B&D MANUFACTURING
safe efficient solutions

B&D Multi Handler
Diesel with MD4

Operation Manual

Read this Operation manual before operating

QD-520 JUNE/24 Rev(1)

BLANK

Foreword

This Guide may be available in your native language. Check with your local distributor.

Congratulations on your purchase of a B&D Manufacturing product.

This Operation Manual provides the operator with and overview of the components incorporated in the design, the procedures and instructions on how to operate your equipment.

The objective of this manual is to provide simple, clear, and complete details, procedures and instructions. These objectives are backed by B&D Manufacturing's commitment to offer superior custom designed equipment and technical support.

Every effort has been undertaken to ensure the accuracy and completeness of information in this manual. Constant efforts are made to improve the quality and performance of B&D Manufacturing products. Some details included in this Operation Manual may differ slightly from your piece of equipment. If you have any questions about these differences, please contact B&D Manufacturing.

If you do not understand any of the information, instructions or procedure explanation in this manual, contact your local distributor or B&D Manufacturing.

BLANK

Table of Contents

Important Contacts

B&D Manufacturing

4703 Regional Road 15
P.O. Box 5197
Chelmsford, Ontario
Canada, P0M 1L0

Telephone: +1-705-855-2363

Toll Free in Canada and U.S.A: **1-800-668-0324**

Website: www.bdmfg.com
Email: mailto:info@bdmfg.com

BLANK

Safety Information

General

The operator **must** understand all outlined potential hazards described in the **Safety** section located at the front of this manual prior to operating, performing maintenance on, or troubleshooting of your equipment.

It shall be the responsibility of the employer or owner to ensure that all operators have received proper training prior to operating, performing maintenance on, or troubleshooting.

The operator **must** follow all specific site procedures and guidelines when operating, performing maintenance on, or troubleshooting this piece of equipment. In **no circumstance** shall the instructions and procedures outlined in this manual take precedence over your established **specific site procedures and guidelines**.

Do not undertake the operation, maintenance, troubleshooting, repairs or servicing of your piece of equipment unless you are familiar with the operation and servicing of technical equipment and have received proper training.

If your level of training, skill or comprehension of the Manual's instructions or procedures could possibly result in injury to personnel or damage to equipment, have the work done by a qualified B&D Manufacturing Representative. Your common sense and good judgment are crucial to the safe and successful operation.

At any time, if the operator suspects that a safety issue may be present with this piece of equipment perform an immediate shutdown, disconnect power source by performing a lock and tag out procedure and immediately notify your supervisor.

NEVER permit anyone to operate, or perform maintenance on, or perform troubleshooting without first receiving proper training. Failure to do so could result in serious injury to personnel.

- Read and understand this Manual before you operate your piece of equipment.
- Read the Cautions, Warnings, and Dangers in this section before operating.
- Review the **Safety** section and all relevant cautions, warnings and dangers each time you prepare to perform maintenance on or troubleshoot.
- Improper usage can cause injury to personnel or damage to equipment. Read and understand your site specific safety instructions **thoroughly** before operating
- Contact B&D Manufacturing for additional training opportunities.

Safety Notices

There are three types of Safety notices used in this manual.

- Caution Notices

CAUTION	
	**Caution notice indicates a potential hazardous situation that if not avoided, may result in personnel injury or damage to equipment.**

- Warning Notices

WARNING	
	**Warning notice indicates a potential hazardous situation that if not avoided, may result in serious injury or death to personnel.**

- Danger Notices

DANGER	
	**Danger notice indicates an imminently hazardous situation that if not avoided, will result in serious injury or death to personnel.**

Cautions, Warnings and Dangers

It shall be the responsibility of the employer or owner to furnish all the tools and personnel protective equipment that are required to safely operate.

Always follow established specific site procedures and guidelines and ensure tools and personnel protective equipment (PPE) are in good condition prior to Operating this piece of equipment.

Although not all of the personnel protective safety equipment is necessary to perform all instructions, procedures and tasks, most sites and facilities require them as a standard and it is good practice to use them at all times.

It is critical that the appropriate protective safety equipment be worn at all times when you operate or perform maintenance.

The following lists the perceived Cautions, Warnings and Dangers that potential exist when operating every effort has been made to outline the potential Caution, Warning and Danger notices that may arise when operating, even though every effort has been made the operator **must** use common sense and good judgment when operating as unforeseen hazards may develop.

Cautions

CAUTION	
	**Training Caution.**

Refer to this Operation Manual before operating, maintaining or troubleshooting or in proximity of equipment.

CAUTION	
	**Eye Protection Caution.**

Wear Eye Protection, safety glasses with side shields or goggles, at all times when operating or in proximity of equipment.

CAUTION	
	**Foot Protection Caution.**

Wear Foot Protection at all time when operating, maintaining or troubleshooting your equipment.

CAUTION	
	**Head Protection Caution.**

Wear a Hard Hat at all time when operating, maintaining or troubleshooting your equipment.

CAUTION	
	Clothing Protection Caution.

Never wear loose Clothing in and around equipment. Ensure that any loose items of clothing, such as sleeve cuffs and pant legs, are buttoned up or tucked in at all time when operating or in proximity of equipment.

CAUTION	
	Ear Protection Caution.

Operators are cautioned to wear Ear Protection as appropriate to protect against harmful levels of noise that may be present in the immediate area near equipment.

CAUTION	
	Hand Protection Caution.

Wear Protective Gloves at all times and when maintaining or troubleshooting your B&D manufacturing equipment.

CAUTION	
	Long Hair Caution.

Operators with long hair must ensure that their long hair is tied, pinned or capped up prior to operating, maintaining or troubleshooting your B&D Manufacturing equipment.

CAUTION	
	**Do Not Weld Caution**

This equipment contains sensitive electronic. Conducting welding procedures may damage its electronic devices. Prior to welding you must contact B&D Manufacturing and receive permission to proceed with your welding request. Failure to do so may result in damage to the sensitive electronic devices.

In the event that permission is granted to you to proceed with welding you should observe the following guidelines.

- **The Safety Lock-out Switch must be placed in the off position. Always install your keyed lock into Safety Lock-out Switch. Perform your site's required Lockout and Tag out procedure.**
- **Disconnect the Battery terminal cables. The Negative terminal must always be disconnected from the battery before disconnecting the Positive cable.**
- **The ground wire of the Welder shall be positioned as close as possible to the area of welding.**
- **The cables on the Welder shall never be placed near the electrical wires of the equipment's Controls System.**

Warnings

WARNING	
	**Pinch Point Warning.**

Always ensure that the supplied Safety Guards are in place before operating. Never place any parts of your body, including loose clothing, hair or jewelry, in close proximity to or inside any moving parts. Failure to do so could result in serious injury or death to personnel.

WARNING	
	**Chain and Sprocket Pinch Point Warning.**

Always ensure that the supplied Safety Guards are in place before operating. Never place any parts of your body, including loose clothing, hair or jewelry, in close proximity to or inside any moving parts. Failure to do so could result in serious injury or death to personnel.

WARNING	
	**Rotating Parts Warning.**

Always ensure that the supplied Safety Guards are in place before operating. Never place any parts of your body, including loose clothing, hair or jewelry, in close proximity to or inside any moving parts. Failure to do so could result in serious injury or death to personnel.

WARNING	
	**Tripping Hazard Warning.**

Always visually inspect and stay alert when walking, stepping onto or off of equipment. Failure to do so could result in serious injury or death to personnel.

WARNING	
	**Fall Warning.**

Always ensure that the Safety Gates are properly closed and you are fully aware of your surrounding when standing on elevated surface or work decks. Make sure you are wearing proper PPE when working in areas were falling could happen. Failure to do so could result in serious injury or death to personnel.

WARNING	
	**Burn Warning.**

Keep your hands, clothing and other body parts away from potential hot surfaces when in proximity, during operation and after shutdown of equipment. These surfaces may become extremely hot and may seriously burn you. Wait until the equipment cools before performing maintenance on or troubleshooting. Failure to do so could result in serious injury to personnel.

WARNING	
	**Drive Assembly Warning.**

Always visually inspect the Safety Perimeter around equipment for other personnel, tools or other objects before any directional rotation of equipment drives. (ex: track drives, wheel drives etc…) Failure to do so could result in serious injury or death to personnel.

Dangers

DANGER	
	**Rotating Parts Danger.**

Always visually inspect the area around equipment for objects, tools or other personnel, before operating. Advise all personnel to immediately clear safety perimeter prior to beginning operations. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**Pinch Point Danger.**

Always visually inspect all equipment's pinch point of any obstructions and that all guards are securely placed prior to beginning operations of equipment. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**Entrapment Danger.**

Always visually inspect for all other personnel, the Safety Perimeter around and along the path you intend on driving and steering the equipment through. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**Falling Object Danger.**

Stand clear of the area when the equipment holding a load, being hoisted or moved through the air with properly rated lifting equipment. Only lifting equipment that is properly rated for the weight load of the equipment must be used. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**Electrical Shock Danger.**

Always disconnect electrical power source when performing maintenance on or troubleshooting. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**High Voltage Danger.**

Turn off and lock out Safety Lock-out Switch and unplug Power prior to servicing the Multi Handler. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**Lock Out Danger.**

Always install your keyed lock into equipment's Safety Lock-Out Switch when performing maintenance or to keep others from actuating equipment functions. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**Fire Danger,**

Diesel Fuel is flammable and explosive under certain conditions. Never remove the Diesel Fuel Tank's Cap when the Diesel Engine is in operation. Never refuel the Diesel Fuel Tank when the Diesel Engine is in operation. Keep all open flames or other forms of ignition away from the equipment at all times. Failure to do so could result in serious injury or death to personnel.

DANGER	
	**Exhaust & Harmful Emissions Danger.**

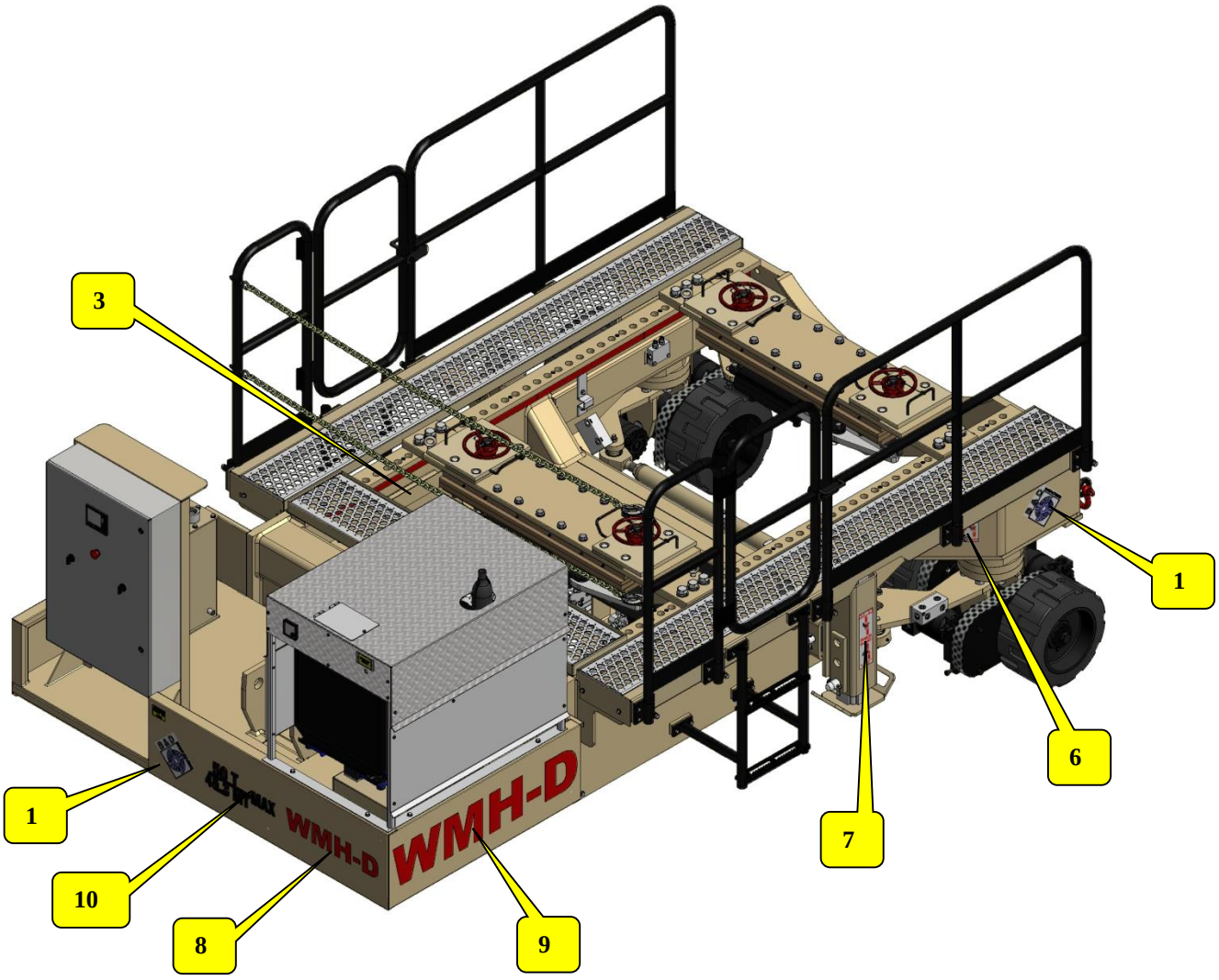
Internal combustion engines produce carbon monoxide gas during operation. The accumulation of carbon monoxide gas within an area that is not properly ventilated could cause illness or death. Never operate the Diesel Engine in an enclosed area without proper ventilation. Never block the means of ventilation if the Diesel Engine is in operation. Failure to do so could result in serious injury or death to personnel.

