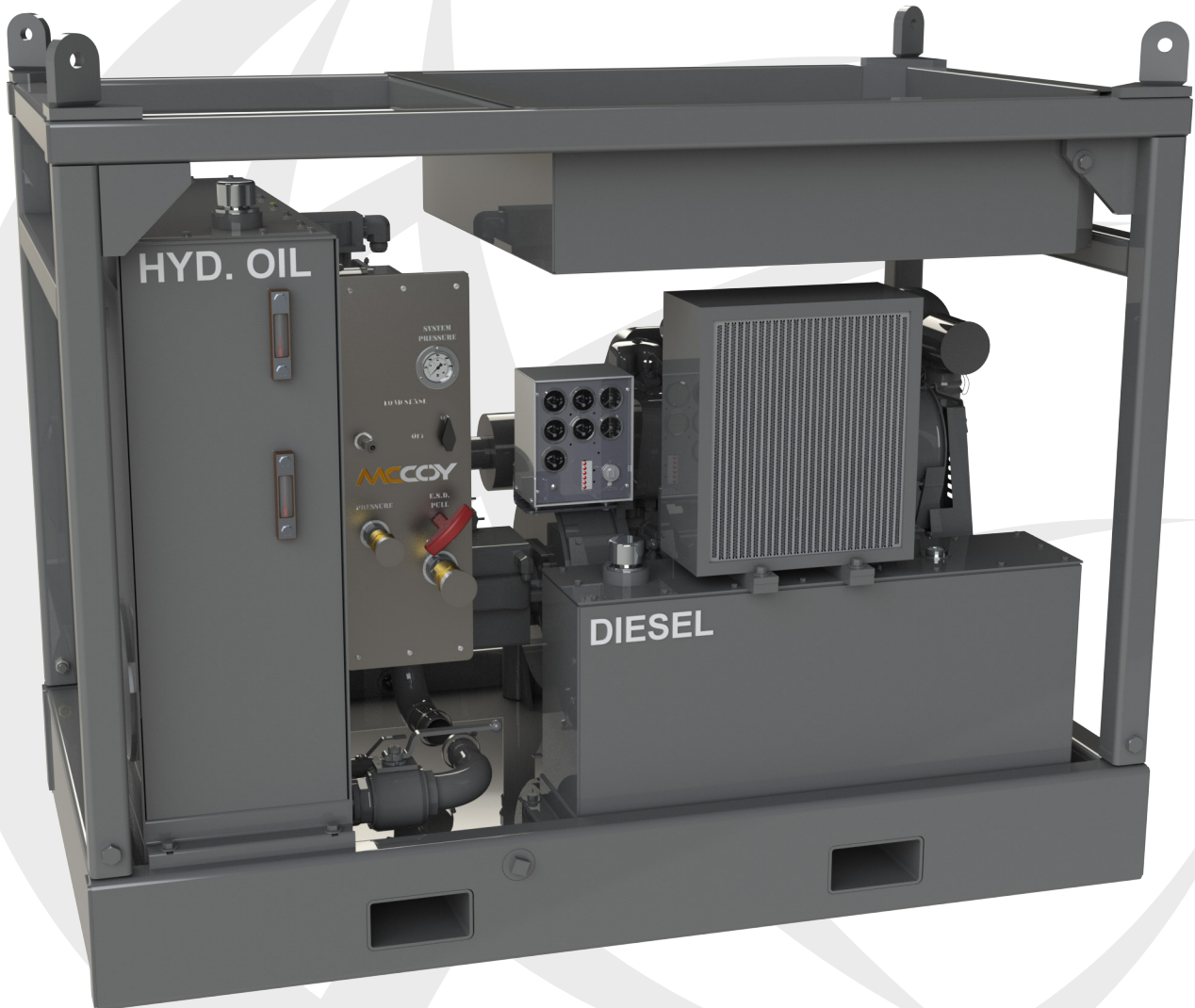


DPU440-11

73 HP, 60 GPM

Diesel Driven Hydraulic Power Unit



SPECIFICATIONS | OPERATION | MAINTENANCE | PARTS



ORIGINAL INSTRUCTIONS

THIS TECHNICAL DOCUMENT APPLIES TO THE FOLLOWING MODELS:		
POWER UNIT MODEL	REV	DESCRIPTION
DPU440-11	A	73 HP, 60 GPM, diesel driven hydraulic power unit

McCoy has made an effort ensure that all illustrations are accurate, but please note that some illustrations used in this manual may not exactly visually match your equipment.

PATENTED & PATENTS PENDING





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McCoy has made every effort to ensure the information contained in this document is accurate and current. This manual is intended to provide equipment operation and safety instructions for your equipment. However, McCoy does not warrant or guarantee that the information is either complete or accurate in every respect and the user of the manual should consult with its McCoy sales representative for any clarifications and updates.

The user of the manual shall protect, indemnify, and hold harmless McCoy and its directors, officers, employees, and agents from and against all liability for personal injury, death, or property damage resulting directly or indirectly from the use of the information contained in this manual.

Observance of all descriptions, information and instructions set out in this manual is the full responsibility of the user. This manual is intended for guidance and informational purposes and must be used in association with adequate training and on-the-job supervision to provide safe and effective equipment use.

It is the responsibility of the user to conform to all regulations and requirements issued by an authority or agency which may affect the operation, safety or equipment integrity, that may overrule the content of this documentation.

The user will acknowledge and obey any general legal or other mandatory regulation in force relating to accident prevention, safety, and equipment integrity.



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Summary Of Revisions	
Date	Description Of Revision
FEB 2017	Initial release

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SECTION 1: INTRODUCTION



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1.0 INTRODUCTION & CONTACT INFORMATION

Congratulations, and thank you for purchasing quality tubular connection equipment from McCoy Global. This unit will provide years of outstanding performance. Proper maintenance and care will extend its life and ensure years of excellent performance and reliability. The installation and commissioning, operating, and maintenance instructions in this manual will assist you in giving your equipment the care it requires. Please read the manual before installing and using your equipment. Replacement parts are readily available from McCoy Global. Should you need replacement parts, or should you experience any difficulty not covered in this manual, please contact:

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Standard Terms and Conditions of Sale (including warranty information):

<http://www.mccoyglobal.com/tcs.pdf>

1.1 SCOPE

This technical manual is the main document supplied by McCoy Global for the equipment identified on Page iii of the preamble. The intent of this document is to provide descriptions of the systems, installation, commissioning and operating instructions, maintenance guidelines, spare parts information, and technical drawings and schematics (where applicable).

The OEM-recommended installation, commissioning, operation, maintenance, and troubleshooting instructions are to be regarded as guidelines, and are not intended to be a comprehensive operating guide for user specific application. Due to the wide variety of operating conditions it remains the responsibility of each equipment owner to use these guidelines together with an experienced manager to develop safe operating procedures that conform to American Petroleum Institute (or equivalent) standards, applicable State/Province or local regulations, and any corporate regulations/operating practices.

1.2 GENERAL HEALTH AND SAFETY

AUTHORIZED USE ONLY!**READ THIS MANUAL BEFORE USING EQUIPMENT**

Only authorized, trained, and competent personnel shall operate, maintain, and repair this equipment.

Fully review this manual and comply with all safety and environmental protection instructions before operating equipment.

1.2.1 Hazard Labels

McCoy Global uses four levels of hazard / notice labels to describe items of four levels of importance:

DANGER is represented by a hazard symbol coupled with a “**DANGER**” signal word, and identifies items of the highest level of risk. Failure to heed information identified by a **DANGER** symbol may result in severe bodily injury or death.

 **DANGER**

THIS IDENTIFIES AN EXTREME HAZARD OF PERSONAL INJURY OR DEATH

A **WARNING** is represented by a hazard symbol coupled with a bold “**WARNING**” signal word, and identifies items of medium risk. Failure to heed information identified by a **WARNING** symbol may result in significant injury to personnel, catastrophic equipment failure, or harmful environmental contamination.

 **WARNING**

THIS IDENTIFIES A WARNING REGARDING POTENTIAL INJURY OR CATASTROPHIC EQUIPMENT DAMAGE

A **CAUTION** is represented by a hazard symbol coupled with a bold “**CAUTION**” signal word, and identifies items of low risk. Failure to heed information identified by a **WARNING** symbol may result in injury to personnel or equipment damage.

 **CAUTION**

THIS IDENTIFIES A CAUTION REGARDING SAFE OPERATION OR THE POTENTIAL OF EQUIPMENT DAMAGE

A **NOTICE** highlights information or items of importance unrelated to personal injury that may aid the user during installation, commissioning, assembly, or operation of your equipment.

NOTICE

THIS HIGHLIGHTS ITEMS OF IMPORTANCE UNRELATED TO PERSONAL INJURY

1.2.2 General Safe Operating Guidelines

Only authorized personnel shall operate equipment delivered by McCoy Global. Equipment shall be in a proper technical condition prior to use, and shall be used only for the purpose for which it is intended. Malfunctions or damages must be rectified before operation to ensure personnel safety and avoid equipment damage.

The user is responsible for ensuring the safety of all personnel while operating any McCoy Global product. McCoy Global is not responsible for injuries or equipment damage that arises from improper use of the equipment.

McCoy Global recommends that a hazard assessment of the work area be performed by a designated safety representative before commencing operations. A designated safety representative is responsible for verifying that all operators have adequate equipment and safety training.

1.2.2 General Safe Operation Guidelines (Continued):

The area surrounding the equipment operating area must be clutter-free and free from tripping hazards, or protruding objects that may snag hoses or cables. Operating surface or drill floor must be kept free of slipping hazards like grease, oil, water, etc.

Adequate lighting of the work area is required. All warnings, labels, gauges, and signs must be clearly visible.

Equipment components painted green are safe for continuous handling. Areas painted yellow and any other equipment components that rotate or move are designated as hazardous areas. Contact with those areas must be avoided during operation.



Illustration 1.2.1: Equipment Handling Warnings

Always wear all personal protective equipment (PPE) specified by established HSE policies. Follow all safety guidelines.

WARNING

BY NATURE, STEEL MACHINERY WITH ROTATING AND MOVING PARTS HAS THE POTENTIAL TO GENERATE IGNITION SOURCES, IE. SPARKS. AS OUTLINED IN THIS MANUAL, SCHEDULED MAINTENANCE, LUBRICATION, TIMELY REPLACEMENT OF WORN COMPONENTS AND MOST IMPORTANTLY, ON-SITE RISK ASSESSMENTS WITH STRINGENT STANDARD OPERATING PROCEDURES ARE ALL REQUIRED TO PREVENT THE POTENTIAL OF SPARK GENERATION.

WARNING

FAILURE TO FOLLOW THE EQUIPMENT PLACEMENT/RIG-UP PROCEDURES OUTLINED IN THIS MANUAL MAY LEAVE EQUIPMENT UNGROUNDED AND AT RISK FOR BUILDING A STATIC CHARGE. ASSESSMENT FOR PROPER GROUNDING MUST BE PERFORMED PRIOR TO OPERATION IN ORDER TO MITIGATE THE SPARK RISKS ASSOCIATED WITH STATIC DISCHARGE.

1.2.3 Rigging and Overhead Lifting

McCoy Global recommends following an industry-accepted standard such as OSHA, ASME B30.9-2006, or manufacturer's guidelines when performing any rigging and overhead lifting. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. Slings will fail if damaged, abused, misused, overused, or improperly maintained. Never stand beneath a suspended load.



DANGER

NEVER STAND BENEATH A SUSPENDED LOAD

1.2.4 Maintenance Safety

All personnel are responsible for performing maintenance tasks in a manner that ensures worker, equipment, and environmental safety, and may require taking additional steps that are not identified in this section.

Maintenance of equipment shall be performed only by designated qualified maintenance personnel. Do not begin a maintenance task without the proper tools or materials on hand, or the proper drawings and documentation necessary.

Isolate the location of the maintenance under way to prevent unaware personnel from inadvertently exposing themselves to a hazard. Use tape, rope, or signage to clearly indicate "off-limits" area.

Where applicable ensure electrical circuits within the affected equipment are deactivated or de-energized by an authorized, qualified person and locked out if necessary. Do not disconnect a live electrical circuit unless location is known to be non-hazardous.



DANGER

ALWAYS MEASURE ELECTRICAL CIRCUITS TO CONFIRM DEACTIVATION BEFORE PROCEEDING WITH MAINTENANCE



WARNING

WHEN REPAINTING EQUIPMENT, THE PAINT COAT BEING APPLIED SHOULD NEVER EXCEED 2MM IN THICKNESS. EXCEEDING THIS THICKNESS MAY FACILITATE STATIC CHARGE BUILDUP AND PRESENT A POSSIBLE SPARK RISK ASSOCIATED WITH STATIC DISCHARGE.

1.2.5 Replacement Parts

All consumable and replacement parts must meet or exceed OEM specifications in order to maintain equipment integrity. Do not replace protective equipment such as hydraulic switches, circuit breakers, and fuses without first consulting with McCoy Global. Do not replace electrical or control hardware without consulting with McCoy Global. Using non-OEM replacement parts without the approval of McCoy Global may void equipment warranty.

1.2.6 Environmental Impact

McCoy Global equipment uses materials that may be harmful to the environment if improperly disposed of (hydraulic fluid, grease, fuel, electrical components, etc.). Dispose of all materials according to established environmental protection regulations in conjunction with published federal, state, provincial, and civic legislation.

