WARNING: IMPORTANT SAFETY INFORMATION ENCLOSED. READ THIS AND ALL OPERATING AND MAINTENANCE INSTRUCTION MANUALS BEFORE OPERATING PRODUCT.

WARNING: THIS INFORMATION MUST BE AVAILABLE TO ALL PERSONNEL THAT WILL OPERATE AND MAINTAIN EQUIPMENT. FAILURE TO READ, UNDERSTAND AND FOLLOW THIS DOCUMENT AND THE OPERATING AND MAINTENANCE INSTRUCTION MANUALS FOR ALL COMPONENTS AND ASSEMBLIES INCLUDED ON THE TRAILER COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH!

Most SPM® products generate, control or direct pressurized fluids; therefore, it is critical that those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly!! DO NOT attempt to Open/Close any of the valves/components during operation.

WARNING: MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM® products. This information is not meant to replace existing Company's safety policies or practices.

NOTE: Images may not be representative of the actual purchased product.

Personal Responsibilities:

1. When working on SPM® flow control products, safety glasses, approved safety shoes and hard hat must be worn.

2. Personnel should never hammer on any component, including SPM® Safety Iron® parts, when pressure is present. Hammering on any part or component may also cause foreign material or steel particles to become airborne.

3. It is a personal responsibility to use the proper tools when servicing the valve. It is a personal responsibility to be knowledgeable and trained in the use and handling of tools for all maintenance of the valve.

4. Hot surface may be present; it is a personal responsibility to protect against burn injury.

NOTE: Refer to SPM® Safety Iron® Operating & Maintenance Instruction Manuals and Procedures.
On Location:

1. Each valve/component is clearly marked with a maximum pressure rating. This pressure must not be exceeded or SERIOUS INJURY OR DEATH CAN OCCUR!

2. The valve’s discharge connections should be properly cleaned and lightly oiled, with white lithium grease, before the downstream piping is attached. Any worn, damaged or missing seals should be replaced.

3. Welding, brazing or heating any part of a valve/component is PROHIBITED. If accessories must be attached, consult Weir Oil and Gas engineering prior to installation.

4. A complete visual inspection of the valves/components must be made prior to each use. Any leaking seals, broken bolts, leaking hoses or improperly tightened parts must be remedied prior to using.

5. Any repairs or service (even routine maintenance) must be performed by a trained service technician who is qualified to work on high pressure flow control systems. All such service and repairs must be supervised by qualified management personnel or returned to Weir Oil & Gas for service. Only SPM® replacement parts should be utilized. Failure to do so may result in loss of warranty as well as SERIOUS INJURY OR DEATH!

Special Precautions:

1. The modification or unauthorized repair of any part of a SPM® valve/component, or use of components not qualified by Weir Oil & Gas, can lead to valve damage or failure and SERIOUS INJURY OR DEATH!

2. All SPM® threaded components are right hand threaded unless specifically designated otherwise. Make sure all threaded components are assembled to the correct torque value.

3. All products should be properly cleaned, greased or oiled with, loctite copper grade anti-seize, after each use and inspected prior to each use.

4. Each integral union connection is clearly marked with a pressure code (i.e. “1502”, 15,000 psi). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections used must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.
PPE and Safety:

WARNING: DO NOT USE FOR H2S SERVICE! Contact your Weir Oil & Gas representative for advice about sour gas service applications.

WARNING: DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

ALWAYS REMEMBER:

1. Always wear PPE (personal protective equipment).
2. Only qualified technicians should perform maintenance on SPM® products.
3. Always use SPM® supplied new parts kit for reassembly.
4. Clean all components thoroughly prior to reassembly.
5. Check sealing surface area of valve for pitting, erosion or other flaws. Failure in sealing can result if these areas are not smooth.
6. Use only SPM® Valve parts on SPM® Valves.
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SECTION I: General Information

Scope:

This document covers the guidelines recommended for the operation of all the SPM® Safety Iron® Manifold Trailers manufactured by Weir Oil & Gas including the actions that should be performed prior to pumping and cautions that should be applied throughout the operation process.