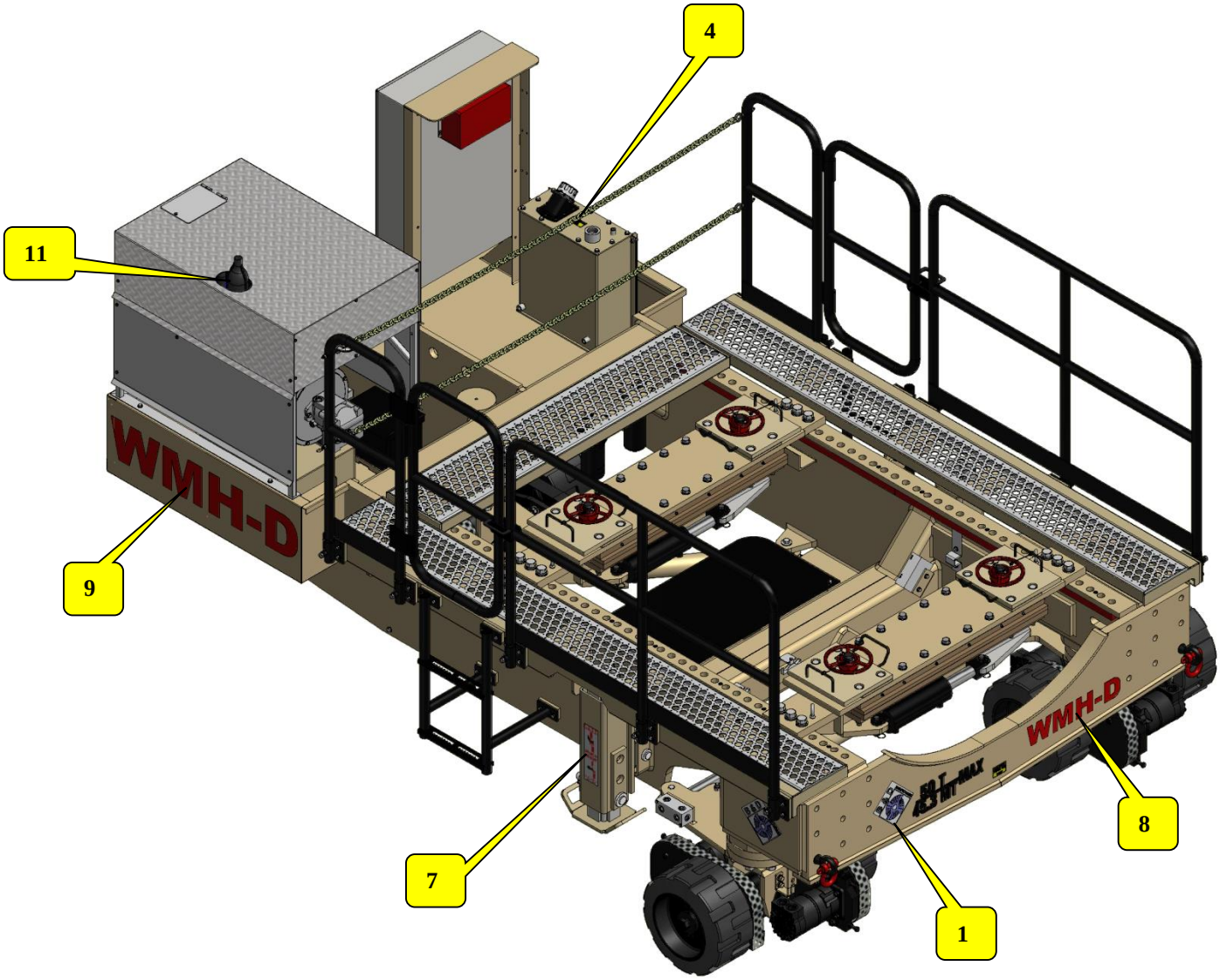
DANGER	
	**Explosion Danger**

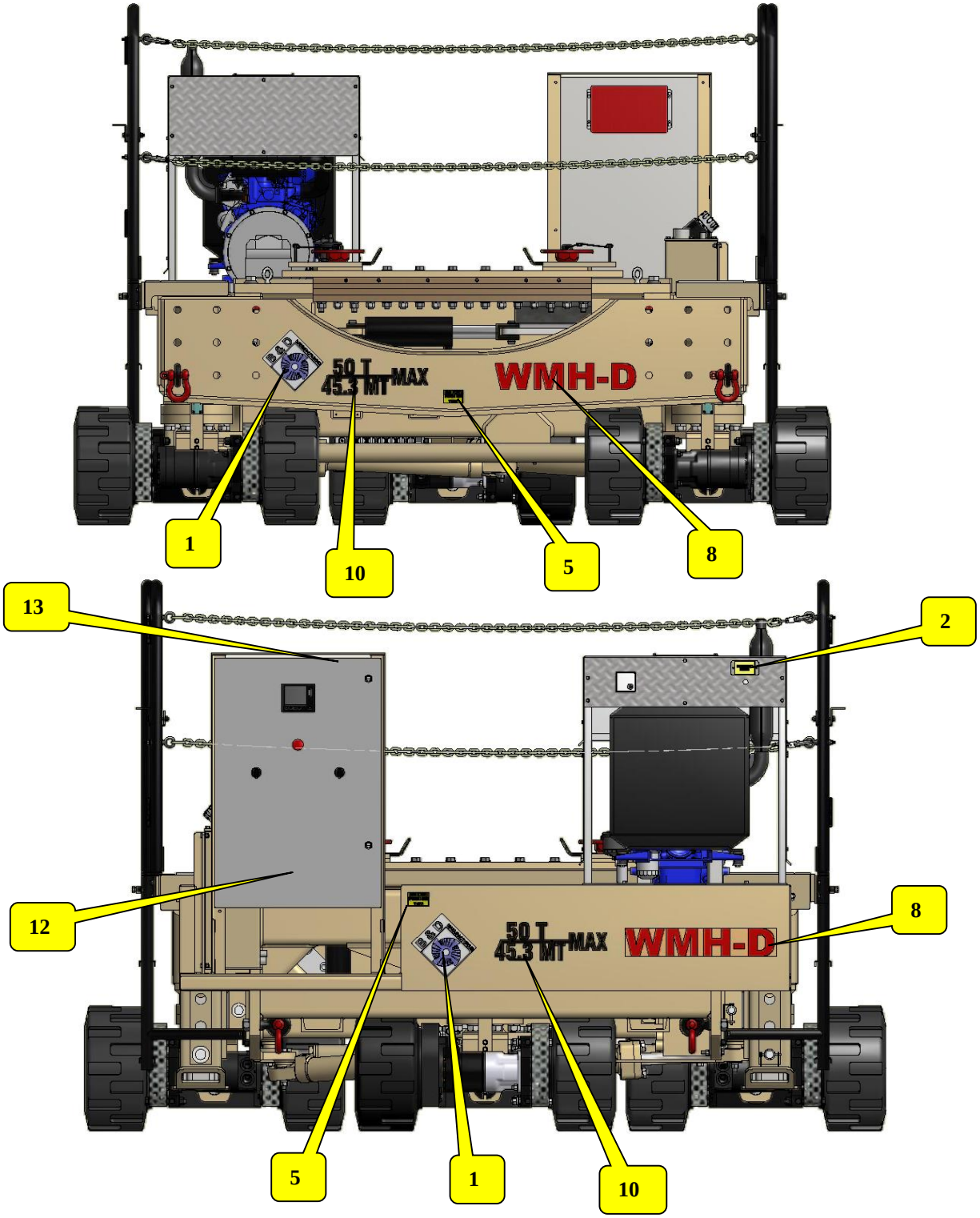
Never short out Battery terminals. Shorting of battery terminals may result in the ignition of a spark that could lead to an explosion fire.

Decals

Safety Decal's on your Multi Handler serves as additional reminders for safe operating practices. The following decals below are installed on your equipment and should any go missing you should be replaced immediately by contacting B&D Manufacturing.




4
11
9
7
8
1
WMH-D
WMH-D


50 T
45.3 MT MAX
WMH-D
1
10
5
8
13
2
12
8
5
1
10

1) Decal, B&D Manufacturing Logo
2) Decal, Disconnect Switch
3) Decal, Hydraulic Fluid decal *located on hydraulic reservoir*
4) Decal, Diesel Fuel Only decal *located on diesel reservoir*
5) Decal, Do not push or tow
6) Decal, 6 x 8
7) Decal, 11 x 3
8) Decal, WMH-D small
9) Decal, WMH-D large
10) Decal, 50 ton capacity
11) Decal, Hot surface
12) Decal, Safety perimeter
13) Decal, B&D nameplate

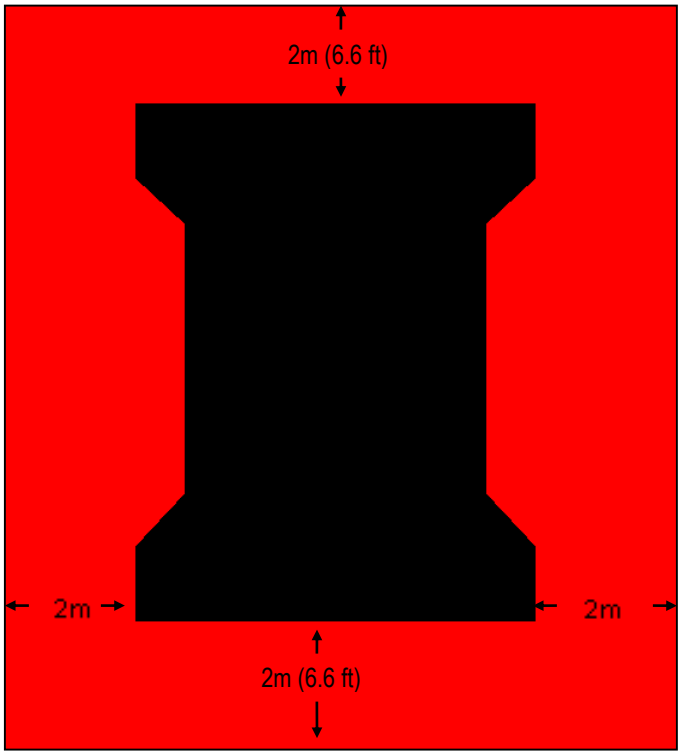
Safety Perimeter

For personnel protection B&D Manufacturing recommends a Safety Perimeter Area be observed and maintained around your piece of equipment by the operator and all other personnel at all times when operating, performing maintenance on or troubleshooting.

B&D Manufacturing recommends that a minimum of 6.6 feet (2 meters) be established by your site as the Safety Perimeter Area.

The operator should visually inspect the Safety Perimeter for any potential hazards or other personnel prior to operating. If any potential hazards or other personnel are within the Safety Perimeter **do not** attempt to operate. Rectify all potential hazards around and advise all personnel to immediately clear the Safety Perimeter area. **Failure to do so could result in serious injury or death to personnel.**

The following displays the recommend Safety Perimeter area to be observed obey all times.



Product Overview

This section of the manual provides the operator with an overview of the major components and assemblies incorporated into the design of the Multi Handler supplied by B&D Manufacturing.

The Multi Handler consists of the following major components and assemblies.

- Drive Wheel Assemblies
- Strut Assemblies
- Steering Assemblies
- Cross Slide Assemblies
- Rear Wheel Group (Final Drive) Attachment
- Operator Work Deck
- Diesel Engine
- Diesel Engine Cover
- Controls System
- Electrical System
- Hydraulic System

Refer to B&D Manufacturing parts manual for replacement parts.

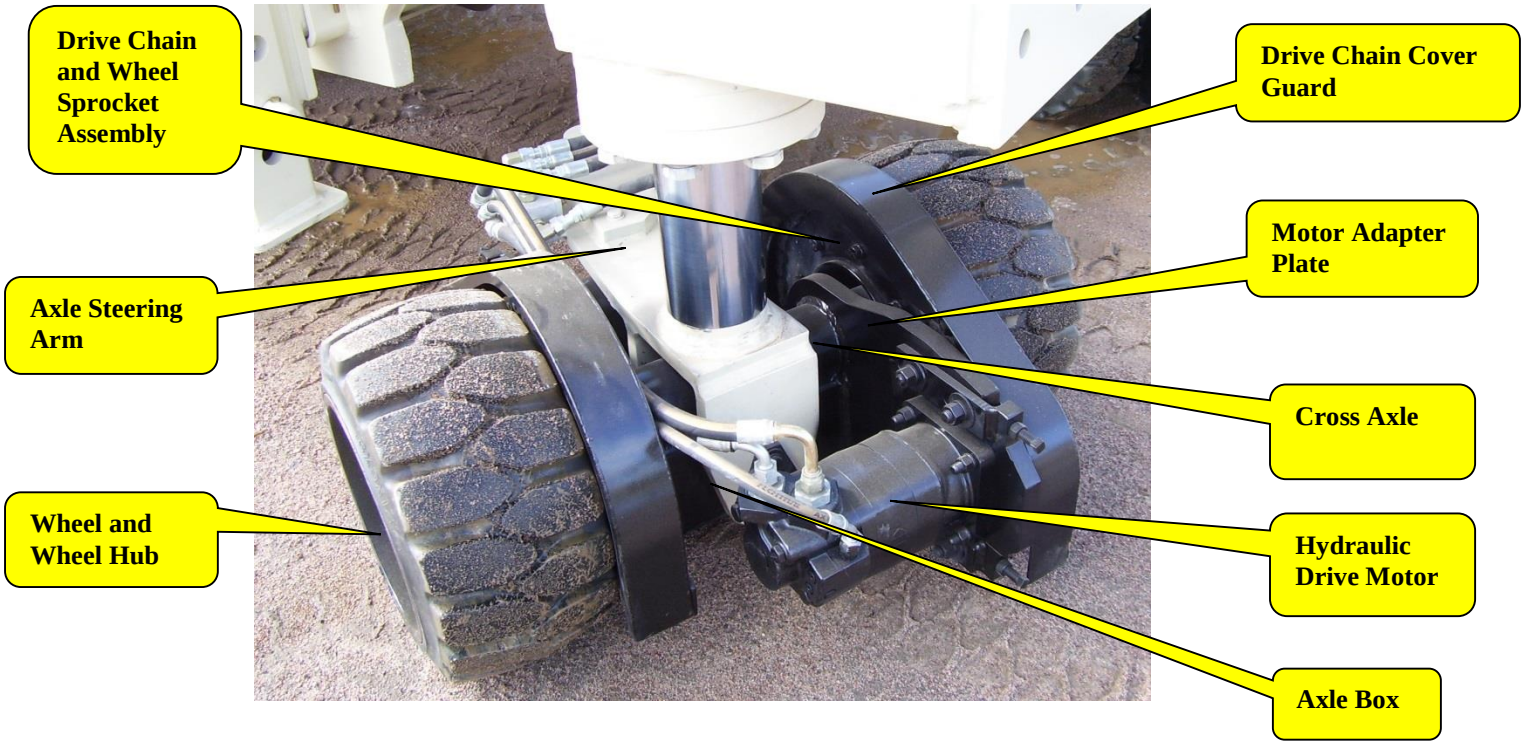
Major Components

Drive Wheel Assemblies

The Multi Handler is equipped with three drive wheel assemblies. One located on the front left side, one located on the front right side and the other located inside the rear of the Multi Handler's main frame.

The Drive Wheel Assemblies consist of the following components.

- Hydraulic Drive Motor
- Motor Adapter Plate
- Axle Box
- Axle Steering Arm
- Cross Axle
- Wheel and Wheel Hub
- Drive Chain and Wheel Sprocket Assembly
- Drive Chain Cover Guard



Hydraulic Drive Motor
The hydraulic drive motor consists of a motor with 12,000 in.lb of holding torque that will operate within nominal hydraulic pressures of up to 2500 psi.

The purpose of the hydraulic drive motor is to provide hydraulically coupled fluid drive power to the drive wheel assembly.

WARNING	
	**Drive Assembly Warning.**

The hydraulic drive motor includes both forward and reverse rotation directions of operation. The operator can control the speed of rotation of the hydraulic drive motor using the Multi handler's radio terminal.

Motor Adapter Plate
The purpose of the motor adapter plate is to provide a means to facilitate the tightening of the drive chain.

Axle Box
The axle box provides a pivoting anchor point for the drive wheel assemblies.

Axle Steering Arm
The axle steering arm provides a point of attachment for both front steering assembly tie rod steering arm and the rear steering assembly's steering cylinder.

Cross Axle
The cross axle provides a means of mounting the wheel and wheel hub to the drive wheel assembly.

Wheel and Wheel Hub
The wheel consists of a vulcanized rubber assembly that is pressed on to the wheel hub.

Drive Chain and Wheel Sprocket Assembly
Each drive wheel assembly includes two sprockets. The drive sprocket is located on the drive motor and mounted via a spline style shaft. The driven sprocket is mounted to and located on the drive wheel and axle assembly. Together the 1.5" pitch drive chain and sprocket assembly mechanically links the hydraulic drive motor to the wheel and wheel hub assembly. This mechanical drive link also includes a mechanical gear reduction.

Drive Chain Cover Guard
The purpose of the drive chain cover guard is to act as a safety guard and to eliminate the pinch point hazard that exists between the moving parts of the drive sprocket, the driven sprocket and the drive chain of the drive wheel assembly.

WARNING	
	**Rotating Parts Warning.**

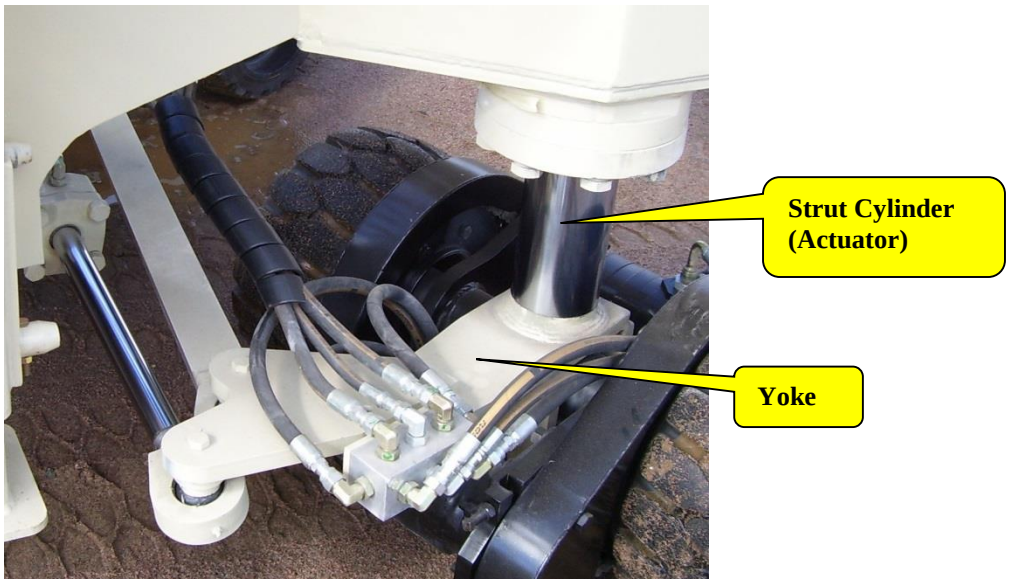
At no time should any personnel attempt to operate the multi handler without the drive chain cover guard installed in its proper position on the drive wheel assembly. **Failure to do so could result in serious injury or death to personnel.**

Strut Assemblies
The Multi Handler is equipped with three strut assemblies. One located on the front left side, one located on the front right side and the other located inside the rear of the Multi Handler's main frame.

The Strut Assemblies consist of the following components.

- Strut Cylinder (Actuator)
- Motion and Flow Control
- Yoke

For further information on the strut functions refer to the controls system's radio terminal and operating procedure sections of this manual.



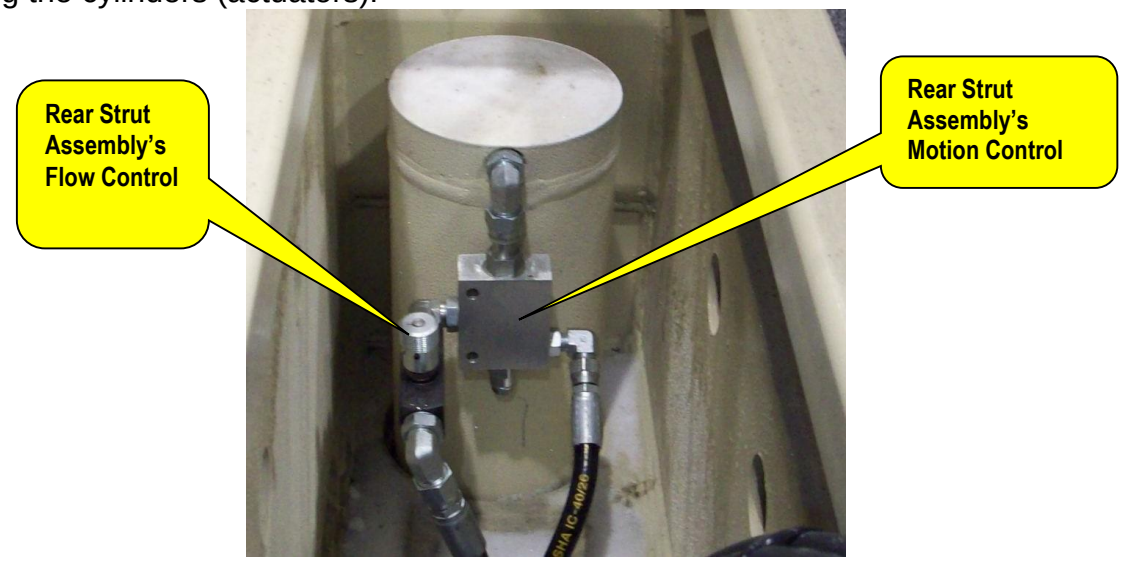
Strut Cylinder (Actuator)
The strut cylinder consists of a heavy duty hydraulic cylinder that will operate within nominal hydraulic pressures of up to 2500 psi.

