Spindle Assy. Style A
14	55109-11300	Rd. Head Screw — 4-40 x 3/16	48	56670-00500	Style A Gear and Hub Assembly
*15	1065-00000	Set Screw	49	56676-00100	Style A Gear and Pinion Assy.
*16	32652-00000	Change Gear — Spec. No. Teeth	50	56955-00100	Style A Gear & Spindle Assy.
*17	56966-00100	AR Relay w/Wire Harness, 110 V	51	22562-01200	Flat Washer
17	56966-00200	AR Relay w/Wire Harness, 220 V	52	34780-00100	Gear — 20 Teeth
17	56966-00300	AR Relay w/Wire Harness, 24 V	53	55230-11300	Set Screw — 4-40 x 3/16
17	53841-00100	Wire Harness, AR less Relay	54	56564-00100	Housing
18	56867-00100	Adjusting Plate	55	22559-01600	Tetraseal
19	56673-00100	Change Gear Spindle Assy.	56	56563-00100	Lens and Bezel
20	31239-00100	Spacer — .109 Long	57	55068-27400	Flat Head Screw — 1/4-20 x 3/8
*21	24574-00100	Switch	58	22559-04200	Tetraseal
22	56654-00100	Switch Adj. Bracket — Short	59	56750-00100	Base
23	56655-00100	Switch Adj. Bracket — Long	60	55030-11800	Hex Capscrew — 1/4-20 x 1-3/4
24	55046-12300	Fil. Head Screw — 4-40 x 5/8	61	55109-19700	Round Head Screw — 8-32 x 3/8
25	55002-03200	Hex Nut — 4-40	62	55294-00800	Lockwasher No. 8
26	55089-11800	Pan Head Screw — 4-40 x 1/2	63	56646-00200	Coupling — Upper
27	22602-00900	Spring	64	56646-00300	OP Meters Coupling — Lower
28	56736-00100	Switch Adjustment Bracket	64	56646-00100	Other Meters Coupling — Lower
29	24334-00000	Spring	65	21451-00000	Set Screw — 4-48 x 1/8
30	24333-00000	Pawl Pivot Post	66	22562-00900	Flat Washer (Gear Spacer)
31	24330-00000	Pawl and Hub Assembly	67	56691-00100	Bushing

