

JACK MODULE HYDRAULIC CYLINDERS

All cylinders are marked with maximum pressure setting

NOTE: For a detailed parts list or to locate a Power Team Authorized Hydraulic Service Center, contact your nearest Power Team facility. A list of all Power Team facilities is located at the end of this document.

DEFINITIONS

Authorized - appointed by a duly constituted administrative or regulatory authority.

Authorized Service Center - independent service facility designated by the manufacturer to repair and test products.

Cylinders, Rams, and Jacks - used to apply force in a linear motion through the use of hydraulic fluid under pressure confined in a pressure vessel (body) with moveable pressure vessel (piston).

Designated - selected by the employer or employer's representative as being qualified to perform specific duties.

Extension - a device to increase the cylinder's, ram's or jack's retracted length.

Load - the total weight or force to be overcome by the cylinder, ram or jack.

Qualified - a person who, by possession of a recognized degree, certificate, professional standing or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter or work, or who is filled or suited for a given purpose or function. Competent.

Operator - a person qualified to operate or use a device or machine.

Rated Capacity - the maximum load for which the cylinder, ram, or jack is designed and built.

Service, Normal - cylinders, rams or jacks used under controlled or known consistent loads at less than 85% of rated capacity except for isolated instances.

Service, Severe - cylinders, rams or jacks used under conditions not rated as normal service.

Travel - linear extending or retracting movement of the cylinder, ram or jack.

SAFETY EXPLANATIONS

Two safety symbols are used to identify any action or lack of action that can cause personal injury. Your reading and understanding of these safety symbols is very important.



DANGER - Danger is used only when your action or lack of action will cause serious human injury or death.



WARNING - Warning is used to describe any action or lack of action where a serious injury can occur.

IMPORTANT - Important is used when action or lack of action can cause equipment failure, either immediate or over a long period of time.



WARNING: It is the operator's responsibility to read and understand the following safety statements,

- Only qualified operators should install, operate, adjust, maintain, clean, repair, or transport this machinery.
- These components are designed for general use in normal environments. These components are not specifically designed for lifting and moving people, agri-food machinery, certain types of mobile machinery or special work environments such as: explosive, flammable or corrosive. Only the user can decide the suitability of this machinery in these conditions or extreme environments. Power Team will supply information necessary to help make these decisions.

Note: Shaded areas reflect last revision(s) made to this form.

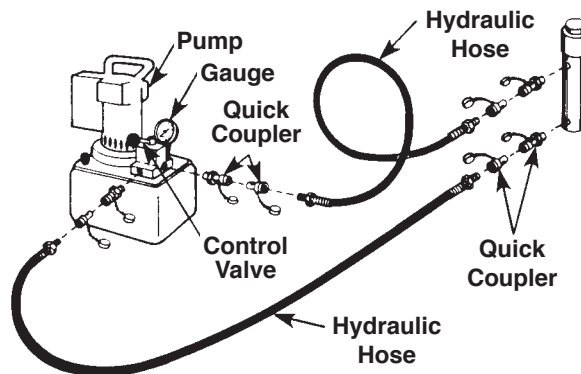
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Rev 3 Date: 28 May 2012

DOUBLE-ACTING HYDRAULIC SYSTEMS

A basic double-acting hydraulic system consists of a pump (which moves the hydraulic fluid), a double-acting cylinder or ram (to do the work), a hydraulic hose (which routes the fluid to the advance cylinder or ram port), a second hydraulic hose (which routes the fluid to the retract cylinder or ram port), and a control valve which can change the direction of the hydraulic fluid.

TYPICAL INSTALLATION



A double-acting cylinder or ram can be either extended or retracted hydraulically.

Most double-acting cylinders or rams are classed as "differential cylinders" because of the different sized areas that the hydraulic fluid pushes against during the extend and retract strokes. Because of this difference, the extend stroke can exert more force than the retract stroke.

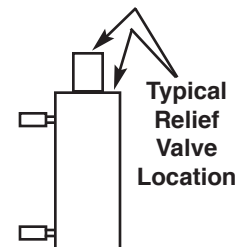
NOTE: The capacity of a hydraulic system is determined by the effective area of the cylinder and the system pressure.

