Product Instruction P22-7

Area Meter
Type JR

Bailey Babcock & Wilcox
### LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mounting Dimensions, 1 inch Area Meter, 750 psi (Type JR1324A)</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Mounting Dimensions, 1 inch Area Meter, 600 psi (Type JR134A)</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Mounting Dimensions, 2 inch Area Meter, 750 psi (Type JR1324A)</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Mounting Dimensions, 2 inch Area Meter, 600 psi (Type JR134A)</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Mounting Dimensions, 4 inch Area Meter, 750 psi (Type JR1322A)</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Mounting Dimensions, 4 inch Area Meter, 600 psi (Type JR134A)</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Routine Maintenance Check Points</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Vane Nozzle Relationship</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>Spring Puller</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>Calibrating Micrometer</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>Indicating and Transmitting Mechanism Adjustments</td>
<td>21</td>
</tr>
<tr>
<td>12</td>
<td>Spindle and Flow Pointer Linkage at 750 psi Scale</td>
<td>22</td>
</tr>
<tr>
<td>13</td>
<td>Indicating Pointer Adjustments</td>
<td>23</td>
</tr>
<tr>
<td>14</td>
<td>Type JR13 Area Meter</td>
<td>26</td>
</tr>
<tr>
<td>15</td>
<td>Schematic of Booster Unit Operation</td>
<td>27</td>
</tr>
<tr>
<td>16</td>
<td>Booster Unit Inlet Exhaust Valve</td>
<td>27</td>
</tr>
<tr>
<td>17</td>
<td>Temperature Variations for Petroleum Oils</td>
<td>29</td>
</tr>
<tr>
<td>18</td>
<td>Specific Gravity Correction Factors</td>
<td>30</td>
</tr>
<tr>
<td>19</td>
<td>Flow Viscosity Correct on Factor for 1 inch, Style F40, JR13 Area Meter</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>Flow Viscosity Correct on Factor for 1 inch, Style F21, JR13 Area Meter</td>
<td>31</td>
</tr>
<tr>
<td>21</td>
<td>Flow Viscosity Correct on Factor for 1 inch, Style F22, JR13 Area Meter</td>
<td>31</td>
</tr>
<tr>
<td>22</td>
<td>Flow Viscosity Correct on Factor for 1 inch, Style F24, JR13 Area Meter</td>
<td>32</td>
</tr>
<tr>
<td>23</td>
<td>Flow Viscosity Correct on Factor for 2 inch, Style F44, JR13 Area Meter</td>
<td>32</td>
</tr>
<tr>
<td>24</td>
<td>Parts Drawing P22-40, Indicating and Transmitting Mechanism for Style F87 JR13 Area Meter</td>
<td>34</td>
</tr>
<tr>
<td>25</td>
<td>Parts Drawing P22-41, 1 inch JR13 Area Meter (750 and 600 psi)</td>
<td>36</td>
</tr>
<tr>
<td>26</td>
<td>Parts Drawing P22-42, 1 inch JR13 Area Meter (250 and 600 psi)</td>
<td>37</td>
</tr>
<tr>
<td>27</td>
<td>Parts Drawing P22-44, 4 inch JR13 Area Meter (600 psi)</td>
<td>38</td>
</tr>
<tr>
<td>28</td>
<td>Parts Drawing P22-43, 4 inch JR13 Area Meter (250 psi)</td>
<td>39</td>
</tr>
<tr>
<td>29</td>
<td>Parts Drawing P22-37 Booster Unit Pt No 316900A</td>
<td>40</td>
</tr>
</tbody>
</table>
# INDEX

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSTALLING THE AREA METER</td>
<td>7</td>
</tr>
<tr>
<td>ROUTINE SERVICING</td>
<td></td>
</tr>
<tr>
<td>Measuring Mechanism</td>
<td>7</td>
</tr>
<tr>
<td>Indicating and Transmitting Mechanism</td>
<td>7</td>
</tr>
<tr>
<td>Weekly</td>
<td>7</td>
</tr>
<tr>
<td>Monthly</td>
<td>8</td>
</tr>
<tr>
<td>Periodically</td>
<td>8</td>
</tr>
<tr>
<td>CORRECTIVE MAINTENANCE</td>
<td></td>
</tr>
<tr>
<td>Transmitter Operation Checks</td>
<td>8</td>
</tr>
<tr>
<td>Booster Unit Operation Checks</td>
<td>8</td>
</tr>
<tr>
<td>Vane Replacement</td>
<td>9</td>
</tr>
<tr>
<td>Nozzle Replacement</td>
<td>9</td>
</tr>
<tr>
<td>Bellows and Vane Mechanism Replacement</td>
<td>9</td>
</tr>
<tr>
<td>Booster Unit Replacement</td>
<td>10</td>
</tr>
<tr>
<td>Booster Unit Fault Correction Chart</td>
<td>10</td>
</tr>
<tr>
<td>Disassembly of Area Meter</td>
<td>11</td>
</tr>
<tr>
<td>Reassembly of Area Meter</td>
<td>12</td>
</tr>
<tr>
<td>Rotating Topwork Assembly</td>
<td>14</td>
</tr>
<tr>
<td>1 inch Area Meter Only</td>
<td>14</td>
</tr>
<tr>
<td>2 inch Area Meter Only</td>
<td>16</td>
</tr>
<tr>
<td>4 inch Area Meter Only</td>
<td>16</td>
</tr>
<tr>
<td>Repositioning of Dowel Pins</td>
<td>17</td>
</tr>
<tr>
<td>1 inch Area Meter Only</td>
<td>17</td>
</tr>
<tr>
<td>2 inch Area Meter Only</td>
<td>18</td>
</tr>
<tr>
<td>4 inch Area Meter Only</td>
<td>19</td>
</tr>
<tr>
<td>CALIBRATING THE AREA METER</td>
<td></td>
</tr>
<tr>
<td>Positioning Metering Plug</td>
<td>19</td>
</tr>
<tr>
<td>Disassembling Micrometer</td>
<td>20</td>
</tr>
<tr>
<td>Transmitter Adjustment Checks</td>
<td>21</td>
</tr>
<tr>
<td>Complete Calibration Procedure</td>
<td>21</td>
</tr>
<tr>
<td>Flow (Black) Pointer</td>
<td>21</td>
</tr>
<tr>
<td>Output Pressure</td>
<td>23</td>
</tr>
<tr>
<td>Output Pressure (Red) Pointer</td>
<td>24</td>
</tr>
<tr>
<td>Resetting Loading Spring</td>
<td>24</td>
</tr>
<tr>
<td>Booster Unit</td>
<td>25</td>
</tr>
<tr>
<td>HOW THE AREA METER OPERATES</td>
<td></td>
</tr>
<tr>
<td>Measuring Mechanism</td>
<td>25</td>
</tr>
<tr>
<td>Transmitting Mechanism</td>
<td>26</td>
</tr>
<tr>
<td>CORRECTION FACTORS</td>
<td></td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>28</td>
</tr>
<tr>
<td>Oil Composition</td>
<td>28</td>
</tr>
<tr>
<td>Viscosity Correction</td>
<td>28</td>
</tr>
<tr>
<td>Recalibration</td>
<td>28</td>
</tr>
<tr>
<td>EXPLANATION OF NOMENCLATURE</td>
<td></td>
</tr>
<tr>
<td>REPLACEMENT PARTS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>33</td>
</tr>
</tbody>
</table>
FIGURE 1  Mounting Dimensions 1 inch Area Meter, 250 psi (Type JR137□A)

FIGURE 2  Mounting Dimensions 1 inch Area Meter, 600 psi (Type JR134□A)
FIGURE 3  Mounting Dimensions, 2 inch Area Meter, 250 psi (Type JR132□A)

FIGURE 4  Mounting Dimensions, 2 inch Area Meter, 600 psi (Type JR134□A)
FIGURE 5  Mounting Dimensions, 4 inch Area Meter, 250 psi (Type JR1327A)

FIGURE 6  Mounting Dimensions, 4 inch Area Meter, 600 psi (Type JR1342A)
INSTALLING THE AREA METER

The Type JR13 Area Meter is shipped completely assembled. (A spring puller to be used as a calibration tool is also shipped with each meter.)

1. Install meter directly in pipeline between standard mating flanges. Loading spring should hang vertically. Meter body flanges are 150 or 600 psig ANSI standard raised face design. Refer to Figures 1 thru 6 for applicable mounting dimensions.

2. Transmitter is mounted on meter with indicating scale facing outward when direction of flow is left to right. If it is necessary, due to inaccessibility or lack of clearance, to reverse transmitter, topwork assembly of Area Meter can be rotated 180 degrees on meter body. Refer to "Rotating Topwork Assembly".

3. A dampener is included with all 1 inch and 2 inch Area Meters. The dampener reduces meter pulsation occurring primarily in marine applications. If dampener is not required for the specific meter application, remove rod as follows:

   a. Remove cover screws (or locknuts from studs) and cover.

   b. Hold metering plug stemocknut (Figure 10) with wrench to prevent stem from moving. (Movement of stem will disturb factory calibration.)

   c. Unscrew dampener rod from threaded extension of metering plug stem. Discard dampener rod.

   d. Replace cover.

4. Refer to Instruction Section G18.2 for recommended methods and precautions for installing connecting tubing.

5. Inspect indicating and transmitting mechanism connecting linkage for damage. Remove shipping screw (identified by red warning tag) in lower right hand corner of Transmitter case.

6. If meter is used for measurement of highly viscous fluids, such as pitch:

   a. Heat and insulate entire meter body, including spring housing. Steam tracing, electrical strip heaters, or a heating cable is recommended for heating. Fiber glass or a similar material is recommended for insulating. Keeping meter body temperature at flowing fluid temperature prevents loss of active fluid at meter from solidifying in spring chamber, making meter inaccurate and/or inoperative.

   b. If necessary, replace drain at bottom of spring housing with a nipple and valve assembly to facilitate blowdown procedures.

   c. Install a bypass line around meter to facilitate checking meter operation particularly if flow thru the meter is constant over an extended period.

7. Check Transmitter calibration as outlined under "Transmitter Adjustment Checks."

ROUTINE SERVICING

MEASURING MECHANISM

1. Every three or four months, remove drain plug from bottom of spring housing and thoroughly flush meter body. Flush meter body more frequently if measured fluid tends to congeal.

INDICATING AND TRANSMITTING MECHANISM

Weekly

1. Press Booster Unit orifice clean out plunger (Figure 7) to insure that orifice remains open and clean.
NOTE Perform this operation only when associated equipment in the system has been transferred to MANUAL operation to insure that the process will not be disturbed

1. Inspect nozzle tip and vane (Figure 7) for deposits of oil or dirt. If necessary, clean with a common solvent.

**CORRECTIVE MAINTENANCE**

If system operation indicates a discrepancy in pressure measurement which is suspected or traced to the Transmitter, check the following possible sources of error.

**TRANSMITTER OPERATION CHECKS**

1. The Transmitter must be in perfect calibration (see "Calibrating the Area Meter").

2. Air supply must be accurate and from a clean regulated source. Presence of oil around vane nozzle indicates contaminated supply source.

3. The vane nozzle and Booster Ray must be free of dirt or dust.

4. Connect piping to Transmitter must be clean and free of corrosion. Sluggish operation may indicate corrosive build up in piping.