\*Recommended Spare Parts

For gear reductions, see table 6-1

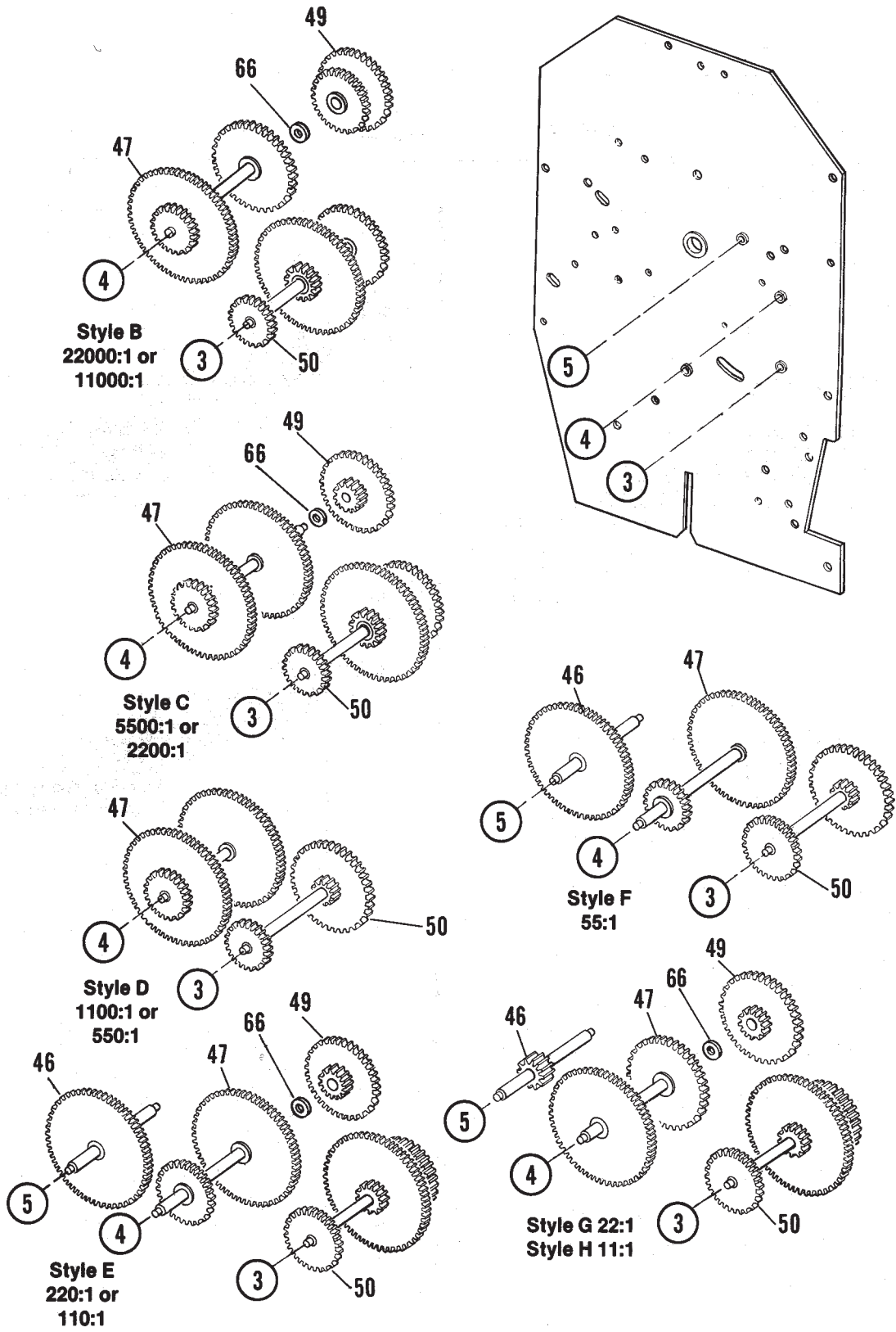


Figure 6-2. (Continued) Model AR Gearing

FIG. 6-2 ITEM NO.	PART NO.	DESCRIPTION
45	56670-00100	Style A & B Gear & Pinion Assy.
45	56670-00100	Style C Gear & Pinion Assy. (5500:1)
45	56670-00700	Style C Gear & Pinion Assy. (2200:1)
45	56670-00700	Style D Gear & Pinion Assembly
46	56960-00400	Style A,B,C, & D Gear & Spindle Assy.
46	56960-00600	Style E & F Gear and Spindle Assembly
46	56960-00300	Style G & H Gear and Spindle Assembly
47	56959-00500	Style A Gear and Spindle Assembly
47	56960-00100	Style B Gear and Spindle Assembly
47	56957-00400	Style C Gear & Spindle Assy. (5500:1)
47	56957-00500	Style C Gear & Spindle Assy. (2200:1)
47	56958-00100	Style D Gear & Spindle Assy. (1100:1)
47	56958-00200	Style D Gear & Spindle Assy. (550:1)
47	56957-00100	Style E Gear and Spindle Assembly
47	56958-00600	Style F Gear and Spindle Assembly
47	56960-00200	Style G Gear and Spindle Assembly
47	56957-00200	Style H Gear and Spindle Assembly
48	56670-00500	Style A Gear and Hub Assembly