Purpose:

All SPM® Safety Iron® manifold trailers are inspected and pressure tested to ensure quality and safety before they are delivered. However, Weir Oil and Gas recommends that a pre-inspection be performed prior to operating the manifold trailer for damaged or loose connections that may have occurred in the previous jobs, during transportation, or other unforeseen reasons.

General Overview:

All SPM® Safety Iron® manifold trailers consist of three major sub-assemblies, low pressure piping assembly, high pressure piping assembly, and trailer frame assembly. See page 7 for illustration of a typical manifold trailer structure.

Features of SPM® Safety Iron® manifold trailers include:

- Multiple configurations allow for increased variability in flow rate, and inlet/outlet configuration.
- SPM® Safety Iron® connections provide greater vibration resistance compared to traditional hammer union alternatives.
- Available coiled-cable suspension for high pressure component mounting decreases the effect of shock and vibration and reduces risk of cracked integrals.
- Isolation valves are available for fluid velocity control through adjustable flow line communication. This is for both High and Low Pressure Piping Assemblies.
## Replacement Parts:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part. No.</th>
<th>Description</th>
<th>Order From</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P34133</td>
<td>Standard Spring Isolator (10.50” x 5.30” x 4.30”)</td>
<td>Weir Oil &amp; Gas</td>
</tr>
<tr>
<td>2</td>
<td>P28369</td>
<td>Customer Spring Isolator (12.00” x 6.25” x 4.80”)</td>
<td>Weir Oil &amp; Gas</td>
</tr>
<tr>
<td>3</td>
<td>P34134</td>
<td>Air-Over-Hydraulic Cylinders (landing gear)</td>
<td>Weir Oil &amp; Gas</td>
</tr>
<tr>
<td>4</td>
<td>P34135</td>
<td>Wet-kit (truck supplies hydraulic fluid to landing gear system)</td>
<td>Weir Oil &amp; Gas</td>
</tr>
<tr>
<td>5</td>
<td>P34135</td>
<td>Electric-over-Hydraulic Cylinders (landing gear)</td>
<td>Weir Oil &amp; Gas</td>
</tr>
<tr>
<td>6</td>
<td>20.0-1081</td>
<td>3/4” Nordlock Washers</td>
<td>Broussard NA</td>
</tr>
<tr>
<td>7</td>
<td>17.0-1081</td>
<td>5/8” Nordlock Washers</td>
<td>Broussard NA</td>
</tr>
</tbody>
</table>
SPM® Safety Iron® Manifold Trailer Assembly:

Depending on the configurations, SPM® Safety Iron® manifold trailers are designed with various inlet / outlet options to handle different pumping flow rates. The maximum allowed flow rates (in Barrels per Minute, or BPM), as described on the warning labels of each trailer, should not be exceeded during the operation.

Figure 1.
Manifold Trailer Assembly Break Down

- Low pressure piping assembly
- High pressure piping assembly
- Trailer frame assembly
- Full manifold trailer assembly
SECTION II: Component Visual Inspection

This section covers the components that should be inspected prior to the operation of the manifold trailer.

SPM® High Pressure Union Seals:

All the open ended female hammer union connections should have union seal rings installed on the seal surface as shown on Figure 2. During the assembly process performed by Weir Oil & Gas, plastic thread protectors are placed on these to protect the threaded surface and the seals. Once these caps are removed, inspect for any missing or loose seals and for damaged threads.
SPM® Safety Iron® Clamps:

All SPM® Safety Iron® bolts should be assembled to the required torque settings. An application of torque seal on the head of each bolt will indicate that the correct torque was applied during the factory assembly process.

It is recommended that the torque of each bolt be verified prior to each job. (Figure 3)

Refer to the SPM® Safety Iron® Operating and Maintenance Instructions, and SPM® Safety Iron® Maintenance and Inspection Procedures for torque specifications and details.
**SPM® High Pressure Plug Valves:**

Visually inspect that all the Plug Valves are in the correct position. This position is usually indicated by the “flat surface area” on the top of the Actuator Cap. An open valve will have the “flat surface area” aligned in the direction of flow (Figure 4.) or perpendicular to this direction to indicate a closed valve.