**MONTHLY**

1. Inspect Booster Unit exhaust valve (Figure 7) for accumulations of oil, dirt, and moisture. If necessary, replace filter in supply pressure port as follows:
   a. Disconnect supply air tubing (Figure 7) and remove filter cap O-ring, and filter spring (Items 6, 7, and 8, Figure 29)
   b. Remove and replace filter assembly. Make certain new filter is installed with open end facing inward.
   c. Reassemble parts and reconnect tubing.

**CAUTION** Filter in supply pressure port is included as added protection only and is not intended as a replacement for the required clean air supply.

**PERIODICALLY**

1. Check air supply. Make certain that clean air, free of oil, dirt, and moisture, is supplied to the Booster Unit.

2. Clean Transmitter. Deposits of oil and dirt make instrument operation sluggish or inaccurate.

5. A connecting tubing must be air tight. Check all tubing for leakage with a leak detecting solution.

6. Check operation of Booster Unit (see "Booster Unit Operation Checks", below).

7. Faulty records or measurements are often caused by the process itself. Examine indications, records, and system component operation carefully to locate faulty component equipment.

**BOOSTER UNIT OPERATION CHECKS**

1. Push vane against nozzle to block air flow from nozzle (Figure 8). Transmitter output pressure should immediately start to increase toward full supply pressure.

2. Pull vane away from nozzle far enough to allow an unrestricted air flow from the nozzle.
Transmitter output pressure should immediately start to decrease to zero

3 If Booster unit does not operate as described in steps 1 and 2, push orifice clean out plunger (Figure 7) to clear orifice (when performing this operation, make certain process will not be disturbed) If Booster continues to operate incorrectly, make the following checks and corrective adjustments

a Check that adjustable vane end is correctly positioned (Figure 8) When vane end is correctly positioned, nozzle tip is opposite center of vane (thinnest area) when midrange measured pressure is applied to Transmitter To adjust vane end position, apply midrange measured pressure to Transmitter, loosen nut holding vane end in place, and reposition vane end.

b Check that vane is parallel to plane of nozzle tip (Figure 8) With Booster unit "at balance", press lightly against vane with pointed instrument at four or more points around nozzle tip (above, below, on either side) If pressure at any of these points produces the relationship shown in Figure 8, Sketch B, either vane is not parallel to plane of nozzle tip or there is a burr on nozzle tip To adjust, bend vane slightly If vane and nozzle tip relationship is still incorrect, rub a fine emery cloth across nozzle tip to remove possible burr

c Repeat steps 1 and 2 under "Booster Unit Operation Checks" above and note output pressure reading If Booster unit output is incorrect see "Fault Correction Chart"

VANE REPLACEMENT (Figure 24)

1 Remove instrument from service and remove cover

2 Remove screws (47) holding vane and operating lever assembly (60) Remove assembly and disconnect vane (from) drive link (23)

3 Replace vane and operating lever assembly

4 Reconnect vane drive link and reposition vane and operating lever assembly

FIGURE 8 Vane Nozzle Relationship

NOZZLE REPLACEMENT (Figure 24)

1 Remove instrument from service and remove cover

2 Loosen nozzle screw (44) and screw (39) holding capillary clip (40) Disconnect nozzle air line (64) at Booster Unit connection (65)

3 With pliers, carefully withdraw nozzle air line (64) from nozzle clamp block (61)

4 Replace nozzle air line (64) assembly and reassemble

NOTE When replacing nozzle, readjust the vane and nozzle relationship as described under "Booster Unit Operation Checks"

BELLOWS AND VANE MECHANISM REPLACEMENT (Figure 24)

1 Remove instrument from service and remove cover

2 Loosen screw (44) and carefully remove nozzle from nozzle clamp block (61)

3 Remove three screws (41) holding bellows and vane mechanism Remove air line from bellows at tee (38)

4 Pull assembly forward and disconnect vane and nozzle arm drive link (23) from vane and nozzle adjustable arms (24)
5 To replace bellows only, remove three screws (53), elastic stop nut (43), hex nut (54) and lockwasher (50). Remove hex nut (49) and lockwasher (50).

   a. Remove two screws (47) holding bellows beam assembly to bellows beam hinge.

   b. Replace bellows.

6 To reassemble, perform steps 1 thru 5 in reverse order.

**BOOSTER UNIT REPLACEMENT**
(Figure 74)

1. Remove instrument from service and remove Transmitter cover.

2. Loosen hose clamp.

3. Disconnect loading air line at loading connector. Disconnect supply air line at supply connector.

4. Disconnect connecting link from adjustable arm (note position). Remove 6 3/8" screw securing drive arm, sector plate and adjustable arm and remove from spindle. (Note position of items on spindle before removing.)

5. Remove locating screw.

6. Disconnect all tubing at Booster Relay.

7. Make certain 10-32 pan head screw (used for shipping purposes only) has been removed.

---

**BOOSTER UNIT FAULT CORRECTION CHART**

<table>
<thead>
<tr>
<th>FAULT</th>
<th>PROBABLE CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booster unit output is incorrect with an increase in measured pressure</td>
<td>1. Supply air not passing thru filter (Item 5, Figure 29)</td>
<td>1. Replace filter at supply port (see Routine Maintenance) and observe Transmitter operation.</td>
</tr>
<tr>
<td></td>
<td>2. Blocked supply passage (Figure 8) to diaphragm and rod assembly (Item 19, Figure 29)</td>
<td>2. Remove cover (Item 17, Figure 29) Make certain cover gasket (Item 16) is not blocking passage from supply port.</td>
</tr>
<tr>
<td></td>
<td>3. Exhaust valve (Figure 15) not properly seated.</td>
<td>3. Check visually. If necessary, replace exhaust valve or seat (Items 12 and 22, Figure 29) Make certain exhaust seat is aligned with inlet seat and that valve retaining pin (in valve retaining spring, Item 11) is centered in valve (Item 12).</td>
</tr>
<tr>
<td>Booster unit output is incorrect with a decrease in measured pressure</td>
<td>1. Blocked line from Booster unit to nozzle (Figure 15).</td>
<td>1. Remove and clean nozzle air line (Figure 15).</td>
</tr>
<tr>
<td></td>
<td>2. Inlet valve (Item 12, Figure 29) improperly sealed</td>
<td>2. Remove exhaust seat and valve (Items 22 and 12, Figure 29) Inspect seat and valve for evidence of improper seating. If necessary, replace valve or diaphragm and rod assembly (Item 19).</td>
</tr>
<tr>
<td></td>
<td>3. Leakage at either diaphragm pivot or diaphragm and rod assembly (Item 19, Figure 29)</td>
<td>3. Remove diaphragm and rod assembly (Item 19 Figure 29) and inspect diaphragms. If necessary, replace diaphragm and rod assembly.</td>
</tr>
</tbody>
</table>
Type JR13 Area Meter

8 Remove mechanism support bracket from Transmitter housing

9 Remove three 10-32 screws in back of mechanism support bracket securing Booster Relay

10 To reassemble perform steps 1 thru 9 in reverse order After reassembly, refer to "Transmitter Adjustment Checks" to check position of drive arm, sector plate and adjustable arm

DISASSEMBLY OF AREA METER

If Type JR13 Area Meter must be disassembled for maintenance or repair follow procedure below and refer to Figures 25, 26, 27 or 28

1 Remove meter from service Remove drain plug from housing assembly and allow fluid to drain from valve body

2 Remove Transmitter cover Disengage connecting link from adjustable range arm (Figure 11)

3 Remove sealing cap from bottom of housing assembly

4 Screw spring puller rod (shipped with Meter) into bottom of adjusting screw and pin assembly Pull rod and remove two 5/16 inch nuts and washer Gradually release rod to prevent spring from snapping when tension is relieved Do not disassemble spring puller rod

5 Remove hex head screws (750 psi) or hex nuts (600 psi) securing housing and adapter plate assembly to valve body (Note position of two extra long 3/4 inch screws when removing) While lifting housing and adapter plate assembly, grasp metering plug stem and lift simultaneously Lift both assemblies until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip free of bearing plates Remove housing and adapter plate assembly (including Transmitter) from valve body

6 Rotate Area Meter Remove 3/4 inch head screws (350 psi) or 3/4 inch nuts (600 psi) securing housing and adapter plate assembly to valve body (Note position of two extra long 3/4 inch screws when removing) While lifting housing and adapter plate assembly, grasp metering plug stem and lift simultaneously Lift both assemblies until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip free of bearing plates Remove housing and adapter plate assembly (including Transmitter) from valve body

9 If pressure tight bearing spindle assembly or Transmitter must be removed from housing and adapter plate assembly, follow procedure outlined below

a Note position of sector plate on spindle assembly Remove 6 32 screw to release adjustable range arm and sector plate from spindle assembly shaft

b Carefully remove pressure tight bearing cap and follower and washer assembly

c Remove pressure tight bearing body and O ring (Replace O ring when reassembling)

d Remove forked lever screw securing drive lever assembly to spindle assembly shaft

e Hold drive lever assembly in position From front of Transmitter, carefully pull spindle assembly shaft to remove from housing
CAUTION Use care when removing shaft to avoid damage to spindle bearing surface

1. To remove Transmitter, loosen hose clamp and remove three 5/16 inch cap screws. (Replace O ring when reassembling.)

2. To replace O ring between adapter plate and spindle housing, remove four 1/8-13 socket head screws.


NOTE: When inserting spindle assembly shaft thru drive lever assembly, rotate shaft until tapped hole in shaft lines up with hole for forked lever screw.

10. Remove all parts as a complete assembly. Lift out of valve body metering plug stem and dampener rod assembly (dampener rod used on 1 inch and 2 inch meters only). Upper bearing, lower bearing, spring, stop washer, (used on 1 inch and 2 inch meters only), metering plug and spring hanger and pin assembly.

1. Do not disassemble items removed in step 10 unless replacement of parts is necessary. If disassembly is necessary, remove dampener rod (used on 1 inch and 2 inch meters only) and locknut (Pt No 197214-3). Replace damaged parts and reassemble. The locknut determines position of upper and lower bearing on metering plug stem. Reset locknut as follows:

a. Install locknut on metering plug stem

b. Turn locknut until there is 2/16 inch between start of threads on stem and top of locknut. (For 4 inch, 600 psig, 3/4 inch stroke meters only, the distance should be set at 3/16 inch.)

c. For 1 inch and 2 inch meters only, assemble dampener rod on 1/4-18 threaded extension of metering plug stem. Use extreme care when tightening dampener rod. Overtightening may shear or deform threads resulting in loss of concentricity between stem and dampener rod. Parts have been inspected for concentricity and are used as a matched set.

1. If valve cage must be replaced, use slot in bottom of cage and unscrew from valve body.

REASSEMBLY OF AREA METER

Refer to Table of Torque Values for parts requiring a specific torque value when reassembling.

1. If valve cage was removed, screw cage into valve body. Tighten to specified torque value.

2. Lower valve stem and dampener rod assembly (dampener rod used on 1 inch and 2 inch meters only), upper bearing, lower bearing, spring, stop washer, metering plug and spring hanger and pin assembly into valve body.