The strut cylinder's function is to raise, lower and to position hold the Multi Handler. The Command of these functions by the operator is accomplished using the Front Left Strut Up/Down, Front Right Strut Up/Down and Rear Strut Up/Down control toggle switches located on the Multi Handler's radio terminal.

WARNING	
	**Pinch Point Warning.**

For further information on the Strut functions refer to the controls system's radio terminal and operating procedure sections of this manual.

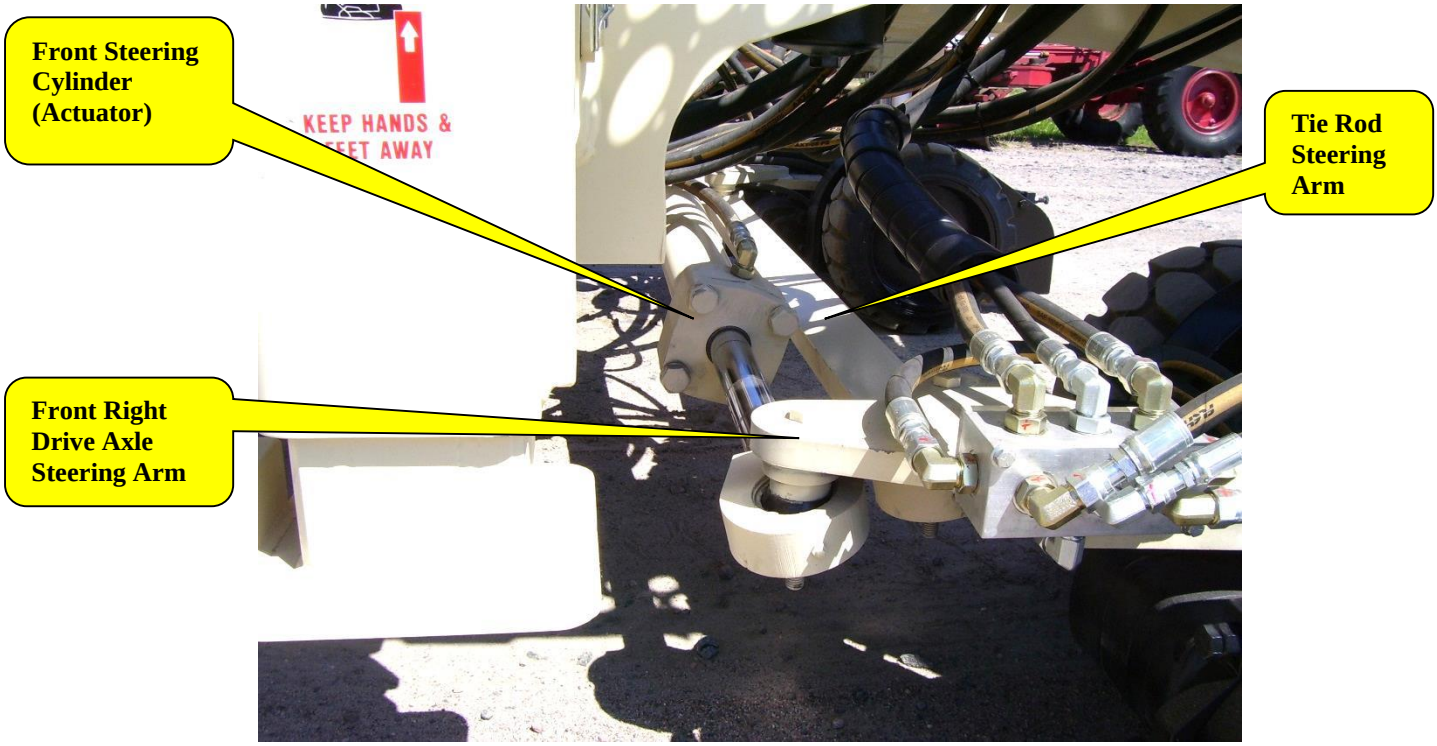
Motion and Flow Control
The motion control prevents the strut assemblies from being lowered in the event of a hydraulic hose failure. The motion control also includes an embedded flow control to assist in controlling the lowering speed of the strut assemblies by limiting the flow rate of the hydraulic oil exiting the cylinders (actuators).



For further information on the motion and flow control functions refer to the **Hydraulic System** sections of this manual.

Yoke
The purpose of the yoke is to provide a means of mechanically attaching the strut cylinder (Actuator) to the drive wheel assembly.

Steering Assemblies
The Multi Handler is equipped with two steering assemblies. One located inside the front of the Multi Handler's main frame and the other one located inside the rear of the Multi Handler's main frame.



The Front Steering Assembly consists of the following components.

- Front Steering Cylinder (Actuator)
- Tie Rod Steering Arm

The Rear Steering Assembly consists of the following component.

- Steering Cylinder (Actuator)

For further information on the steering functions refer to the **Controls System's Radio Terminal** and **Operating Procedure** sections of this manual.

Steering Cylinder
The Steering Cylinders consist of a heavy duty hydraulic cylinder that will operate within nominal hydraulic pressures of up to 2500 psi.The Steering Cylinder's function is to pivot the Drive Wheel Assemblies in the left or right directions.

The Multi Handler's Controls System monitors the operator's movement of the Drive Forward/Reverse and Front Steer and Rear Steer Left/Right control joysticks via the Radio Terminal.

For further information on the Steering functions refer to the **Controls System's Radio Terminal** and **Operating Procedure** sections of this manual.

Tie Rod Steering Arm
The purpose of the Tie Rod Steering Arm is to provide a mechanical link between the front left and front right drive wheel assemblies.

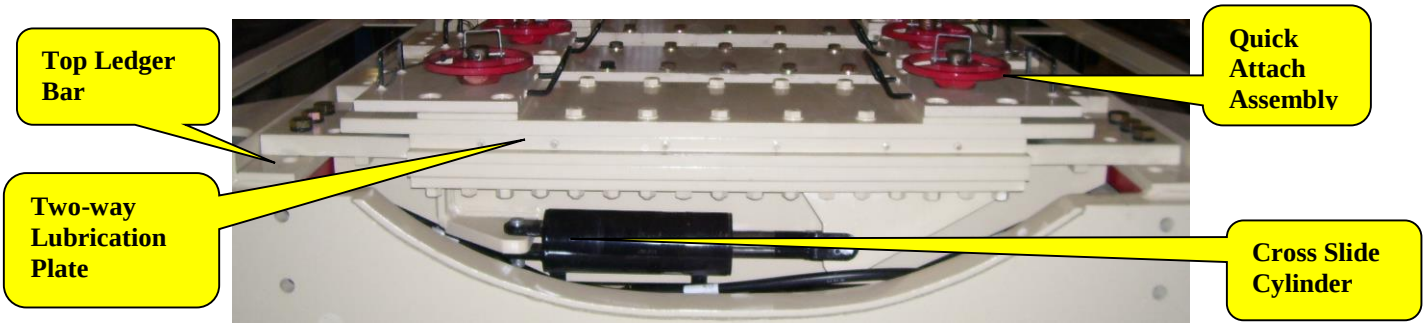
The tie rod steering arm is attached to the front left drive wheel assembly's axle steering arm at one end and to the front right drive wheel assembly's axle steering arm at the other. The tie rod ends included are also adjustable.

Cross Slide Assemblies
The Multi Handler is equipped with two Cross Slide Assemblies. One located inside the front of the Multi Handler's main frame and the other one located inside the rear of the Multi Handler's main frame.

The Cross Slide Assemblies consist of the following components.

- Cross Slide Cylinders (Actuators)
- Quick Attach Clamp Plate
- Quick Attach Locking Handle
- Two-way Lubrication (Slider) Plate
- Lower Frame Assembly

For further information on the Cross Slide functions refer to the **Controls System's Radio Terminal** and **Operating Procedure** sections of this manual.



The Cross Slide Assemblies are fastened to the Multi Handler's main frame by way of mounting bolts that are installed through the Cross Slide Assembly and top ledger bar.

Cross Slide Cylinders (Actuators)
There are two hydraulic cylinders included in the design of each Cross Slide Assembly. The Cross Slide Cylinders consist of a heavy duty hydraulic cylinder that will operate within nominal hydraulic pressures of up to 2500 psi.

The Cross Slide Cylinder includes a cap fixed clevis style mount at both ends, one for securing it to the lower frame assembly and the other to attach it to the two-way lubrication plate.

WARNING	
	**Pinch Point Warning.**

The Cross Slide Cylinder's function is to move the Wheel Motor Jig in the left or right directions in order to position the Wheel Motor Jig into place under the truck's Wheel Motor Group.

Quick Attach Clamp Plate and Locking Handle
Each Cross Slide Assembly includes two quick attach clamp plate and locking handle. The purposes of the quick attach clamp plate and locking handle is to provide a means of securing truck specific component attachments to the Multi Handler.

Two-way Lubrication Plate
A Two-way Lubrication Plate is included with the Cross Slide Assemblies. the two-way lubrication plate facilitates the left and right movement of the cross slide assembly and wheel motor jig.

Operator Work Deck

The Multi Handler is equipped with an operator work deck. The operator work deck provides the operator with a platform to stand on while removing and installing the truck's wheel motor group.

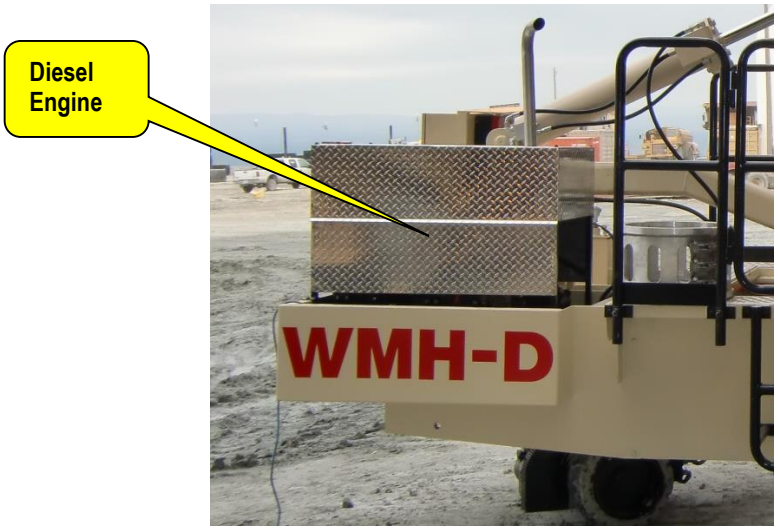
The operator work deck consists of the following components.

- Safety Gate
- Step Ladder
- Hand Rails
- Catwalk

WARNING	
	**Tripping Hazard Warning.**

WARNING	
	**Fall Warning.**

Diesel Engine
Two types of diesel engine are included in your Multi Handler. A low altitude diesel engine will come standard in a Multi handler and a high altitude engine is generally equipped when working at greater than 10 000ft above sea level.



B&D Manufacturing's Diesel Engine meets EPA (Environmental Protection Agency) emission control standards and California ARB (Air Resources Board) regulations.

DANGER	
	**Exhaust & Harmful Emissions Danger.**

The diesel engine is located inside rear of the Multi Handler's main frame. It is important to fill the diesel engine with engine oil that meets or exceeds the guidelines and classifications recommended by the engine manufacturer.

The Diesel Engine consists of the following main components.

- Cooling System
- Fuel System
- Inlet Air Heater
- Diesel Engine Micro Panel

Cooling System

The Diesel Engine is generally liquid cooled. Only fill the cooling system with engine coolant that meets the guidelines and specifications recommended by the engine manufacturer.

WARNING	
	**Rotating Parts Warning.**

Fuel System

The Diesel Engine's fuel system is equipped with the following:

- Fuel Pump
- Fuel Filter and Water Separator
- Fuel Tank Reservoir

Fuel Tank Reservoir

The fuel tank reservoir is located inside the rear center of the Multi Handler's main frame. Fuel tank capacity is 47 liters (12.5 US gallons).

Only fill the fuel tank reservoir with diesel fuel that complies with the specifications recommended engine manufacturer. **Refer to the recommended fluids list for further information**

Inlet Air Heater
The purpose of the diesel engine's inlet air heater is to make the engine easier to start during cold weather temperatures.

The inlet air heater is located on the diesel engine's intake manifold.

During the engine starting sequence the inlet air heater is activated for approximately 15 seconds. Note: inlet air heater kits come equipped on certain high altitude engines only.

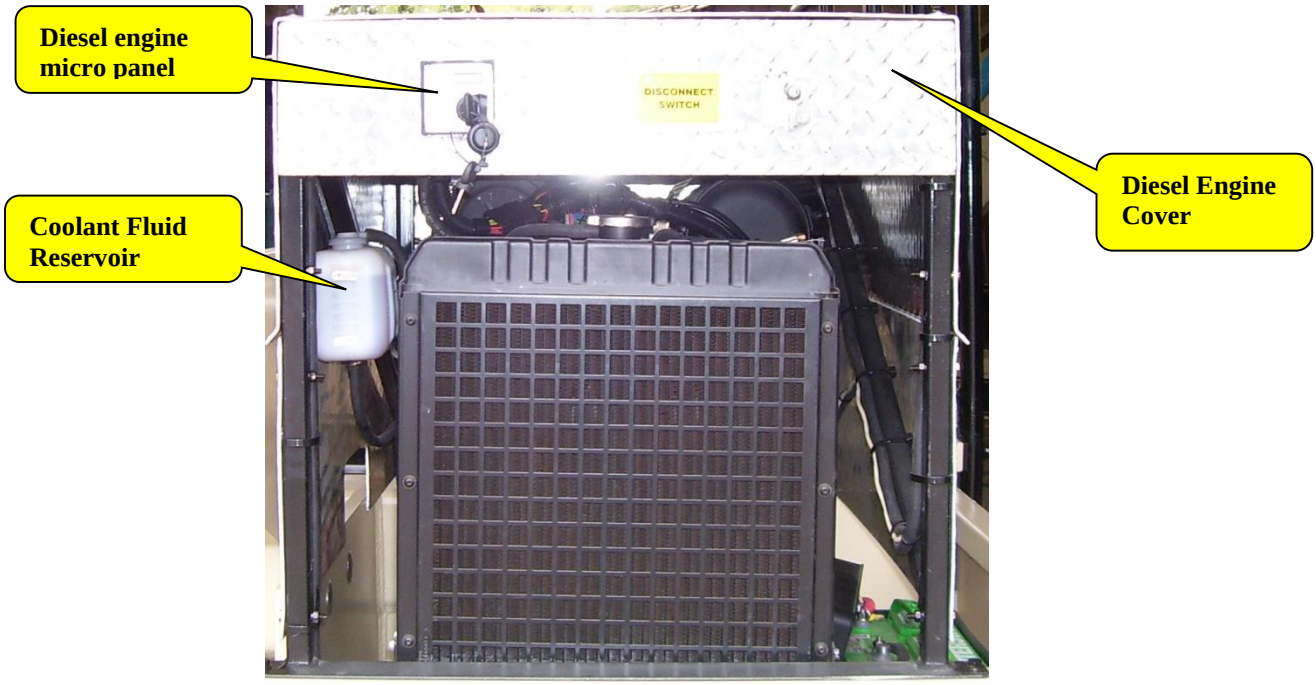
Diesel Engine Micro Panel
The purpose of the diesel engine micro panel is to provide the operator with a means to start and stop the Multi Handler's diesel engine.

The diesel engine micro panel provides the operator with visual status indication of low battery charge, high diesel engine temperature and low diesel engine pressure via diagnostic LEDs (light emitting diodes).

Refer to B&D service manual for further detail.