In all cases observance of the following is the full responsibility of the user:

- **all descriptions, information and instructions set out in this manual**
- **any regulation or requirement issued by an authority or agency which may influence operation, safety or integrity of the equipment that overrules the content of this document.**
- **any legal or other mandatory regulation in force governing accident prevention or environmental protection.**

1.3 ACRONYMS AND TERMINOLOGY

1.3.1 Acronyms and Definitions

ACRONYM	DEFINITION
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ATEX	Appareils destinés à être utilisés en AT mosphères EX plosibles
BDC	Bottom dead centre
CBU	CLINCHER [®] -style backup
CE	Conformité Européenne
CCW	Counter-clockwise
COG	Centre of gravity
CW	Clockwise
DS	Driller's side
EU	European Union
HMI	Human-machine interface
HPU	Hydraulic power unit
HSE	Health, Safety, and Environmental (context: protection)
ID	Inside diameter
ISO	International Organization for Standardization
JDK	Jaw die kit
JSA	Job safety assessment
LH	Left-hand
LJBU	LOCKJAW [™] backup
MBU	"McCoy style" backup
N/A	Not applicable or Not available (context-dependant)
NLGI	National Lubricating Grease Institute
ODS	Off-driller's side
OEM	Original equipment manufacturer
OSHA	Occupational Safety and Health Administration
OD	Outside diameter
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PSI	Pounds per square inch (pressure)
RH	Right-hand
VAC	Volts, alternating current
VDC	Volts, direct current
WLL	Working Load Limit

1.3.2 Terms and Definitions

TERM	DEFINITION
ATEX-certified	Conforms with the EU "ATEX" directive for equipment operated within an explosive atmosphere.
Backup	The component of a tong-backup arrangement that mechanically attaches to the stationary side of a tubular connection and provides resistance to the tong when making up or breaking out a joint.
Box	The female side of a pipe connection
Break Out	Loosening, un-threading, and disconnecting a connection (typically a tubular connection). The term may also apply to a general threaded connection.
CE-marked	CE compliant. Conforms with the essential requirements of the applicable Conformité Européenne directives.
Clamp	To grasp the stationary side of a pipe joint with a backup.
Die	A component of a jaw die kit that provides the mechanical contact between the tong and the tubular.
Joint	Also called a "pipe joint". A threaded tubular connection.
Load Cell	A hydraulic device that transmits a proportional signal to a torque gauge for the purpose of measuring connection torque.
Make Up	Threading together a connection (typically a tubular connection) and tightening to a specified torque. The term may also apply to a general threaded connection.
Pin	The male side of a pipe connection
Ring Gear	The rotating component, mechanically coupled to a hydraulic motor through a gear train, which provides rotation to the pin-side of a tubular connection through the use of jaw assemblies
Door Switch	A device mechanically connected to the door of a hydraulic power tong that uses hydraulic switching to prevent rotation of the cage plates when the tong door is open.
Sling	A rigid or non-rigid device used to hoist a piece of equipment using a crane.
Tank	Hydraulic fluid reservoir
Tong	The component of a tong-backup arrangement that mechanically attaches to the tubular connection and rotates the tubular to make up or break out a connection
Un-clamp	To release the stationary side of a pipe joint with a backup.
WINCATT®	Data acquisition and torque/turns management system manufactured by McCoy Global
Headstock	The tong assembly on a horizontal bucking unit
Tailstock	The backup assembly on a horizontal bucking unit



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SECTION 2: EQUIPMENT & LUBRICATION SPECIFICATIONS



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2.0 EQUIPMENT DESCRIPTION

This manual provides operational & maintenance instructions as well as spare parts assemblies for the McCoy DPU440-11 Diesel Power Unit. The DPU440-11 is a rugged, self-contained unit designed to be used in conjunction with approved pieces of hydraulic equipment.

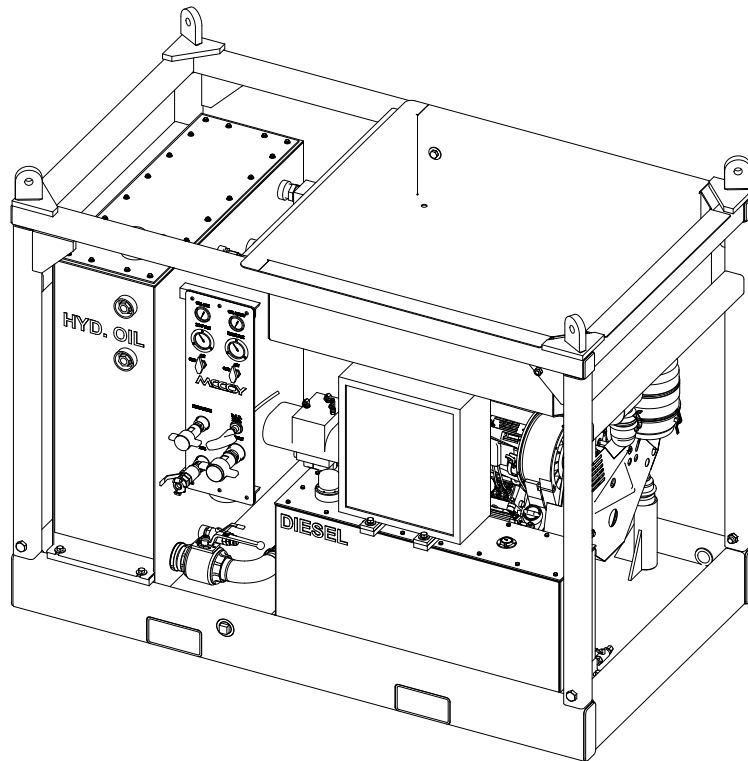


Illustration 2.0.1: DPU440-11 Diesel Power Unit

! WARNING

THE AREAS HIGHLIGHTED IN YELLOW ON THIS PAGE INDICATE POTENTIAL HAZARDS DURING OPERATION. KEEP CLEAR OF INDICATED AREAS WHEN EQUIPMENT IS ENERGIZED.

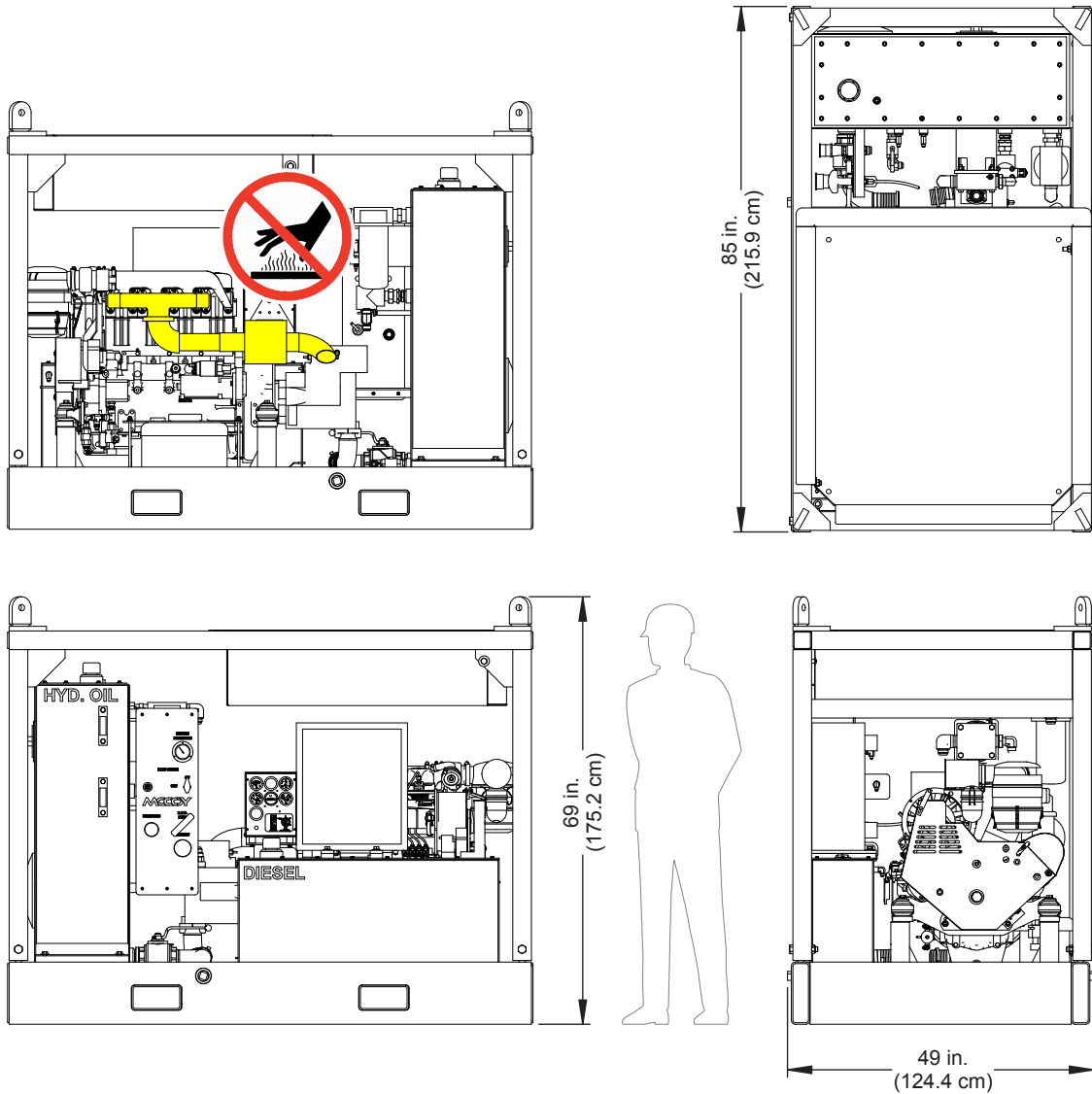
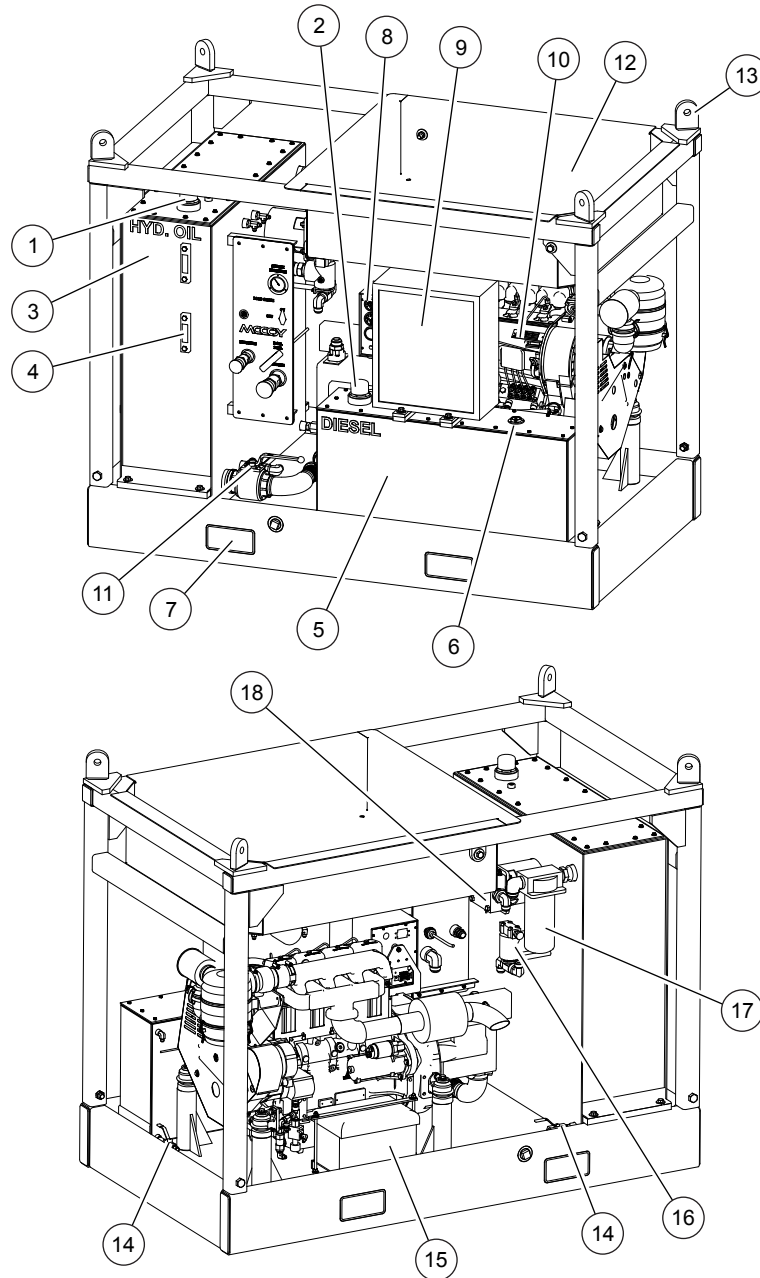


Illustration 2.0.2: DPU440-11 Dimensions & Hazard Areas

2.1 MAJOR COMPONENT IDENTIFICATION



Item	Description	Item	Description
1	Hydraulic Oil Tank Filler Cap	10	Diesel Engine
2	Diesel Fuel Tank Filler Cap	11	Hydraulic Oil Tank Drain Valve
3	Hydraulic Oil Tank	12	Hose Basket
4	Hydraulic Oil Level Sight Glass	13	Lifting Padeye
5	Diesel Fuel Tank	14	Tank Drain Valve
6	Fuel Gauge	15	Battery
7	Forklift Lifting Tube	16	Relief Valve
8	Engine Gauge Panel	17	Return Hydraulic Oil Filter
9	Heat Exchanger	18	High Pressure Hydraulic Oil Filter

Illustration 2.1.1: DPU440-11 Component Identification

2.2 EQUIPMENT SPECIFICATIONS

Maximum Hydraulic Flow	60 GPM (227.1 LPM)
Maximum Operating Pressure	3000 PSI (20.684 MPa)
Dimensions (without accessories)	See page 2.4
Diesel Motor Output	73 HP
Diesel Fuel Tank Capacity	35 US Gal. / 132.4 L
Hydraulic Oil Reservoir Capacity	130 US Gal. / 492.1 L
Dry Weight (approx. without accessories or oil)	4,200 lbs / 1,905 kg

2.3 RECOMMENDED LUBRICANT SPECIFICATIONS

2.3.1 Hydraulic Fluid

McCoy Global recommends using high-quality hydraulic fluid containing rust & oxidation inhibitors and foam suppressant that meets the following requirements. Operating this equipment using hydraulic fluid that does not meet these requirements greatly accelerates equipment damage due to (but not limited to) premature component wear, premature seal failure, cavitation, and fluid starvation.