**WARNING:** DO NOT ATTEMPT TO OPEN OR CLOSE VALVES DURING OPERATION.
U-Bolts:

The high pressure and low pressure components should be properly restrained by the U-bolts to the trailer frame and mounting brackets. Inspect and assure that all U-bolts are tightened so the components are secured adequately.

As shown in Figure 5a, a gap between the U-bolt and the component that is to be restrained may indicate the U-Bolt is not adequately tightened. When the U-bolt is installed correctly (Figure 5b) the inner surface of the U-bolt should touch the component in the curvature section. In addition, a set of Nord-Lock washers should be used between the threaded nut and the supporting bracket to prevent the U-Bolt from backing out due to vibrations. Lastly, there should be at least 1/4” of threads visible after the Nord-Lock washer and the threaded nut.

![Figure 5a. Incorrect Installation](image)
U-Bolts (Cont.):

**Figure 5b. Correct Installation**

- U-bolt touching the component that is to be secured.
- Nord-Lock Washers 1/4" of the threads visible from the u-bolt.
SECTION III: Landing Gear & Suspension System

This section covers the Landing gear systems, Suspension airbag system, and Foot Pad

Landing Gear Systems:

**CAUTION:** THE LANDING GEAR SYSTEM MUST ONLY BE USED FOR LOADING AND UNLOADING THE MANIFOLD TRAILER.

There are three options of Landing Gear Systems available for SPM® Safety Iron® manifold trailers: Wet Kit, Electric / Hydraulic, and Air / Hydraulic. The important features associated with these options and the replacement part numbers are listed in Figure 6.1 & 6.2.

**Figure 6.1 Types and features of different landing gear options (5 inch bore cylinders)**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>External Hydraulic Source Needed</th>
<th>Drive System Self Sustained</th>
<th>Battery Needed</th>
<th>External Air Source Needed</th>
<th>Landing Gear Cylinder Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet Kit</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>P36648</td>
</tr>
<tr>
<td>Electric / Hydraulic</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>P36648</td>
</tr>
</tbody>
</table>

**CAUTION:** Travel speed can differ depending on size of landing gear cylinders and GPM (gallons per minute) of tractor rig setup.

**Figure 6.2 (4 inch bore cylinders)**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>External Hydraulic Source Needed</th>
<th>Drive System Self Sustained</th>
<th>Battery Needed</th>
<th>External Air Source Needed</th>
<th>Landing Gear Cylinder Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet Kit</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>P34135</td>
</tr>
<tr>
<td>Electric / Hydraulic</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>P34135</td>
</tr>
<tr>
<td>Air / Hydraulic</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>P34134</td>
</tr>
</tbody>
</table>

For operating temperatures of -20 degrees Fahrenheit the Following Hydraulic Fluid is recommended:

- (Texaco Rando HDZ-15HVI Mil. Spec. H-5606)………………………………………….suggest 10 Gallons
- (Mobil DTE Kendall Hyden Glacial Blu)…………………………………………………suggest 10 Gallons

Please contact Weir Oil & Gas Engineering for instructions on how to fill Reservoir.
Suspension Airbag Systems:

After the trailer is decoupled from the truck and prior to starting a job, the trailer’s landing gear and suspension system **MUST** be adjusted. If an air suspension system is utilized, the suspension airbags must first be dumped of air pressure prior to operating the manifold trailer. The airbag dump and load button is typically located on the roadside rear or very rear of trailer and will be clearly labeled.

Foot Pad and Landing Gear:

After the airbags have been dumped, the landing gear can now be retracted. The landing gear must be fully retracted so that the bottom of each cylinder disc is approximately one to three inches **OFF THE GROUND**. The trailer must be fully supported by the Foot Pad during operation. The location of the foot pad and landing gear system are illustrated in Figure 7.