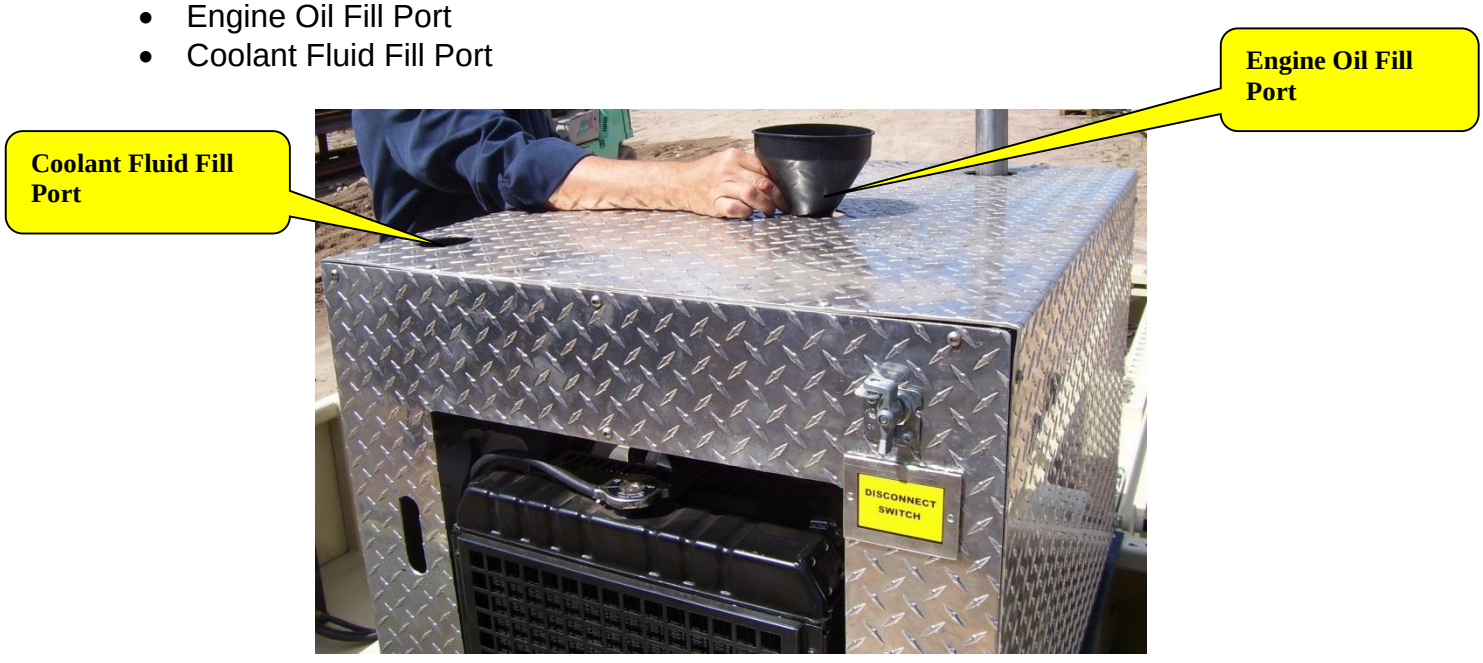
Diesel Engine Cover

The Multi Handler's diesel engine is housed inside a protective cover.



The diesel engine cover is includes for knockout for the following:

- Engine Oil Dipstick Port
- Engine Oil Fill Port
- Coolant Fluid Fill Port



Controls System

The Controls System components are located on and inside of the electrical panel assembly.

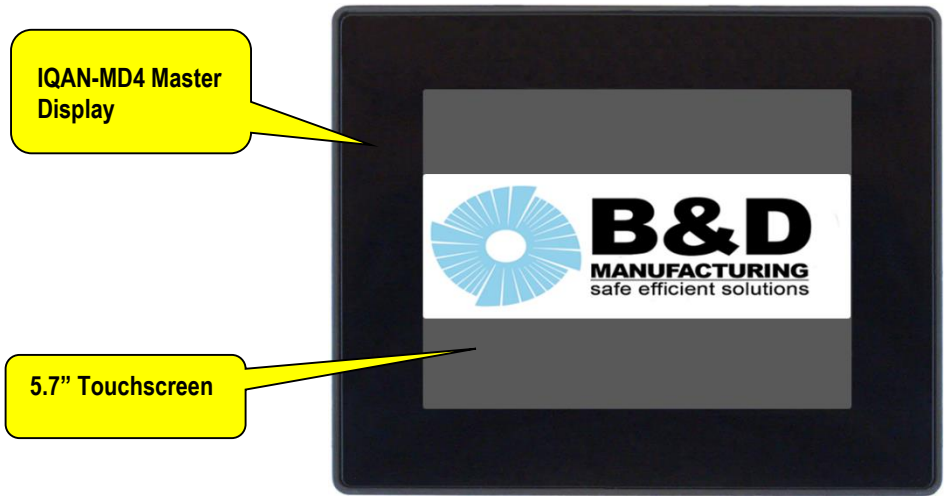
The Controls System consists of the following components.

- Display Module
- Two Expansion Modules
- Radio Terminal
- Base Unit
- Warning Horn
- Motion Beeper

The Master Display, the Expansion Modules, the Base Unit and the Radio Terminal communicate via serial CAN-bus communications and function as the Multi Handler's controls system.

Display Module MD4

The Master Display is the heart of the Multi Handler's Controls System and is mounted on the exterior door's surface of the electrical panel assembly.



The display module contains the Multi Handler's application software, displays conditional text messages, performs application calculations and decisions and, initiates all communications to and from the two expansion modules and the Base Unit.

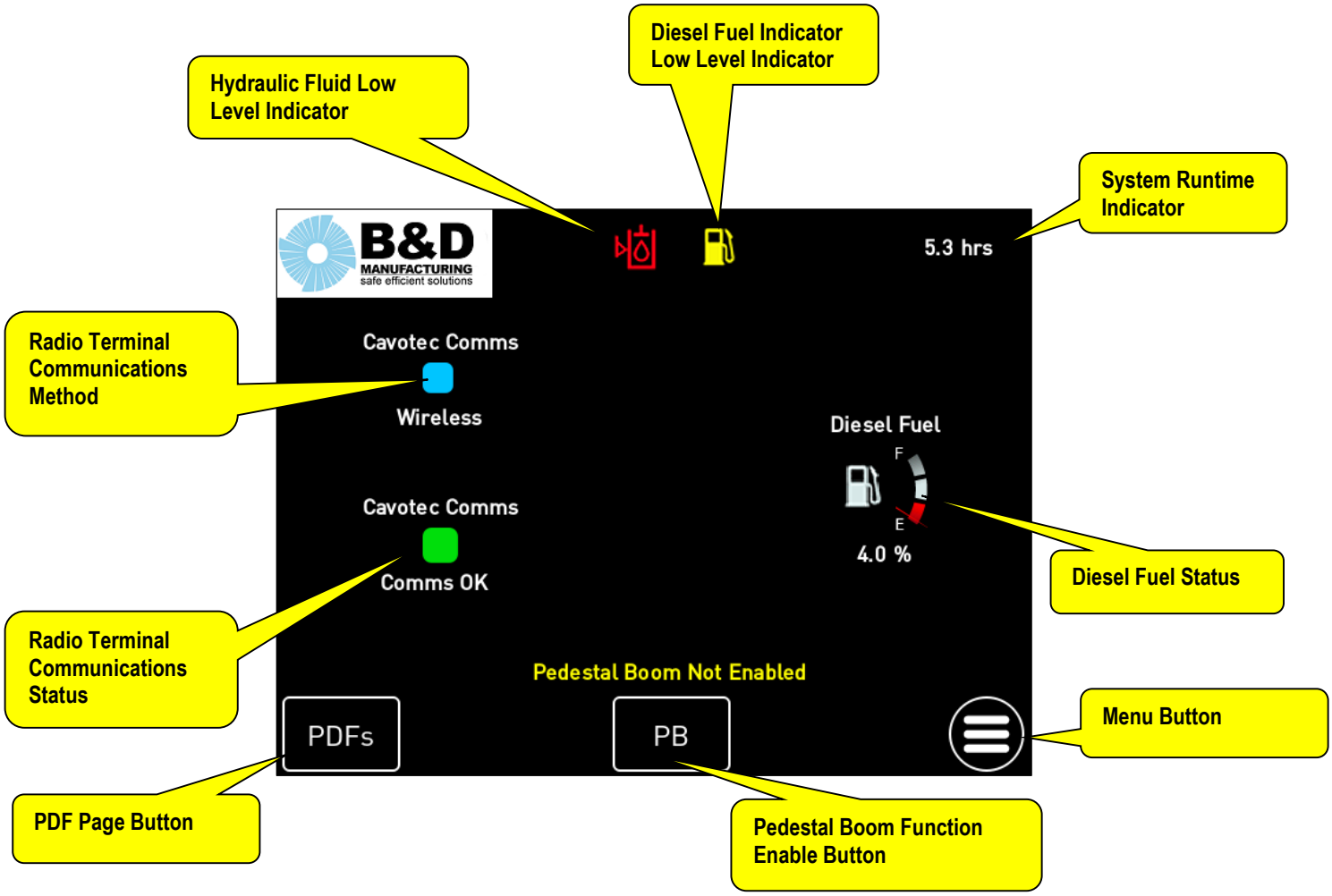
The IQAN-MD4 display has a capacitive touch screen enabling the user to control the display with the use of fingers, passive stylus, thin gloves or thicker gloves with conductive material in the finger tips. The touch sensor is protected from wear behind a glass surface.

Start Up Image

When the IQAN-MD4 Master Display starts after power to it is switched on, a start-up image will be displayed on the Master Display for a short period of time before the Main Display screen appears shown. The start-up image is shown below.

Main Display Screen

The Main Display screen will replace the Start Up image on the IQAN-MD4 Master Display within a few seconds of having power applied to the Master Display. The Main Display screen is shown below.



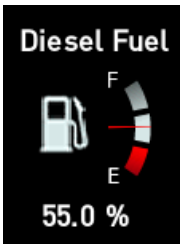
The MD4 Main Display screen consists of the following components.

- **Diesel Fuel Level Indicator**. The Diesel Fuel Level Indicator provides the operator with a graphical indication of the diesel fuel level contained in the Reservoir.

  The Diesel Fuel Level Indicator's icon will be displayed as "gray" in color whenever the diesel fuel is above the low level set point value.

The Diesel Fuel Level Indicator's icon will be displayed as "yellow" in color whenever the diesel fuel reservoir becomes low.

- **Diesel Fuel Status**. The Diesel Fuel Status provides the operator with a numerical and graphical indication of the diesel fuel level that remains in the Reservoir. The current value of the Diesel Fuel Status is monitored via the Fuel Gauge sensor located on top of the fuel tank.



- **Hydraulic Fluid Indicator**. The Hydraulic Fluid Indicator provides the operator with a graphical indication of the ok status of the hydraulic fluid level contained in the Hydraulic Fluid Tank Reservoir.

  The Hydraulic Fluid Indicator's icon will be displayed as "gray" in color whenever the hydraulic fluid level contained in the Hydraulic Fluid Tank Reservoir is above the low level setpoint value and its status is ok.

  The low level setpoint is a discrete digital input signal hardwired into the IQAN-XC43 module.

  The Hydraulic Fluid Indicator's icon will be displayed as "red" in color whenever the hydraulic fluid fuel level contained in the Hydraulic Fluid Tank Reservoir is below the low level setpoint value and its status is low.

- **System Runtime Indicator**. The Runtime Indicator provides the operator with a numerical indication of the total runtime, in hours, accumulated on the Multi Handler. The runtime indicator will start incrementing whenever the Multi Handler's IQAN-MD4 Master Display is powered.

- **Radio Terminal Comms Status**. The Radio Terminal Comms Status provides the operator with a textural and graphical indication of the communication status between the Cavotec Radio Terminal and Base Unit.

  The Radio Terminal Comms Status icon will be displayed as "red" in color and its text indicator will display "Not OK" whenever communications has not been established or has been terminated between the Radio Terminal and the Base Unit.

  The Radio Terminal Comms Status icon will be displayed as "green" in color and its text indicator will display "Comms OK" whenever communications has been established and the data being transmitted between the Radio Terminal and the Base Unit is valid been.

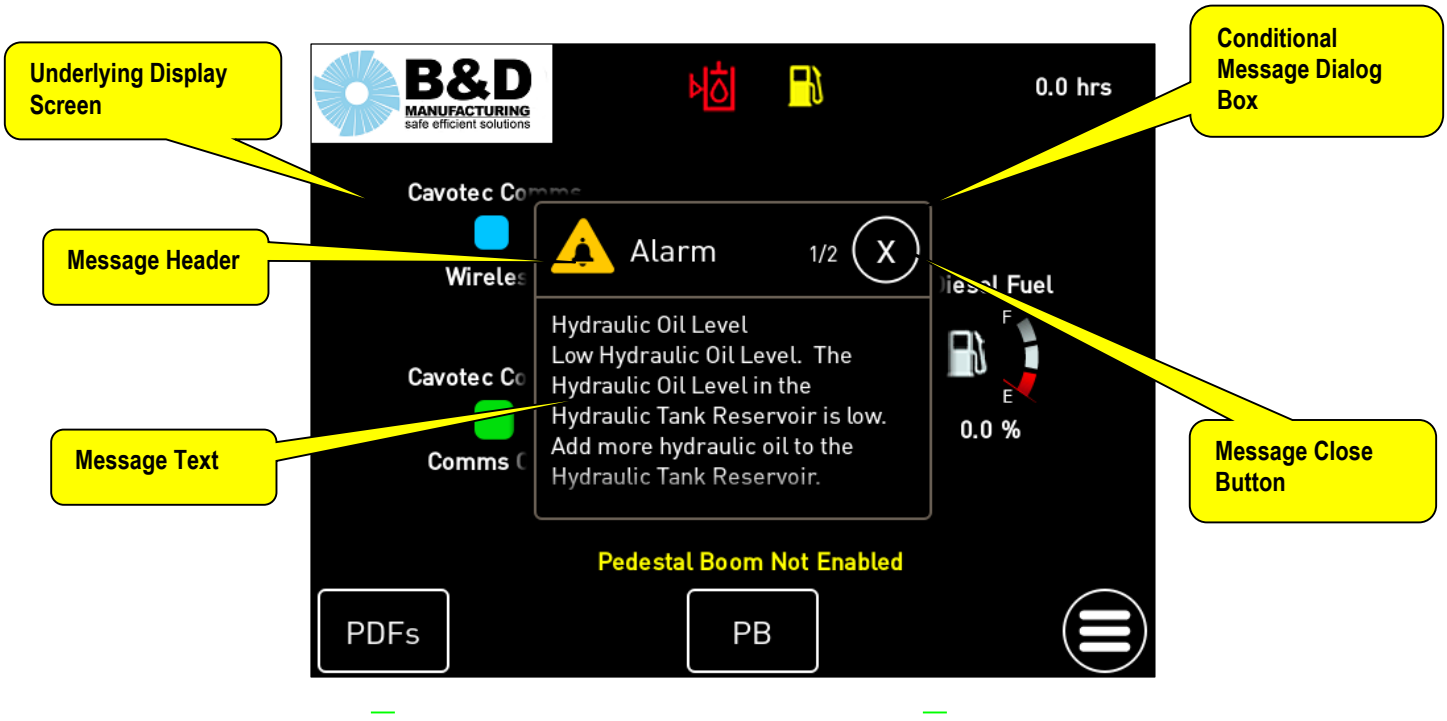
- **Radio Terminal Comms Method**. The Radio Terminal Comms Method provides the operator with a textural and graphical indication of the means of communication between the Cavotec Radio Terminal and Base Unit.

  The Radio Terminal Comms Method icon will be displayed as "cyan" in color and its text indicator will display "Wireless" whenever communications between the Radio Terminal and the Base Unit is being achieved wirelessly.

  The Radio Terminal Comms Method icon will be displayed as "green" in color and its text indicator will display "Hardwired" whenever communications between the Radio Terminal and the Base Unit is being achieved via the communication cable.

Conditional Messages
When activated by the IQAN-MD4's application, conditional messages will be displayed in Dialog Boxes that will appear on top of the IQAN-MD4's active display screen. The Dialog box window is smaller than the total IQAN-MD4 display size. This means that the underlying display screen will be visible around the conditional message Dialog Box. All of the underlying display screen's buttons will be disabled while the Dialog Box is visible on the IQAN-MD4 display.

A typical conditional message that may appear on an IQAN-MD4 Master Display screen is shown below.

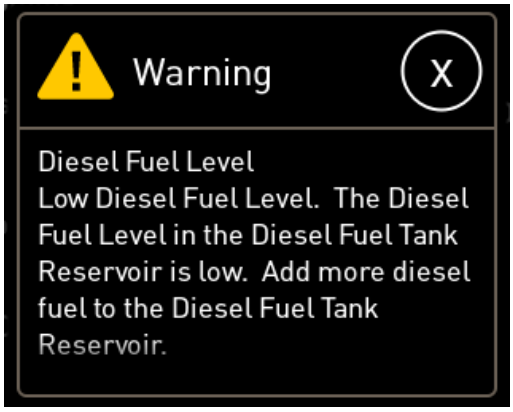


The conditional messages that appear on the IQAN-MD4 Master Display will remain visible until either the operator presses the message close button or the activating condition is no longer present.

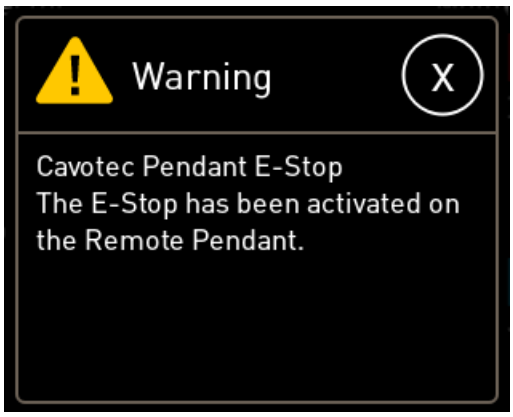
The following conditional messages may be displayed on the IQAN-MD4's Master Display.

- Low Hydraulic Oil Level. The Hydraulic Oil Level in the Hydraulic Tank Reservoir is low. Add more hydraulic oil to the Hydraulic Tank Reservoir.