⚠ CAUTION

OPERATING THIS EQUIPMENT USING HYDRAULIC FLUID THAT DOES NOT MEET THE LISTED REQUIREMENTS GREATLY ACCELERATES EQUIPMENT DAMAGE.

Hydraulic Fluid Standards	
Characteristic	Requirement
Maximum viscosity at cold startup	<1000 cSt (<4600 SUS)
Operating viscosity range	100 to 16 cSt (170 to 80 SUS)
Minimum viscosity (intermittent periods only)	10 cSt (60 SUS)
Hydraulic fluid operating temperature range	86 - 140°F (30 - 60°C) - measured in main reservoir
Maximum fluid temperature	180°F (82°C)
Fluid cleanliness	Filtered to ISO 4406:1999 (22/18/13)

Hydraulic fluid should be chosen with due regard to expected climactic conditions and equipment load. Note that this equipment may have been tested using hydraulic fluid that does not meet operational requirements beyond those specified in the above table. Therefore, McCoy recommends purging and flushing the equipment’s hydraulic system before connecting to a hydraulic supply.

NOTICE

MCCOY GLOBAL RECOMMENDS PURGING AND FLUSHING THE EQUIPMENT’S HYDRAULIC SYSTEM BEFORE CONNECTING TO A HYDRAULIC SUPPLY.

⚠ CAUTION

EQUIPMENT IS SHIPPED WITHOUT HYDRAULIC OIL. THE HYDRAULIC OIL RESERVOIR MUST BE FILLED WITH NEW, FILTERED OIL PRIOR TO OPERATION.

2.3.2 Grease

McCoy Global recommends use of a high-quality EP multi-purpose grease with an NLGI consistency grade of "2" and an NLGI performance grade of "GC-LB" for general lubrication of bearings and metal-to-metal contact.

McCoy Global recommends thoroughly greasing the equipment before first use as per the lubrication instructions in Section 5.



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SECTION 3: INSTALLATION & COMMISSIONING



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Adequate setup and proper hydraulic connections are essential in ensuring reliable operation of McCoy equipment. For best results and long term reliability, read and obey the installation and commissioning instructions in this section.

3.0 RECEIPT, INSPECTION, AND HANDLING OF EQUIPMENT

⚠ CAUTION

THIS EQUIPMENT HAS BEEN THOROUGHLY TESTED AND INSPECTED AT THE FACTORY. HOWEVER, MCCOY ADVISES INSPECTING EQUIPMENT FOR SHIPPING DAMAGE UPON RECEIPT AND TESTING EQUIPMENT BEFORE RELEASING TO AN OPERATIONAL ENVIRONMENT.

Upon receipt inspect packaging materials for shipping damage. Shipping damage may include (but not be limited to) perforation of a crate, misshapen crate, crushed corners, missing hardware, scraped or bent metal, and impact or orientation indicators (like a “tip’n’tell”). Record all shipping damage on the shipping manifest and ensure shipping company and McCoy are immediately contacted.

Remove all protective shipping materials including plastic wrap, desiccant packs, padding, etc and perform a visual inspection of the equipment. Check structural components for bending or buckling indicative of vertical impact. Immediately identify any shipping damage to the shipping company, and correct all damage before connecting equipment to a hydraulic power source.

⚠ CAUTION

EQUIPMENT MAY HAVE SHIPPING COMPONENTS INSTALLED WHICH SERVE TO STABILIZE MOVING COMPONENTS DURING SHIPPING. ALL SHIPPING COMPONENTS MUST BE REMOVED PRIOR TO USE. FAILURE TO DO SO MAY CAUSE EQUIPMENT DAMAGE.

3.0.1 Lifting the Equipment

Lifting should be performed using a forklift through the forklift lifting tubes on the bottom of the equipment. Assure all hoses and cables are disconnected and any connected accessories are removed prior to lifting. Lifting of the power unit should always be performed by using either the pad eye lifting mounts located at the top of the frame or the forklift lifting slots located at the base of the frame.

When lifting with cables attached to the padeye lifting mounts, lifting should only be performed with all four (4) points bearing the load evenly in a stable, level manner. Any sling or lifting device and associated rigging equipment should be, at minimum, rated to lift the total weight of the power unit multiplied by a factor of two (2). Refer to specifications for approximate weights.

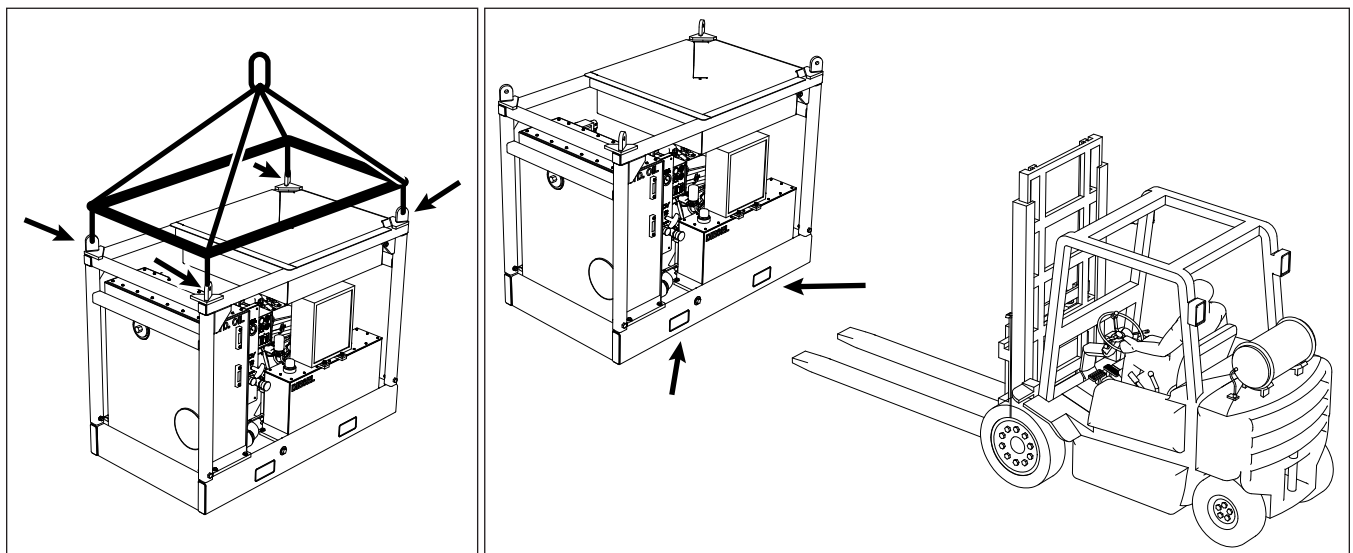
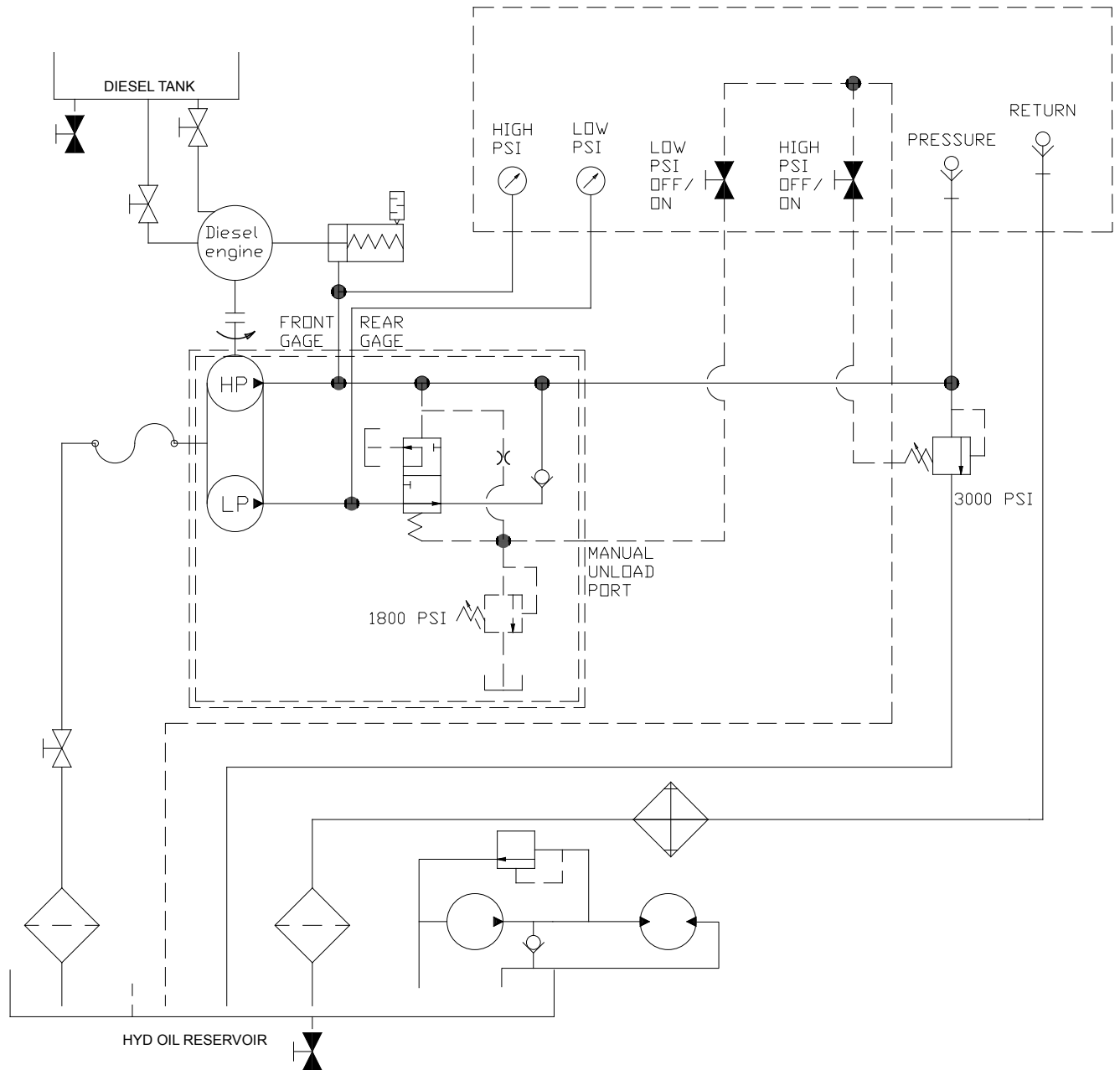


Illustration 3.0.1: Lifting Procedures

3.1 HYDRAULICS

3.1.1 Hydraulic Schematic



3.1.2 Main Hydraulic Connections

Hydraulic hoses are connected to the power unit through the bulkhead panel on the front of the unit.

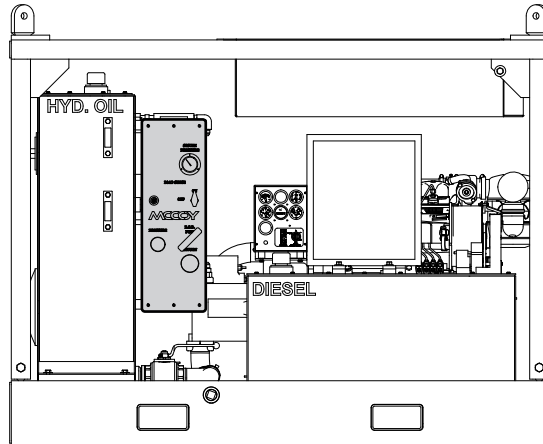


Illustration 3.1.1: Hydraulic Bulkhead Panel Location

Inspect all connectors for damage, debris, or other contaminants before performing hydraulic connections. Clean connectors using compressed air or an approved cleaning solvent and lint-free cloth. Always cover disconnected fittings with clean brass or plastic dust caps, typically attached to each connector with a lightweight chain or flexible line. These caps provide significant protection from dust, dirt, other contaminants, and impact damage.