SAFETY PRECAUTIONS



DANGER

- A double-acting cylinder or ram must have both hoses and all couplers securely connected to both ports. If one of the two ports is restricted or becomes disconnected, pressure will build and the cylinder, hose or coupler can burst, possibly causing serious injury or death.
- When extending double-acting cylinders or rams, the retract port must not be restricted. A restricted retract port will prevent pressure from being released and the cylinder can burst, possibly causing serious injury or death.
- DO NOT attempt to adjust or service the rod end relief valve on a double-acting cylinder or ram. If oil leakage is detected from this relief valve, discontinue use of the cylinder or ram immediately and contact your nearest Authorized Hydraulic Service Center. If improperly adjusted, the cylinder or ram could develop excessive pressure and cause the cylinder, hose or couplers to burst which could cause serious injury or death.
- When extending a cylinder or ram under load, always insure that the coupler(s) or port thread(s) has (have) not been damaged or do(es) not come in contact with any rigid obstruction. If this condition does occur, the coupler's attaching threads may become stripped or pulled from the cylinder or ram resulting in the instantaneous release of high pressure hydraulic fluid, flying objects, and loss of the load. All of these possible results could cause serious injury or death.
- Avoid off-center loads which could damage the cylinder or ram and/or cause loss of the load, possibly causing serious injury or death.
- Control the load at all times. Do not drop the load.
- Properly rated adapters must be installed and used correctly for each application.



WARNING

- All WARNING statements must be carefully observed to help prevent personal injury.

Hydraulic Hoses and Fluid Transmission Lines

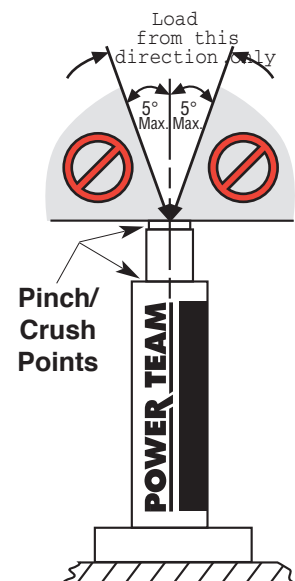
- Avoid straight line tubing connections in short runs. Straight line runs do not provide for expansion and contraction due to pressure and/or temperature changes.
- Eliminate stress in the tube lines. Long tubing runs should be supported by brackets or clips. Tubes through bulkheads must have bulkhead fittings. This makes easy removal possible and helps support the tubing.
- Before operating the pump, all hose connections must be tightened with the proper tools. Do not overtighten. Connections should only be tightened securely and leak-free. Overtightening can cause premature thread failure or high pressure fittings to split at pressures lower than their rated capacities.
- Should a hydraulic hose ever rupture, burst, or need to be disconnected, immediately shut off the pump and release all pressure. Never attempt to grasp a leaking pressurized hose with your hands. The force of escaping hydraulic fluid could cause serious injury.
- Do not subject the hose to potential hazard such as fire, sharp surfaces, extreme heat or cold, or heavy impact. Do not allow the hose to kink, twist, curl, crush, cut, or bend so tightly that the fluid flow within the hose is blocked or reduced. Periodically inspect the hose for wear, because any of these conditions can damage the hose and possibly result in personal injury.

SAFETY PRECAUTIONS (CONTINUED)

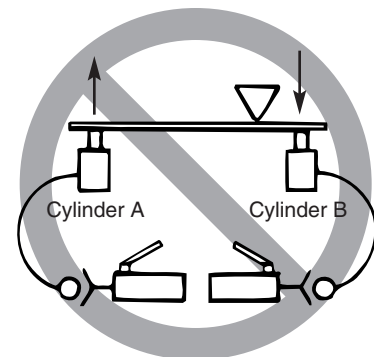
- Do not use the hose to move attached equipment. Stress can damage the hose and possibly cause personal injury.
- Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive materials such as creosote-impregnated objects and some paints. Hose deterioration due to corrosive materials can result in personal injury. Consult the manufacturer before painting a hose. Never paint a coupler.