3. To reassemble housing and adapter plate assembly, use procedure below applicable to Area Meter size.

a. 1 inch Area Meter Position adapter plate on valve body and secure with 3/8-10 socket head screws. Torque screws to specified value. While lowering housing and adapter plate assembly (including Transmitter) into position, grasp metering plug stem and dampener rod assembly and lift until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip into position between bearing plates. Lower both assemblies into position, making certain holes in housing and adapter plate assembly are in alignment with dowel pins in adapter plate. Secure assembly with two 1/4-20 ill ster head screws.

b. 2 inch Area Meter While lowering housing and adapter plate assembly (including Transmitter) into position, grasp metering plug stem and dampener rod assembly and lift until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip into position between bearing plates. Lower both assemblies into position, making certain holes in housing and adapter plate assembly are in alignment with dowel pins in adapter plate. Secure assembly with two 1/4-20 ill ster head screws.

c. 4 inch Area Meter While lowering housing and adapter plate assembly (including Transmitter) into position, grasp metering plug stem and lift until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip into position between bearing plates. Lower both assemblies into position,
<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Part Name</th>
<th>Location</th>
<th>Service Pressure 250 psig</th>
<th>Service Pressure 600 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P TB Body</td>
<td>P TB and Sp nd e Assemby</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td>1 Inch</td>
<td>7/16 14x3 1/4</td>
<td>Ho dng Cover to Adapter P ate</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td></td>
<td>Hex Hd Screw</td>
<td>Ho dng Adapter P ate to Va ve Body</td>
<td>20 ft b</td>
<td>20 ft b</td>
</tr>
<tr>
<td></td>
<td>Va ve Cage</td>
<td>12 ft b</td>
<td>12 ft b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3/8 16x1</td>
<td>Ho dng Hous ng Assemby to Va ve Body</td>
<td>20 ft b</td>
<td>20 ft b</td>
</tr>
<tr>
<td></td>
<td>3/8 16</td>
<td>Ho dng Hous ng Assemby to Va ve Body</td>
<td>20 ft b</td>
<td>20 ft b</td>
</tr>
<tr>
<td></td>
<td>1/2 13x1 1/2</td>
<td>Ho dng Adapter P ate to Hous ng</td>
<td>35 ft b</td>
<td>35 ft b</td>
</tr>
<tr>
<td></td>
<td>Soc Hd Screw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P TB Body</td>
<td>P TB and Sp nd e Assemby</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td>2 Inch</td>
<td>7/16 14x3 1/4</td>
<td>Ho dng Cover to Va ve Body</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td></td>
<td>Hex Hd Screw</td>
<td>Ho dng Cover to Va ve Body</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td></td>
<td>Va ve Cage</td>
<td>35 ft b</td>
<td>35 ft b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7/16 14x1 1/4</td>
<td>Ho dng Hous ng Assemby to Va ve Body</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td></td>
<td>Hex Hd Screw</td>
<td>Ho dng Hous ng Assemby to Va ve Body</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td></td>
<td>1/2 13x1 1/2</td>
<td>Ho dng Adapter P ate to Hous ng</td>
<td>35 ft b</td>
<td>35 ft b</td>
</tr>
<tr>
<td></td>
<td>Soc Hd Screw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P TB Body</td>
<td>P TB and Sp nd e Assemby</td>
<td>30 ft b</td>
<td>30 ft b</td>
</tr>
<tr>
<td>4 Inch</td>
<td>1/2 13</td>
<td>Ho dng Cover to Hous ng and Adapter P ate Assemby</td>
<td>50 ft b</td>
<td>50 ft b</td>
</tr>
<tr>
<td></td>
<td>Hex Nut</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3/4 10x2</td>
<td>Ho dng Hous ng and Adapter P ate Assemby to Va ve Body</td>
<td>160 ft b</td>
<td>160 ft b</td>
</tr>
<tr>
<td></td>
<td>Hex Hd Screw</td>
<td>Ho dng Hous ng and Adapter P ate Assemby to Va ve Body</td>
<td>160 ft b</td>
<td>160 ft b</td>
</tr>
<tr>
<td></td>
<td>Va ve Cage</td>
<td>80 ft b</td>
<td>80 ft b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3/4 10x1 3/4</td>
<td>Ho dng Hous ng Assemby to Va ve Body</td>
<td>160 ft b</td>
<td>160 ft b</td>
</tr>
<tr>
<td></td>
<td>Hex Hd Screw</td>
<td>Ho dng Hous ng Assemby to Va ve Body</td>
<td>160 ft b</td>
<td>160 ft b</td>
</tr>
<tr>
<td></td>
<td>3/4 10</td>
<td>Ho dng Hous ng Assemby to Va ve Body</td>
<td>160 ft b</td>
<td>160 ft b</td>
</tr>
<tr>
<td></td>
<td>Hex Nut</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/2 13x1 1/2</td>
<td>Ho dng Adapter P ate to Hous ng</td>
<td>35 ft b</td>
<td>35 ft b</td>
</tr>
<tr>
<td></td>
<td>Soc Hd Screw</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
making certain holes in housing and adapter plate assembly are in alignment with dowel pins in valve body. Install 3/4-10 hex head screws (250 psi) or 3/4-10 hex nuts on studs (600 psi). Tighten screws or nuts to specified torque value. (Make certain two extra long 3/4-10 screws are installed in correct location)

4 Attach loading spring (including adjustment screw and pin assembly and threaded spring puller rod) to spring hanger and pin assembly

5 Position housing assembly on valve body. Install hex head screws (250 psi) or hex nuts on studs (600 psi) and torque to specified value.

6 Assemble Transmitter connecting link to adjustable range arm (Figure 11)

7 If metering plug stop screw settings have been disturbed, set stops as follows:

a. Loosen two 10-32 screws holding lock plate.

b. Lift metering plug stem until Transmitter pointer reads approximately 1/32 inch beyond 100 psi scale (assuming Transmitter calibration is correct).

c. Hold valve stem in position and turn three fillister head stop screws down until screws touch top of metering plug stop was ter.

d. Lower metering plug stem to position on scale. Tighten two 10-32 screws to lock stop screws in place.

8 Position cover on housing and adapter plate assembly. Install hex head screws (or hex nuts on studs) and torque to specified value.

9 Inch and 1 3/4 Inch Area Meters on y With cover installed, remove drain valve. Install 6-32 screw or threaded rod into metering plug stem and dampener rod assembly. Move screw or rod up and down to simulate full stroke of metering plug. Make certain binding or rubbing does not occur between dampener rod and center hole in cover. If binding occurs, loosen screws or hex nuts and shift cover slightly (movement will be limited by dowel pins) to assure equal clearance around dampener rod. If clearance problems still exist, refer to "Repositioning of Dowel Pins". Locate procedure applicable to Area Meter size

Included in procedure will be steps for removing old dowel pins and relocating cover. Do not attempt to place Meter in service until clearance problems have been resolved. If binding or rubbing does not occur, remove 6-32 screw or threaded rod from dampener rod.

10 Replace drain plug in housing assembly.

11 Calibrate Area Meter as described under "Complete Calibration Procedure".

12 After Meter has been calibrated, set tension on loading spring as described under "Re-setting Loading Spring".

ROTATING TOPWORK ASSEMBLY

Rotation of topwork mechanism can be accomplished with minimum disturbance of calibration by carefully following the procedure outlined below.

NOTE: In all cases, flow thru the meter must be in accordance with arrow stamped on valve body flange.

1 Remove meter from service. Remove drain plug from housing assembly and allow fluid to drain from valve body.

2 Remove Transmitter cover. Disengage connecting link from adjustable range arm. (Figure 11)

3 Remove sealing cap from bottom of housing assembly.

4 Screw spring puller rod (shipped with meter) into bottom of adjusting screw and pin assembly. Pull rod and back off two 5/16 inch nuts gradually release rod to prevent spring from snapping when tension is relieved. Leave spring puller rod assembled.

1 Inch Area Meter Only

1 Remove cap screws and separate cover from housing and adapter plate assembly.

2 Remove two 1/4-20 fillister head screws holding housing and adapter plate assembly to adapter plate.

3 While lifting housing and adapter plate assembly to clear pins grasp metering plug stem.
and dampener rod assembly and lift simultaneously. Lift both assemblies until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip free of bearing plates. Remove housing and adapter plate assembly.

4 Punch mark adapter plate and valve body. This will insure that adapter plate will not be installed in same position when reassembled.

5 Remove 3/8 inch hex head screws holding adapter plate to valve body.

NOTE: It is not necessary to remove lockplate or disturb siting of stop screws when removing adapter plate from valve body.

6 Position adapter plate on valve body. Rotate adapter plate until alignment mark is 180 degrees from alignment mark on valve body. Install two 3/8 inch hex head screws finger tight.

7 Push bearing down (compressing spring) until bearing passes thru inside diameter of lockplate. Check clearance and concentricity of outside diameter of bearing to inside diameter of lockplate. Install remaining 3/8 inch hex head screws and torque to 20 ft lb.

8 Lower reversed housing and adapter plate assembly into position while grasping metering plug stem and dampener rod assembly and lifting until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip into position between bearing plates. Lower both assemblies into position, making certain holes in housing and adapter plate assembly are in alignment with dowel pins in adapter plate. If assembly is impossible, refer to “Repositioning Dowel Pins.”

9 Make certain pin of drive lever assembly is correctly located between bearing plates. Carefully check clearances between inside surface of drive lever assembly arms and outside diameter of bearing plates. If either arm is touching bearing plates, remove housing and adapter plate assembly.

10 Grind or file inside face of drive lever assembly arm (opposite of arm with pin). Remove all metal particles from inside housing. Reassemble housing and adapter plate assembly (step 8) and check clearance (step 9). If clearance is good and no binding occurs, install two 1/4 inch 20 tlfister head screws and tighten. If a clearance problem still exists after grinding arm of drive lever assembly, proceed to “Repositioning Dowel Pins.”

11 Assemble Transmitter connecting link to range arm and check zero adjustment. If parts have not been damaged and position of locknut on metering plug stem and dampener rod assembly has not been changed, zero adjustment should be correct. If zero adjustment is not correct check calibration as outlined under “Complete Calibration Procedure.”

12 Remove drain valve and reducer bushing from cover. Install reversed cover and a minimum of two 7/16 inch hex head screws.

13 Install 6-32 screw or threaded rod in top of metering plug and dampener rod assembly. Move screw or rod up and down to simulate full stroke of metering plug. Check for binding of internal components. Any misalignment will cause friction between hole in cover and metering plug stem and dampener rod assembly.

14 If clearance is good and no binding occurs, install remainder of 7/16 inch and torque to 30 ft lb. Proceed to step 16.

15 If binding occurs, disassemble cover. Remove two 3/16 inch dowel pins in housing and adapter plate assembly. Reassemble cover and reposition until vertical movement of metering plug stem and dampener rod assembly can traverse full stroke of metering plug without binding. Secure cover using 7/16 inch 14 screws. Locate two thru holes in cover. Drill two 3/16 inch holes (1.910 inch max.), 7/32 inch deep in housing and adapter plate assembly. Remove cover and clean all metal particles from drilling area. Install two 3/16 inch dowel pins in new location. Reassemble cover. Install 7/16 inch hex head screws and torque to 30 ft lb.

16 Remove 6-32 screw or threaded rod from metering plug stem and dampener rod assembly. Install reducer bushing and drain valve assembly in cover.

17 Reassemble drain plug in housing assembly. Refer to “Resetting Loading Spring” for assembly of drain and sealing cap.
2 Inch Area Meter Only

1 Remove cap screws (250 psi) or hex nuts (600 psi) and separate cover from housing and adapter plate assembly.

2 Remove two 1/4 20 tillsler head screws holding housing and adapter plate assembly to valve body.

3 While fitting housing and adapter plate assembly to clear dowel pins grasp metering plug stem and dampener rod assembly and lift simultaneously. Lift both assemblies until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip free of bearing plates.