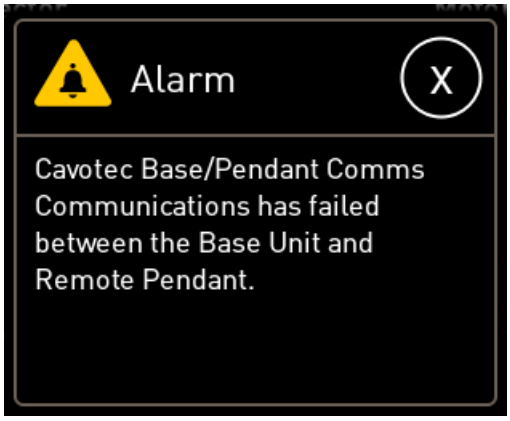
- Low Diesel Fuel Level. The diesel fuel level in the diesel fuel tank reservoir is low. add more diesel fuel to the diesel fuel tank reservoir.



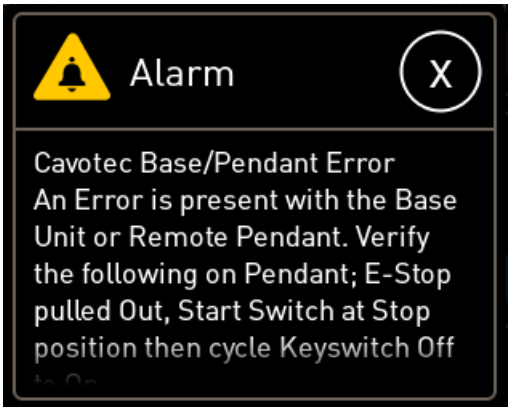
- Cavotec Pendant E-Stop. The E-Stop (emergency stop) pushbutton has been activated, pushed down, on the Cavotec Radio Terminal.



- Cavotec Base/Pendant Comms. Communications between the Cavotec Radio Terminal and Base Unit has failed.

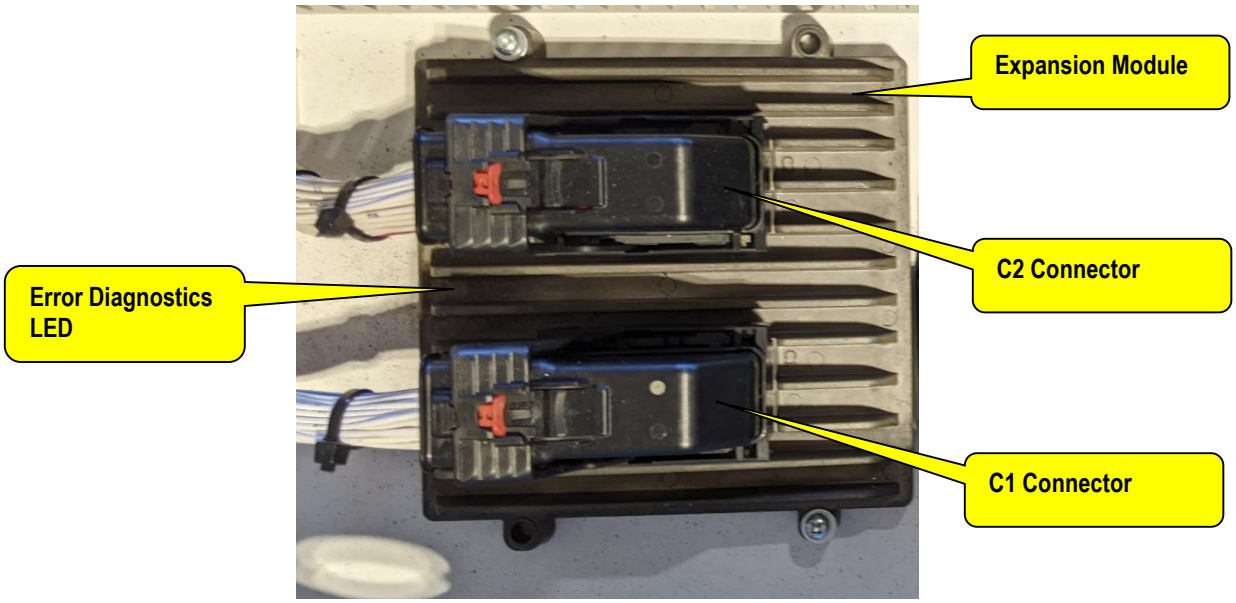


- Cavotec Base/Pendant Error. An Error is present with the Cavotec Radio Terminal and/or Base Unit. Verify the state of each of the following on the Radio Terminal; E-Stop (emergency stop), Motor switch and Keyswitch.



Expansion Module IQAN-XC43

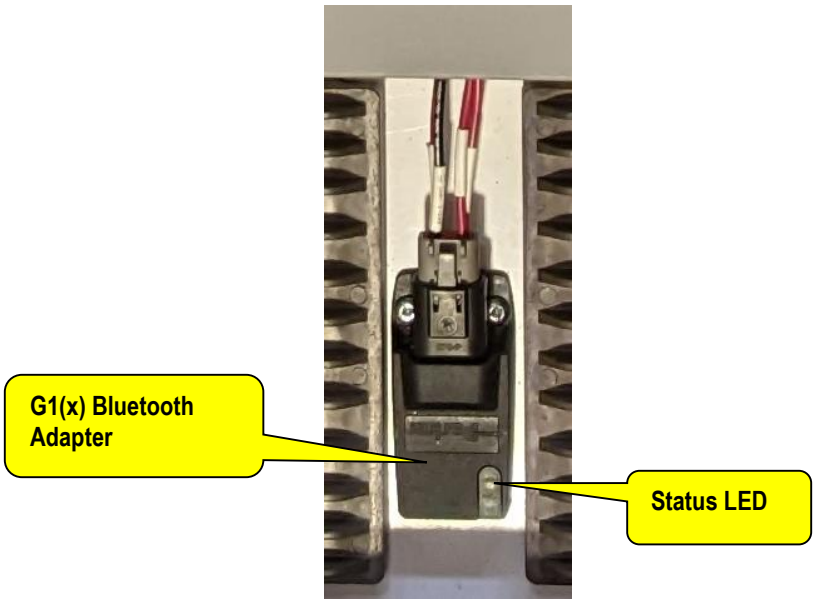
The expansion module is an I/O module that provides voltage inputs, digital inputs, digital outputs, and current outputs for the Multi Handler's Controls System.



There are two (2) expansion modules, XC43-B0 and XC43-D1, located inside of the Electrical Panel Assembly.

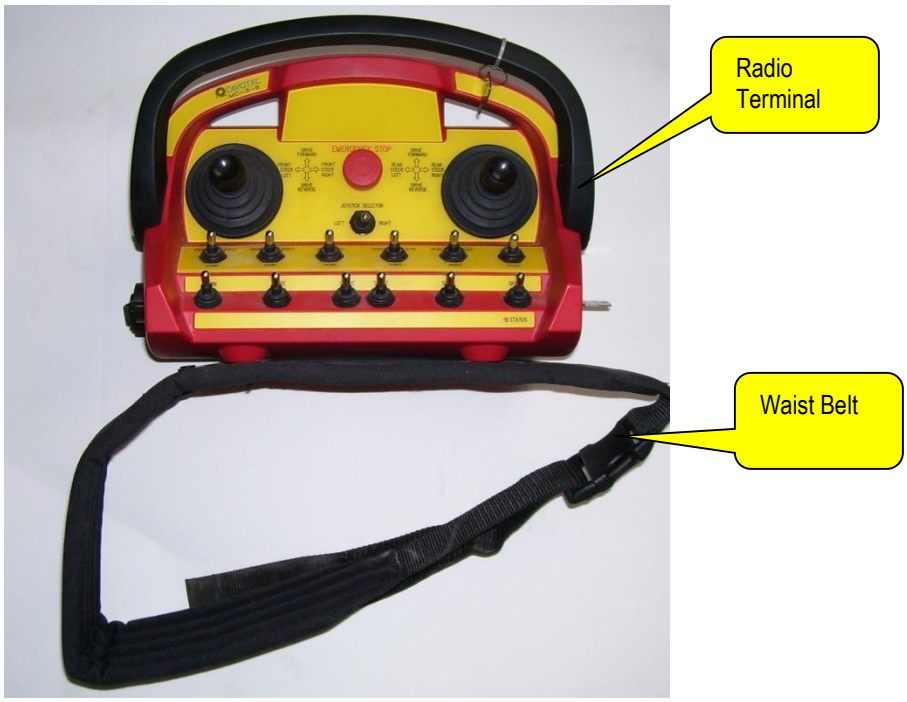
Bluetooth Adapter IQAN-G1(x)
The IQAN-G1(x) Bluetooth adapter allows for a wireless connection to the Multi Handler's IQAN-MD4 display through a smartphone that has the Parker IQANgo application installed on it. This feature allows for on-site diagnostics or off-site connectivity and support by B&D technicians over the internet.
IQAN-G1(x) wireless communication range over Bluetooth is up to 20 meters, typically 5 to 10 meters and up to a maximum speed of 70Kbit/sec.

The top of the Bluetooth adapter is equipped with a status diagnostic LED. Under normal operating conditions the LED will blink yellow approximately once per second, on for 900ms and off for 100ms. Under an error condition the LED will begin to blink and alternate between red and yellow flashes.



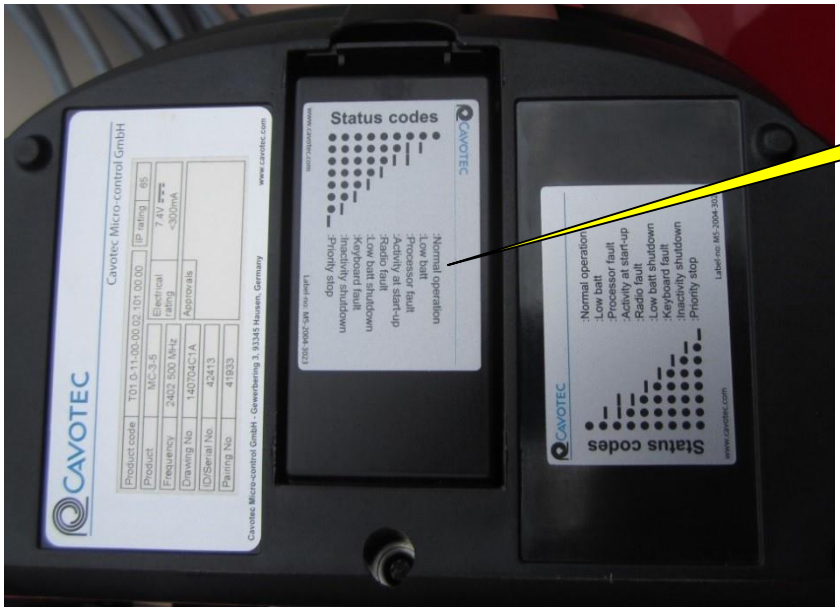
Radio Terminal
The Radio Terminal provides the operator with means of operating the Multi Handler.

The Radio Terminal communicates wirelessly with the Base Unit via embedded radio remote control components. The Radio Terminal can also communicate with the Base Unit via a hardwired Radio Communications cable. The Radio Communications cable is hardwired to the Base Unit at one end and the other end of the cable mates with a receptacle located on the left side of the Radio Remote Body.

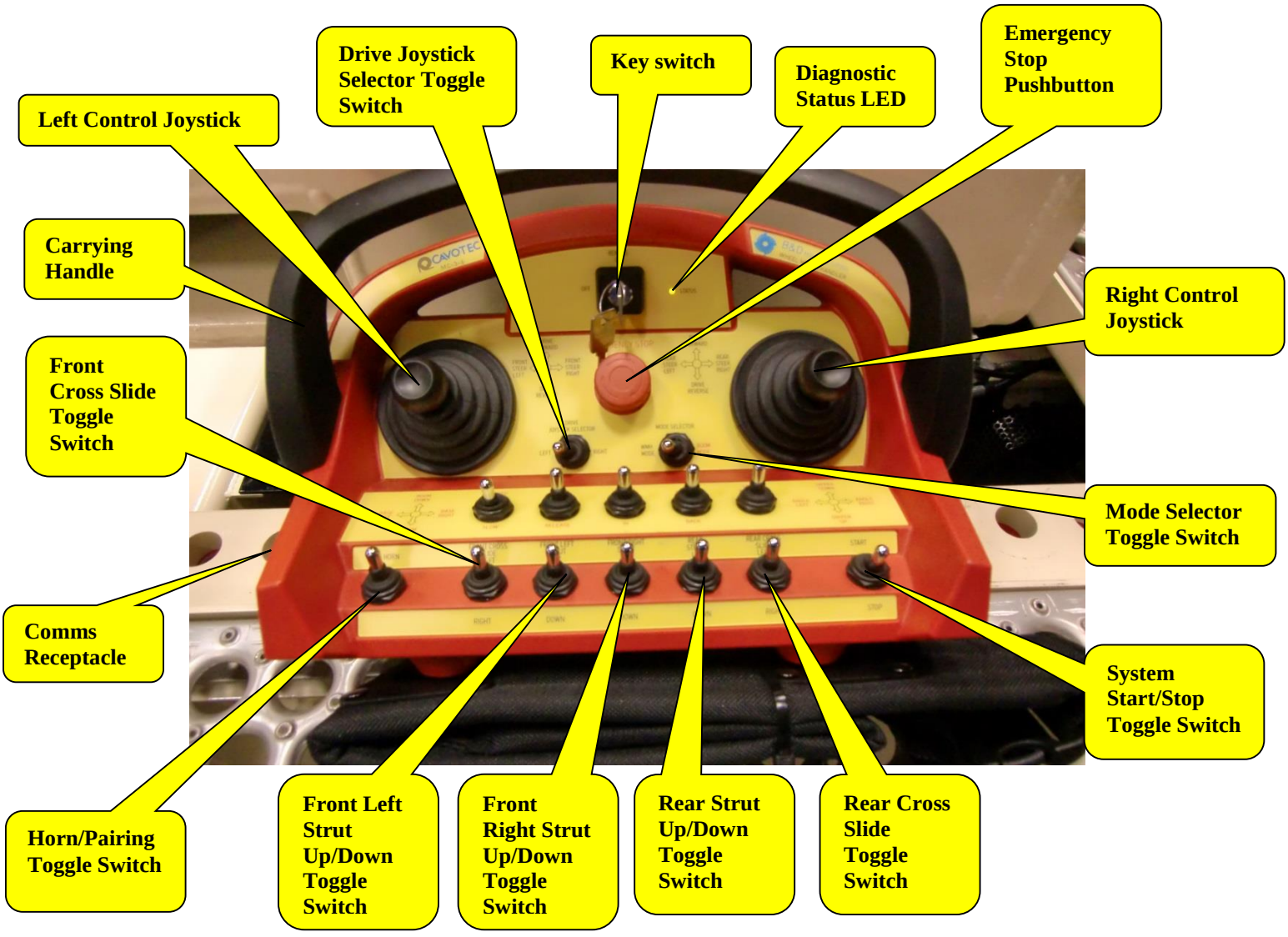


The Radio Terminal consists of the following components.