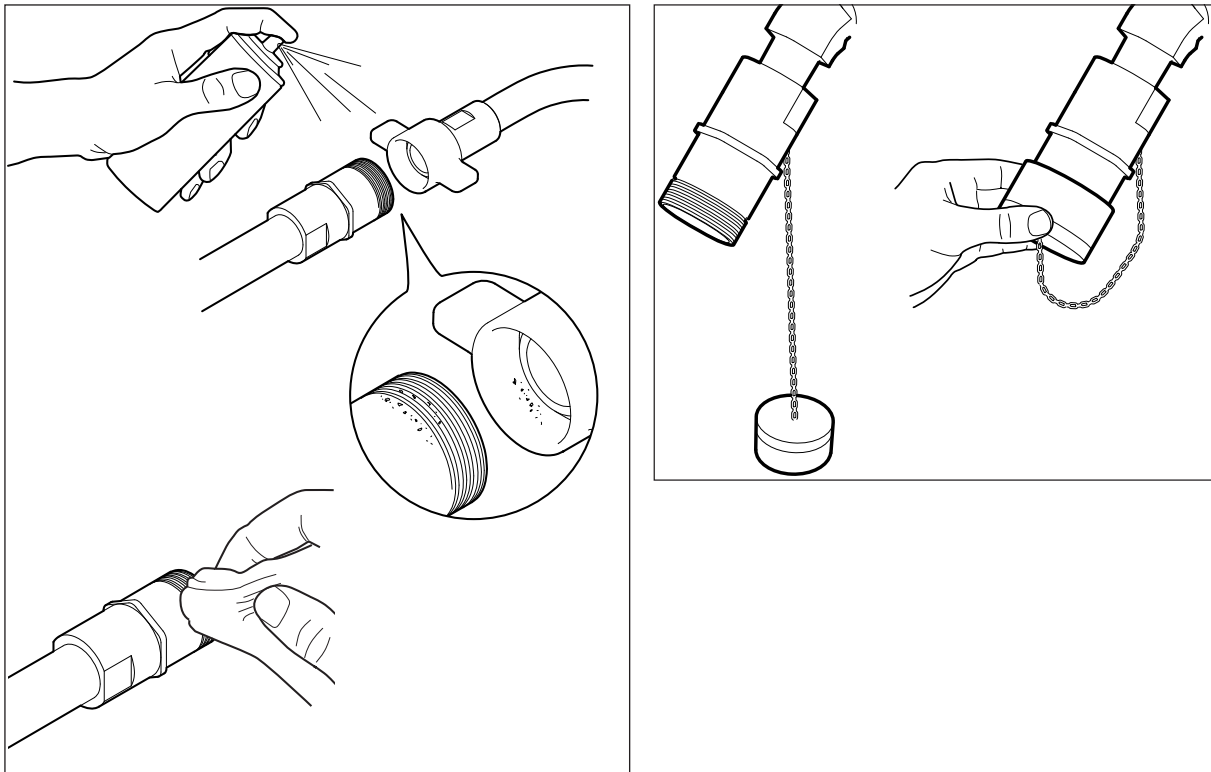


Illustration 3.1.2: Hydraulic Connection Cleaning / Maintenance

3.1.2 Main Hydraulic Connections (Continued):

Hydraulic connections should only be broken out or made up when the hydraulic system is de-energized.

Hydraulic disconnects should always be fully made up to the “fully engaged” position. Inspect all hydraulic connections before energizing hydraulic power to ensure secure connections have been made. Supplying full hydraulic pressure without ensuring an established return line may result in system damage.

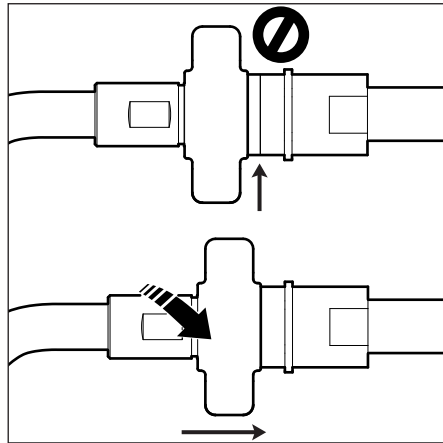


Illustration 3.1.3: Securing Hydraulic Connections

Inspect these connections upon activation of the power unit. Leaking components must be repaired before releasing the equipment to an operational environment. Deactivate the power unit and depressurize the hydraulic system according to the procedure in Section 4. Disconnect the main hydraulic connections and inspect all four connectors (two male, two female) for damage or debris. If the connectors cannot be cleaned or easily repaired, replace the leaking connector. Note that damage to one of the connectors may have caused damage to its mate.

Turn off power unit and depressurize hydraulic system before disconnecting the main hydraulic lines under normal working conditions. See Section 4 for hydraulic system depressurization. McCoy recommends placing protective caps over the exposed connectors to protect them from water and impact damage.

! WARNING

ALWAYS TURN OFF HYDRAULIC POWER AND DEPRESSURIZE HYDRAULIC SYSTEM BEFORE DISCONNECTING MAIN HYDRAULIC LINES.

3.1.3 Hydraulic Oil Reservoir Fill Level

The hydraulic oil level should never exceed the maximum level of the upper sight glass, and should never drop below the minimum level of the lower sight glass. See the illustration provided for optimal oil fill level.

Hydraulic oil level should only be determined to be accurate when completely disconnected from hydraulic equipment. Any existing oil in the hydraulic equipment must be accounted for when attempting to gauge an accurate oil level reading.

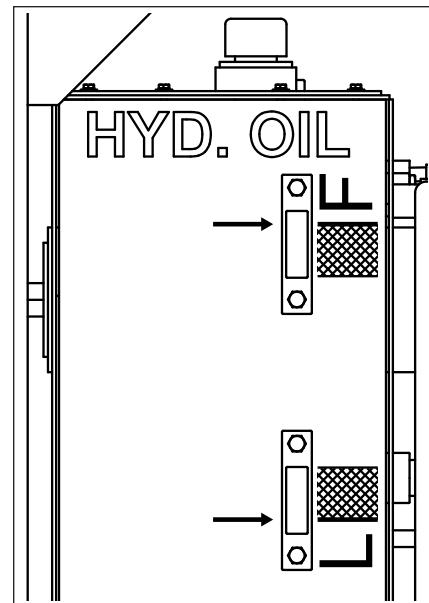


Illustration 3.1.4: Hydraulic Oil Reservoir Fill Level

3.2 UNIT PLACEMENT & SETUP

3.2.1 Operational Surface

The Power Unit must be placed on a level, dry surface for operation.

3.2.2 Component Placement / Ventilation Considerations

When setting up the work area, it is critical to take into account space needed for the following:

- Placement of the equipment so that the operator has a clear line of sight over all equipment components (and their full range of motion) during operation
- Operators are situated in a safe location
- A minimum of 3 ft. (91.4 cm) clear space is maintained around the unit to accommodate maintenance efforts
- Any surrounding personnel are a minimum of 3 ft. (91.4 cm) away from equipment and tubular loading areas
- When operating diesel power units in an enclosed environment, assure that the unit is placed in an area with sufficient ventilation to assure that exhaust fumes do not accumulate.

WARNING

THE EQUIPMENT OPERATOR MUST MAINTAIN A CLEAR LINE OF SIGHT OF ALL EQUIPMENT COMPONENTS DURING OPERATION. ALL PERSONNEL MUST STAY CLEAR OF EQUIPMENT DURING OPERATION.

CAUTION

IF THE POWER UNIT IS TO BE PLACED WITHIN AN ENCLOSED AREA, IT IS IMPERATIVE THAT SUFFICIENT VENTILATION BE MAINTAINED. LOCAL MECHANICAL CODES SHOULD BE CONSULTED WHEN CONSIDERING INDOOR PLACEMENT LOCATIONS AND SETUPS. POOR VENTILATION MAY RESULT IN THE ACCUMULATION OF EXHAUST FUMES OR HEAT WHICH POSES A HEALTH RISK TO PERSONNEL. SEE POWER UNIT ENGINE MANUAL FOR MORE INFORMATION.



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SECTION 4: OPERATION



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4.0 OPERATOR TRAINING

McCoy Global recommends operator training, which typically consists of operation of the equipment under the supervision of a trained equipment operator until a satisfactory level of competence is achieved. Typical operator training should include:

- Introduction to and general description of equipment
- Technical specifications and performance data
- Operating instructions
- Control systems and interlocks
- Operating hazards
- Checks and inspections

4.1 OPERATOR SAFETY

McCoy recommends that a hazard assessment of the work area be performed by a designated safety representative before commencing operations. A designated safety representative is responsible for verifying that all operators have adequate equipment and safety training.

The area surrounding the tong operating area must be clutter-free and free from tripping hazards, or protruding objects that may snag hydraulic hoses. Operating surface or drill floor must be kept free of slipping hazards like grease, oil, water, etc.

Adequate lighting of the work area is required. All warnings, labels, gauges, and signs must be clearly visible

Always wear all personal protective equipment (PPE) specified by applicable HSE policies and follow all designated safety guidelines.

CAUTION

ALWAYS WEAR APPROVED PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN OPERATING HYDRAULICALLY-POWERED EQUIPMENT.

Ensure hydraulic power is deactivated and tong hydraulics are depressurized before disconnecting the main hydraulic lines. McCoy recommends depressurizing the tong hydraulic system before connecting or disconnecting quick-connect fittings. See page 5.4 for depressurization procedure.

WARNING

DEPRESSURIZE EQUIPMENT BEFORE DISCONNECTING MAIN HYDRAULIC LINES.

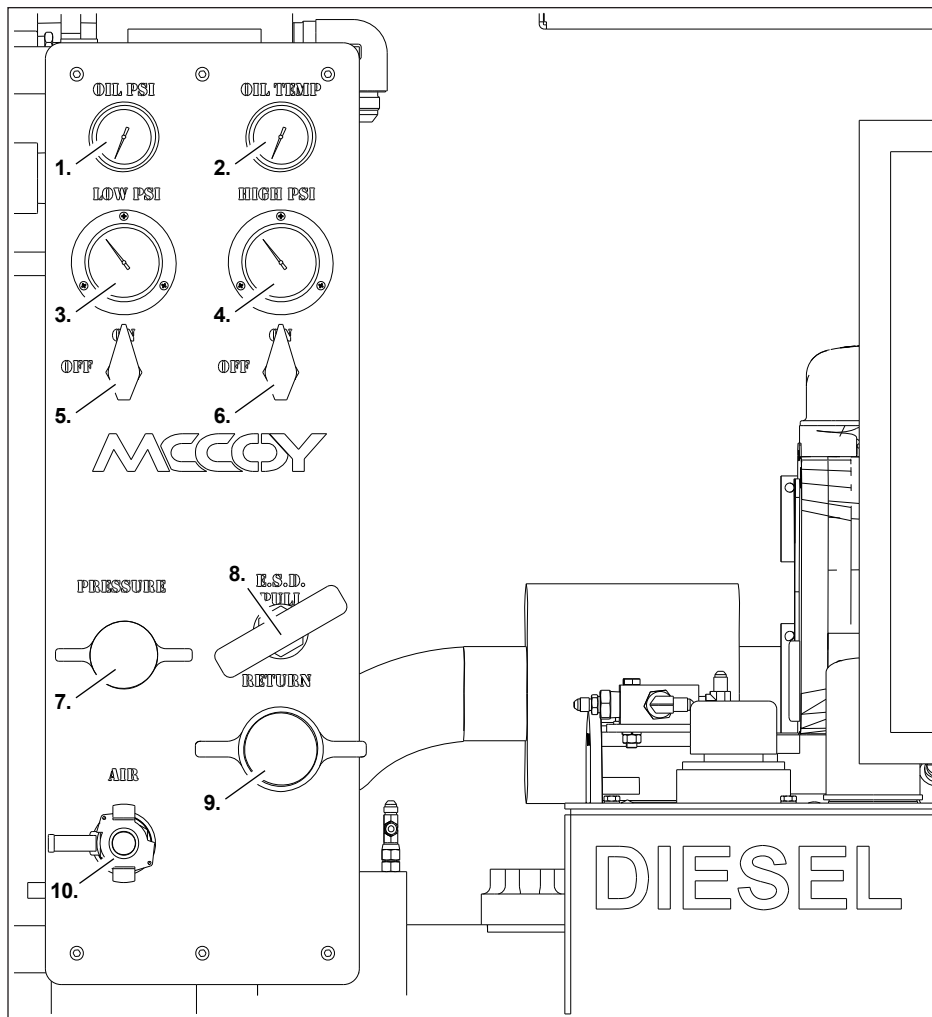


Illustration 4.2.1: Bulkhead Panel Functions & Readouts

4.2 BULKHEAD PANEL OPERATION GUIDE

1. OIL PSI PRESSURE GAUGE

Displays current hydraulic oil pressure.

2. OIL TEMPERATURE READOUT

Displays current hydraulic oil temperature.

3. LOW PSI PRESSURE GAUGE

Measures system pressure when the Low PSI Switch is activated.

4. HIGH PSI PRESSURE GAUGE

Measures system pressure when the Hi PSI Switch is activated.

5. LOW PSI - ON / OFF SWITCH

ON - Activates low motor pressure, allowing system pressure to reach 1500 PSI.

OFF - Deactivates low motor pressure.

6. HIGH PSI - ON / OFF SWITCH

ON - Activates high motor pressure, allowing system pressure to reach 3000 PSI. Note that the Low PSI Switch must be activated in order to activate the Hi PSI Switch.

OFF - Deactivates high motor pressure.

7. HYDRAULIC PRESSURE LINE CONNECTION

Connection point for the hydraulic pressure line.

8. E.S.D. PULL HANDLE

E.S.D. (Emergency Shut Down) handle which will immediately shut down the power unit.

9. COMPRESSED AIR CONNECTION

Connection point for the compressed air line.

10. HYDRAULIC RETURN LINE CONNECTION

Connection point for the hydraulic return line.

4.3 INITIAL STARTUP

1. Perform a visual inspection of all components for damage and leaks. Do not proceed until all leaks are corrected and damaged components are repaired or replaced.
2. Fill hydraulic oil reservoir with new, freshly filtered hydraulic oil as specified on page 2.7. Monitor fluid level through the hydraulic oil sight glass on the front of the control console. Do not overfill.

NOTICE

FLUID EXPANSION WILL OCCUR WHEN HYDRAULIC OIL IS HEATED DURING USE. DO NOT OVERFILL.

3. Connect all required hydraulic connections to the power unit. Ensure connections are fully made up and matched according to hose labels and the labels on the connection bulkhead (see page 3.6).
4. Ensure all control valve levers on connected equipment are in the neutral position.
5. Consult OEM engine documentation for initial start up and function testing.