NOTE: It is not necessary to remove cockplate or disturb setting of stop screws when removing housing and adapter plate assembly.

4 While lowering reversed housing and adapter plate into position grasp metering plug stem and dampener rod assembly and lift until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip into position between bearing plates. Lower both assemblies into position making certain holes in housing and adapter plate assembly are in alignment with dowel pins in valve body. If assembly is impossible, refer to “Repositioning Dowel Pins”.

5 Make certain pin of drive lever assembly is correctly located between bearing plates. Carefully check clearance between inside surface of drive lever assembly arms and outside diameter of bearing plates. If either arm is touching bearing plates, remove housing and adapter plate assembly.

6 Grind or file inside face of drive lever assembly arm (opposite of arm with pin). Remove all metal particles from housing. Reassemble housing and adapter plate (step 4) and check clearance (step 5). If clearance is good and no rubbing or binding occurs install two 1/4 20 tillsler head screws and tighten. If clearance problems still exist after grinding arm of drive lever assembly proceed to “Repositioning Dowel Pins”.

7 Assemble Transmitter connecting link to range arm and check zero adjustment. If parts have not been damaged and position of locknut on metering plug stem and dampener rod has not been changed, zero adjustment should be correct. If zero adjustment is not correct check calibration as outlined under “Complete Calibration Procedure”.

8 Remove drain valve and reducer bushing from cover. Install reverse cover and a minimum of two 7/16 14 hex head screws (250 psi) or two 7/16 14 hex nuts (600 psi). Tighten screws or nuts finger tight.

9 Install 6-32 screw or threaded rod in top of metering plug stem and dampener rod assembly. Slowly move screw or rod up and down to simulate full stroke of metering plug. Check for binding of internal components. Any misalignment will cause friction between hole in cover and metering plug stem and dampener rod assembly.

10 If clearance is good and no binding occurs, install remainder of 7/16 14 screws or 7/16 14 hex nuts. Torque screws or nuts to 30 ft lb. Proceed to step 11.

11 If binding occurs, disassemble cover. Remove two 3/16 inch dowel pins in housing and adapter plate assembly. Reassemble cover and reposition until vertical movement of metering plug stem and damper rod assembly can travel full stroke of metering plug without binding. Secure cover using 7/16 14 screws or 7/16 14 hex nuts. Locate two 3/16 inch holes (1/10 inch max.) 7/32 inch deep in housing and adapter plate assembly. Remove cover and drill a 3/16 inch hole from drilling area. Install two 3/16 inch dowel pins in new location. Reassemble cover. Install screws or nuts and torque to 30 ft lb.

12 Remove 6-32 screw or threaded rod from metering plug stem and dampener rod assembly. Install reducer bushing and drain valve assembly in cover.

13 Reassemble drain plug in housing assembly. Refer to “Resetting Loading Spring” for assembly of spring and sealing cap.

4 Inch Area Meter Only

1 Remove hex nuts from studs and separate cover from housing and adapter plate assembly.
Type JR13 Area Meter

3. Remove 3/4 10 hex head screws (250 psi) or 3/4 10 hex nuts (600 psi) holding housing and adapter plate assembly to valve body. Note position of two extra long 3/4 10 hex head screws when removing.

3. While lifting housing and adapter plate assembly to clear dowel pins, grasp metering plug stem and lift simultaneously. Lift both assemblies until stem moves back and forth a sufficient amount to permit pin of drive lever assembly to slip free of bearing plates.

NOTE: It is not necessary to remove lock plate or disturb setting of stop screws when removing housing and adapter plate assembly.

4. For 600 psi meter only: Note difference in length of two studs in valve body. Interchange two long studs with two short studs diametrically opposite.

5. While lowering reversed housing and adapter plate assembly into position, grasp metering plug stem and lift until stem moves back to slip into position between bearing plates. Lower both assemblies into position, making certain holes in housing and adapter plate are in alignment with dowel pins in valve body. It is impossible, refer to "Repositioning Dowel Pins".

NOTE: When installing housing and adapter plate assembly (600 psi meter) use care to prevent damage to threads of valve body studs.

6. Make certain pin of drive lever assembly is correctly located between bearing plates. Carefully check clearance between inside surface of drive lever assembly arms and outside diameter of bearing plates. If either arm is touching bearing plates, remove housing and adapter plate assembly.

7. Grind or file inside face of drive lever assembly arm (opposite of arm with pin). Remove all metal particles from housing. Reassemble housing and adapter plate (step 5) and check clearance (step 6). If clearance is good and no rubbing or binding occurs, install 3/4 10 hex head cap screws or 3/4 10 hex nuts and retorque to 160 ft lb. (Make certain two extra long 3/4 10 screws are installed in correct location.) If clearance problems still exist after grinding, proceed to "Repositioning Dowel Pins".

8. Install 6-32 screw or threaded rod in top of metering plug stem. Slowly move screw or rod up and down to simulate full stroke of metering plug. Check for binding of internal components. If binding occurs, locate problem area. Disassemble housing and adapter plate and rework or replace parts.

9. Assemble Transmitter connecting link to adjustable range arm and check zero adjustment. If parts have not been damaged and position of locknut on metering plug stem has not been changed, zero adjustment should be correct. If zero adjustment is not correct, check calibration as outlined under "Complete Calibration Procedure".

10. Remove 6-32 screw or threaded rod from metering plug stem.

11. Assemble reversed cover and install 1/2-13 hex nuts. Torque nuts to 50 ft lb.

12. Reassemble drain plug in housing assembly. Refer to "Resetting Loading Spring" for assembly of spring and sealing cap.

REPOSITIONING OF DOWEL PINS

NOTE: Dowel pins must be removed to allow repositioning of components due to clearance problems. Installation of new dowel pins is recommended. This procedure would assure correct reassembly at a later date in addition to holding components in position when installing and tightening the attaching screws or nuts.

Follow procedure below applicable to specific Area Meter.

1. Inch Area Meter Only

1. If initial assembly of housing and adapter plate was impossible or clearance problems still exist after grinding arm of drive lever assembly, remove housing and adapter plate assembly from adapter plate.

2. Remove two 1/4 inch dowel pins from adapter plate. Drill holes an additional 3/16 inch deep. Reassemble pins in adapter plate making certain pins are flush with surface of adapter plate. If necessary, carefully grind excess portion of pins.
3 Reassemble reversed housing and adapter plate assembly. When pin of drive lever assembly is between bearing plates, reposition housing until clearance is obtained between inside surface of drive lever assembly arms and outside diameter of bearing plate. Secure housing using two 1/4 x 20 fillister head screws.

4 Repositioning of housing and adapter plate assembly affects clearance between metering plug stem and dampener rod assembly and cover. Remove two 3/16 inch dowel pins from housing and adapter plate assembly.

5 Remove drain valve and reducer bushing from cover. Position cover over housing and adapter plate assembly. Install 6 32 screw or threaded rod in top of metering plug and dampener rod assembly. Reposition cover until vertical movement of stem and dampener rod assembly can travel full stroke of metering plug without binding. Secure cover using 7/16 x 14 hex head screws and torque to 30 ft lb.

6 Locate two thru holes in cover. Drill two 3/16 inch holes (1910 inch max), 1/4 inch deep in housing and adapter plate assembly. Remove cover and install two 3/16 x 1/2 inch dowel pins in new location.

7 Locate two thru holes in housing and adapter plate assembly. Drill two 1/4 inch holes (254 inch max), 5/16 inch deep in adapter plate. Remove housing and adapter plate assembly. Install two 1/4 inch dowel pins in new location.

8 Reassemble housing and adapter plate assembly. Install two 1/4 x 20 fillister head screws and tighten.

9 Replace cover and install 7/16 x 14 hex head screws. Torque screws to 30 ft lb.

10 Remove 6 32 screw or threaded rod from metering plug stem and dampener rod assembly. Install reducer bushing and drain valve in cover.

11 Install drain plug in housing assembly. Refer to “Resetting Loading Spring” for assembly of spring and sealing cap.

Inch Area Meter Only

1 It initial assembly of housing and adapter plate was impossible or clearance problems still exist after grinding arm of drive lever assembly.

2 Remove two 1/4 inch dowel pins from valve body. Drill holes an additional 3/16 inch deep. Reassemble pins in valve body, making certain pins are flush with surface of valve body. If necessary, carefully grind excess portion of pins.

3 Reassemble reversed housing and adapter plate assembly. When pin of drive lever assembly is between bearing plates, reposition housing until clearance is obtained between inside surface of drive lever assembly arms and outside diameter of bearing plate. Secure housing using two 1/4 x 20 fillister head screws.

4 Repositioning of housing and adapter plate assembly affects clearance between metering plug stem and dampener rod assembly and cover. Remove two 3/16 inch dowel pins from housing and adapter plate assembly.

5 Remove drain valve and reducer bushing from cover. Position cover on housing and adapter plate assembly. Install 6 32 screw or threaded rod in top of metering plug and dampener rod assembly. Reposition cover until vertical movement of stem and dampener rod assembly can travel full stroke of metering plug without binding. Secure cover using 7/16 x 14 hex head screws (250 psi) or 7/16 x 14 hex nut (600 psi) and torque to 30 ft lb.

6 Locate two thru holes in cover. Drill two 3/16 inch holes (1910 inch max), 1/4 inch deep in housing and adapter plate assembly. Remove cover and install two 3/16 x 1/2 inch dowel pins in new location.

7 Locate two thru holes in housing and adapter plate assembly. Drill two 1/4 inch holes (254 inch max), 5/16 inch deep in valve body. Remove housing and adapter plate assembly. Install two 1/4 inch dowel pins in new location.

8 Reassemble housing and adapter plate assembly. Install two 1/4 x 20 fillister head screws and tighten.

9 Replace cover and install 7/16 x 14 hex head screws (250 psi) or 7/16 x 14 hex nut (600 psi) and torque to 30 ft lb.

10 Remove 6 32 screw or threaded rod from metering plug stem and dampener rod assembly. Install reducer bushing and drain valve in cover.
11 Install drain plug in housing assembly
Refer to "Resetting Loading Spring" for assembly of spring and sealing cap

4 Inch Area Meter Only

1 If initial assembly of housing and adapter plate was impossible or clearance problems still exist after grinding arm of drive lever assembly, remove housing and adapter plate assembly from valve body.

2 Remove two 1/4 inch dowel pins from valve body. Drill holes an additional 3/16 inch deep. Reassemble pins in valve body, making certain pins are flush with surface of valve body. If necessary, carefully grind excess portion of pins.

3 Reassemble reversed housing and adapter plate assembly. When pin of drive lever assembly is between 1 bearing plates, reposition housing until clearance is obtained between inside surface of drive lever assembly, arms and outer 1/2 diameter of bearing plates. Secure housing using 3/4 10 hex head screws (250 psi) or 3/4 10 hex nuts (600 psi) and torque to 160 ft lb. (Make certain two long 3/4 10 hex head screws are in correct location.

4 Install 6 32 screw or threaded rod in top of metering plug stem. Slowly move screw or rod up and down to simulate full stroke of metering plug Check for binding of internal components. If binding occurs, locate problem area. Disassemble housing and adapter plate assembly and rework or replace parts.

5 If no binding occurs, locate two thru holes in housing and adapter plate assembly. Drill two 1/4 inch holes (254 inch max) 5/16 inch deep in valve body. Remove housing and adapter plate assembly. Install two 1/4 inch dowel pins in new location.