Cylinder

- The user must be a qualified operator familiar with the correct operation, maintenance, and use of the cylinder(s). Lack of knowledge in any of these areas can lead to personal injury.
- Read and understand all safety and warning decals and instructions.
- Use only approved accessories and approved hydraulic fluid. Hoses, seals and all components used in a system must be compatible with the hydraulic fluid used.
- Do not exceed the rated capacities of the cylinders. Excess pressure can result in personal injury.
- Inspect each cylinder, fitting, tube line, hose, valve and coupler before each shift or usage to prevent unsafe conditions from developing.
- Do not use cylinders if they are damaged, altered or in poor condition.
- Do not use cylinders with bent or damaged couplers or damaged port threads.
- Under certain conditions, the use of an extension with a hydraulic cylinder may not be advisable and could present a dangerous condition.
- Avoid pinch points or crush points that can be created by the load or parts of the cylinder.
- To help prevent material fatigue if the cylinder is to be used in a continuous application, the load should not exceed 85% of the rated capacity.
- Cylinder must be on a stable base which is able to support the load while pushing or lifting.
- To help prevent personal injury, use shims, friction material or constraints to prevent slippage of the base or load.
- Surfaces contacting the load cap must be parallel to the base supporting surface within 5°.
- At least 75% of the load cap and base must be supported securely when pushing or lifting a load.
- Block or secure the load to prevent movement during lifting.
- Do not set poorly-balanced or off-center loads on a cylinder. The load can tip or the cylinder can “kick out” and cause personal injury.
- Do not exceed 5° misalignment of the load on the load cap.



- Do not create an uneven fulcrum and lever condition or overload condition where force exerted by one cylinder on a lever will intensify downward force on a pressure-checked cylinder at the other end of the lever. *For example: If straightening an axle as illustrated, when cylinder A extends, and uneven fulcrum and lever condition will intensify force downward on pressure-checked cylinder B. The pressure created in cylinder B will be increased to dangerously high levels.*



If this component is used to lift or lower loads, be certain that the load is under operator control at all times and that others are clear of the load. Do not drop the load.

- As the load is lifted, use blocking and cribbing to guard against a falling load.

SAFETY PRECAUTIONS (CONTINUED)

- To help prevent personal injury, do not allow personnel to go under or work on a load before it is properly cribbed or blocked. All personnel must be clear of the load before lowering.
- Never use extreme heat to disassemble a hydraulic cylinder or ram. Metal fatigue and/or seal damage will result and can lead to unsafe operating conditions.
- The guide cannot cover every hazard or situation so always do the job with SAFETY FIRST.

Valve

- Consult operating instructions #102896 provided with load lowering valve #9720.

IMPORTANT:

- Keep the cylinder clean at all times.
- While at a job site, when the cylinder is not in use, keep the piston rod fully retracted.
- Use an approved, high-grade pipe thread sealant to seal all hydraulic connections. PTFE tape can be used if only one layer of tape is used and it is applied carefully (two threads back) to prevent the tape from being pinched by the coupler and broken off inside the pipe end. Any loose pieces of tape could travel through the system and obstruct the flow of fluid or cause jamming of precision-fit parts.
- Always use protective covers on disconnected quick couplers.
- When mounting cylinders or rams using the internal piston rod threads, collar threads, threaded tie rods or base mounting holes, the threads must be fully engaged. Always use SAE grade 8 or better fasteners when attaching components to cylinders or rams and tighten securely.

INTRODUCTION

These instructions are written to help you, the user, more effectively use and maintain your cylinders and rams. If any questions, please call your nearest Power Team facility (see listing).

NOTE: For a detailed parts list or to locate a Power Team Authorized Hydraulic Service Center, contact your nearest Power Team facility. A list of all Power Team facilities is located at the end of this document.

Some of the information included in these instructions was selected from A.N.S.I. B30.1 and applies to the construction, installation, operation, inspection and maintenance of hydraulic cylinders. It is strongly recommended that you read A.N.S.I. B30.1 to answer any questions not covered in these instructions. The complete A.N.S.I. B30.1 standard which contains additional information can be obtained at a nominal cost from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th, New York, New York 10017.