Figure 7. Foot Pad and Landing Gear
SECTION IV: Attention to Iron Rig up and Operation Condition

Rig Up and Operation Conditions:

**CAUTION:** FOLLOW YOUR COMPANY’S STANDARD RIG UP PROCEDURE. This document is NOT intended to replace standard operation procedure used by your service company.

- It is the recommendation of Weir Oil & Gas that all customers flush out suction assembly and discharge assembly with fresh water after each operation. This practice will help ensure longer lasting performance of the manifold trailer and all iron components.

![WARNING]

Excessive vibrations due to improper rig up may cause undesired dynamic loadings or side loadings on the high pressure iron connections, which are common causes of premature equipment damage or failure. Verify the iron rig up to avoid excessive vibrations and dynamic loadings.

Verify the pumping pressure and pumping flow rate to be within the treating iron’s and manifold trailer’s design specifications. Verify the manifold trailer is set up correctly with landing gear fully retracted prior to the operation.

**Examples**

Some examples of improper rig up include (but are not limited to):

- Swivels are set up with limited flexibility to swing sideways
- High pressure treating Iron is not brought to ground or not properly supported before connecting to the pump truck
- Operating manifold trailer with a higher pumping flow rate than it is designed for
- Operating manifold trailer without fully retracting the landing gear system
REFERENCES:

- SPM® Safety Iron® Maintenance and Inspection Procedures
- SPM® Safety Iron® Operating and Maintenance Instructions
SECTION VI: Service and Support

Service Center Order Information:

Weir Oil & Gas stocks a large inventory of genuine “original equipment” SPM® replacement parts. In order to expedite a parts order and avoid any delays, please provide the following information with your order:

- The part number and description of each item ordered.
- The quantity of each part, kit, or assembly ordered.
- The model number and serial number
- Your purchase order number.
- Specify method of shipment, complete shipping address, complete billing address and telephone number at the destination of the shipment.
UNITED STATES:

Houston, TX - Sales Office
363 N. Sam Houston Pkwy. E., Suite 550
Houston, TX 77060
Ph: +1-281-847-7270
Fax: +1-281-820-2972

GULF COAST:

Alice, TX - Service Center
2450 Business Hwy. 281 North
Alice, TX 78332
Ph: +1-361-661-0900
Fax: +1-361-661-0909

Deer Park, TX - Service Center
920 Seacoast
Deer Park, TX 77536
Ph: +1-832-200-6220
Fax: +1-832-200-6220

Lafayette, LA - Service Center
401 S. Bernard Rd.
Broussard, LA 70518
Mailing: PO Box 82099, Lafayette, LA 70508
Ph: +1-337-837-3161
Fax: +1-337-839-1985

Pleasanton, TX - Service Center
772 HWY 281 South
Pleasanton, TX 78064
Ph: +1-830-569-3571
Fax: +1-830-569-3643

MID CONTINENT:

Bossier City, LA - Service Center
2403 Crimmitt Dr.
Shreveport, LA 71107
Ph: +1-318-677-2422
Fax: +1-318-677-5185

- Elk City, OK - Service Center
2111 S. Main
Elk City, OK 73648
Ph: +1-580-223-2385
Fax: +1-580-223-3402

Fort Worth, TX - Service Center
7711 Wyatt Dr.
Fort Worth, TX 76108
Ph: +1-817-935-7900
Fax: +1-817-246-3970

Kilgore, TX - Service Center
1102 State Hwy 31W
Kilgore, TX 75662
Ph: +1-903-984-8153
Fax: +1-903-984-8626

- Searcy, AR - Service Center
Searcy, AR 72143
Ph: +1-501-305-3296
Fax: +1-501-305-3419

PERMIAN:

Odessa, TX - Service Center
2424 E. I-20
Odessa, TX 79766
Ph: +1-432-580-3887
Fax: +1-432-333-1351

NORTH EAST:

Blairsville, PA - Service Center
1519 Route 22 Hwy East
Blairsville, PA 15717
Ph: +1-724-459-4770
Fax: +1-724-459-4771

Buckhannon, WV - Service Center
52 Norwins Drive
Buckhannon, WV 26201
Ph: +1-304-472-9701
Fax: +1-304-472-9130

Horseheads, NY - Service Center
36 Level Acres Dr
Horseheads, NY 14845
Ph: +1-607-739-1215
Fax: +1-607-739-1314

Williamsport, PA - Service Center
76 Oddell Road
Muncy, PA 17756
Ph: +1-570-546-1005
Fax: +1-570-546-2033

ROCKIES:

Fort Lupton, CO - Service Center
13055 Weld County Road R
Fort Lupton, CO 80621
Ph: +1-303-535-5450
Fax: +1-303-535-5455

Grand Junction, CO - Service Center
842 1/2 Rd., Building A
Grand Junction, CO 81505
Ph: +1-970-243-4600
Fax: +1-970-243-8027

Williston, ND - Service Center
5073 Owens Industrial Park
Williston, ND 58801
Ph: +1-701-572-0776
Fax: +1-701-572-0784

CANADA:

Edmonton, AB, Canada - Service Center
4737 97th Street
Edmonton, Alberta T6E 5W2
Ph: +1-780-436-1122
Fax: +1-780-437-5218

Fort St. John, BC, Canada - Service Center
10508 99th Avenue
Fort St. John, British Columbia V1J 5P9
Ph: +1-250-785-6627
Fax: +1-250-785-4501

Grande Prairie, AB, Canada - Service Center
8801 99th Street
Clairmont, Alberta T0H 0W0
Ph: +1-780-567-3857
Fax: +1-780-567-2808

Medicine Hat, AB, Canada - Service Center
1202 Dirkson Drive N.E.
Redcliff, Alberta T0J 2P0
Ph: +1-403-504-8353
Fax: +1-403-504-8370

Red Deer, AB, Canada - Service Center
Unit A, 8060 Edgar Industrial Crescent
Red Deer, Alberta T4P 5R3
Ph: +1-403-341-3410
Fax: +1-403-341-3072

INTERNATIONAL:

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Villahermosa, Mexico - Service Center
Bodega 3, Lote 8, Manzana 3
Sobre Calle San Lazaro
Parque Logistico Industrial, Tabasco
Villahermosa, Tabasco 86150
Ph: +52-993-142-7083

Poza Rica, Mexico - Service Center
San Miguel Mecatepec Tihuatlan, Veracruz
Bodega C
Ph: +782-111-73-55

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Rua Internacional, No 245, Lote 09, Quadra W
Lot. Emenselio Novo Calaveiros, Macae, RJ Brazil
Ph: +55-22-2106-8750
Fax: +55-22-2106-8777

EUROPE:

Aberdeen, Scotland - Service Center
Badentoy Industrial Park, Portlethen
Aberdeen AB12 4YD, Scotland
Ph: +44-1224-783666
Fax: +44-1224-784184

MIDDLE EAST:

Dubai, UAE - Service Center
Oilfields Supply Center, P.O. Box 1518, Jebel Ali, Dubai, UAE
Ph: +971-48836-368
Fax: +971-48836-485

AUSTRALASIA:

Singapore - Sales Office
15 Tukang Innovation Drive, Singapore, 618299
Ph: +65-6302-0852
Fax: +65-6302-0883

Australia - Service Center
Henderson Service Center
20 Stuart Drive
Perth, Western Australia 6166
Ph: +61-8-9410-7500

Adelaide (AUS) - Service Center
83 Rundle Road
Salisbury South SA 5106
Ph: +61-8-8285-3133
Fax: +61-8-8285-3151

Toowoomba (AUS) - Service Center
Unit 4, 24 Carroll Street, Toowoomba QLD 4350
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Fax: +61-7-4633-7083

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No.232 Nanyi Road, Dongying City
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Fax: +86-546-7769899

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Ph: +1-214-398-1491