6 Reassemble housing and adapter plate assembly. Install 3/4 10 hex head screws (250 psi) or 3/4 10 hex nuts (600 psi) and torque to 160 ft lb.

7 Remove 6 32 screw or threaded rod from metering plug stem.

8 Position reversed cover on housing and adapter plate assembly. Install 1/2 13 hex nuts and torque to 50 ft lb.

9 Reassemble drain plug in housing assembly. Refer to "Resetting Loading Spring" for assembly of spring and sealing cap.

**CALIBRATING THE AREA METER**

The Type JR13 Area Meter (except those 4 inch meters for measurement of viscous fluids) is factory calibrated before shipment and the adjustment points are marked with red paint. The meter should require no further adjustment. However, before placing in service, make the adjustment checks outlined under "Transmitter Adjustment Checks".

These adjustment checks consist of checking the flow and output pressure pointer readings at 0°, 50°, and 100°. It is necessary to assemble Calibrating Micrometer (Part No. 663811) and Adapter (Part No. 6638111) to the top of the metering plug stem and cover and then set the meter for the desired stroke position. To assemble and set the micrometer, refer to "Positioning Metering Plug" below.

**POSITIONING METERING PLUG**

1 For 1 inch and 2 inch Area Meters, remove dampener rod from metering plug stem as outlined in step 3 under "Installing the Area Meter". Do not discard rod.

2 With meter removed from service (no flow thru meter), remove drain plug from bottom of spring housing (Figure 14) and drain meter.

3 Remove sealing cap from bottom of spring housing.

4 Attach spring puller (shipped with instrument) to lower end of adjustment screw (Figure 9) and tighten spring puller bracket against bottom of spring housing with 6 32 hex nut.

5 Back off lock nut and adjust meter until adjustment screw to free spring. Do not allow
12. To set meter at any desired stroke position
   a. Lift handle. Do not turn
   NOTE: Lifting the assembly by the handle relieves the load on the micrometer screw while the barrel is turned. This prevents excessive wear of the screw threads thus maintaining accuracy.
   b. With handle lifted, turn barrel until thimble reads desired stroke (50" or 100" stroke).
   c. Lower handle until t contacts barrel end.

DISASSEMBLING MICROMETER

1. To disassemble micrometer from meter
   a. Turn barrel to zero
   b. Turn locknut and handle up against brass nut
   c. Remove spindle from metering plug stem by turning knob

11. With metering plug stop washer down against cage (meter at zero), turn handle down until t contacts barrel end. Lock handle in place with locknut.

FIGURE 9 Spring Puller

Spring to snap free relieve tension gradually by backing off 0-3° hex nut. Leave spring puller attached to adjustment screw.

6. Place adapter on micrometer (Figure 10).

7. For 1 inch and 2 inch Area Meters Remove reducer bushing and drain valve assembly from top of meter body cover (Figure 26 or 27).

8. For 4 inch Area Meters Remove drain valve from top of meter body cover (Figure 28 or 29).

9. Turn locknut and handle against brass nut (Figure 10) Insert spindle thru drain valve hole in meter body cover. Screw spindle into top of metering stem by turning knob.

10. Screw micrometer and adapter into drain valve hole in meter body cover. Turn micrometer barrel up or down until th mb c reads zero.

FIGURE 10 Calibrating Micrometer
d Remove micrometer and adapter from body cover

e For 1 inch and 2 inch Area Meter Remove meter body cover. Replace reducer bushing and drain valve assembly in cover. Screw damper rod into threaded extension of metering plug stem. Replace cover on meter body

f For 4 inch Area Meter Replace drain valve on meter body cover

TRANSMITTER ADJUSTMENT CHECKS

1 With no flow thru meter, flow pointer and output pressure pointer should read zero scale

   a If flow pointer does not read zero scale, adjust pointer zero adjustment (Figure 13) until reading is correct

   b If output pressure pointer does not read zero scale, adjust nozzle pointer alignment screw (Figure 13) until reading is correct

2 Using the Calibrating Micrometer as outlined under "Positioning Metering Plug", set metering plug at 50% and 100% stroke. Flow and output pressure pointers should read 50% and 100% scale, respectively. If not, perform "Complete Calibration Procedure" outlined below

3 If readings are correct, refer to "Disassembling Micrometer" and "Resetting Loading Spring".

COMPLETE CALIBRATION PROCEDURE

If meter is being calibrated following corrective maintenance or repair, perform the steps outlined under "Positioning Metering Plug" before proceeding further.

Flow (Black) Pointer

1 Set metering plug at 50% stroke. Flow pointer should read 50% scale +1/32 in. If pointer reads correctly, proceed to step 2. If pointer reads incorrectly, make the necessary adjustments in steps 2, 3, and 4.

2 Check for parallel linkage (Figure 17)

   a Range arm Line A should be at right angles to connecting link

   b Connecting link should be at right angles to Line B (thru pointer drive arm pivot and lower connecting pin of connecting link)
3. If parallel linkage exists but pointer does not read 50° scale until pointer zero adjustment screw is adjusted, repeat steps 5 and 6 until correct pointer readings are obtained for 50° and zero scale.

4. If parallel linkage does not exist in step 3 above, make the following adjustments:

   a. Loosen two range arm sector screws and connecting link screw.

   b. Rotate range arm sector until range arm is at right angles with connecting link. Adjust length of connecting link until the link is at right angles to Line B.

   c. Tighten screws.

   d. With metering plug set for 50° stroke and parallel linkage established, pointer should read 50° scale. If not, turn pointer zero adjustment screw until pointer reads correctly.

   e. If pointer reading was greater than zero, lengthen range arm slightly, increasing Dimension D. Tighten screws.

   f. If pointer reading was less than zero, shorten range arm slightly, decreasing Dimension D. Tighten screws.

   g. Check for parallel linkage in steps 1, 3, and 4.

5. Set metering plug for 0° stroke. If pointer still reads incorrectly, repeat steps 5 and 6 until correct pointer readings are obtained for 50° and zero scale.

6. Set metering plug for 100° stroke. Flow pointer should read 100° scale. If pointer reads correctly, set metering plug for 50° zero and 100° scale and check respective scale readings. Then proceed to "Output Pressure" below. If pointer reads incorrectly, make the necessary adjustments as outlined below:

   a. Loosen connecting link screw.

   b. If pointer reading was greater than 100° scale, tighten connecting link slightly. Tighten screw.

   c. If pointer reading was less than 00° scale, shorten connecting link slightly. Tighten screw.

   d. Return metering plug to 50° stroke. If pointer does not read 50° scale, turn pointer zero adjustment screw to obtain correct reading.

7. Set metering plug for 0° stroke. If pointer reads zero scale, proceed to step 10 below. If pointer does not read zero scale, repeat steps 5a, b, c, and d only then make the following adjustments:

   a. Loosen range arm sector screws and rotate sector until range arm is at right angles with connecting link.

   b. Reset pointer on 50° scale by turning pointer zero adjustment screw.

8. Repeat step 5 until pointer reads correctly at 50° and zero scale.

9. Repeat steps 7, 8, and 9 until pointer reads correctly at zero, 50°, and 100° scale.

10. Adjust max traverse stop screws (Figure 10) to limit pointer to 1/16 1/32 inch beyond the 100° scale mark, when the plug is at its highest position.
Output Pressure

Insert an accurate pressure gage (0-30 psig) in output pressure line or connect gage directly into output pressure connection (see Figure 11). If Transmitter is being bench tested, avoid pulsations in the pressure by inserting a volume chamber or 30 feet of 1/4 inch tubing in output pressure line between Transmitter and test gage.

3. Apply supply pressure to Transmitter.

4. Disconnect connecting link from pointer drive arm at lower connecting pin (Figure 13) so black level pointer may be moved freely by hand.

5. Manually position black level pointer at 0” on scale. Output pressure should read 15 psig for 3-27 range or 9 psig for 3-25 range. If not, adjust vane pointer alignment screw (Figure 13) to position transmitting unit range arm so that left end of connecting wire is on extended centerline of black pointer. Reset output pressure to midrange value by adjusting spring tension adjustment (Figure 11).

6. If output range is linear (that is, output pressure range evenly divided on both sides of midrange value), turn transmitting unit range adjustment screw (Figure 12) counterclockwise to decrease range or clockwise to increase range.

7. If output pressure range is non-linear, i.e., not equally divided on both sides of midrange loading pressure, position black pointer to 50% scale.

a. Compare output loading pressure with pressures read at 0 and 100” and determine difference in pressure spans between upper and lower halves of scale.

b. Adjust vane pointer alignment screw to change output pressure (in direction of largest pressure span) by an amount equal to one half the difference as determined in step a.
8 Repeat steps 4, 6 and 7 until correct output pressure readings are obtained at maximum, minimum, and midrange scale values. Then proceed to "Output Pressure (Red) Pointer." If, however, correct output pressure readings cannot be obtained, proceed to step 9.

9 With black pointer at midrange scale, make the following checks:

a. Check that nozzle is perpendicular to vane. If not, loosen nozzle clamp screw (Figure 11) and adjust nozzle position until vane is vertical.

b. Vane (front) drive arm should be parallel to center line of black pointer and at 90-degree angle with connecting wire (Figure 13). If not, adjust vane pointer alignment screw and vane adjustable arm until the above relationships exist.

10 Repeat steps 3 thru 9 until correct midrange, minimum, and maximum range output pressure readings are obtained.

Output Pressure (Red) Pointer

The red output pressure pointer should give the same scale readings as the black flow pointer at all times when the black pointer and transmitting unit are in correct calibration. The red pointer indicates that the output pressure is correct for measured flow if both red and black pointers read the same.

1 Manually position black flow pointer at 50% scale. Red output pressure pointer should read 50% scale. If pointer reads correctly, proceed to step 2. If not, turn nozzle pointer alignment screw (Figure 13) until pointer reads correctly.

2 Manually position black pointer at minimum and maximum scale. Red pointer should read minimum and maximum scale respectively. If pointer reads correctly, remove micrometer as described under "Disassembling Micrometer." If not, make the necessary adjustments below:

a. If red pointer motion was linear (that is, pointer motion evenly divided on both sides of midrange value), turn output pressure range adjustment (Figure 13) counterclockwise to decrease motion or clockwise to increase motion.

b. If red pointer motion was nonlinear (that is, pointer motion not evenly divided on both sides of midrange value), loosen two screws on nozzle adjustable arm and:

1) rotate adjustable arm clockwise if motion was greater from 0% to 100% scale or

2) rotate adjustable arm counterclockwise if motion was greater from 0% to zero scale.

c. Tighten screws on nozzle adjustable arm.

3 Repeat steps 1 and 2 until correct red output pressure pointer readings are obtained for 0%, 100%, and 0 scale.

RESETTING LOADING SPRING

NOTE: Make certain loading spring is at ambient temperature before adjusting or resetting.

1 With spring puller attached to adjustment screw, and locknut, adjustment nut, and washer in position against spring puller bracket (Figure 91), turn 6-32 x 0.300" square portion of adjustment screw passes thru square hole. If there is interference, apply a wrench to flat on end of spring puller until free passage is attained.

2 When square portion of adjustment screw has passed thru square hole, start adjustment nut on adjustment screw.

3 Apply weights to spring puller finger ring until total weight including weight of spring puller equals required spring tension as given in Table 1.