49	56676-00100	Style A Gear and Pinion Assembly
49	56670-00100	Style B Gear Pinion Assy. (22000:1)
49	56670-00400	Style B Gear & Pinion Assy. (11000:1)
49	56670-00600	Style C Gear & Pinion Assy. (5500:1)
49	56676-00100	Style C Gear & Pinion Assy. (2200:1)
49	56670-00600	Style E Gear & Pinion Assy. (220:1)
49	56676-00100	Style E Gear & Pinion Assy. (110:1)
49	56670-00400	Style G Gear and Pinion Assembly
49	56670-00600	Style H Gear and Pinion Assembly
50	56955-00100	Style A Gear & Spindle Assembly
50	56956-00200	Style B Gear & Spindle Assy. (22000:1)
50	56956-00300	Style B Gear & Spindle Assy. (11000:1)
50	56955-00200	Style C Gear & Spindle Assy. (5500:1)
50	56955-00300	Style C Gear & Spindle Assy. (2200:1)
50	56956-00400	Style D Gear & Spindle Assy. (1100:1)
50	56956-00500	Style D Gear & Spindle Assy. (550:1)
50	56955-00400	Style E Gear & Spindle Assy. (220:1)
50	56955-00500	Style E Gear & Spindle Assy. (110:1)
50	56956-00400	Style F Gear and Spindle Assembly
50	56956-00100	Style G Gear and Spindle Assembly
50	56955-00600	Style H Gear and Spindle Assembly