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SECTION 5: MAINTENANCE



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McCoy Global recognizes that minor on-site repairs and modifications are occasionally required. Examples of minor repairs are:

- Replacement of damaged hydraulic hoses and fittings
- Replacement of malfunctioning pressure gauges and valves
- Replacement of fasteners

Any replaced component must be an identical component supplied by McCoy Global. Replaced fasteners must be Grade 8 or equivalent, unless otherwise specified by McCoy. All repairs must be performed by authorized, skilled personnel. Any attempt to make unauthorized repairs to equipment beyond the minor repairs described above exposes personnel to potential hazards and may cause catastrophic equipment failure. Contact McCoy if any question about the nature of repairs arises.



DANGER

MAKING UNAUTHORIZED REPAIRS TO YOUR EQUIPMENT EXPOSES PERSONNEL TO POTENTIAL HAZARDS AND MAY CAUSE CATASTROPHIC EQUIPMENT FAILURE.

5.0 GENERAL MAINTENANCE SAFETY PRACTICES

The practices identified here are intended as a guideline. All personnel are responsible for performing their tasks in a manner that ensures worker, equipment, and environmental safety, and may require taking additional steps that are not identified in this section.

Equipment maintenance shall be performed only by designated qualified maintenance personnel. Wear approved eye wear and footwear, and follow all of designated safety guidelines. Do not begin a maintenance task without the proper tools or materials on hand, or the proper drawings and documentation necessary.

Schedule planned maintenance with operators to avoid conflicts, unnecessary downtime, and the danger of accidental equipment activation. Notify operations when maintenance procedures are complete and equipment functionality is restored.

Isolate the location of the maintenance under way to prevent unaware personnel from inadvertently exposing themselves to a hazard. Use tape, rope, or signage to clearly indicate an “off-limits” area.

Replacement of large, heavy individual parts and/or heavy structural components must be performed using an approved lifting device of sufficient lifting capacity. Use care when attaching the lifting device, and safeguard area to avoid endangering personnel or equipment.

All spare parts must meet or exceed OEM specifications in order to maintain equipment integrity, especially protective equipment

Ensure your equipment is isolated from hydraulic power before commencing maintenance operations.



WARNING

DO NOT PERFORM MAINTENANCE UNTIL EQUIPMENT HAS BEEN COMPLETELY DE-ENERGIZED.

This equipment uses materials that may be harmful to the environment if improperly disposed of (hydraulic fluid, grease, etc.). Dispose of all materials according to proscribed environmental protection regulations.

5.1 CLEANING

Clean equipment thoroughly with a petroleum-based cleaning agent after each job, prior to storage. Ensure that cleaning solvents and chemicals are captured to prevent environmental contamination, and dispose of all materials according to environmental protection regulations.

5.2 PREVENTIVE MAINTENANCE PRACTICES

Regular maintenance programs are necessary, and must be established to assure safe, dependable operation and to avoid costly breakdown maintenance. The following maintenance procedures provides information required to properly maintain the equipment specified in this manual. The equipment may require more or less maintenance depending upon the frequency of use and the field conditions under which it operates. These maintenance procedures are designed for equipment operating at 10°C to 35°C ambient temperature for 10 hours per day. McCoy recommends that the inspection and maintenance procedures in this section be performed as recommended in the maintenance checklists.

Manufacturers of purchased components included with the equipment (for example: motors, valves, etc.) may specify maintenance tasks and intervals over and above what McCoy recommends as part of their recommended procedures. All OEM maintenance instructions should be observed.

McCoy Global recommends tracking all maintenance activity, including the lubrication schedule and replacement of hydraulic hoses. This may be as simple as keeping a paper log, or using a software-based maintenance tracking utility. A maintenance log is a valuable tool that can be used for easily retrieving maintenance history or identifying trends that require correction.

5.3 HYDRAULIC SYSTEM MAINTENANCE

Poor hydraulic fluid maintenance is a leading cause of hydraulic equipment failure. Contaminants are introduced to the hydraulic system through several sources including dirty hydraulic connections, dirty hydraulic cylinder rods, and through the wear of internal components. Failure to remove entrained contaminants through the use of a maintained filtration system will contribute to rapid wear of system components. McCoy recommends filtering to ISO 4406:1999 standards.

Premature fouling of particulate filters within the prime mover or ancillary hydraulic power unit indicates a high level of contaminants, and requires immediate hydraulic fluid laboratory analysis to identify the contaminants. High levels of wear metals in the fluid may be symptomatic of impending failure of a component in a hydraulic system. Early identification of the potential failure enables the user to schedule preventive repairs, preventing costly breakdown maintenance.

Fluid that has been repeatedly and consistently overheated will provide much poorer response and overall performance than fluid in a temperature-managed hydraulic system. McCoy recommends the use of hydraulic heaters and/or coolers to maintain the fluid temperature within the operating temperature range specified in Section 2. Maintaining adequate fluid level in the hydraulic reservoir helps dissipate heat in the hydraulic system. Fluid repeatedly heated to high temperatures (above 80°C) is subject to rapid depletion of the additives that prevent oxidation and water emulsification, leading to the build-up of sludge, gum, and varnish. These contaminants will build up on internal surfaces of the components of the hydraulic system causing “sticky” operation or clogging orifices and small passages. Water entrained in the fluid will react with components in the hydraulic system to produce rust and increase the rate of oxidation of the fluid.

Regularly schedule hydraulic fluid analysis as part of a preventive maintenance routine. Test particulate content using a portable fluid analysis kit, and compare the fluid sample to new hydraulic fluid. Fluid that is discolored or has a foul odor should be sent to a qualified laboratory for detailed analysis. Hydraulic fluid that is no longer capable of operating within the parameters specified by this manual must be replaced, and the hydraulic system flushed.

Fluid that is unused for a long period of time should be tested before circulating through the hydraulic system. Hydraulic systems operated in environments experiencing extreme temperature variances are susceptible to condensation within in the oil reservoir. Over a period of time the condensation will accumulate in the bottom of the reservoir, which should be drawn off at six month intervals, or as required.

5.4 HYDRAULIC SYSTEM DEPRESSURIZATION

McCoy Global recommends that the hydraulic system be depressurized prior to maintenance on any hydraulic component. The following procedure is provided assuming this equipment is coupled with a McCoy tubular connection equipment. Always consult any attached equipment’s operation manual before proceeding. Perform the following steps to ensure the dangers posed by pressurized hydraulic fluid are minimized.

CAUTION

ENSURE ADEQUATE CONTAINMENT IS IN PLACE TO PREVENT ENVIRONMENTAL CONTAMINATION FROM RESIDUAL HYDRAULIC FLUID

1. Fully Unclamp all energized hydraulic cylinders.
2. De-energize the power unit.
3. Repeatedly actuate valve lever(s) IN BOTH DIRECTIONS to dissipate any residual pressure.
4. Remove the hydraulic SUPPLY line from the equipment.
5. Repeatedly actuate valve lever(s) IN BOTH DIRECTIONS to dissipate any residual pressure.

5.5 LUBRICATION INSTRUCTIONS

See page 2.7 for lubrication specifications. Ensure selected grease remains within its viscosity range at expected operating temperatures.

McCoy recommends lubricating your equipment before beginning each shift, and immediately following operation prior to storage. This section identifies all necessary lubrication points.

5.6 ASSEMBLY PRACTICES

NOTE ON INSTALLATION PRACTICES: Ensure all bearings are liberally greased before installing over a shaft or into gears or bearing caps. Also ensure all metal-to-metal contact in the gear train is adequately greased. **Please refer to the relevant exploded diagrams in Section 7 when assembling components.**

 **WARNING**

REPLACEMENT FASTENER (BOLTS, NUTS, CAP SCREWS, MACHINE SCREWS, ETC.) USED DURING MAINTENANCE OR OVERHAUL MUST BE GRADE 8 OR EQUIVALENT UNLESS OTHERWISE SPECIFIED.

TIGHTENING TORQUE GUIDE (DRY)							
SAE GRADE 8 - FINE THREAD				SAE GRADE 8 - COARSE THREAD			
SIZE	CLAMP LOAD	PLAIN	PLATED	SIZE	CLAMP LOAD	PLAIN	PLATED
¼ - 28 (.250)	3,263	14 ft. lbs.	10 ft. lbs.	¼ - 20 (.250)	2,850	12 ft. lbs.	9 ft. lbs.
⅝ - 24 (.3125)	5,113	27 ft. lbs.	20 ft. lbs.	⅝ - 18 (.3125)	4,725	25 ft. lbs.	18 ft. lbs.
⅜ - 24 (.375)	7,875	49 ft. lbs.	37 ft. lbs.	⅜ - 16 (.375)	6,975	44 ft. lbs.	33 ft. lbs.
7/16 - 20 (.4375)	10,650	78 ft. lbs.	58 ft. lbs.	7/16 - 14 (.4375)	9,600	70 ft. lbs.	52 ft. lbs.
½ - 20 (.500)	14,400	120 ft. lbs.	90 ft. lbs.	½ - 13 (.500)	12,750	106 ft. lbs.	80 ft. lbs.
9/16 - 18 (.5625)	18,300	172 ft. lbs.	129 ft. lbs.	9/16 - 12 (.5625)	16,350	153 ft. lbs.	115 ft. lbs.
⅝ - 18 (.625)	23,025	240 ft. lbs.	180 ft. lbs.	⅝ - 11 (.625)	20,325	212 ft. lbs.	159 ft. lbs.
¾ - 16 (.750)	33,600	420 ft. lbs.	315 ft. lbs.	¾ - 10 (.750)	30,075	376 ft. lbs.	282 ft. lbs.
7/8 - 14 (.875)	45,825	668 ft. lbs.	501 ft. lbs.	7/8 - 9 (.875)	41,550	606 ft. lbs.	454 ft. lbs.
1 - 12 (1.000)	59,700	995 ft. lbs.	746 ft. lbs.	1 - 8 (1.000)	54,525	909 ft. lbs.	682 ft. lbs.
1 - 14 (1.000)	61,125	1019 ft. lbs.	764 ft. lbs.	1-⅛ - 7 (1.125)	68,700	1288 ft. lbs.	966 ft. lbs.
1-⅛ - 12 (1.125)	77,025	1444 ft. lbs.	1083 ft. lbs.	1-¼ - 7 (1.125)	87,225	1817 ft. lbs.	1363 ft. lbs.
1-¼ - 12 (1.125)	96,600	2012 ft. lbs.	1509 ft. lbs.	1-⅜ - 6 (1.375)	103,950	2382 ft. lbs.	1787 ft. lbs.
1-⅜ - 12 (1.375)	118,350	2712 ft. lbs.	2034 ft. lbs.	1-½ - 6 (1.500)	126,450	3161 ft. lbs.	2371 ft. lbs.
1-½ - 12 (1.500)	142,275	3557 ft. lbs.	2668 ft. lbs.				

NOTICE

IMPORTANT ASSEMBLY INFORMATION

DO NOT TORQUE NYLOCK NUTS. NYLOCK NUTS ARE NOT USED FOR CLAMPING PURPOSES AND SHOULD ONLY BE TIGHTENED UNTIL METAL-TO-METAL CONTACT IS MADE AND VERTICAL MOTION IS ELIMINATED. OVER-TIGHTENING WILL RESULT IN PREMATURE BUSHING FAILURE AND WILL INHIBIT ROTATION, AND MAY IMPART EXCESS STRESS ON ROTATING COMPONENTS.

NYLOCK NUTS ARE A ONE-TIME USE ITEM AND MUST BE DISCARDED & REPLACED AFTER USE.

5.7 INSPECTION & MAINTENANCE CHECKLIST

McCoy recommends that the following inspection and maintenance procedures be performed before each use, and at least once per day when the tong is in steady use, in the order in which they are listed.

 **WARNING**

MCCOY RECOMMENDS THAT ALL HYDRAULIC LINES ARE FULLY DISCONNECTED, AND RESIDUAL HYDRAULIC PRESSURE IS BLED OFF. ENSURE ADEQUATE CONTAINMENT IS IN PLACE TO PREVENT ENVIRONMENTAL CONTAMINATION FROM RESIDUAL HYDRAULIC FLUID.

1. **DEPRESSURIZE HYDRAULIC SYSTEM IN PREPARATION FOR MAINTENANCE.**
Complete Depressurization Procedure outlined on page 5.4 .

 **WARNING**

HYDRAULIC PRESSURES AS HIGH AS OPERATING PRESSURE MAY REMAIN TRAPPED IN SMALL AREAS OF THE EQUIPMENT. ENSURE ALL MAINTENANCE IS CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN, AND THAT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT IS USED TO GUARD AGAINST PRESSURE INJURIES

2. Wash unit to remove majority of dirt and grease build up to allow for inspection of the overall condition of unit. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid and dirty grease.
3. Inspect for major damage or excessive wear. Repair or replace as necessary.
4. Inspect all hoses for wear. Replace as necessary.
5. Refer to engine manufacturer's for required engine maintenance procedure.
6. Follow power unit start up procedure. Test unit under normal work load. Re-inspect all hoses and hydraulic system for leaks. Repair or replace if necessary.
7. Check condition indicator on return filter elements. Replace as necessary or at 6 month intervals.
8. Test hydraulic oil for contamination every 6 months under normal operation conditions. Replace with new filtered oil as required.
9. Refer to third party component manufacturer's maintenance literature and carry out as instructed.

 **WARNING**

FAILURE TO ENSURE THAT THE SELF-SEALING SUPPLY AND RETURN LINES ARE FULLY MADE UP MAY RESULT IN CATASTROPHIC EQUIPMENT FAILURE.