4 Back off locknut and adjustment nut until washer bares top of spring puller. Tighten locknut and adjustment nut against washer. If necessary, reposition adjustment nut and locknut on adjustment screw until setting is correct.

5 Remove weights and spring puller. Replace sealing cap.
TABLE 1

<table>
<thead>
<tr>
<th>Area Meter</th>
<th>Standard Differential Pressure (psi)</th>
<th>Total Dead Weight (lbs)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (Inches)</td>
<td>Type</td>
<td>10 psi</td>
</tr>
</tbody>
</table>

- Includes spring power and calibrating weight.

BOOSTER UNIT

1. Remove Booster Unit from Transmitter as outlined under “Booster Unit Replacement”

2. With Booster at test bench, make the following connections:
   a. Connect an accurate air supply to Booster supply connection “S”. 30 psig for 3 to 27 psig range, 18 psig for 3 to 15 psig range
   b. Install accurate test gage at Booster output tee connection. Plug connection from Booster to restoring bellows.
   c. Install accurate test gage in line from Booster Unit nozzle connection “N” (Gage must accurately measure 20 to 35 psig)
   d. Extend short length of rubber tubing with adjustable pinch clamp from nozzle to control flow of air from nozzle.

3. Adjust pinch clamp to obtain 35 psig for 3 to 27 range or 10 psig for 3 to 15 range on test gage.

4. Output pressure should be approximately 15 psig for 3 to 27 range or 9 psig for 3 to 15 range. If not, adjust two concentric adjustment screws in center of lower housing (Item 25, Figure 29). Turn outer screw (Item 29, Figure 29) clockwise to decrease or counterclockwise to increase output pressure.

5. With nozzle back pressure at 35 (or 20) psig, and Booster unit output pressure at 15 (or 9) psig, turn inner screw (Item 27, Figure 29) clockwise until output pressure begins to decrease. Then turn inner screw two turns counterclockwise.

6. Remove tee, pinch clamp, plug, and supply and output connections. Perform “Transmitter Adjustment Checks” before returning to operation.

HOW THE AREA METER OPERATES

The Type JR13 Area Meter Transmitter is shown in Figure 14. The meter consists of a measuring mechanism and an indicating and transmitting mechanism.

MEASURING MECHANISM

The measuring mechanism is contained in a housing (similar to a valve body) which consists of an internal cage, a metering plug, and a loading spring connecting the metering plug to the bottom of the spring housing.

The indicating and transmitting mechanism (Figure 11) consists of a pointer and scale, a vane nozzle assembly, and a booster unit. Refer to “Transmitting Mechanism” for a complete description of the transmitting unit.

Fluid flowing into the internal cage (Figure 14) lifts the metering plug upward. As the plug moves, it covers the ports of the cage allowing the fluid to flow through the cage. Upward motion of the plug is opposed by the downward force of the loading spring. The displacement of the plug is directly proportional to the rate of flow while the force of the spring remains constant.

Motion of the metering plug is directly transmitted through a spindle and connecting linkage to the indicating pointer and the vane of the transmitting mechanism. The position of the pointer and vane reflects the position of the metering plug. Since the output signal developed by the transmitting mechanism is directly proportional to the vane position, the output signal is also directly proportional to the metering plug position and to the measured rate of flow.
The output pressure pointer should always be opposite the flow indicating pointer to indicate that the output signal is proportional to the measured rate of flow.

TRANSMITTING MECHANISM

The transmitting mechanism consists of a vane/nozzle assembly and a Booster Unit. The vane is linked to the indicating pointer (black) so that vane position corresponds to the measured flow. When the measured flow is constant the vane and nozzle are in their "at balance" positions and the pressure in the Booster bellows is maintained at a value which holds the U beam in an approximately horizontal position (inlet and exhaust valves closed).

An increase in measured flow repositions the spindle indicating pointer. This movement causes the vane to move closer to the nozzle, retarding the flow of air from the nozzle and increasing pressure in the Booster bellows. Expansion of the bellows pulls the U beam downward, opening the inlet valve (as the U beam pivots at the diaphragm seals) and increasing the pressure in Chamber 3. The inlet/exhaust valve (Figure 16) is spring loaded downward (downward motion of the U beam end closes the exhaust valve and opens the inlet valve, Sketch A) upward motion of the U beam end closes the inlet valve and opens the exhaust valve (Sketch B).

Increased pressure in Chamber 3 is applied to the restoring bellows expanding the bellows and moving the nozzle away from the vane. When pressure in Chamber 3 becomes great enough to move the nozzle to its "at balance" position, (1) the rate of air flow from the nozzle and the pressure in the Booster bellows return to their "at
balance" values, (2) the U beam returns to its horizontal position, and (3) the inlet and exhaust valves close, maintaining the Booster Unit output pressure at a new increased value.

When the measured flow decreases, all movement is in the opposite direction of that described above and the Transmitter output pressure is maintained at a new decreased value proportional to the decreased measured flow.
CORRECTION FACTORS

Bailey area meters operate on the principle that flow through an opening or restriction creates a differential pressure. The differential pressure is established by spring tension and is maintained constant while the opening is varied as required to permit the flow to pass. A measurement of opening is thus a measurement of flow rate. This relationship has a linear characteristic since the differential pressure is held constant.

An area meter must be calibrated for a specified fluid density, and is sensitive to changes from that specified density. If design operating conditions are not maintained, a correction factor or combination of factors must be applied to meter readings to obtain corrected flow. Instruction Section G99.2 provides correction factors for water and other fluids, but since the area meter is used almost exclusively for fuel oil measurement, which involves some additional considerations, the subject of correction factors for fuel oil measurement is described below.

SPECIFIC GRAVITY

Changes in density caused by the volumetric expansion on heating are referred to as changes in specific gravity. The diagonal lines of Figure 17 represent this change in specific gravity with temperature for petroleum oils of constant composition, and of 0.75 to 1.10 base specific gravity, referred to water at 60°F. Figure 18 shows the correction factor for the new specific gravity at the changed temperature. This specific gravity factor applies whether the flowing units are in weight or volume, since it is understood that a unit of volume is at a standard or base temperature (60°F) rather than at the flowing temperature.

OIL COMPOSITION

Should an oil of a different composition be used, the specific gravity of base or standard condition may change as well as at flowing condition. In this case it is necessary to take this specific gravity ratio into account, and the revised correction factor becomes

\[
\text{CF} = \sqrt{\frac{Gt_a}{Gt_d}} \times \frac{Gbd}{Gba}
\]

CF Multiplier factor for chart or integration

Gt_a Specific gravity at flowing temperature, actual value

Gt_d Specific gravity at flowing temperature, design value

Gbd Specific gravity at 60/60°F, design value

Gba Specific gravity at 60/60°F actual value

The ratio Gt_a/Gt_d may be determined from Figure 18.

VISCOSITY CORRECTION

1 inch and 2 inch area meters are sensitive to viscosity, and are flow calibrated at the specified viscosity to remove this effect. Should the flowing viscosity later be changed, it will be necessary to take this into account by introducing an empirically derived correction factor Fv.

\[
\text{CF} = \sqrt{\frac{Gt_a}{Gt_d}} \times \frac{Gbd}{Gba} \times Fv
\]

Fv Viscosity factor, for the style (port size) of the meter

Figures 19 thru 23 are flow viscosity correction curves for 1 inch and 2 inch area meters.

RECALIBRATION

The use of correction factors can be eliminated by recalibrating the area meter for the new operating conditions. Determine the new maximum stroke required by dividing the original maximum stroke by CF, then refer to calibration procedure on page 19.
FIGURE 17 Temperature Variations for Petroleum Oils
**FIGURE 18** Specific Gravity Correction Factors

**FIGURE 19** Flow Viscosity Correction Factor for 1 inch, Stye F□'0 JR13 Area Meter
FIGURE 20  Flow Viscosity Correction Factor for 1 inch, Style F-11, JR13 Area Meter

FIGURE 21  Flow Viscosity Correction Factor for 1 inch, Style F-22, JR13 Area Meter
FIGURE 22  Flow Viscosity Correction Factor for 1 inch, Style F44, JR13 Area Meter

FIGURE 23  Flow Viscosity Correction Factor for 2 inch, Style F44, JR13 Area Meter
EXPLANATION OF NOMENCLATURE

An "X" in any Nomenclature position indicates that the feature is special. An "X" as a suffix indicates that the unit includes some special feature not covered by Nomenclature.

SPARE PARTS KITS

The Spare Parts Kits shown in Figures 25 thru 29 should be carried in stock. Specify the Spare Parts Kit part number to order a complete kit.

ORDERING INDIVIDUAL PARTS

Figures 24 and 25 are Parts Drawings for the Indicating and Transmitting mechanism. Figures 26 thru 29 are Parts Drawings for the Type JR13 Area Meter. Normally, these drawings apply to the instruments furnished. However, there may be individual differences in specific meters because of design changes made since the printing of this Instruction Section.

1 Design changes made since the printing of this Instruction Section

2 Special design of equipment furnished to make it more suitable for special applications

Therefore, when ordering parts, assure receipt of correct replacements by specifying on order

a The complete Nomenclature and all information stamped on nameplate (Type, Style, Model, Loading Range, Head, Stroke, etc.) of instrument for which parts are desired.