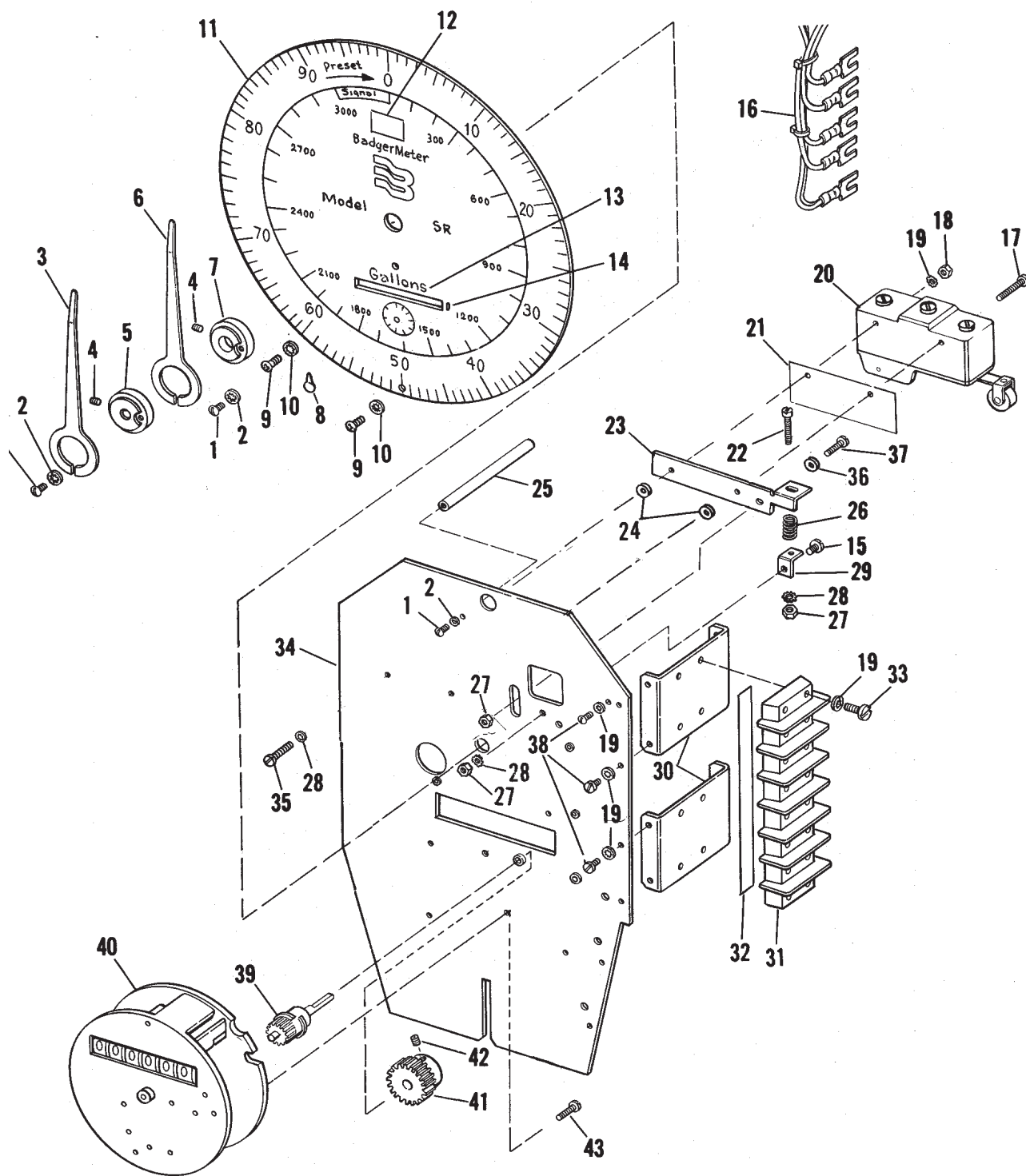
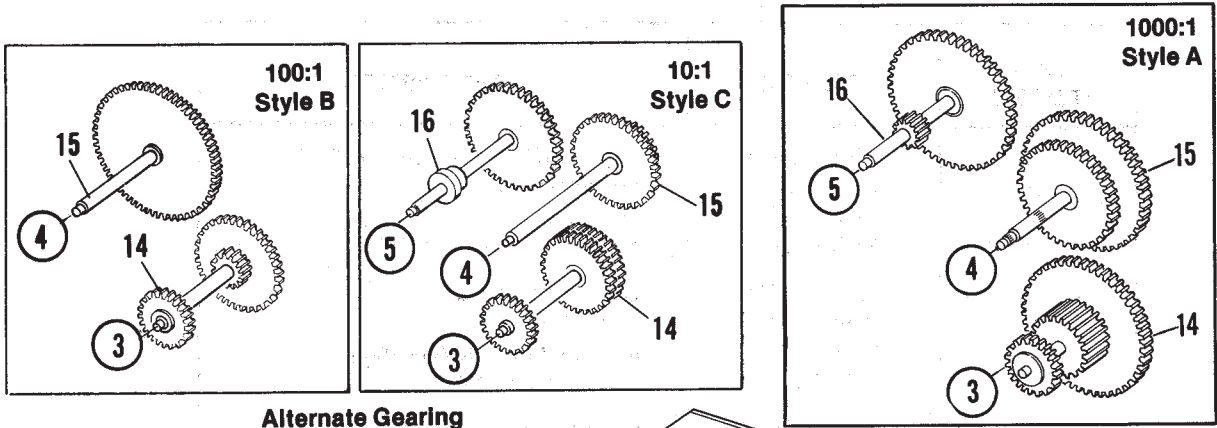