An inspection checklist (Form No. 105503) is available on request from your nearest Power Team facility.

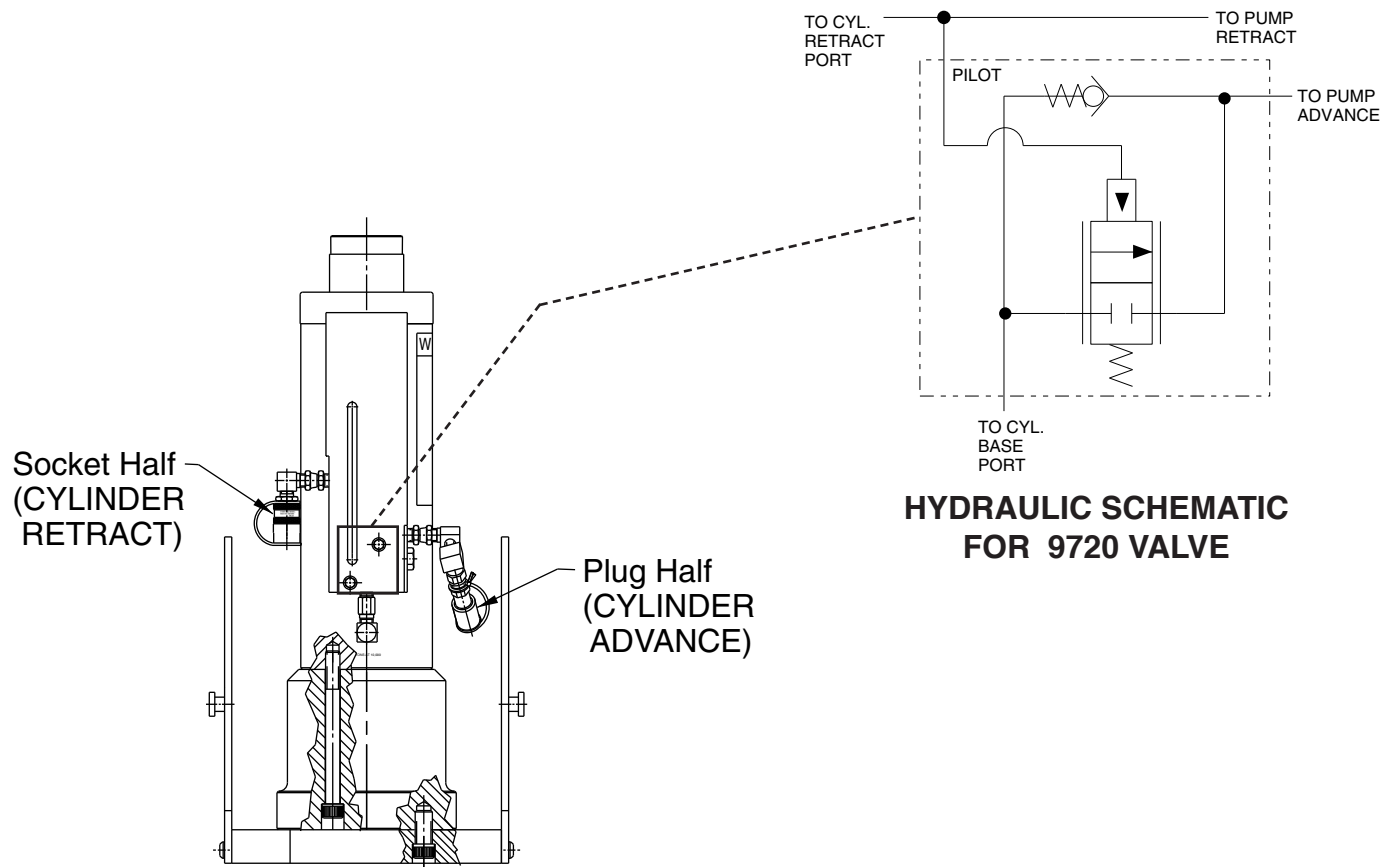
SYSTEM EVALUATION

Your cylinder, hose(s), couplings and pump all must be rated for the same maximum operating pressure, correctly connected and compatible with the hydraulic fluid used. An improperly matched system can cause the system to fail and possibly cause serious injury. If you are in doubt, consult your nearest Power Team facility.