5.8 EQUIPMENT DECOMMISSIONING & SHIPPING

Perform the following decommissioning procedures when removing equipment from service, with the intent of short to long-term storage. These procedures are essential for ensuring proper protection of the equipment from environmental corrosion, and to aid in the quick turnaround when returning the equipment to service.

Store all o-rings, seals, packings, gaskets, etc. in strong, moisture proof airtight containers. Ensure that these items are not crushed or otherwise damaged.

Do not perform any further actions or maintenance while the equipment is connected to any hydraulic power supply. McCoy Global recommends that all hydraulic lines are fully disconnected, and residual hydraulic pressure is bled off. Ensure adequate containment is in place to prevent environmental contamination from residual hydraulic fluid.

NOTICE

IN ORDER TO MAINTAIN THE INTEGRITY OF INSTALLED SEALS, MCCOY RECOMMENDS THAT THE MAXIMUM STORAGE INTERVAL NOT EXCEED ONE YEAR. AT LEAST ONCE PER YEAR ALL TUBULAR CONNECTION EQUIPMENT IN LONG-TERM STORAGE SHOULD BE RECOMMISSIONED AS PER SECTION 5. IF FURTHER STORAGE IS REQUIRED, THE EQUIPMENT SHOULD THEN BE PUT THROUGH ANOTHER DECOMMISSIONING PROCEDURE.

DEPRESSURIZE HYDRAULIC SYSTEM IN PREPARATION FOR MAINTENANCE.

- Complete Depressurization Procedure on page 5.4.
Disconnect all remaining connections from the equipment. Ensure the equipment is completely free of all connections before beginning storage preparations.

 **WARNING**

HYDRAULIC PRESSURES AS HIGH AS OPERATING PRESSURE MAY REMAIN TRAPPED IN SMALL AREAS OF THE EQUIPMENT. ENSURE ALL MAINTENANCE IS CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN, AND THAT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT IS USED TO GUARD AGAINST PRESSURE INJURIES

- Perform steps in Inspection & Maintenance Checklist on page 5.6.
- Completely drain fluid reservoirs.
- Wash the exterior of the equipment to remove the majority of dirt and grease buildup.
- Wash the interior of the equipment thoroughly, using either water (do not use a pressure washer), or an appropriate solvent-based grease cutting cleaner. If metal shavings or chips are observed being flushed out of the equipment, an overhaul of the equipment must be performed to eliminate the issue and prevent further damage.
- Thoroughly wash the exterior of the equipment using either water (do not use a pressure washer) or an appropriate solvent-based grease cutting cleaner such as Varsol®.
- Inspect all paint. Locations in which the paint has been damaged must be repaired prior to storage. Prepare areas to be painted to ensure they are free of grease, dirt, or solvent. Touch up using a solvent-based acrylic paint, and allow sufficient time for paint to dry before proceeding.
- Perform a complete lubrication of all externally accessible grease fittings on equipment.
- Inspect all paint. Locations in which the paint has been damaged must be repaired prior to storage. Prepare areas to be painted to ensure they are free of grease, dirt, or solvent. Touch up using a solvent-based acrylic paint, and allow sufficient time for paint to dry before proceeding.
- Refer to engine manual for any decommissioning or long-term storage procedures.

5.8 EQUIPMENT DE-COMMISSIONING & SHIPPING (CONTINUED):

11. Wipe all excess grease from outside of equipment. Use a solvent-based cleaner on rags to wipe all external surfaces to remove residual grease or hydraulic fluid. Once the outside surfaces have been de-greased, wipe all external surfaces with clean water to remove residual solvent.
12. McCoy recommends that an anti-corrosive agent such as Tectyl® 506 be applied to all external surfaces (including chain slings). Refer to manufacturer data sheets for proper application and safety information.
13. Allow the anti-corrosive coating ample time to dry. Refer to manufacturer data sheets for drying times at room temperature.
14. Wrap entire assembly in 100 gauge (1 mil) corrosion-inhibiting wrap, at least 3 layers thick. Attempt to ensure that the tool is well-sealed within the wrapping, including the bottom.

Store in a sealed, climate controlled environment. If isolated storage is not available, McCoy recommends storing wrapped equipment using silica gel desiccant to reduce the humidity within the wrapping. As a guideline, use 125 g. of desiccant for each cubic meter of space, or 3.5 g. per cubic foot.

Calculation Of Required Desiccant:

- 1) Calculate the trapped air volume by measuring the outside dimensions of the tool to be stored, and treat that as the volume to be stored. For example, the overall external dimensions of this tool are 96.5" x 96.5" x 64.5", which calculates to an approximate volume of 600640 in³, or 348 ft³ (9.854 m³).
- 2) Multiply the calculated air volume, in cubic feet, by the recommended amount of desiccant (3.5 g) per cubic foot. Carrying forth the example used in the previous step, the required desiccant charge would be 3.5 g. x 348 ft³, equaling 1218 g. Several manufacturers offer silica gel desiccant in packaged quantities of 125 grams per bag, so ten packages of desiccant distributed throughout the wrapped equipment would be required. Please keep in mind that this is a guideline only - more or less desiccant may be required in extreme environmental conditions.

For best corrosion resistance, the equipment should be removed from storage and exercised on a regular basis, depending on the storage environment. McCoy recommends that for equipment stored in a saltwater maritime or exposed dusty environment, repeat steps 9 through 24 monthly. For equipment stored in isolated storage in a non-maritime environment, repeat steps 9 through 24 quarterly. Replace desiccant packs at this time.

5.8.1 Shipping Instructions

Use the following steps to prepare the equipment for shipping.

1. Fully depressurize the equipment. Disconnect any hoses and cables as necessary.
2. Place the equipment on a pallet rated for the full weight of the equipment. Ensure the pallet is large enough to accommodate the wooden crate containing the tong accessories.
3. Securely strap the equipment in place using metal strapping. Use caution not to entrap any flexible hydraulic hoses beneath the strapping (guide strapping through beneath the hydraulic hoses). Strapping requirements such as strap thickness and number of straps must be determined using a recognized standard, taking into account the full weight of the equipment being secured.
4. Before tightening strapping, place strapping protectors wherever the metal strapping comes into contact with the equipment. Never allow straps to cover components that may easily be bent or broken.
5. Use a large polyethylene shipping bag (sometimes called a pallet cover) to completely enclose the equipment. Seal polyethylene bag to the pallet using 1 mil polyethylene wrap. Use the wrap to conform the plastic cover to the general shape of the equipment, but do not wrap so tight that sharp edges on the equipment perforate the cover.
6. Enclose the equipment in a sturdy shipping crate which is securely fastened to the pallet.

5.9 EQUIPMENT RECOMMISSIONING PROCEDURE

Perform the following recommissioning procedures when removing equipment from short or long-term storage back into regular service. These procedures are essential for ensuring proper equipment preparation and operation. The following procedures also assume that the decommissioning and storage procedures recommended by McCoy have been strictly observed.

1. Remove all protective plastic wrapping and dispose of desiccant packs.
2. Wipe excess grease or heavy oil from equipment.
3. Perform a visual inspection of all lifting points. Replace visibly damaged parts before returning the equipment to service. Ensure that the most recent test date falls within the past year. Perform recertification if necessary.
4. Remove shipping components from the equipment. Store for future use.
5. Perform a complete lubrication of all externally accessible grease fittings on equipment.
6. Fill fluid reservoirs to appropriate levels using specified fluids.
7. Perform the start up procedure to energize the power unit. Ensure all lines are fully made up to prevent equipment damage from excessive back pressure. Do not neglect to connect the motor drain.

**WARNING**

FAILURE TO ENSURE THAT THE SELF-SEALING SUPPLY AND RETURN LINES ARE FULLY MADE UP MAY RESULT IN CATASTROPHIC EQUIPMENT FAILURE.

8. Assure pressure and temperature are nominal.
9. Ensure that supply pressure is at or above the equipment's specified operating pressure, and that the return pressure is less than 350 psi.
10. Perform a thorough inspection of pressurized hydraulic lines and fittings. Leaking hydraulic fluid lines or fittings must be replaced before returning the equipment to service.
11. Perform a thorough inspection of all seals. Any seal that is leaking must be replaced before returning the equipment to service.
12. Run power unit under normal work load to ensure proper functionality.
13. When all of the previous steps are completed, the equipment may be returned to service.



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SECTION 6: TROUBLESHOOTING



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Adequate maintenance and proper fluid selection is essential for minimizing hydraulic-related failures. All troubleshooting must be performed by a technician trained in hydraulics who is also familiar with the equipment design, assembly, and operation.

The following troubleshooting instructions are intended to be guidelines only. Any faults not solved through the use of this guide should be referred to our engineering department for their evaluation and recommendations.

6.0 HYDRAULIC PUMP MAKING EXCESSIVE NOISE

	POSSIBLE PROBLEM	SOLUTION(S)
1	Restricted or clogged intake line	Clean intake line and check for fluid contamination
2	Contaminated fluid	Flush hydraulic system and replace with new filtered fluid. See page 2.7 for hydraulic fluid specifications.
3	Restricted vent	Clean or replace air vent
4	Air in fluid	Check for leaks and assure fluid suction in reservoir is well below hydraulic fluid level
5	Fluid viscosity is not appropriate (too high or too low)	Ensure hydraulic fluid being used is the viscosity recommended by McCoy Global. Power unit pump may not prime if fluid is too heavy, and the hydraulic system will overheat if fluid is too light. Replace with proper viscosity fluid
		Hydraulic fluid viscosity is affected by environmental conditions. Ensure the fluid being used is suitable for high or low temperatures. Replace with proper viscosity fluid for the operating conditions if necessary
6	Damaged or worn parts	Repair or replace damaged parts, check fluid for contamination
7	Excessive RPM	Check PTO, gears, and assure pump is running at nominal speed
8	Increased friction	Assure pump has been installed using correct torque values
9	Damaged/restricted valves	Check all valves for damage and replace as necessary. Check hydraulic fluid for contamination.
10	Restricted discharge	Check to make sure relief valve is set to correct pressure setting.

6.1 EXCESSIVE WEAR TO HYDRAULIC COMPONENTS

	POSSIBLE PROBLEM	SOLUTION(S)
1	Fluid contamination	Flush hydraulic fluid system, replace with new filtered fluid as outlined on page 2.7
2	Components misaligned	Inspect and realign
3	High operating pressures	Gauge and set to correct pressure
4	Exhausted hydraulic fluid	Flush hydraulic fluid system, replace with new filtered fluid as outlined on page 2.7
5	Air in fluid	Check for leaks and assure fluid suction in reservoir is well below hydraulic fluid level
6	Shortened bearing life	Check alignment, insure proper lubrication of non-sealed bearings

6.2 GENERAL COMMENTS

The following factors generally contribute to poor hydraulic operation and premature wear of equipment:

1. Contaminated hydraulic fluid due to overuse, overheating, or inadequate fluid filtration.
2. Unsuitable hydraulic fluid, especially in extreme climatic conditions.
3. Defective packing or seals in components of the hydraulic system.
4. Poor or incomplete hydraulic system training. Users must be fully qualified to operate the equipment, and have complete understanding of the hydraulic system.

If your hydraulic troubleshooting procedures involve flow and pressure tests at the power unit, use of a test rig that can easily be connected to the main suction and discharge ports of the power unit is recommended.



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SECTION 7: PARTS & ASSEMBLIES



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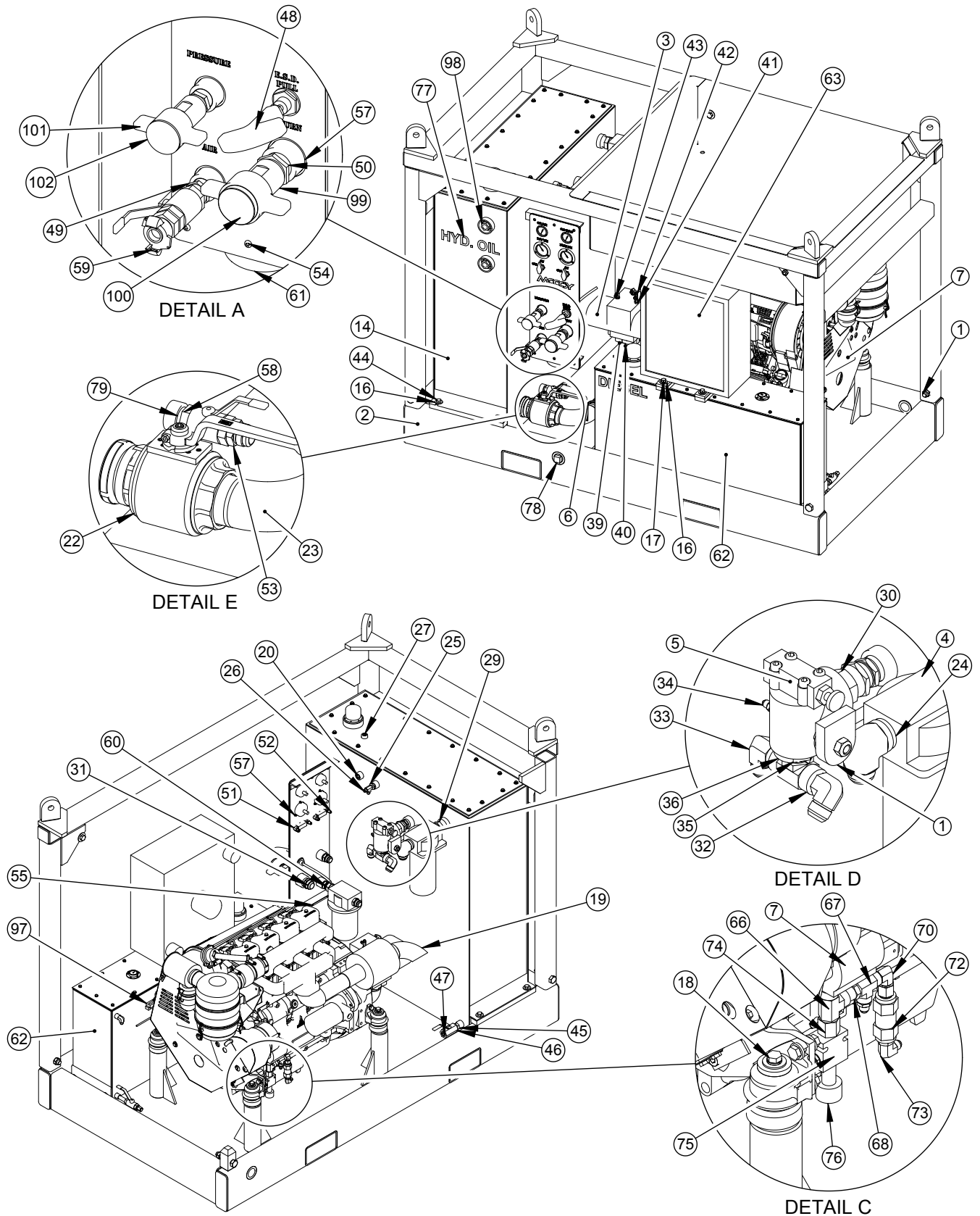
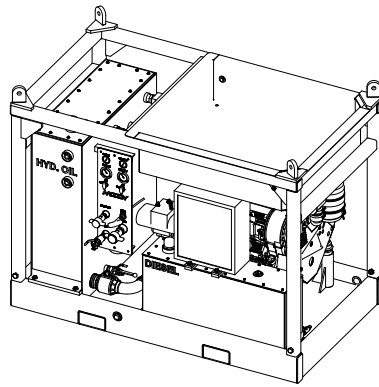