b The Parts Drawing on which each part is illustrated. (The Parts Drawing Number is given in the Figure caption.)
<table>
<thead>
<tr>
<th>TEM</th>
<th>PART NO</th>
<th>NAME</th>
<th>TEM</th>
<th>PART NO</th>
<th>NAME</th>
<th>TEM</th>
<th>PART NO</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>5311409</td>
<td>2</td>
<td>COVER SCREW</td>
<td>2</td>
<td>REQD</td>
<td>30</td>
<td>SEE TABLE</td>
<td>TYPE A</td>
<td>PLA</td>
</tr>
<tr>
<td>98173</td>
<td>16</td>
<td>RETA N NG R NG</td>
<td>2</td>
<td>REQD</td>
<td>31</td>
<td>5376128</td>
<td>28</td>
<td>SUPPLY CONNECTOR</td>
</tr>
<tr>
<td>68851</td>
<td>1</td>
<td>COVER ASSY</td>
<td>NCL</td>
<td>SURES</td>
<td>TEMS</td>
<td>3A</td>
<td>THRU</td>
<td>9</td>
</tr>
<tr>
<td>68855</td>
<td>1</td>
<td>COVER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982400</td>
<td>1</td>
<td>STYLE PLATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08522</td>
<td>1</td>
<td>GASKET</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>981691</td>
<td>1</td>
<td>W WIDOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>1813</td>
<td>CLAMP</td>
<td>2</td>
<td>REQD</td>
<td>35</td>
<td>6.32</td>
<td>HEX</td>
<td>NUT</td>
</tr>
<tr>
<td>88</td>
<td>NU</td>
<td>2XJ</td>
<td>8</td>
<td>PAN</td>
<td>HU</td>
<td>HMG</td>
<td>SCR</td>
<td></td>
</tr>
<tr>
<td>5316543</td>
<td>1</td>
<td>SEAL</td>
<td>NG</td>
<td>STR</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SEE TABLE</td>
<td>D R V E</td>
<td>AR MS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>SEE TABLE</td>
<td>SECTOR</td>
<td>PLATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>SEE TABLE</td>
<td>ADJUSTABLE</td>
<td>ARM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>SEE TABLE</td>
<td>PAN HD MACH SRC</td>
<td>AS</td>
<td>REQD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>NO</td>
<td>2</td>
<td>REG</td>
<td>SPR</td>
<td>NG</td>
<td>LK WASH</td>
<td>AS</td>
<td>REQD</td>
</tr>
<tr>
<td>68937</td>
<td>1</td>
<td>L NK</td>
<td>ASSY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>609691</td>
<td>1</td>
<td>LOCAT</td>
<td>NG</td>
<td>SCREW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>032X5</td>
<td>6</td>
<td>F LL</td>
<td>HD</td>
<td>STN</td>
<td>STN</td>
<td>MACH</td>
<td>SCR</td>
<td></td>
</tr>
<tr>
<td>081</td>
<td>23</td>
<td>NO</td>
<td>1</td>
<td>NETER</td>
<td>MECH</td>
<td>ASSY</td>
<td></td>
<td>NCL</td>
</tr>
<tr>
<td>440X5</td>
<td>8</td>
<td>PAN</td>
<td>HD</td>
<td>MACH</td>
<td>SCR</td>
<td>AS</td>
<td>REQD</td>
<td></td>
</tr>
<tr>
<td>440X14</td>
<td></td>
<td>PAN</td>
<td>HD</td>
<td>MACH</td>
<td>SCR</td>
<td>AS</td>
<td>REQD</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>NO</td>
<td>4</td>
<td>SPR</td>
<td>NG</td>
<td>LK WASH</td>
<td>AS</td>
<td>REQD</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>4.40X</td>
<td>12</td>
<td>STN</td>
<td>STL</td>
<td>MACH</td>
<td>SCR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>0881</td>
<td>1</td>
<td>SPR</td>
<td>NG</td>
<td>ADJ</td>
<td>STMENT</td>
<td>ARM</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>881</td>
<td>1</td>
<td>P</td>
<td>VOT</td>
<td>PRESS</td>
<td>F T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>688</td>
<td>3</td>
<td>BELL</td>
<td>WOS</td>
<td>BEAM</td>
<td>ASSY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>686</td>
<td>7</td>
<td>VAN</td>
<td>E</td>
<td>OPER</td>
<td>AT</td>
<td>NG</td>
<td>LEVER</td>
</tr>
<tr>
<td>61</td>
<td>68834</td>
<td></td>
<td>CLAMP</td>
<td>BLOCK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>4.40X</td>
<td>16</td>
<td>PAN</td>
<td>HD</td>
<td>STN</td>
<td>STL</td>
<td>MACH</td>
<td>SCR</td>
</tr>
<tr>
<td>63</td>
<td>NO</td>
<td>4</td>
<td>SAE</td>
<td>STN</td>
<td>STL</td>
<td>LK WASH</td>
<td>AS</td>
<td>REQD</td>
</tr>
<tr>
<td>64</td>
<td>60</td>
<td>167</td>
<td></td>
<td>NOZZLE</td>
<td>A R L</td>
<td>NE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>9510541</td>
<td>5</td>
<td>MALE</td>
<td>CONNECTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>68841</td>
<td></td>
<td>OVER</td>
<td>TRAVEL</td>
<td>STOP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>5316500</td>
<td></td>
<td>BOOSTER</td>
<td>RELAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>10</td>
<td>37</td>
<td>X</td>
<td>2</td>
<td>HEX</td>
<td>HD</td>
<td>STN</td>
<td>STL</td>
</tr>
<tr>
<td>70</td>
<td>681654</td>
<td></td>
<td>MECH</td>
<td>SM</td>
<td>SUPPORT</td>
<td>BRAC</td>
<td>YET</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>0.37X</td>
<td>3</td>
<td>SHE</td>
<td>MACH</td>
<td>SCR</td>
<td>SEE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>WARN</td>
<td>NG</td>
<td>TAJ</td>
<td>SEE</td>
<td>NTE</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>19334</td>
<td>32</td>
<td>SPACER</td>
<td>SEE</td>
<td>NOTE</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>88</td>
<td>027</td>
<td>COVER</td>
<td>PLATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>10</td>
<td>32</td>
<td>G</td>
<td>0</td>
<td>PAN</td>
<td>HD</td>
<td>MACH</td>
<td>SCR</td>
</tr>
<tr>
<td>76</td>
<td>8</td>
<td>32</td>
<td>HEX</td>
<td>NUT</td>
<td>AS</td>
<td>REQD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>19981</td>
<td>6</td>
<td>PLUG</td>
<td>BUT</td>
<td>TON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>68006</td>
<td>3</td>
<td>HOUS</td>
<td>NG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>588068</td>
<td></td>
<td>GAS</td>
<td>KET</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>197734</td>
<td>1</td>
<td>HOSE</td>
<td>CLAMP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>19734</td>
<td>1</td>
<td>WASHER</td>
<td>4</td>
<td>REQD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>6.32X</td>
<td>3</td>
<td>PAN</td>
<td>HD</td>
<td>SEMS</td>
<td>EXT</td>
<td>AS</td>
<td>REQD</td>
</tr>
</tbody>
</table>

**Note A**: SPEC FY NUMBER ON CODE LABEL WHEN ORDER NG PARTS
**Note B**: USED FOR SHP NG ONLY

*SEE PARTS DWG P22 37 FOR BOOSTER RELAY DETA LS*

### TABLE A

<table>
<thead>
<tr>
<th>STYLE</th>
<th>TRANSM</th>
<th>TCH</th>
<th>ASSEMBLY</th>
<th>TEM</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>TEM</th>
<th>13</th>
<th>TEM</th>
<th>22</th>
<th>TEM</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL EXCEPT FS87</td>
<td>681120</td>
<td>631181</td>
<td>68</td>
<td>117</td>
<td>16</td>
<td>6</td>
<td>117</td>
<td>16</td>
<td>6881181</td>
<td>8</td>
<td>6.32X</td>
<td>7/16</td>
<td>348</td>
</tr>
<tr>
<td>FS87</td>
<td>681773</td>
<td>631181</td>
<td>68</td>
<td>117</td>
<td>16</td>
<td>6</td>
<td>117</td>
<td>16</td>
<td>6881181</td>
<td>8</td>
<td>6.32X</td>
<td>7/16</td>
<td>348</td>
</tr>
</tbody>
</table>

### TABLE A Cont.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TEM</th>
<th>14</th>
<th>ITEM</th>
<th>76</th>
<th>ITEM</th>
<th>82</th>
</tr>
</thead>
<tbody>
<tr>
<td>160300</td>
<td>660</td>
<td>00</td>
<td>708</td>
<td>00</td>
<td>6.32X</td>
<td>7/16</td>
</tr>
<tr>
<td>NO 3</td>
<td>110600</td>
<td>1208</td>
<td>00</td>
<td>6.32X</td>
<td>7/16</td>
<td></td>
</tr>
</tbody>
</table>
### Type JR13 Area Meter

#### Table of Parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Part No</th>
<th>NAME</th>
<th>Item</th>
<th>Part No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>03/16</td>
<td>NAMEPLATE</td>
<td>18B</td>
<td>1/2 13 x 1/2</td>
</tr>
<tr>
<td>2</td>
<td>311569</td>
<td>THD P/RNG SCR TYPE U AS READ</td>
<td>18C</td>
<td>3/16 x 3/8</td>
</tr>
<tr>
<td>3</td>
<td>41026</td>
<td>PRESS T GHT BRG CAP</td>
<td>18D</td>
<td>159825 3</td>
</tr>
<tr>
<td>4</td>
<td>311651</td>
<td>FOLLOWER &amp; WASHER ASSY</td>
<td>18E</td>
<td>681372 1</td>
</tr>
<tr>
<td>5</td>
<td>311651</td>
<td>PTB FOLLOWER</td>
<td>19</td>
<td>316056 1</td>
</tr>
<tr>
<td>6</td>
<td>311651</td>
<td>P T B WASHER</td>
<td>20</td>
<td>316059 2</td>
</tr>
<tr>
<td>7</td>
<td>683203</td>
<td>COVER</td>
<td>21</td>
<td>155826 6</td>
</tr>
<tr>
<td>8</td>
<td>7/16-14x3 1/4</td>
<td>HEX HD CAP SCR</td>
<td>22</td>
<td>156173 1</td>
</tr>
<tr>
<td>9</td>
<td>7/16</td>
<td>8 REOUSH FOR 250 PS 8 REOUSH FOR 300 PS</td>
<td>23</td>
<td>157216 2</td>
</tr>
<tr>
<td>10</td>
<td>196025</td>
<td>M LED STUD 8 REOUSH FOR 300 PS FOR 600 PS</td>
<td>24</td>
<td>10 32 x 1/4</td>
</tr>
<tr>
<td>11</td>
<td>195467</td>
<td>DRA N VALVE ASSY</td>
<td>25</td>
<td>9/16 7/8</td>
</tr>
<tr>
<td>12</td>
<td>681651</td>
<td>REDUCER BUSH NG</td>
<td>26</td>
<td>681120</td>
</tr>
<tr>
<td>13</td>
<td>681651</td>
<td>FORKED LEVER SCR</td>
<td>27</td>
<td>682956 1</td>
</tr>
<tr>
<td>14</td>
<td>195925</td>
<td>PRESS T GHT BODY</td>
<td>28</td>
<td>682956 1</td>
</tr>
<tr>
<td>15</td>
<td>681325</td>
<td>Q R NG</td>
<td>29</td>
<td>681120</td>
</tr>
<tr>
<td>16</td>
<td>681325</td>
<td>PRESS T GHT BRG SP NDLE ASSY</td>
<td>30</td>
<td>681120</td>
</tr>
<tr>
<td>17</td>
<td>681325</td>
<td>DR VER LEVER ASSY</td>
<td>31</td>
<td>681120</td>
</tr>
<tr>
<td>18</td>
<td>681361</td>
<td>Housng &amp; Adapter Ass Y</td>
<td>32</td>
<td>681120</td>
</tr>
<tr>
<td>19A</td>
<td>681325</td>
<td>18A THRU 8E</td>
<td>33</td>
<td>681120</td>
</tr>
<tr>
<td>18A</td>
<td>681325</td>
<td>ADAPTER PLATE</td>
<td>34</td>
<td>681120</td>
</tr>
</tbody>
</table>