SET-UP

HYDRAULIC CONNECTIONS

Power Team Jack Modules are supplied and assembled with quick disconnect couplers and dust caps. These couplers are paired as plug and socket halves to insure proper unit operation when used with the PMA or PME Series pump and cart assemblies. Other pumps and hoses must be correctly connected. See hydraulic schematic below.



BLEEDING THE SYSTEM

Power Team Jack Modules have been cycled at the factory, but to insure proper operation, each unit should be cycled (full extension and retraction) two or more times.

INSPECTION

Before each use, visually inspect for the following items:

1. Cracked or damaged cylinder
2. Excessive wear, bending, damage, or insufficient thread engagement
3. Leaking hydraulic fluid
4. Scored or damaged piston rod
5. Improperly functioning or damaged swivel heads and caps
6. Loose bolts or cap screws
7. Damaged or improperly assembled accessory equipment
8. Modified, welded, or altered equipment
9. Bent or damaged couplers or port threads

Preventive Maintenance (yearly or sooner, if the cylinder or ram condition suggests damage) - Visual examination by the operator or other designated personnel with a dated and signed equipment record.

RAM AND CYLINDER MAINTENANCE

- Always use clean, approved hydraulic fluid and change as needed.
- Any exposed threads (male or female) must be cleaned and lubricated regularly, and protected from damage.
- If a cylinder or ram has been exposed to rain, snow, sand, grit-laden air, or any corrosive environment it must be cleaned, lubricated, and protected immediately after exposure.

PERIODIC CLEANING

A routine should be established to keep the hydraulic system as free from dirt as possible. All unused couplers must be sealed with dust covers. All hose connections must be free of dirt and grime. Any equipment attached to the cylinder must be kept clean.



WARNING: Contamination of the hydraulic fluid could cause the valve to malfunction. Loss of the load or personal injury could result.

Use only Power Team hydraulic fluid and change as recommended or sooner if the fluid becomes contaminated (never exceed 300 hours).

STORAGE

Double-acting Cylinders

These units should be stored in a **dry**, well-protected area where they will not be exposed to corrosive vapors, dust or other harmful elements.

If a unit has been stored for a year or more, it must be thoroughly inspected before it is used.

TROUBLE-SHOOTING GUIDE

IMPORTANT:

- The following trouble-shooting and repair procedures should be performed by qualified personnel familiar with this equipment. Use the proper equipment when trouble-shooting!

| PROBLEM | CAUSE | SOLUTION |
|--|---|---|
| Erratic action | <ol style="list-style-type: none"> 1. Air in system or pump cavitation 2. Internal leakage in cylinders 3. Cylinder or valve sticking or binding 4. Malfunctioning valve | <ol style="list-style-type: none"> 1. Add fluid, bleed air and check for leaks 2. Replace worn packings. Check for excessive contamination or wear. Replace contaminated fluid as necessary. 3. Check for dirt or leaks. Check for bent, misaligned, worn parts or defective packings. Replace contaminated hydraulic oil with clean, compatible hydraulic oil. 4. Replace. This valve is <u>NOT</u> serviceable. |
| Cylinder/Ram does not move | <ol style="list-style-type: none"> 1. Loose couplers 2. Faulty coupler 3. Improper valve position 4. Low or no hydraulic fluid in pump reservoir 5. Air-locked pump 6. Pump not operating 7. Load is above the capacity of the system 8. Fluid leaks out of rod end relief valve 9. No pilot pressure to valve 10. Malfunctioning valve | <ol style="list-style-type: none"> 1. Tighten couplers 2. Verify coupler is not locked up. Replace as needed. 3. Close release valve or shift to new position 4. Fill and bleed the system 5. Prime pump per pump operating instructions 6. Check pump's operating instructions 7. Use the correct equipment 8. Make sure all couplers are fully coupled. Contact your nearest Authorized Hydraulic Service Center. 9. Check connections, pump valve position, and pressure. 10. Replace. This valve is <u>NOT</u> serviceable. |
| Cylinder/Ram extends only partially | <ol style="list-style-type: none"> 1. Pump reservoir is low on hydraulic fluid 2. Load is above the capacity of the system 3. Cylinder piston rod binding | <ol style="list-style-type: none"> 1. Fill and bleed the system 2. Use the correct equipment 3. Check for dirt or leaks. Check for bent, misaligned, worn parts or defective packings. |
| Cylinder/Ram moves slower than normal | <ol style="list-style-type: none"> 1. Loose connection or coupler 2. Restricted hydraulic line or fitting 3. Pump not working correctly 4. Cylinder seals leaking | <ol style="list-style-type: none"> 1. Tighten 2. Clean and replace if damaged 3. Check pump operating instructions 4. Replace worn seals. Check for excessive contamination or wear |