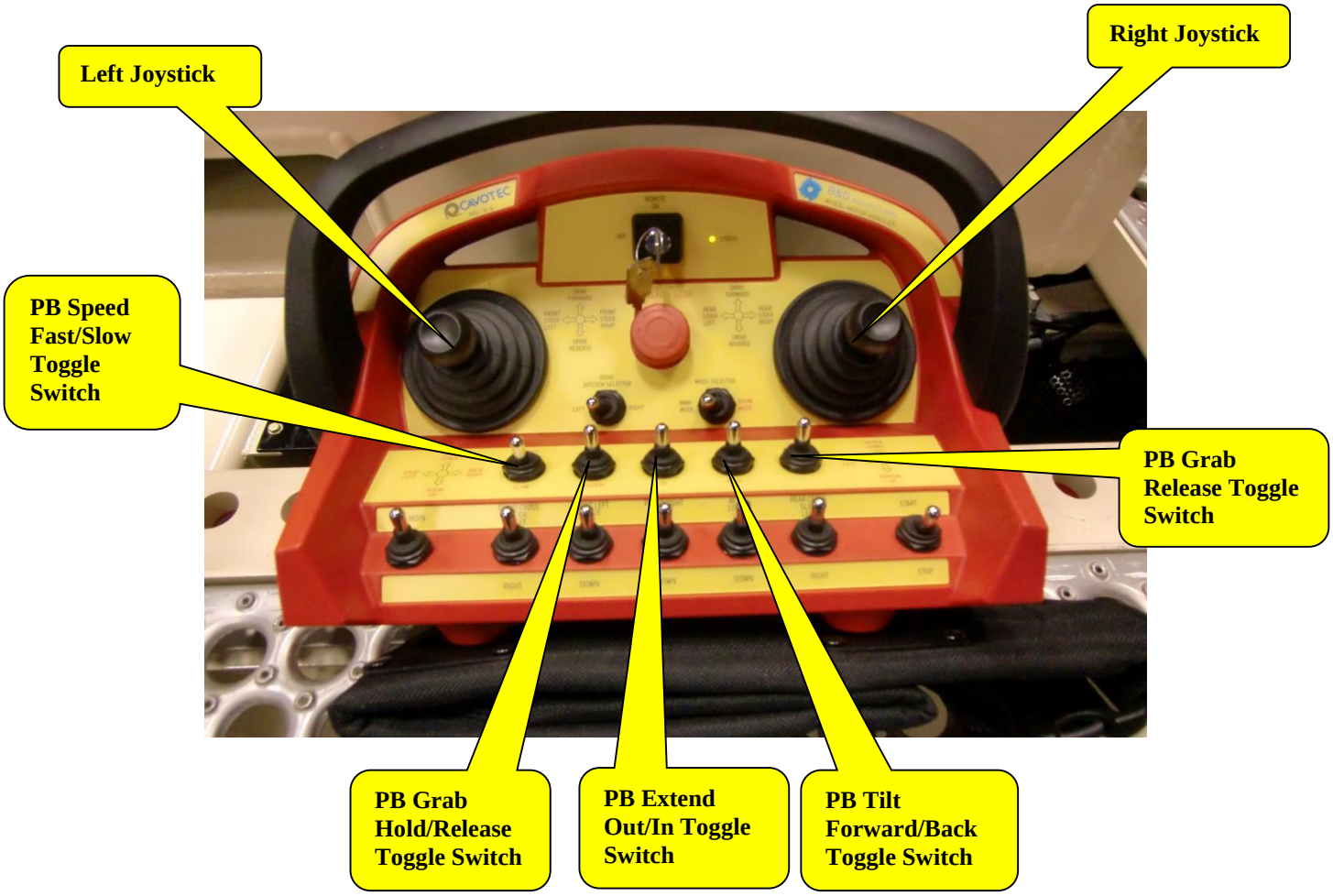
- Left control joystick
- Right control joystick
- Drive Joystick Selector toggle switch
- Mode Selector toggle switch
- PB Speed toggle switch
- PB Grab Hold/Release toggle switch
- PB Extend Out/In toggle switch
- PB Tilt Forward/Back toggle switch
- PB Grab Release toggle switch
- Front Left Strut Up/Down toggle switch
- Front Right Strut Up/Down toggle switch
- Rear Strut Up/Down toggle switch
- Front Cross Slide toggle switch
- Rear Cross Slide toggle switch
- System Start/Stop toggle switch
- Warning Horn/ Cable Pairing toggle switch
- Emergency Stop Pushbutton
- Diagnostics Status LED
- Communications Receptacle
- Key switch
- Rechargeable Batteries
- Waist Belt
- Battery Charger



WMH Mode


Left Control Joystick
Drive Joystick Selector Toggle Switch
Key switch
Diagnostic Status LED
Emergency Stop Pushbutton
Carrying Handle
Right Control Joystick
Front Cross Slide Toggle Switch
Mode Selector Toggle Switch
Comms Receptacle
System Start/Stop Toggle Switch
Horn/Pairing Toggle Switch
Front Left Strut Up/Down Toggle Switch
Front Right Strut Up/Down Toggle Switch
Rear Strut Up/Down Toggle Switch
Rear Cross Slide Toggle Switch

Boom Mode


Left Joystick
Right Joystick
PB Speed Fast/Slow Toggle Switch
PB Grab Release Toggle Switch
PB Grab Hold/Release Toggle Switch
PB Extend Out/In Toggle Switch
PB Tilt Forward/Back Toggle Switch

Left Control Joystick
In WMH Mode, the Drive Forward/Reverse and Front Steer Left/Right control joystick consist of a dual axis control operator, Drive Forward and Reverse control in the y-axis direction and Front Steer Left and Right control in the x-axis direction.

In Boom Mode, the Boom Down/Up and Base Left/Right control joystick consist of a dual axis control operator, Boom Up and down control in the y-axis direction and Base Left and Right control in the x-axis direction.

Right Control Joystick
In WMH Mode, the Drive Forward/Reverse and Front Steer Left/Right control joystick consist of a dual axis control operator, Drive Forward and Reverse control in the y-axis direction and Rear Steer Left and Right control in the x-axis direction.

In Boom Mode, the Dipper Down/Up and Angle Left/Right control joystick consist of a dual axis control operator, Dipper Up and down control in the y-axis direction and Angle Left and Right control in the x-axis direction.

Drive Joystick Selector Toggle Switch
The Drive Joystick Selector toggle switch consists of a two-position maintained. To drive with the Left Joystick push the switch in the left direction and to drive with the right Joystick push the switch in the right direction.

Front Left Strut Up/Down Toggle Switch
In WMH Mode, the Front Left Strut Up/Down toggle switch consist of a three-position spring return. The operator uses the Front Left Strut Up and Down toggle switch to raise or lower the Front Left Strut Assembly when the Multi Handler is in operation.

Pushing the toggle switch in the upward direction towards the Up label will cause the Front Left Strut Assembly to move in the up vertical direction.

Pushing the toggle switch in the downward direction towards the Down label will cause the Front Left Strut Assembly to move in the down vertical direction.

Front Right Strut Up/Down Toggle Switch
In WMH Mode, the Front Right Strut Up/Down toggle switch consist of a three-position spring return. The operator uses the Front Right Strut Up and Down control toggle switch to raise or lower the Front Right Strut Assembly when the Multi Handler is in operation.

Pushing the toggle switch in the upward direction towards the Up label will cause the Front Right Strut Assembly to move in the up vertical direction.

Pushing the toggle switch in the downward direction towards the Down label will cause the Front Right Strut Assembly to move in the down vertical direction.

Rear Strut Up/Down Toggle Switch
In WMH Mode, the Rear Strut Up/Down toggle switch consist of a three-position spring return. The operator uses the Rear Strut Up and Down control toggle switch to raise or lower the Rear Strut Assembly when the Multi Handler is in operation.

Pushing the toggle switch in the upward direction towards the Up label will cause the Rear Strut Assembly to move in the up vertical direction.

Pushing the toggle switch in the downward direction towards the Down label will cause the Rear Strut Assembly to move in the down vertical direction.

Front Cross Slide Toggle Switch
In WMH Mode, the Front Cross Slide toggle switch consists of a three-position spring return. The operator uses the Front Cross Slide toggle switch to move the Front Cross Slide Assembly left or right when the Multi Handler is in operation.

Pushing the toggle switch in the upward direction towards the Left label will cause the Front Cross Slide Assembly to move in the left direction.

Pushing the toggle switch in the downward direction towards the Right label will cause the Front Cross Slide Assembly to move in the right direction.

Rear Cross Slide Toggle Switch
In WMH Mode, the Rear Cross Slide toggle switch consists of a three-position spring return. The operator uses the Rear Cross Slide toggle switch to move the Rear Cross Slide Assembly left or right when the Multi Handler is in operation.

Pushing the toggle switch in the upward direction towards the Left label will cause the Rear Cross Slide Assembly to move in the left direction.

Pushing the toggle switch in the downward direction towards the Right label will cause the Rear Cross Slide Assembly to move in the right direction.

Speed Fast Control Toggle Switch
In Boom Mode, the Speed Fast toggle switch consists of a two-position maintained.
When equipped with a Pedestal Boom this switch will either increase the available speed of the pedestal boom or decrease its speed of function.

Pushing the toggle switch in the upward direction towards the Fast label will increase the speed of attached Pedestal Boom

Pushing the toggle switch in the downward direction towards the slow label will decreases the speed of the attached pedestal boom.

Note: The Fast control toggle switch must be in the slow position prior to turning the Radio Terminal's Key switch to the 'on' position. Control of the Pedestal Boom Attachment via the Radio Terminal will be inhibited whenever the key switch is turned to the 'on' position and the Fast control toggle switch is in the 'Fast' position. The Radio Terminal will provide diagnostic feedback of this condition via its Diagnostic Status LED.

Refer to the Diagnostic Status LED section for more information regarding the description on the Radio Terminal's Diagnostic Status LED.

Mode Selector Toggle Switch
The Mode Selector WMH/Boom control toggle switch consists of a two-position maintained switch. The WMH functions control in the left position and Pedestal Boom functions control in the right position.

System Start/Stop Toggle Switch
The System Start/Stop control toggle switch consists of a two-position maintained control switch.

Pushing the toggle switch in the upward direction towards the Start label will activate the Radio Terminal's selected control.

Pushing the toggle switch in the downward direction towards the Stop label will deactivate any of the Radio Terminal's selected functions.

Note: The System Start/Stop control toggle switch must be in the 'Stop' position prior to turning the Radio Terminal's Key switch to the 'on' position. Control of the Multi Handler or Pedestal Boom functions via the Radio Terminal will be inhibited whenever the key switch is turned to the 'on' position and the System Start/Stop control toggle switch is in the 'Start' position. The Radio Terminal will provide diagnostic feedback of this condition via its Diagnostic Status LED.

Refer to the Diagnostic Status LED section for more information regarding the description on the Radio Terminal's Diagnostic Status LED.

Horn/Pairing Toggle Switch
The Multi Handler is equipped with an audible Warning Horn. The Warning Horn control toggle switch consists of a two-position momentary switch.

Pushing the toggle switch in the upward direction towards the Horn label will cause the Warning Horn to sound.

The Multi handler radio remote has a new cable pairing feature. This cable pairing feature enables new radio remote controls to be quickly flashed and utilized to operate the Multi Handler without having to re-flash entire system.

To perform the cable pairing procedure:

- Turn the key switch located on the radio terminal to the ‘off’ position.
- Connect the new radio terminal to the base unit using the backup communication cable.
- Turn on power to the base (receiver) unit by turning the lock-out switch located on the Multi Handler’s diesel engine cover to the “on” position, by deactivating the emergency stop push button located on the electrical panel’s door by pulling up on the pushbutton’s head and then by turning the key switch located on the diesel engine micro panel in the clockwise direction to the heat position. The IQAN-MD4 display module should now be powered on.
- Deactivate the emergency stop pushbutton located on the radio terminal by pulling up on the pushbutton’s head.
- Push the start/stop control toggle switch located on the radio terminal downward to the ‘stop’ position.
- Push the speed fast/slow control toggle switch located on the radio terminal downward to the ‘slow’ position.
- On older version remotes, you may also need to push the grab release control toggle switch located on the right side in the middle row on the radio terminal in the downward direction.
- Push up on the horn/pairing control toggle switch.
- Turn the key on the radio remote terminal to the ‘on’ position while still pushing up on the horn/pairing control toggle switch.
- Continue pushing up on the horn/pairing control toggle switch while observing the status LED on the radio terminal. The status LED will begin to flash. After the 8 flashes the status LED will stop flashing and change to a steady illuminated state. Once the LED is on steady the pairing function between the radio terminal and base unit is complete.
- Release the horn/pairing control toggle switch.
- Turn the key on the radio terminal to the off position.
- The newly paired radio terminal should now be able to operate and control the Multi Handler. You may now disconnect the communications cable from the radio terminal and verify that the new radio terminal controls all of the Multi Handler’s functions via wireless communications. **Note:** The radio terminal’s rechargeable batteries must be installed in the back of the radio terminal in order for the radio terminal to communicate with the base (receiver) unit via wireless communications.

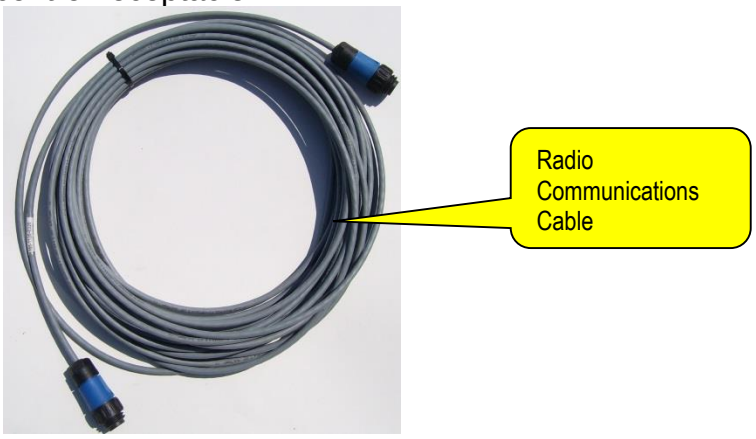
Emergency Stop Pushbutton
The Emergency Stop pushbutton provides a means for the operator to initiate an immediate stop function of the radio control system only.

Note: The Emergency Stop Pushbutton must be in the pulled up, position prior to turning the Radio Terminal's key switch to the 'on' position. Control of the Multi Handler via the Radio Terminal will be inhibited whenever the key switch is turned to the 'on' position and the Emergency Stop Pushbutton is in the activated, pushed down, position. The Radio Terminal will provide diagnostic feedback of this condition via its Diagnostic Status LED.

Refer to the diagnostic status LED section for more information regarding the description on the Radio Terminal's Diagnostic Status LED.

Communications Receptacle
The Communications Receptacle is a multi-conductor receptacle. The Communications Receptacle is used when the operator needs to have the Radio Terminal communicate via a hardwired connection with the Base Unit.

The Radio Communications Cable is connected to the Base Unit at one end and the other end to be connected to the remote control receptacle.



When connected to both ends the operator is then able turn the Start/Stop switch to the start position.

Key switch
A power Key switch has been included in the design of the Radio Terminal. The Key switch provides the operator with a means to turn power on to the Radio Terminal.

Diagnostic Status LED
A Diagnostic Status LED, yellow (amber) in color, has been included. The Diagnostic Status LED provides the operator with a visual feedback indication of the status of the Radio Terminal.

The most common feedback states indicated by the Diagnostic Status LED are:

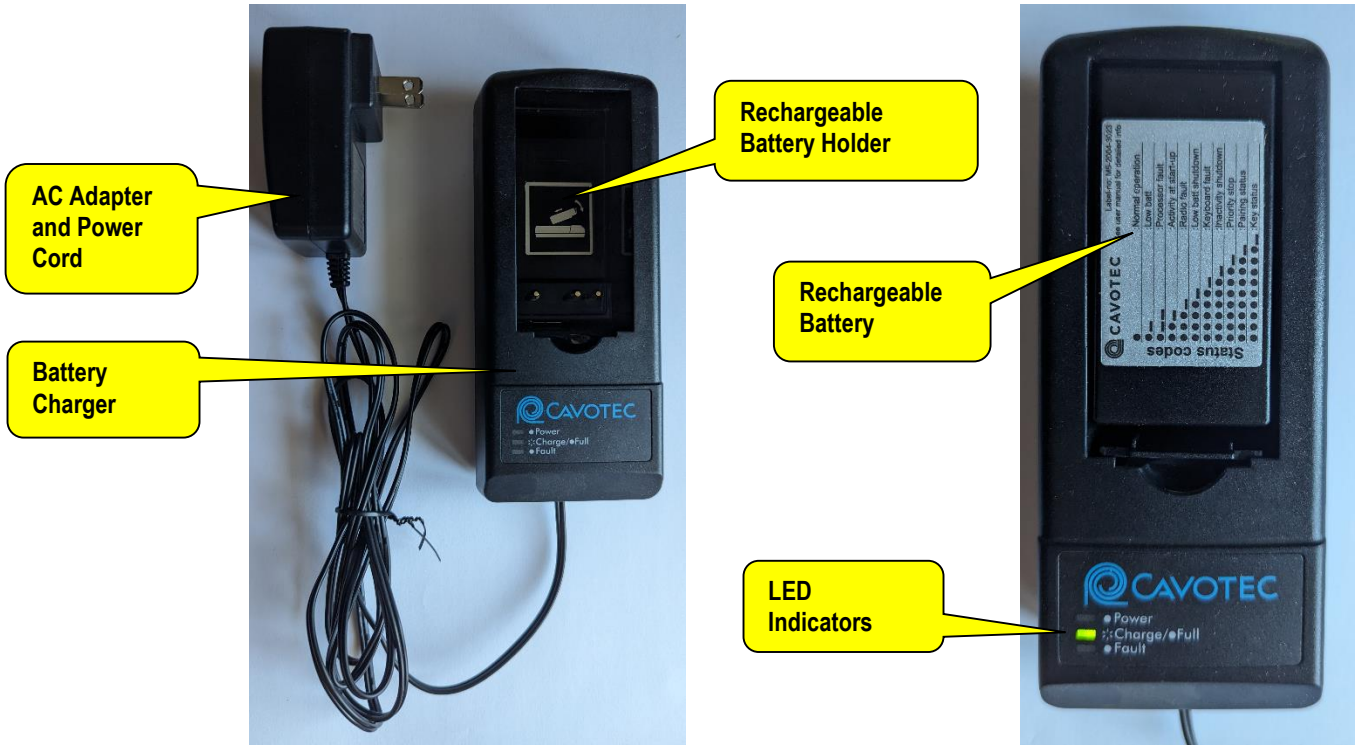
- Steady Light – Normal operation, no errors have been detected and the rechargeable battery voltage level is ok.
- Flashing Light, 1 flash per second – Rechargeable battery voltage level is low. Change or recharge batteries.
- Flashing Light, 2 flashes with a stop (pause) – One or more of the control joysticks or maintained switches are in the active, contact, position when the Radio Terminal's Key switch is turned on. Deactivate the function and cycle power to the Radio Terminal.

Waist Belt
A Waist Belt has been provided with your Multi Handler's Radio Terminal. The Waist Belt mates to the bottom of the Radio Terminal and provides the operator with a means to secure the Radio Terminal around his/her waist.

Battery Charger

A Battery Charger has also been provided with your Multi Handler's Radio Terminal. The operator uses the Battery Charger to recharge the Radio Terminal's Rechargeable Batteries whenever the Radio Terminal's Diagnostic Status LED is indicating a state of low battery voltage.

A Battery Charger has also been provided with your Multi Handler's Radio Terminal. The operator uses the Battery Charger to recharge the Radio Terminal's Rechargeable Batteries whenever the Radio Terminal's Diagnostic Status LED is indicating a state of low battery voltage.



The Battery Charger includes an AC adapter and power cord to power the unit.