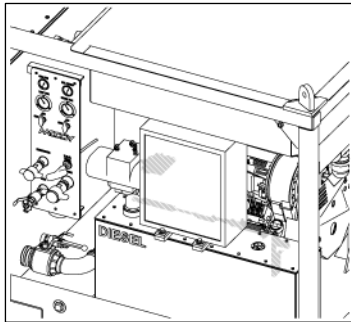
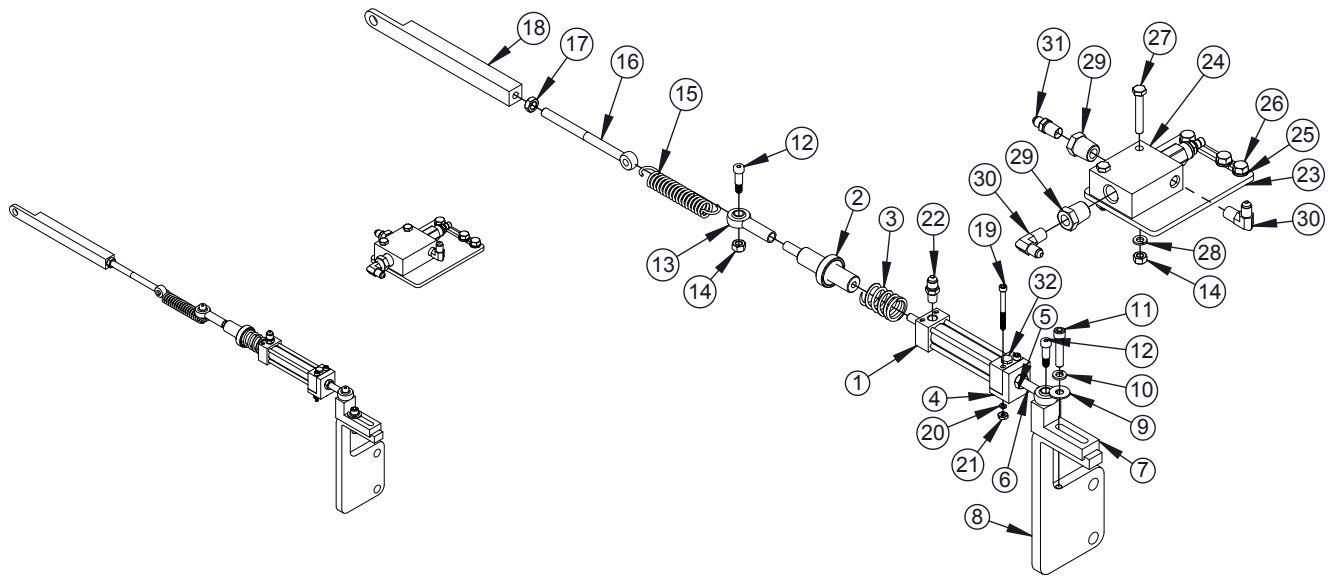
Illustration 7.1: DPU440-11 Diesel Power Unit Assembly



ITEM	QTY.	P/N	DESCRIPTION	ITEM	QTY.	P/N	DESCRIPTION
1	1	DBSKT-008	ASSEMBLY, HOSE BASKET	55	6	1737	NUT, NYLOCK, 1/4-20 SS
2	1	DSKD-01	WELDMNT, SKID, 4-CYL DPU	56	1	1559	FITTING, ADAPTER, STRAIGHT, 3/8 MJIC, 1/4 MNPT
3	1	GNSH15-15	PUMP, HYDRAULIC, HIGH/LOW	57	1	7042HL-013	ASSEMBLY, BULKHEAD PLATE
4	1	DPU660-S1	BLOCK, FILTER	58	2	V500P-16	VALVE, BALL, BRASS, 1" NPT, PARKER# V500P-16
5	1	2070	VALVE, RELIEF	59	1	UM-100-M	FITTING, MALE, FOOT
6	2	D40H-75-300-SL	CLAMP, T-BOLT 2 1/2	60	1	16F6X	FITTING, SWIVEL, 1 MNPT, 1 FJIC
7	1	F4L914	ENGINE, DIESEL, 4 CYLINDER	61	1	F6L914-S2	WATER SERPARATOR, VENDOR PART NUMBER F329-08
8	1	W43-16-24U	FITTING, 1 1/2IN CODE 61 X 1IN FNPT, STRAIGHT	62	1	DT-35G-01A	ASSEMBLY, TANK, DIESEL, 35 GALLON
9	2	1391	FITTING, STREET ELBOW, LOW PRESSURE, 3/4	63	1	PU2500-H21-02	HEAT EXCHANGER, WITH MOTOR
10	1	PN24-33T	PIPE NIPPLE, 1 1/2 MNPT X 33, SCH 80	64	1	DPU660-08-S1	PUMP, HYDRAULIC, COOLER FAN
11	1	PN20-33T	PIPE NIPPLE, 1 1/4 X 33 MNPT, SCH 80	65	1	0107-8-8-S	FITTING, STRAIGHT SWIVEL, 1/2 FNPT, 1/2 MNPT
12	2	PN12-20T	FITTING, 3/4 MNPT X 20 LONG SCH. 80 PIPE NIPPLE	66	1	8MRO-S	FITTING, RUN TEE, 1/2 FNPT, 1/2 FNPT
13	1	1393	FITTING, STREET ELBOW, LOW PRESSURE, 1 1/4 IN	67	1	1595	FITTING, 3/8 FNPT, 3/8 FNPT, 3/8 MNPT, TEE
14	1	HRES-130	ASSEMBLY, HYDRAULIC RESERVIOR, 130 GALLON	68	1	1491	FITTING, 1/2 MNPT, 3/8 FNPT, STRAIGHT
15	1	PN40-C	NIPPLE, SCH. 80 PIPE NIPPLE, 2 1/2	69	1	1570	FITTING, 3/8 MNPT, 3/8 MJIC, STRAIGHT
16	16	1102	WASHER, FLAT, 1/2, STEEL, GR08	70	1	3-8CR-S	FITTING, 3/8 MNPT, ELBOW, 90 DEGREES
17	8	1103	WASHER, LOCK, 1/2	71	1	8-6F50G5-S	FITTING, REDUCER BUSHING, 1/2 MORB, 3/8 FNPT
18	4	1260	SCREW, HEX HEAD, 1/2-13 X 5 1/4, GR8	72	1	DPU660-08-S4	VALVE, CHECK
19	1	DPU-100-S1	ELBOW, MUFFLER, 6 CYL ENGINE	73	1	1464-A	FITTING, 1/2 MORB, 3/8 MJIC, ELBOW 1/2 MJIC
20	1	3-4HHP-S	FITTING, HEX PLUG, 3/4	74	1	1727	FITTING, ADAPTER, 3/8 MORB, 1/2 FNPT
21	1	1448	FITTING, PIPE NIPPLE, CLOSE, 2 1/2" SCH. 40	75	1	DPU660-08-S3	VALVE, BODY, ALUMINUM
22	1	BVAL-2500S-4321	VALVE, BALL, 2 1/2" SAE	76	1	DPU660-08-S2	CARTRIDGE, RELIEF
23	1	SBE-25HB-25SM-11	FITTING, 2 1/2 HOSE BARB X 2 1/2, CODE 61 FLANGE ADAPTER, 90 DEG	77	1	HYDOIL	LETTER, CLEAR, ADHESIVE
24	1	20-24CTXS	FITTING, ELBOW, 90 DEG., 1 1/2" MNPT X 1 1/4" MJIC	78	1	1612-G	FITTING, PLUG, 1 1/2 NPT
25	1	1494	FITTING, BUSHING, REDUCER, 3/4 MNPT X 3/8 FNPT	79	2	1371-A	FITTING, 1 MNPT, 1 MNPT, CLOSE, STRAIGHT, SCH 80
26	1	1527	FITTING, TEE, 3/8" MNPT X 3/8" MJIC X 3/8" MJIC	80	1	1STRAINER	SUCTION STRAINER
27	1	1609-A	PLUG, FLUSH, 1/2	81	2	H20-48-FJFJS	HOSE, 1 1/4 X 48 LONG, SINGLE WIRE, FJIC X FJIC
28	1	24CD	FITTING, ELBOW, 1 1/2 NPT, STREET EL	82	1	H12-72-FJFJ9	HOSE, 3/4, 3000 PSI, TOUGH COVER, 72 LONG, FJIC X FJIC 90 DEG
29	1	1504	FITTING, PIPE NIPPLE, HEX, 1 1/2"	83	1	ASR115-6-5	FUEL HOSE, 3/8 X 5FT
30	1	20F6X	FITTING, SWIVEL, 1 1/4 MNPT, 1 1/4 FJIC	84	1	H16-720-FJFJS	HOSE, 1 X 72 LONG, FJIC X FJIC, SINGLE WIRE
31	2	1470	FITTING, 1 1/4, MNPT, 1 1/4, MJIC, STRAIGHT	85	1	H6-60-FJFJ9	HOSE, 3/8, 3000 PSI, 60 LONG, FJIC 90 DEG
32	1	1669	FITTING, TEE, BRANCH, 1 MNPT, 1 FNPT	86	1	H6-22-FJFJ	ASSEMBLY, HOSE, 3/8 X 22 LENGTH
33	2	1617	FITTING, 1 MNPT, 1 MJIC, ELBOW	87	1	H6-20-FJFJ	ASSEMBLY, HOSE, 3/8
34	1	1562	FITTING, 1/4 MNPT, 1/4 MJIC, STRAIGHT	88	1	H6-100-FJFJ	HOE, 3/8, 3000 PSI, TOUGH COVER, 100 LONG, FJIC X FJIC
35	1	1499	FITTING, REDUCER BUSHING, 1 1/4 X 1 NPT	89	1	H4-66-FJFJ9	HOSE, 1/4, 3000 PSI, TOUGH COVER, 66 LONG, FJIC X FJIC 90 DEG
36	1	1014	U-BOLT, 1/4-20, 1 3/4 ID	90	3	H4-60-FJFJ	ASSEMBLY, HOSE, 1/4 X 60
37	2	100	NUT, HEX, 1/4-20, GR8	91	1	H4-17-FJFJ	ASSEMBLY, HOSE, 1/4 X 17
38	2	101	WASHER, LOCK, 1/4, GR8	92	1	H4-100-FJFJ	HOE, 1/4, 3000 PSI, TOUGH COVER, 100 LONG, FJIC X FJIC
39	1	BSE-25HB-25S-11	ADAPTER, 2 1/2, 2 1/2, 90	93	1	H20-60-FJFJ9S	HOSE, 1 1/4, 60 LONG, FJIC X FJIC 90, SINGLE WIRE
40	1	40SFO	FLANGE, SPLIT, 2 1/2", CODE 61	94	1	H20-45-FJFJS	HOSE, 1 1/4, 45 LONG, SINGLE WIRE, FJIC X FJIC
41	1	4f50x-s	FITTING, 1/4 MORB, 1/4 MJIC, STRAIGHT	95	1	H16-21-FJFJ	ASSEMBLY, HOSE, 1 FJIC X 21, PARKER 451TC TOUGH COVER
42	1	4R6X-S	FITTING, 1/4 FJIC SWIVEL, 1/4 MJIC, RUN TEE	96	1	H16-23-FJFJ	ASSEMBLY, HOSE, 1 FJIC X 23, PARKER 451TC TOUGH COVER
43	3	4-6C5OX-S	FITTING, 3/8 MORB, 1/4 MJIC, ELBOW	97	1	7040HL-011-03	KIT, ASSEMBLY, THROTTLE CYLINDER, DIESEL ENGINE, 4 CYLINDER
44	12	1111	SCREW, HEX, 1/2-13, 1 1/4, STEEL, GR8, ZINC	98	2	SLP-1	SIGHT, LEVEL, PLUG - 1 NPT
45	1	1461	FITTING, 3/4 MNPT, 3/4 MNPT, HEX NIPPLE	99	1	1445	FITTING, QUICK DISCONNECT, WING TYPE 1 1/4 FEMALE
46	1	V500P-12	VALVE, BALL, BRASS, 3/4" NPT, PARKER# V500P-12	100	1	1443	CAP, QUICK DISCONNECT, 1 1/4
47	1	1610	FITTING, 3/4 MNPT, PLUG	101	1	1440	FITTING, QUICK DISCONNECT, 1 FML-WING TYPE
48	1	F6L914-S1	PULL HANDLE, EMERGENCY	102	1	1666	FITTING, QUICK DISCONNECT, PLUG, DUST, FEMALE, 1
49	2	1462	FITTING, NIPPLE, HEX, 1"				
50	1	1463	NIPPLE, HEX, 1 1/4"				
51	2	1576-A	FITTING, 1/4 MNPT, 3/8 MJIC, ELBOW				
52	2	1576	FITTING, 1/4 MNPT, 1/4 MJIC, ELBOW				
53	4	1469	FITTING, 1 MNPT, 1 MJIC, STRAIGHT				
54	6	SST-18	SCREW, BUTTON HEAD, 1/4-20 X 1, STAINLESS				