**NOTE**

*FOR DATA LS OF PNEUMATIC CT TRANSMITTER SEE PTS DWG P22**

*FOR DATA LS OF ELECTRIC CT TRANSMITTER MODELS K, P S & T SEE PTS DWG E22 63 MODELS WA & VB SEE PTS DWG E22 5*

---

**FIGURE 26** Parts Drawing P22-42 2 Inch JR13 Area Meter (250 and 600 PSI)
<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART NO</th>
<th>NAME</th>
<th>TEM</th>
<th>PART NO</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0316</td>
<td>NAMENAMEPLATE</td>
<td>16C</td>
<td>16×28</td>
<td>GROOV P N TYPE 4</td>
</tr>
<tr>
<td>2</td>
<td>41D26</td>
<td>PRESS T GHT BRG CAP</td>
<td>6D</td>
<td>195826</td>
<td>O R NG</td>
</tr>
<tr>
<td>3</td>
<td>31 691</td>
<td>FOLLOWER &amp; WASHER ASSEMBLY</td>
<td>18E</td>
<td>681104</td>
<td>SP N DLE HOUS NG NCL TEM 2</td>
</tr>
<tr>
<td>4</td>
<td>311071</td>
<td>PRESS T GHT BRG CAP</td>
<td>21</td>
<td>97283</td>
<td>FULL THREADED STUD 9 REQU</td>
</tr>
<tr>
<td>5</td>
<td>311511</td>
<td>P T B FOLLOWER</td>
<td>22</td>
<td>341784</td>
<td>SP N DLE BEAR NG</td>
</tr>
<tr>
<td>6</td>
<td>681371</td>
<td>P T B WASHER</td>
<td>23</td>
<td>316091</td>
<td>006 SH M AS REQU</td>
</tr>
<tr>
<td>7</td>
<td>67891</td>
<td>COVER</td>
<td>24</td>
<td>316092</td>
<td>010 SH M AS REQU</td>
</tr>
<tr>
<td>8</td>
<td>1/2 3</td>
<td>SEM F N SHED HEAVY HEX NUT AS REQU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>196025</td>
<td>1 1/8 N DRA N VALVE</td>
<td>10</td>
<td>195825 6</td>
<td>O RING</td>
</tr>
<tr>
<td>10</td>
<td>311021</td>
<td>FORKED LEVER SCR</td>
<td>25</td>
<td>1958255</td>
<td>O R NG</td>
</tr>
<tr>
<td></td>
<td>315601</td>
<td>ALL EXCEPT FS87</td>
<td>26</td>
<td>681131</td>
<td>LOCKPLATE</td>
</tr>
<tr>
<td></td>
<td>681811</td>
<td>PRESS T GHT BRG BODY</td>
<td>27</td>
<td>197218</td>
<td>PAN HD STN STL MACH SCR AS REQU</td>
</tr>
<tr>
<td></td>
<td>681801</td>
<td>PRESS T GHT BRG</td>
<td>28</td>
<td>68173</td>
<td>FS87 ONLY</td>
</tr>
<tr>
<td></td>
<td>681330</td>
<td>SP N DLE ASSY</td>
<td>29</td>
<td>3.4×3.8</td>
<td>GROOV P N T WEF J 2 REQU</td>
</tr>
<tr>
<td></td>
<td>681791</td>
<td>DR VE LEVER ASSY</td>
<td>30</td>
<td>681120</td>
<td>TRANSSEE NOTE</td>
</tr>
<tr>
<td></td>
<td>681350</td>
<td>ALL EXCEPT FS87</td>
<td>31</td>
<td>681773</td>
<td>FS87 ONLY</td>
</tr>
<tr>
<td></td>
<td>681361</td>
<td>FS87 ONLY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>3.4 10</td>
<td>SEM F N SHED HEAVY HEX NUT 8 REQU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>681360</td>
<td>HOUS NG &amp; ADAPTER PLATE ASSY (NCL TEMS 14A)</td>
<td>32</td>
<td>662478</td>
<td>SEALNG CAP</td>
</tr>
<tr>
<td></td>
<td>681781</td>
<td>THRU 6E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17A</td>
<td>68 328</td>
<td>ADAPTER PLATE</td>
<td>33</td>
<td>5/16 18×1.78</td>
<td>HEX HD CAP SCR</td>
</tr>
<tr>
<td>16B</td>
<td>68 328</td>
<td>HEX HO DEN SCREW ASSEMBLY</td>
<td>34</td>
<td>662951</td>
<td>WASHER</td>
</tr>
<tr>
<td></td>
<td>68 328</td>
<td>ADAPTER PLATE</td>
<td>35</td>
<td>195825 2</td>
<td>O R NG</td>
</tr>
<tr>
<td></td>
<td>68 328</td>
<td>HEX HO DEN SCREW ASSEMBLY</td>
<td>36</td>
<td>197214</td>
<td>LOCK NUT</td>
</tr>
</tbody>
</table>

**NOTE:** For details of pneumatic control transmitters, see parts of P22-39 or P22-40.

**TABLE A**

<table>
<thead>
<tr>
<th>STYLE</th>
<th>TEM</th>
<th>QUANTITY</th>
<th>USE</th>
<th>STROKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS46</td>
<td>661141</td>
<td>1</td>
<td>4 PORTS</td>
<td>2/2 N</td>
</tr>
<tr>
<td>FS86</td>
<td>664208</td>
<td>1</td>
<td>8 PORTS</td>
<td>2/2 N</td>
</tr>
<tr>
<td>FS87</td>
<td>667399</td>
<td>1</td>
<td>8 PORTS</td>
<td>3/4 N</td>
</tr>
</tbody>
</table>

**SPARE PARTS & T.P. NO. 256057 2**

<table>
<thead>
<tr>
<th>TEM</th>
<th>QTY</th>
<th>PT NO</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
<td>311607</td>
<td>P T B FOLLOWER</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>316  5</td>
<td>P T B FOLLOWER</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>195825</td>
<td>O R NG</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>195825</td>
<td>O R NG</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>195825</td>
<td>O R NG</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>195825</td>
<td>O R NG</td>
</tr>
</tbody>
</table>

**FIGURE 77 Parts Drawing P22-44, 4 Inch JR13 Area Meter (600 PSI)**
### Table A

<table>
<thead>
<tr>
<th>TEM PART NO</th>
<th>NAME</th>
<th>ITEM PART NO</th>
<th>NAME</th>
<th>TEM PART NO</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NAMEPLATE</td>
<td>18A</td>
<td>ADAPTER PLATE</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>2</td>
<td>PAN HD THD FRN E SCR TYPE U A3 REQ</td>
<td>18B</td>
<td>HEX HD CAP SCR</td>
<td>37</td>
<td>LOCKNUT</td>
</tr>
<tr>
<td>3</td>
<td>PRESS T GHT BRG CAP ASSY NCL TEMS 5 &amp; 6</td>
<td>18C</td>
<td>GROOV P N TYPE 4</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>4</td>
<td>FOLLOWER &amp; WASHER ASSY NCL TEMS 5 &amp; 6</td>
<td>18D</td>
<td>2 REOQ</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>5</td>
<td>P T B FOLLOWER</td>
<td>18E</td>
<td>SP NDLE HOUS NG</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>6</td>
<td>P T B WASHER</td>
<td>23</td>
<td>SP NDLE BEAR NG</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>7</td>
<td>COVER</td>
<td>24</td>
<td>006 SH MS AS REQD</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>8</td>
<td>FULL THREADED STUDS B REOQ</td>
<td>25</td>
<td>010 SH MS AS REQD</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>9</td>
<td>1/2 13 SEM F N SHED HEAVY HEX FULL NUT AS REQD</td>
<td>26</td>
<td>0 R NG</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>10</td>
<td>196025 8 N DRA N VALVE SP NDLE ASSY</td>
<td>27</td>
<td>0 R NG</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>11</td>
<td>FORKED LEVER &amp; CREW</td>
<td>28</td>
<td>LOCKPLATE</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>12</td>
<td>PRESS T GHT BRG BODY</td>
<td>29</td>
<td>PAN HD MACH SCR AS REQD</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>13</td>
<td>195875 2  O R NG</td>
<td>30</td>
<td>3 16 x 3 8</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>14</td>
<td>681325 1 PRESS T GHT BRG SP NDLE ASSY</td>
<td>31</td>
<td>2 REOQ</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>15</td>
<td>OR DE LEVER ASSY</td>
<td>32</td>
<td>5/16 18 x 1 7 B HEX HD CAP SCR 3 REOQ</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>16</td>
<td>3 4 0x2 HEX HD CAP SCR 6 REOQ</td>
<td>33</td>
<td>SEAL NG CAP</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>17</td>
<td>3 4 10 x 3 4 HEX HD CAP SCR 2 REOQ</td>
<td>34</td>
<td>5/16 x 24</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
<tr>
<td>18</td>
<td>681300 1 HSG &amp; ADAPTER PLATE ASSY NCL TEMS 18A THRU 18E</td>
<td>35</td>
<td>HEX FULL NUT AS REQD</td>
<td>37</td>
<td>METER NG PLUG STEM</td>
</tr>
</tbody>
</table>

**NOTE FOR DETAL LS OF PNEUMATIC TRANSM TTER SEE P TS D WG 22 39**

**FIGURE 28** Parts Drawing P22-13, 4 Inch JR13 Area Meter (250 PSI)
**Product Warranty**

Bailey Meter Company warrants the products manufactured by it to be free from defects in material and workmanship and will repair or replace, at its option, free of charge, f.o.b. its factory such part or parts which prove defective within one year from date of shipment. In respect to any products which are not an integral part of a product manufactured by the Company, the warranty given by the manufacturer thereof shall apply.

**Shipping Damage**

We strongly recommend that you inspect and test your instrument as soon as you receive it. If the instrument is damaged or operates improperly, notify the carrier for inspection of the shipment. The carrier's claim agent will prepare a report of damage, a copy of which should be forwarded to your nearest Bailey District Office (see back cover for location). The District Office will then tell you how to have the instrument repaired or replaced.

**Service**

The Bailey Meter Company is very concerned that your Bailey instrument provides continued, fine performance. This instruction manual is designed to fully describe the correct installation, operation, and maintenance of your instrument under recommended conditions. If the need arises, factory-trained Service Engineers are on call for prompt, in-plant maintenance. Telephone or wire your nearby Bailey District Office to make arrangements for this service.

**Replacement Parts and Supplies**

Complete parts drawings and recommended spare parts kit information are included in this instruction manual. When replacement parts or supplies are required for maintenance of your Bailey instrument, contact your nearest Bailey District Office (see back cover for location). Always specify complete data on the instrument nameplate on your inquiry or order for parts. Common parts are available for shipment within 48 hours on a speed-order basis.
BAILEY METER COMPANY
HEADQUARTERS
Wick rffe, Oh o 44092
U.S.A. SALES OFFICES
Calif. Los Angeles
Calif. San Francisco
Colo. Denver
Connecticut, New Haven
Conn. Jacksonville
Ga. Atlanta
Ill. Chicago
Ky. Louisville
La. New Orleans
Maine. Augusta
Maryland. Baltimore
Massachusetts Boston
Mich. Detroit
Minnesota. Minneapolis
Mo. Kansas City
Mo. St. Louis
N.C. Carolina, Charlotte
N.J. New Jersey, East Orange
N.Y. New York, Buffalo
N.Y. New York, Syracuse
Ohio. Cincinnati
Ohio. Cleveland
Ohio. Columbus
Pennsylvania. Philadelphia
Pennsylvania. Pittsburgh
Texas. Dallas
Texas. Houston
Va. Richmond
Wash. Seattle
Wisconsin. Madison
BALEY METER COMPANY L.M.TED
PO. NITE CLAIRE, QUEBEC
Alberta Edmonton
B.C. Vancouver
Manitoba Winnipeg
Nova Scotia Halifax
Ontario. Toronto
Quebec Montreal
BALEY METER AUSTRAL. A PTY LTD
REGENTS PARK N.S.W. 2143
N.S.W. Sydney
Queensland. Brisbane
South Australia Adelaide
Victoria. Melbourne
Western Australia. Perth
BALEY JAPAN COMPANY LTD
511 I BARAK. N RAYAMA CHO, TACATA GUN
SH ZUKA KEN JAPAN
INTERNATIONAL REPRESENTATIVES
Argentina. Buenos Aires
Brazil. Rio de Janeiro
Chile. Santiago
England. Croydon
France. Paris
India. New Delhi
Italy. Milan
Japan. Tokyo
Mexico. Mexico City
Puerto Rico San Juan
Spain. Madrid
Taiwan. Taipei
Turkey. Ankara
And Other Principal Countries

Bailey
a subsidiary of Babcock & Wilcox U.S.A.