Figure 6-3. Model SR Front Plate

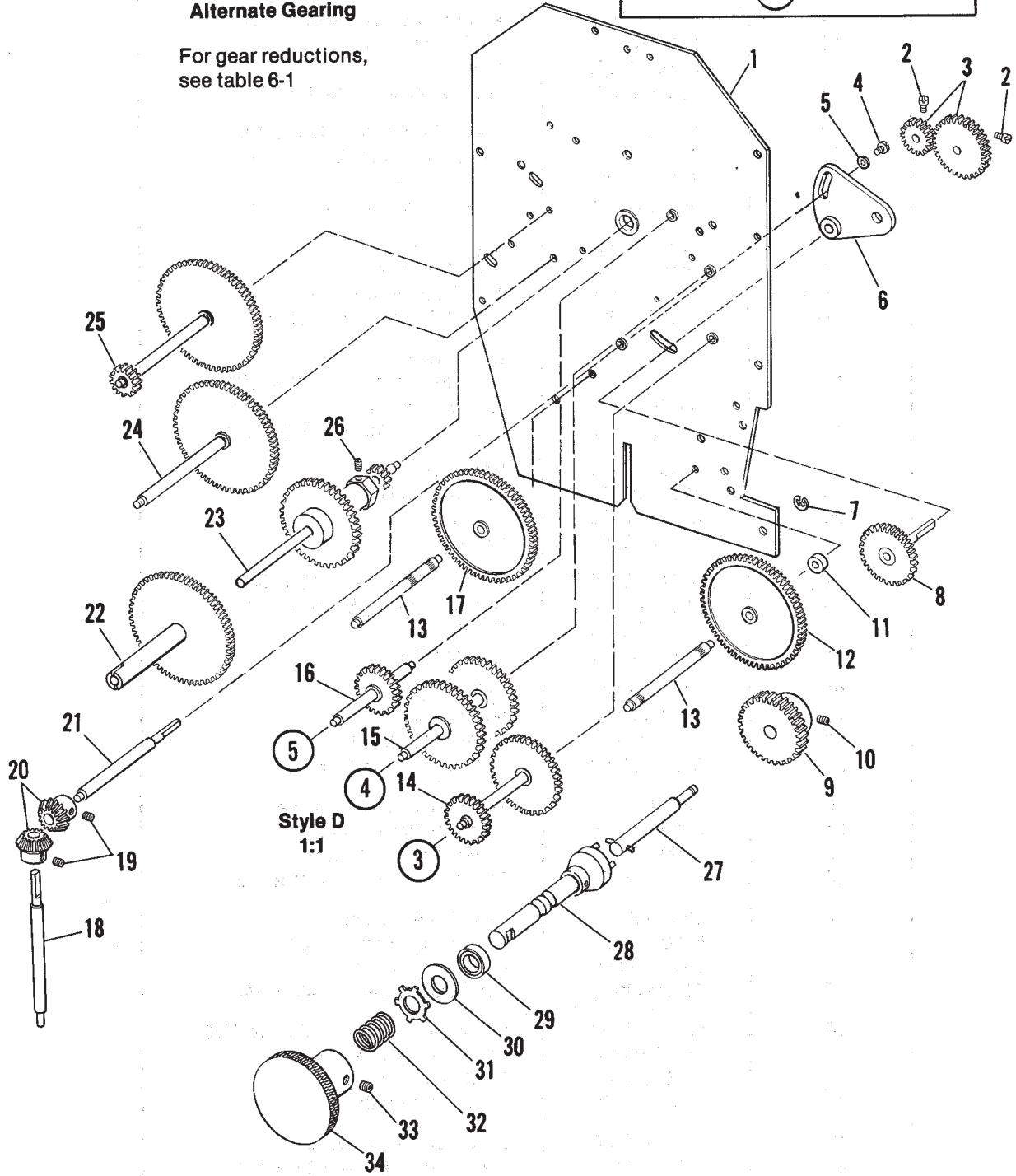
FIG. 6-3 ITEM NO.	PART NO.	DESCRIPTION
1	55090-08600	Pan Head Screw — 3-48 x 3/16
2	20454-00000	Lockwasher No. 3
3	22859-00000	Outer Pointer
4	21451-00000	Set Screw — 4-48 x 1/8
5	22860-00000	Outer Pointer Hub
6	22859-00100	Inner Pointer
7	56962-00100	Inner Pointer Hub Assembly
8	33319-00000	Test Circle Pointer
9	31820-00000	Pan Head Screw — 2-32 x 5/16
10	55293-00300	Lockwasher No. 2
11	56599-00100	Dial
12	56600-00500	30,000 Capacity Label x 10
12	56600-00600	300,000 Capacity Label x 100
12	56600-00700	3,000,000 Cap. Label x 1000
13	56600-00200	Label — Liters
13	56600-01400	Label — Imp. Gallons
13	56600-00300	Label — M <sup>3</sup>
14	56600-01000	100 Test Circle Label — 00
14	56600-01100	1000 Test Circle Label — 000
14	56600-01500	.1 Test Circle Label — x .1
14	56600-01600	Blank Label
15	55090-11500	Pan Head Screw — 4-40 x 5/16
16	56844-00100	Wiring Harness
17	55109-17500	Round Head Screw — 6-32 x 3/4
18	55002-03400	Hex Nut — 6-32
19	55294-00700	Lockwasher No. 6
*20	24574-00500	Signal Switch
21	56872-00100	Insulation
22	55046-12300	Fil. Head Screw — 4-40 x 5/8
23	56734-00100	Switch Adjusting Bracket
24	22562-00100	Flat Washer
25	21700-00000	Spacer Port
26	22602-02500	Spring
27	55002-03200	Hex Nut — 4-40
28	55291-00500	Lockwasher No. 4
29	56736-00100	Switch Adjusting Bracket
30	56664-00100	Terminal Mounting Bracket
31	22800-01400	Terminal Strip — 4 Term.
32	31898-01000	Marker Strip — 4 Term.
33	55090-17200	Pan Head Screw — 6-32 x 1/2
34	56678-00100	Front Plate Assembly
35	55109-17700	Round Head Screw — 6-32 x 1
36	55291-00500	Lockwasher No. 4
37	55089-11400	Pan Head Screw — 4-40 x 1/4
38	55109-16700	Round Head Screw — 6-32 x 3/16
39	56630-00100	Cam Spindle Assembly
40	56950-00100	Totalizer Assembly
41	34780-00100	Gear — 20 Teeth
42	55230-11300	Set Screw — 4-40 x 3/16
43	31820-00400	Flat Head Screw — 2-32 x 3/8