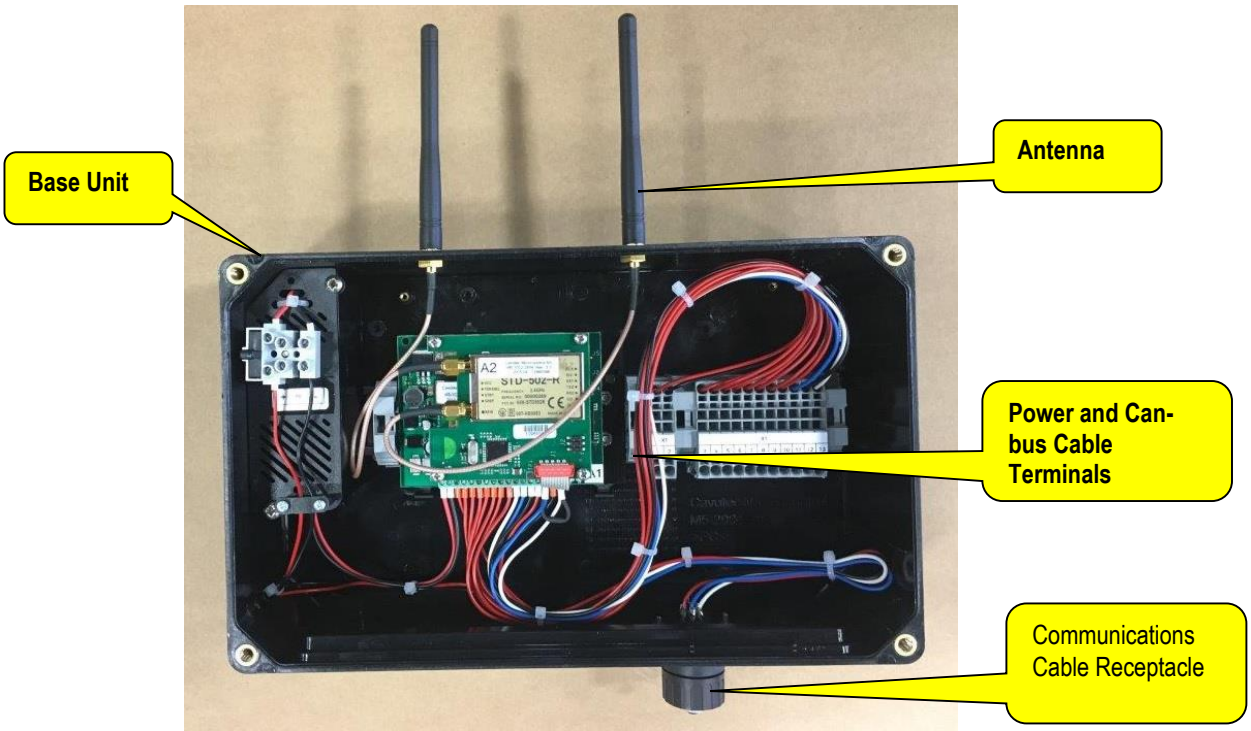
LED indicators common states are:

- Power LED: Solid yellow (amber) – Not charging, battery is in stand-by safe state mode and will not charge. Replace battery
- Charge/Full LED: Flashing green – Battery is charging. Solid green – Battery is fully charged.
- Fault: Solid red – Battery voltage is too low or battery temperature is too low (cold) or high (hot) to charge. Allow battery temperature to come to room temperature if too cold or too hot prior to charging.

All LEDs will light up on startup to do a short self-test.

Base Unit
The Base Unit serves as the main interposing device between the Radio Terminal and the IQAN-MD4 Master Display. The Base Unit is located at the rear Electrical System's Controls Panel Assembly.

The Base Unit monitors the data transmitted between it and the Radio Terminal, checks the data packets for validity, monitors the status of the Radio Terminal's Emergency Stop Pushbutton and transmits the status of the control joysticks and control toggle switches to the IQAN-MD4 Master Display via a J1939 Can-bus communications protocol.



The Base Unit consists of the following components.

- Radio Frequency Module
- Antennas
- Communications Cable Receptacle
- Power and Can-bus Cable Terminals

Antennas
Two (2) omni directional Antennas have been included in the design of the Base Unit. The Antennas screw into receptacles located on the exterior housing of the Base Unit.

The function of the Antennas is to extend the communications ability of the Base Unit with the Radio Terminal.

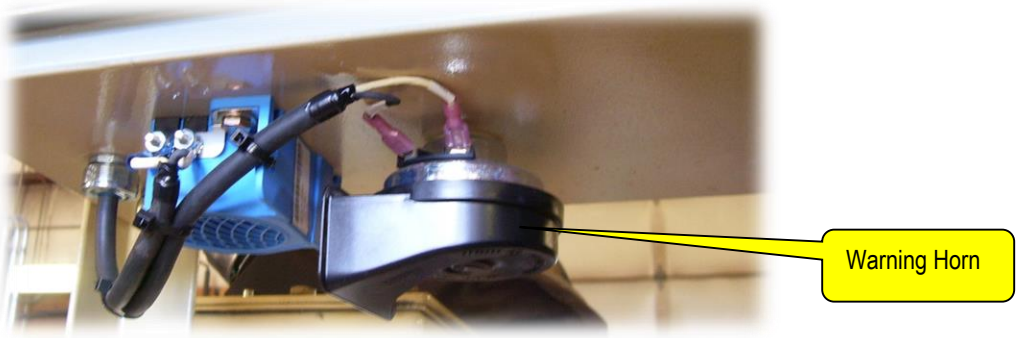
Communications Cable Receptacle
The Communications Cable Receptacle is located on the bottom of the Base Unit's housing. It provides a means of connecting the backup communications cable from the Radio Terminal to the Base Unit.

Power Can-bus Cable Terminals
The Power Can-bus Cable is hardwired to the Base Unit's terminals at one end and to the Electrical System's Controls Panel Assembly at the other end.

The Power Can-bus Cable includes conductors to supply 12Vdc power to the Base Unit and Can-bus communications between the Base Unit and the IQAN-MD4 Master Display.

Refer to the Electrical Schematics for more detailed information on the Electrical System supplied with your Multi Handler.

Warning Horn
The Multi Handler is equipped with an audible warning horn. The warning horn is mounted to the exterior bottom of the electrical panel enclosure.



The Warning Horn is a 12VDC 112db (decibels) high tone trumpet style horn.

The operator can sound the Warning Horn control toggle switch by pushing the Horn control toggle switch located on the Radio Terminal.

Motion Beeper

The Multi Handler is equipped with an audible Motion Beeper. The Motion Beeper is mounted to the exterior bottom of the Electrical Panel Assembly Enclosure.

The Motion Beeper is a 12VDC 400mA 97db (decibels) medium to low noise surround type C audible alarm.

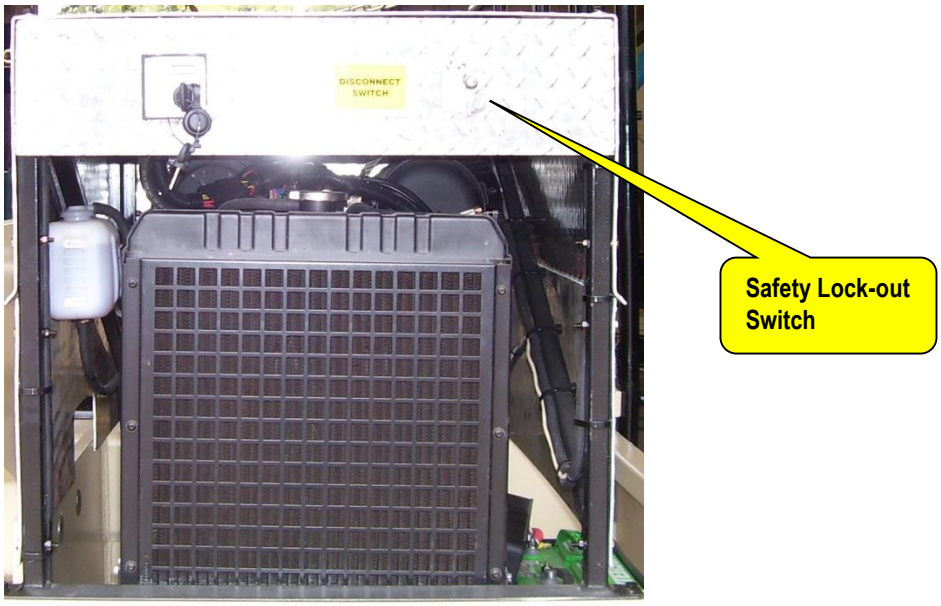
Electrical System

The Electrical System consists of the following main components.

- Safety Lock-out Switch
- Electrical Panel Assembly
- Engine Battery

Refer to the Electrical Schematics located in your service manual

Safety Lock-out Switch
The Safety Lock-out Switch is located on the rear right side of the Multi Handler's Diesel Engine Cover.



The DC Common supply from the Engine Battery is hardwired directly of the Safety Lock-out Switch.

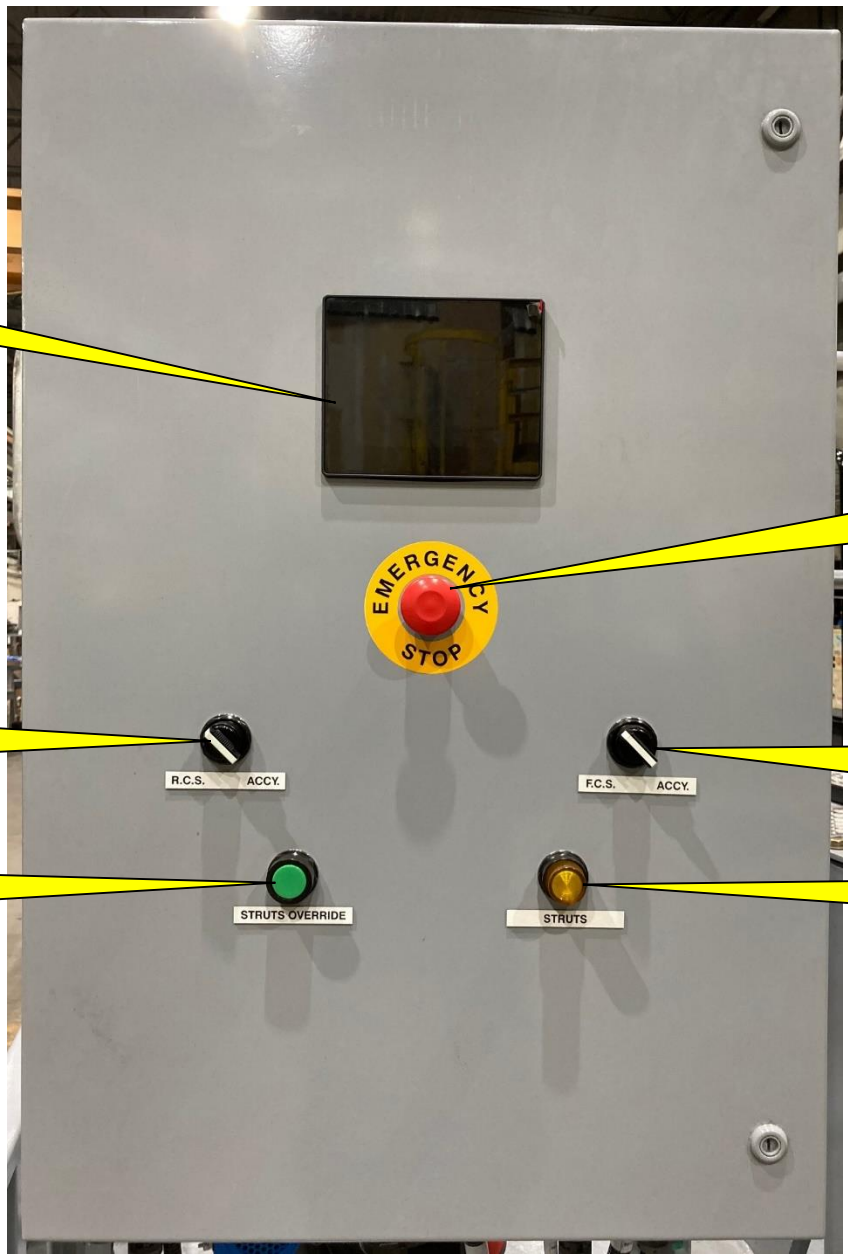
DANGER	
	**Lock Out Danger.**

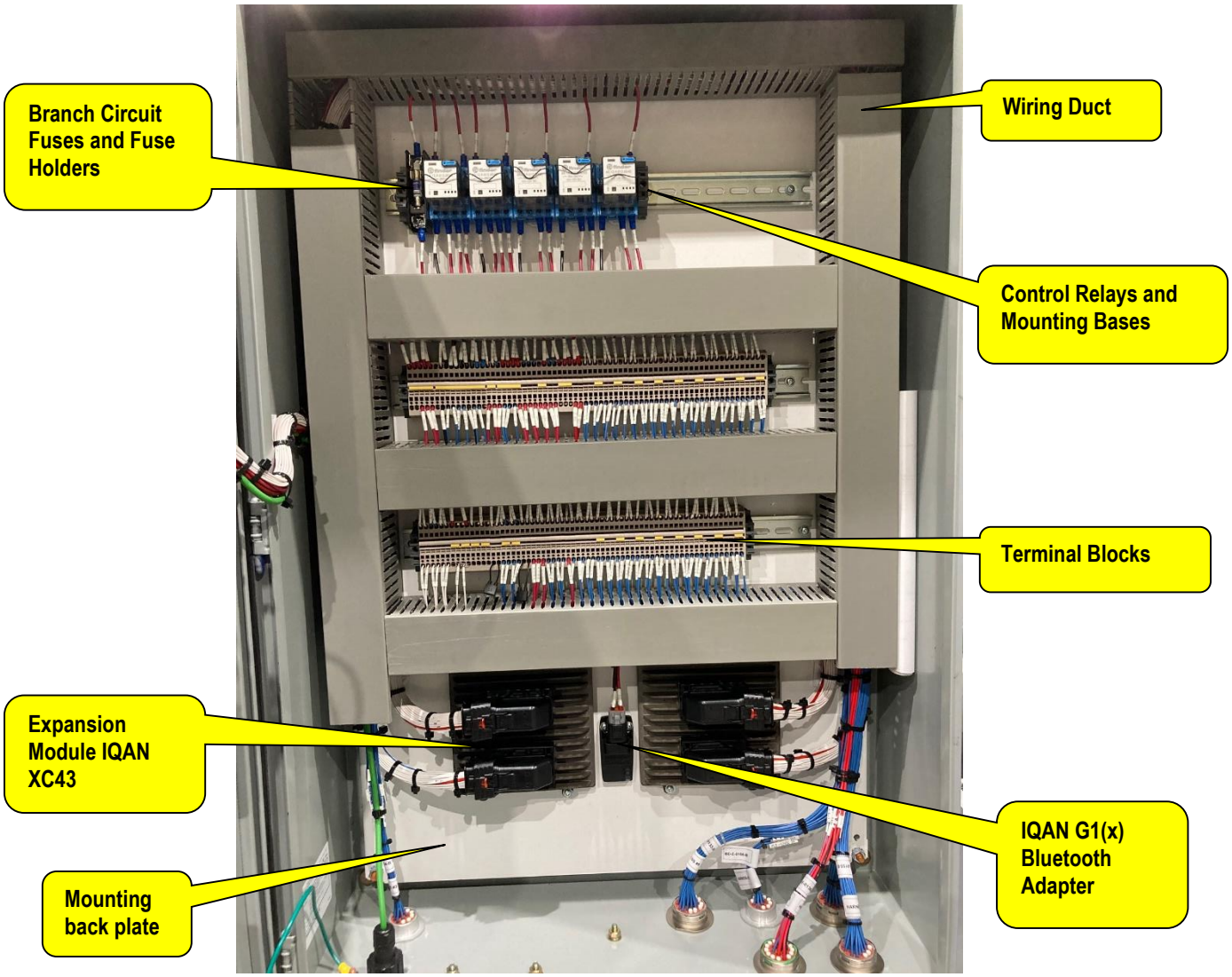
The Safety Lock-out Switch is equipped with a provision for a keyed lock this is the operator location to perform a lock out, tag out procedure. When the safety lock out switch is in the off position your Multi Handler will have no means of being powered on.

Electrical Panel Assembly
The Electrical Panel Assembly is located on the left, at the rear of the Multi Handler.

The Electrical Panel Assembly consists of the following main components.