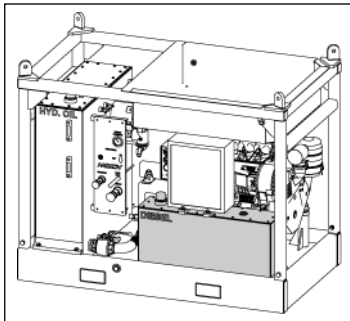
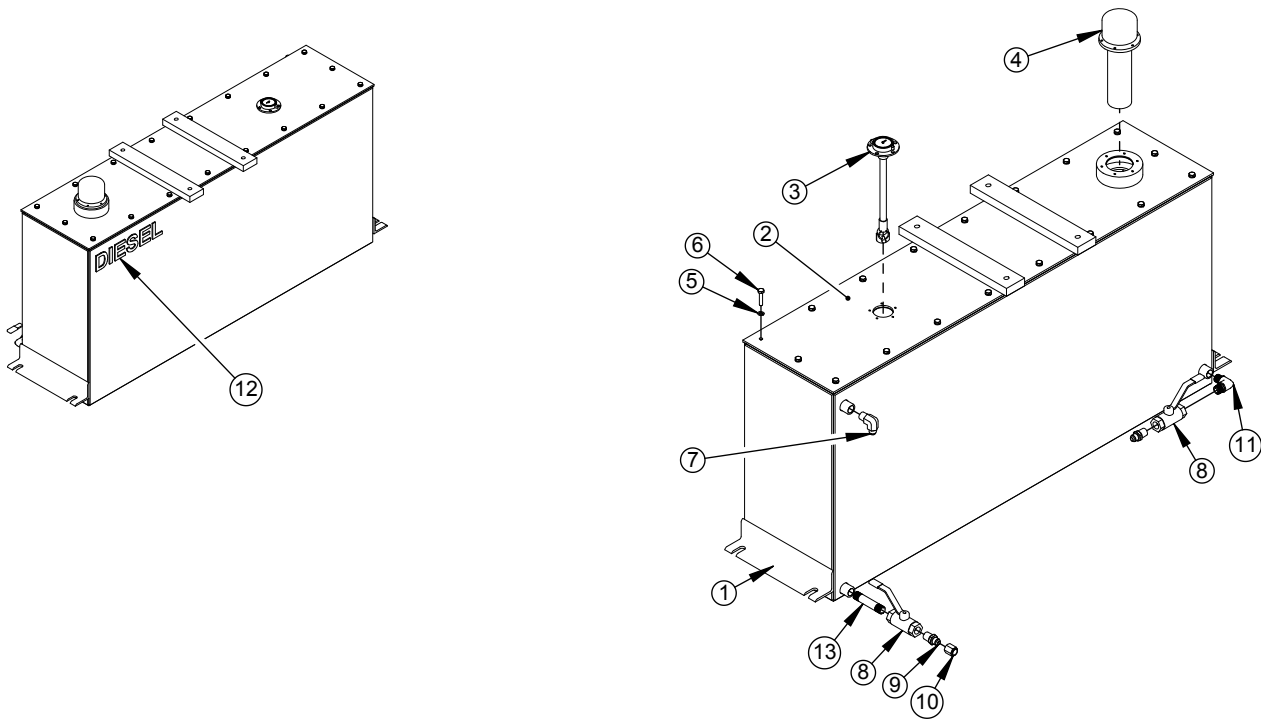
SEE SEPARATE ASSEMBLY DRAWING FOR FURTHER DETAIL

Illustration 7.2: DPU440-11 Diesel Power Unit Assembly BOM



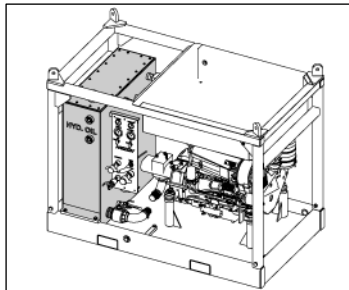
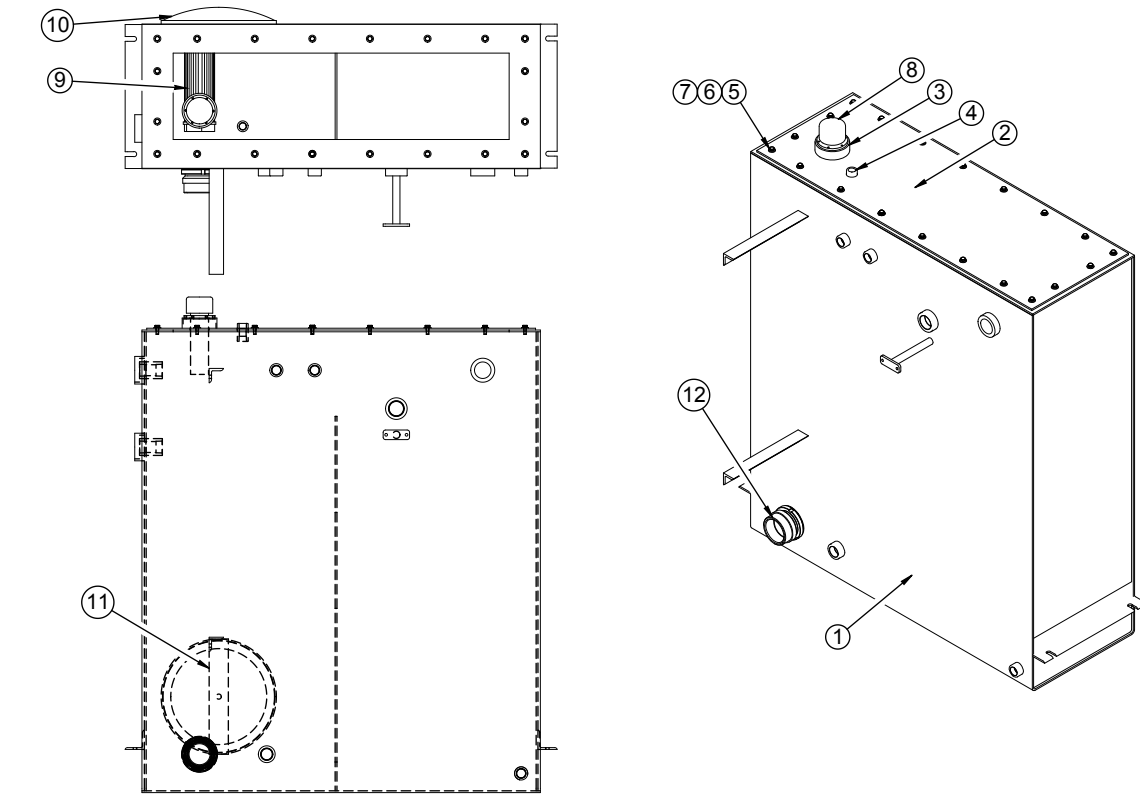
ITEM	QTY.	P/N	DESCRIPTION
1	1	BJTC-23	CYLINDER, 0.75 BORE X 0.313 ROD X 2.125 STROKE
2	1	BJTC-21	CAP, SPRING, CYLINDER
3	1	72592	SPRING, COMPRESSION, 1.100 OD X 0.850 ID X 4.000 L
4	1	BJTC-22	BLOCK, MOUNT, CYLINDER
5	1	BJTC138	NUT, JAM, 3/8-24, S.S.
6	1	BJTC-10SS	BALL, JOINT, 3/8-24
7	1	BJTC-12	ASSEMBLY, CYLINDER, THROTTLE
8	1	1735	WASHER, FLAT, 5/16, SS
9	1	1734	WASHER, LOCK, 5/16, STAINLESS
10	1	1743	SCREW, SOCKET HEAD, COUNTERSUNK, 5/16 -18 X 1 1/2, STAINLESS STEEL
11	2	BJTC-11SS	BOLT, 3/8-16, 5/8, SHOULDER
12	1	BJTC-9SS	BALL, JOINT, 3/8-24
13	3	1023-A	NUT, HEX 5/16 - 18 GR8
14	1	71017	SPRING, EXTENSION, .750 OD, .105 WIRE, 4.0 OA
15	1	58229	BOLT, EYE, 3/8 -16 X 5
16	1	BJTC137-B	NUT, HEX, JAM, 3/8"-16, STAINLESS STEEL
17	1	BJTC-14-6	ANCHOR, SPRING
18	2	91251A253	SHCS, #10-24, 2 IN. LONG, MCMASTERCARR: 91251A253
19	2	90073A011	WASHER, LOCK, #10
20	2	3102	HEX NUT, #10-24
21	1	1588-S	FITTING, STRAIGHT, 1/8 MNPT, 1/4 MJIC
22	1	BJTC-28	PLATE, ADAPTER
23	1	BJTC-25	ASSEMBLY, PRESSURE REDUCING, DIRECT ACTING, PRDRLAN-ECC
24	3	1027	WASHER, LOCK, 3/8, STEEL
25	3	1046	SCREW, HEX, 3/8 - 16, 3/4, STEEL, GR8
26	2	126	SCREW, HEX HEAD, 5/16-18 X 2, GR8
27	2	1023-B	WASHER, LOCK, 5/16, GR8
28	2	1490	BUSHING, REDUCER, 1/2 X 1/4
29	2	1576	FITTING, 1/4 MNPT, 1/4 MJIC, ELBOW
30	1	1562	FITTING, 1/4 MNPT, 1/4 MJIC, STRAIGHT
31	1	1579-B	VENT, 1/8 NPT
32	1	PU4060-S26	PLATE, BRACKET, THROTTLE

Illustration 7.3: 7040HL-011-03 Throttle Cylinder Assembly



ITEM	QTY.	P/N	DESCRIPTION
1	1	DT-35G-01	WELDMENT, TANK, DIESEL, 35 GALLON
2	1	DT-35G-S10	WELDMENT, LID, TANK, DIESEL
3	1	TRG-1775-M	GAUGE, FUEL
4	1	PU4060-S30	FILLER CAP
5	18	101	WASHER, LOCK, 1/4, GR8
6	18	106	SCREW, HEX, 1/4-20, 1 1/4
7	1	6-6CTX	FITTING, ELBOW, 90 DEG., 3/8" MJIC X 3/8" MNPT
8	2	1478	VALVE, BALL, BRASS, 3/8 FNPT, 3/8 FNPT
9	2	1570	FITTING, 3/8 MNPT, 3/8 MJIC, STRAIGHT
10	1	1636	CAP, JIC, 3/8
11	1	1579	FITTING, 3/8 MNPT X 3/8 MNPT 90 DEG
12	1	DIESEL	LETTER, CLEAR, ADHESIVE
13	1	1402	NIPPLE, 3/8 MNPT, 3/8 MNPT X 3, SCH. 80

Illustration 7.4: DT-35G-01A 35 Gallon Diesel Tank Assembly



ITEM	QTY	P/N	DESCRIPTION
1	1	HRES-01	WELDMENT, RESEVOIR, 130 GAL
2	1	HRES-02	PLATE, TOP, RESERVOIR
3	1	FBR-035	FILLER/BREATHER FLANGE, 3 1/2 DIA , 10-32 THREAD
4	1	1376	COUPLING, THREADED, 1/2, 3000 PSI
5	21	104	SCREW, HEX, 1/4-20, 3/4
6	21	101	WASHER, LOCK, 1/4, GR8
7	21	1008-B2	WASHER, FLAT, 1/4, GR8
8	1	PU4060-S30	FILLER CAP
9	1	SS-2-100-3	STRAINER, SUCTION, 100 MESH, 50 GPM
10	1	SEC-12	COVER, CLEANOUT
11	1	12002000	BAR, MOUNTING, HATCH COVER
12	1	SNS-25N-25S-11	ADAPTER, WELD, 2 1/2

Illustration 7.5: HRES-130 130 Gallon Hydraulic Reservoir Assembly



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SECTION 8: OEM DOCUMENTATION

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8.0 OEM DOCUMENTATION LINKS

Diesel Engine:

http://deutz.com/live_deutz_products/file/8a85818a1840a916011855396d681f29.de.0/data_sheet_d%20914_landtechnik_2011.pdf

Hydraulic Pump:

http://www.eaton.com/ecm/groups/public/@pub/@eaton/@hyd/documents/content/pll_1444.pdf

Heat Exchanger:

<http://emmegiinc.com/wp-content/uploads/2014/06/AC-Fan-Driven-Coolers-R1.pdf>