TROUBLE-SHOOTING GUIDE (CONTINUED)

| PROBLEM | CAUSE | SOLUTION |
|---|--|--|
| Cylinder/Ram moves but does not maintain pressure | <ol style="list-style-type: none"> 1. Leaky connection 2. Cylinder seals leaking 3. Pump or valve malfunctioning | <ol style="list-style-type: none"> 1. Clean, reseal with thread sealant and tighten connection 2. Replace worn seals. Check for excessive contamination or wear. Replace contaminated fluid as necessary. 3. Check pump or valve operating instructions |
| Cylinder/Ram leaks hydraulic fluid | <ol style="list-style-type: none"> 1. Worn or damaged seals 2. Loose connections 3. Rod end relief valve has activated | <ol style="list-style-type: none"> 1. Replace worn seals. Check for excessive contamination or wear. Replace contaminated fluid as necessary. 2. Clean, reseal with thread sealant and tighten connection 3. Make sure all couplers are fully coupled. <ol style="list-style-type: none"> a. <i>If relief valve is still leaking, do not attempt to service this component. Contact your nearest Authorized Hydraulic Service Center.</i> |
| Cylinder/Ram will not retract or retracts slower than normal | <ol style="list-style-type: none"> 1. Pump release valve closed 2. Loose couplers 3. Blocked hydraulic lines 4. Cylinder damaged internally 5. Pump reservoir too full 6. Pump or valve malfunctioning | <ol style="list-style-type: none"> 1. Open pump release valve 2. Tighten couplers 3. Clean and flush 4. Send to service center for repair 5. Drain hydraulic fluid to correct level 6. Check pump or valve operating instructions |

POWER TEAM FACILITIES

POWER TEAM®



WORLD HEADQUARTERS
THE AMERICAS CUSTOMER
SERVICE CENTER
5885 11TH STREET
ROCKFORD, ILLINOIS 61109
TEL: 1-815-874-5556
CUSTOMER SERVICE/ORDER ENTRY
TEL: 1-800-541-1418
FAX: 1-800-288-7031

E-MAIL: INFO@POWERTEAM.COM



ASIA PACIFIC CUSTOMER
SERVICE CENTER
7 GUL CIRCLE
SINGAPORE 629563, SINGAPORE
TEL: (65) 6265-3343

E-MAIL: INFOASIA@POWERTEAM.COM

EUROPEAN CUSTOMER
SERVICE CENTER
ALBERT THIJSSRAAT 12
6471 WX EYGELSHOVEN
THE NETHERLANDS
TEL: (31) 45 5678877
FAX: (31) 45 5678878

EMAIL: INFOEUROPE@POWERTEAM.COM

CHINA (CCSC)

NO: 1568, HUA SHAN ROAD,
TREASURY BUILDING,
11TH FLOOR,
SHANGHAI 200052, CHINA
TEL: 86 (21) 2208 5888
FAX: 86 (21) 2208 5682

EMAIL: INFOCHINA@POWERTEAM.COM