\*Recommended Spare Parts



**Alternate Gearing**

For gear reductions, see table 6-1



**Figure 6-4. Model SR Back Plate and Gearing**

FIG. 6-4 ITEM NO.	PART NO.	DESCRIPTION
1	56679-00100	Back Plate Assembly
*2	1065-00000	Set Screw — 4-48
*3	32652-00000	Change Gear — Spec. No. Teeth
4	55109-11300	Round Head Screw — 4-40 x 3/16
5	55283-00500	Lockwasher No. 4
6	56867-00100	Adjusting Plate Assembly
7	22570-00300	"E" Ring
8	56673-00100	Change Gear Spindle Assembly
9	26459-03000	Drive Pinion — 30 Teeth
10	55230-11300	Set Screw — 4-40 x 3/16
11	56708-00100	Spacer
12	56720-00100	Gear Cluster — 50 Teeth
13	56711-00100	Spindle
14	56955-00700	Style A Gear & Spindle Assy.
14	56956-00400	Style B Gear & Spindle Assy.
14	56956-00600	Style C Gear & Spindle Assy.
14	56955-00800	Style D Gear & Spindle Assy.
15	56960-00500	Style A Gear & Spindle Assy.
15	56958-00400	Style B Gear & Spindle Assy.
15	56958-00500	Style C Gear & Spindle Assy.
15	56959-00100	Style D Gear & Spindle Assy.
16	56959-00300	Style A Gear & Spindle Assy.
16	56959-00300	Style B Gear & Spindle Assy.
16	56959-00400	Style C Gear & Spindle Assy.
16	56959-00200	Style D Gear & Spindle Assy.
17	56710-00100	Gear & Hub Assy. — 60 Teeth
18	56649-00100	Input Spindle
19	55230-16500	Set Screw — 6-32 x 1/8
20	20398-00000	Miter Gear
21	56634-00100	Drive Spindle
22	56706-00200	Gear & Cam Assy. — 77 Teeth
23	56705-00600	Clutch Spindle Assy., Style A, B & C
23	56705-00700	Clutch Spindle Assy., Style D
24	56957-00300	Spindle Assembly
25	56958-00300	Spindle Assembly
26	55234-11100	Set Screw — 4-48 x 1/8
27	56961-00100	Reset Spindle
28	56787-00100	Reset Knob Spindle Assembly
29	22877-00400	"V" Ring
*30	22562-02300	Flat Washer
31	56751-00100	Retaining Ring
32	22602-02400	Spring
*33	55230-19400	Set Screw — 8-32 x 3/16
*34	24399-00000	Control (Preset) Knob

\*Recommended Spare Parts

**Table 6-1. Gear Reduction Versus Dial Capacities**

**MODEL AR AUTOMATIC RESET REGISTER**

METER SIZE	REGISTER TEST CIRCLE	DIAL CAPACITY	REDUCTION RATIO
5/8" Through 1"	10	100	11:1
	10	200	22:1
	10	500	55:1
	10	1,000	110:1
	10	2,000	220:1
	10	5,000	550:1
	10	10,000	1,100:1
	10	20,000	2,200:1
	10	50,000	5,500:1
	10	100,000	11,000:1
	10	200,000	22,000:1
1-1/2" Through 3"	100	1,000	11:1
	100	2,000	22:1
	100	5,000	55:1
	100	10,000	110:1
	100	20,000	220:1
	100	50,000	550:1
	100	100,000	1,100:1
	100	200,000	2,200:1
	100	500,000	5,500:1
	100	1,000,000	11,000:1
	100	2,000,000	22,000:1
4" and Over	1,000	50,000	55:1
	1,000	100,000	110:1
	1,000	200,000	220:1
	1,000	500,000	550:1
	1,000	1,000,000	1,100:1
	1,000	2,000,000	2,200:1
	1,000	5,000,000	5,500:1
	1,000	10,000,000	11,000:1

**MODEL SR SIGNAL REGISTERS**

METER SIZE	REGISTER TEST CIRCLE	OUTER CIRCLE	INNER CIRCLE	REDUCTION RATIO
5/8" Through 1"	10	100	3,000	10:1
	10	1,000	30,000	100:1
	10	10,000	300,000	1,000:1
1-1/2" Through 3"	100	100	3,000	1:1
	100	1,000	30,000	10:1
	100	10,000	300,000	100:1
	100	100,000	3,000,000	1,000:1
4" and Above	1,000	1,000	30,000	1:1
	1,000	10,000	300,000	10:1
	1,000	100,000	3,000,000	100:1

## WARRANTY

Badger warrants meters and parts manufactured by it and supplied hereunder to be free from defects in materials and workmanship for a period of 18 months from date of shipment or 12 months from date of installation, whichever period shall be shorter. If within such period any meters or parts shall be proved to Seller's satisfaction to be defective, such meters or parts shall be repaired or replaced at Seller's option. Seller's obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Seller's receiving written notice of any alleged defect within 10 days after its discovery and, at Seller's option, return of such meters or parts to Seller f.o.b. its factory. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES WHATSOEVER INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES (EXCEPT OF TITLE) OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Badger shall not be liable for any defects attributable to acts or omissions of others after shipment, nor any consequential, incidental or contingent damage whatsoever.

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