- Master Display (IQAN MD4)
- Expansion Modules (IQAN XC43)
- Bluetooth Adapter
- Emergency Stop Pushbutton
- Rear Cross Slide Selector Switch (R.C.S)
- Front Cross Slide Selector Switch (F.C.S)
- All Struts Down Indicator Light
- Struts Down Override Pushbutton
- Control Relays and Mounting Bases
- Branch Circuit Fuses and Fuse Holders
- Terminal Blocks, Wiring Duct and Mounting Back plate
- USB Interface Cable
- B&D Manufacturing's Nameplate


Master Display
IQAN MD4
Emergency
Stop
Pushbutton
EMERGENCY
STOP
Rear Cross
Slide Selector
Switch
R.C.S.
ACCY.
Front Cross
Slide Selector
Switch
F.C.S.
ACCY.
Struts down
Override
Pushbutton
STRUTS OVERRIDE
STRUTS
All Struts Down
Indicator Light



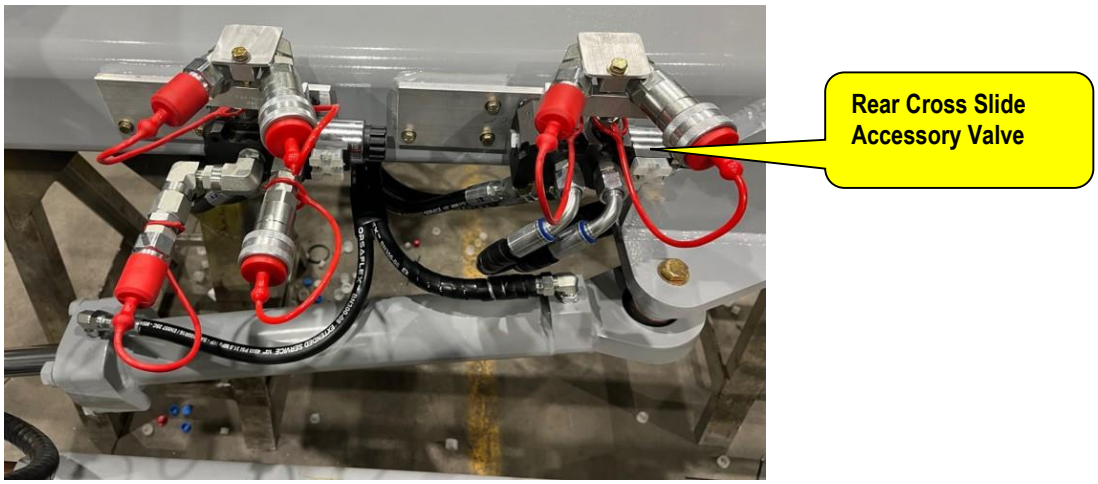
Master Display
One (1) IQAN-MD4 Master Display module has been incorporated into the Multi Handler's Controls System design. For information on the IQAN-MD4 Master Display refer to the **Controls System** section of this manual.

Expansion Module
There are two (2) IQAN-XC43 expansion modules, XC43-B0 and XC43-D1 incorporated into the Multi Handler's Controls System design. For information on the IQAN-XC43 expansion modules refer to the **Controls System** section of this manual.

Emergency Stop Pushbutton
This Emergency Stop Pushbutton will force off power to the Multi Handler's Controls System. Activate the Emergency Stop Pushbutton by pushing down on the pushbutton's head. Deactivate the Emergency Stop Pushbutton pulling up on the pushbutton's head.

Rear Cross Slide Selector Switch
A two-position maintained Rear Cross Slide Accessory Selector Switch has been included in the Multi Handler's Controls System.

The purpose of the Rear Cross Slide Selector Switch is to redirect the flow of hydraulic fluid from the rear cross slide hydraulic cylinders to the outlet port of the Rear Cross Slide (R.C.S) valve assembly in order to control optional Multi Handler attachments.



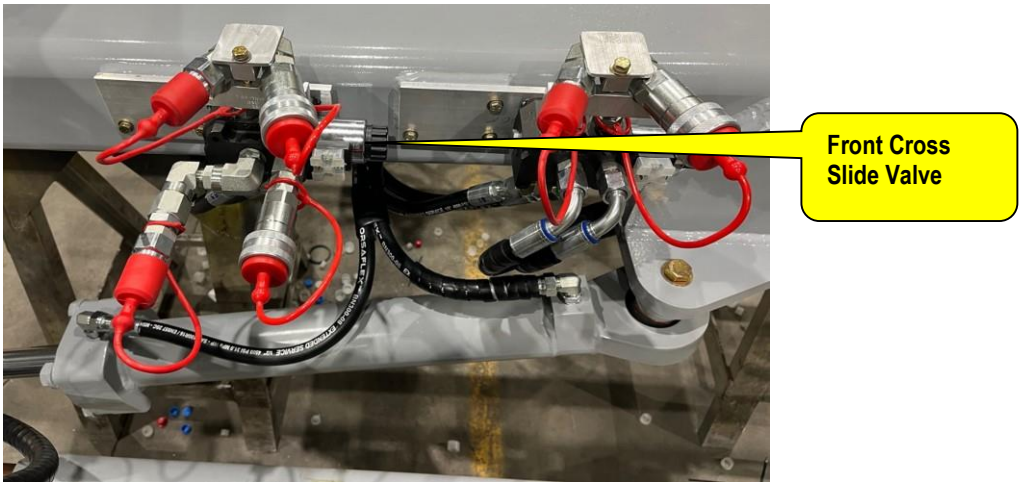
When the Rear Cross Slide Selector Switch is placed in the R.C.S. position, the Rear Cross Slide accessory valve assembly's electric operated solenoid will remain de-energized allowing the operator to control the rear cross slide hydraulic cylinders via the Rear Cross Slide toggle switch located on the Radio Terminal.

When the Rear Cross Slide Accessory Selector Switch is place in the ACCY position, the Rear Cross Slide valve will allow the operator to control the Multi Handler attachment that is connected to the outlet port of the Rear Cross Slide (R.C.S) valve assembly via the Rear Cross Slide toggle switch located on the Radio Terminal.

Note: The operator is not able to command the movement of the Rear Cross Slide hydraulic cylinders whenever the selector switch is in the ACCY position.

Front Cross Slide Selector Switch
A two position maintained Front Cross Slide Accessory Selector Switch has also been included in the Multi Handler's Controls System.

The purpose of the Front Cross Slide Selector Switch is to redirect the flow of hydraulic fluid from the front cross slide hydraulic cylinders to the outlet port of the Front Cross Slide (F.C.S) valve in order to control optional Multi Handler attachments.



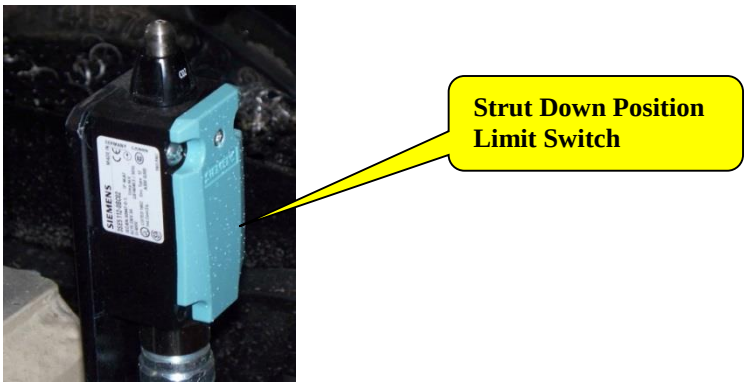
When the Front Cross Slide Selector Switch is placed in the F.C.S. position, the Front Cross Slide valve will allow the operator to control the front cross slide hydraulic cylinders via the Front Cross Slide toggle switch located on the Radio Terminal.

When the Front Cross Slide Selector Switch is place in the ACCY position, the Front Cross Slide will allow the operator to control Multi Handler attachment that is connected to the outlet port of the Front Cross Slide (F.C.S) valve via the Front Cross Slide toggle switch located on the Radio Terminal.

Note: The operator is not able to command the movement of the Front Cross Slide hydraulic cylinders whenever the selector switch is in the ACCY position.

Strut Down Position Limit Switches
Three (3) Struts down Position Limit Switches have been incorporated into the Multi Handler's Electrical and Controls System design.

The three struts down position limit switches are located underneath the multi handler main frame at each of the multi handler strut assemblies.



The purpose of the Strut down Position Limit Switches is to provide down position feedback to the Multi Handler's application. The Multi Handler's application will automatically inhibit the control of the Pedestal Boom Attachment's various functions whenever one or more of the three Multi Handler Strut Assemblies are not in the fully down position.

Whenever the three (3) strut assemblies are in the fully down position, the All Struts down Indicator Light located on the Electrical Panel Assembly's door will illuminate and the Multi Handler's application will allow the operator to control the various Pedestal Boom Attachment's functions.

Strut Override Pushbutton

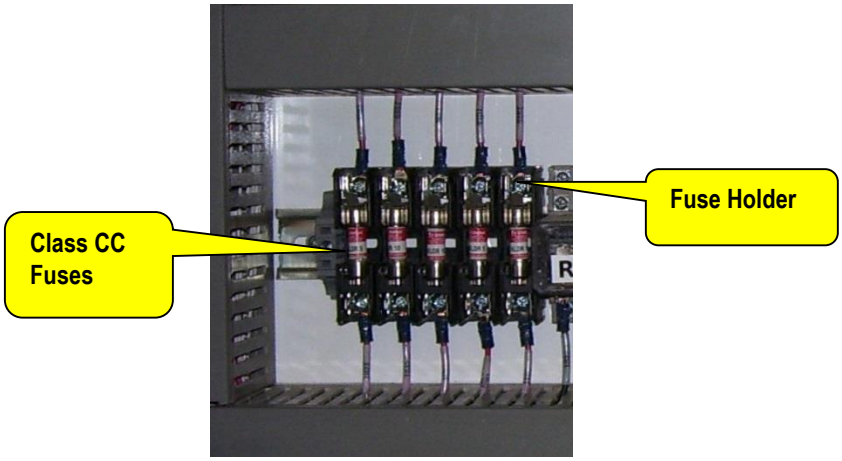
The purpose of the Strut Override Pushbutton is to override the position feedback of all three strut assemblies. By activating the pushbutton the operator is able to regain control of the Pedestal Boom Attachment's various functions and rectified the position of the Pedestal Boom Attachment.

Note: Refer to Pedestal Boom Section of the Multi Handler Attachment Operator Manual for further details on the Strut Override function.

Control Relays and Mounting Bases
The Electrical System is equipped with five (5) Control Relays, labeled R1 thru R5.

The individual Control Relays consists of the relay body and a mounting base.

Branch Circuit Fuses and Fuse Holders
Current limiting Class CC Time Delay Fuses have been installed on Electrical System's electrical branch circuits.

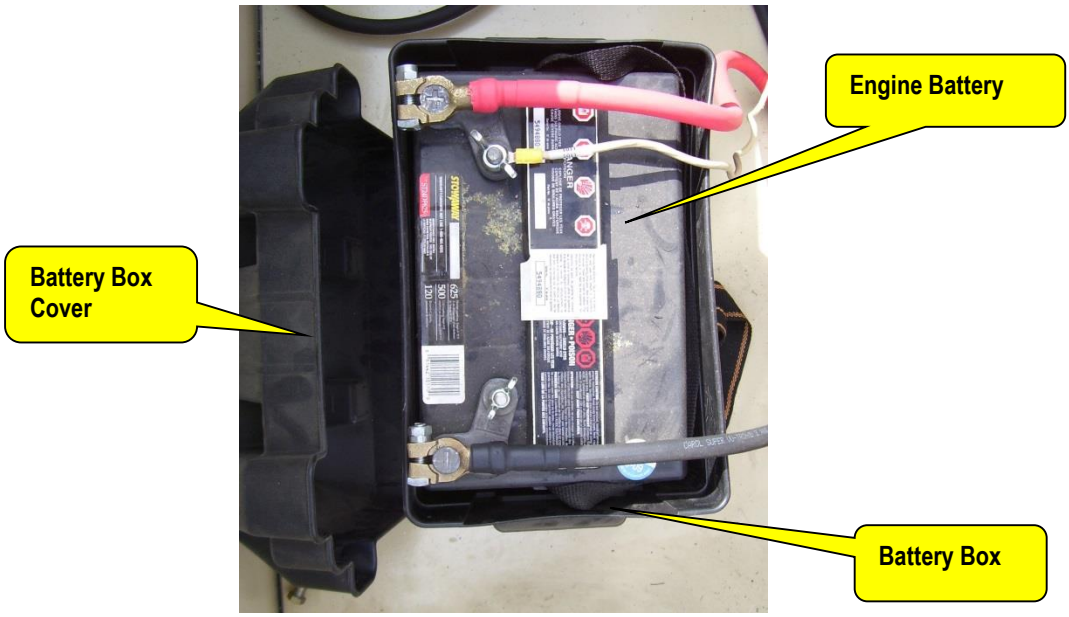


Terminal Blocks, Wiring Duct and Mounting back plate
The Electrical Panel Assembly components are fastened to the Mounting back plate. The Mounting back plate is installed inside of the Electrical Panel Assembly's Enclosure and secured in place by four mounting standoffs.

Engine Battery
The Engine Battery supplied with your Multi Handler is a 12VDC automotive style deep cycle battery. The Engine Battery is located inside the rear of the Multi Handler's Main Frame to the right of the Diesel Engine.

WARNING	
	**Burn Warning.**

DANGER	
	**Explosion Danger**



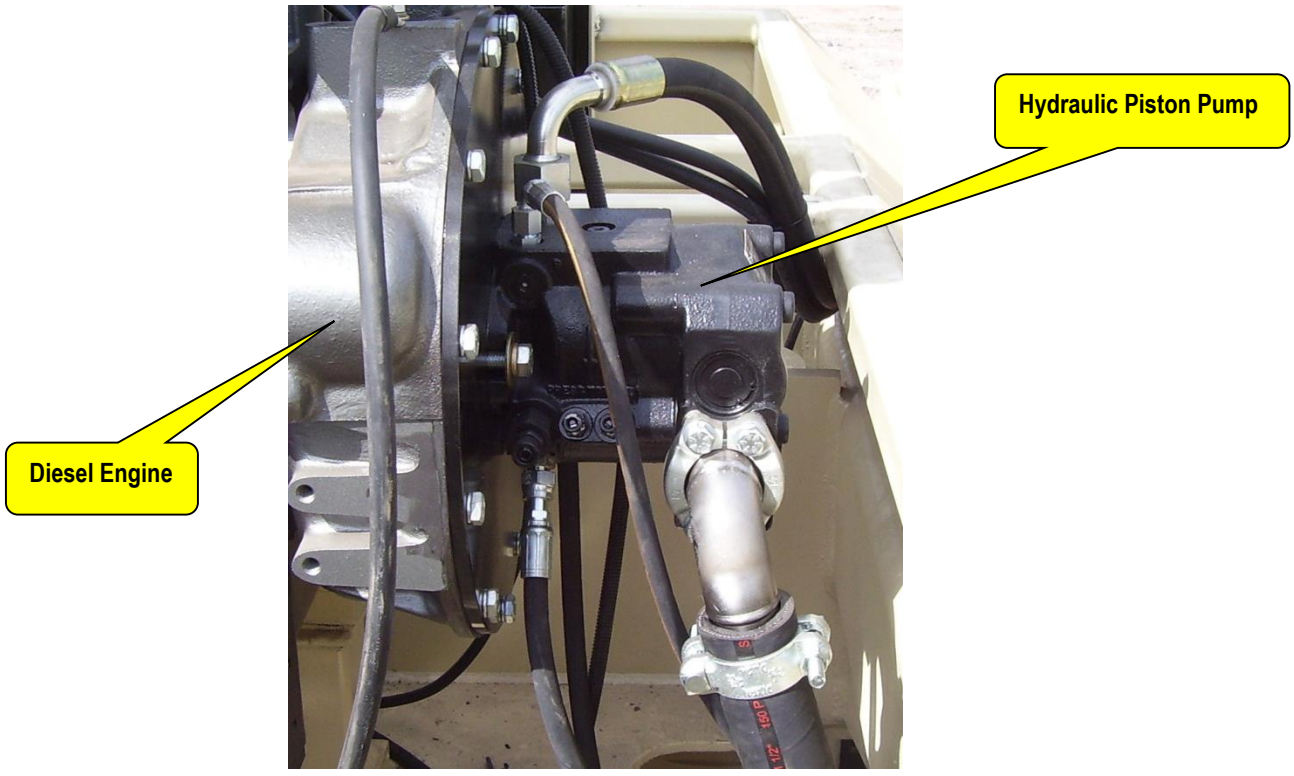
The Engine Battery supplies electrical power to the following Multi Handler components.

- Diesel Engine Starter
- Master Display
- Expansion Modules
- Base Unit
- Warning Horn
- Motion Beeper
- Diesel Engine Micro Panel

Hydraulic System

The Multi Handler's Hydraulic System is a load sense system and consists of the following main components.

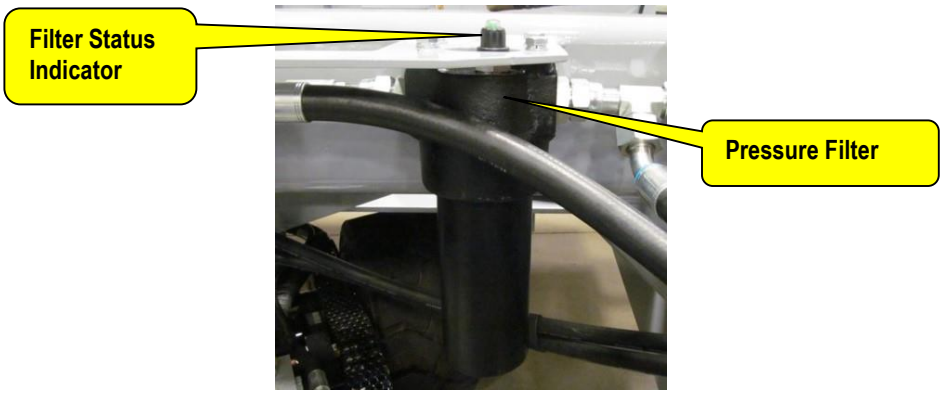
- Hydraulic Piston Pump
- Pressure Filter
- Directional Valve Assemblies
- Return Filter
- Breather Filter
- Fluid Tank Reservoir
- Fluid Level Gauge
- Motion Control
- Actuators



Hydraulic Piston Pump

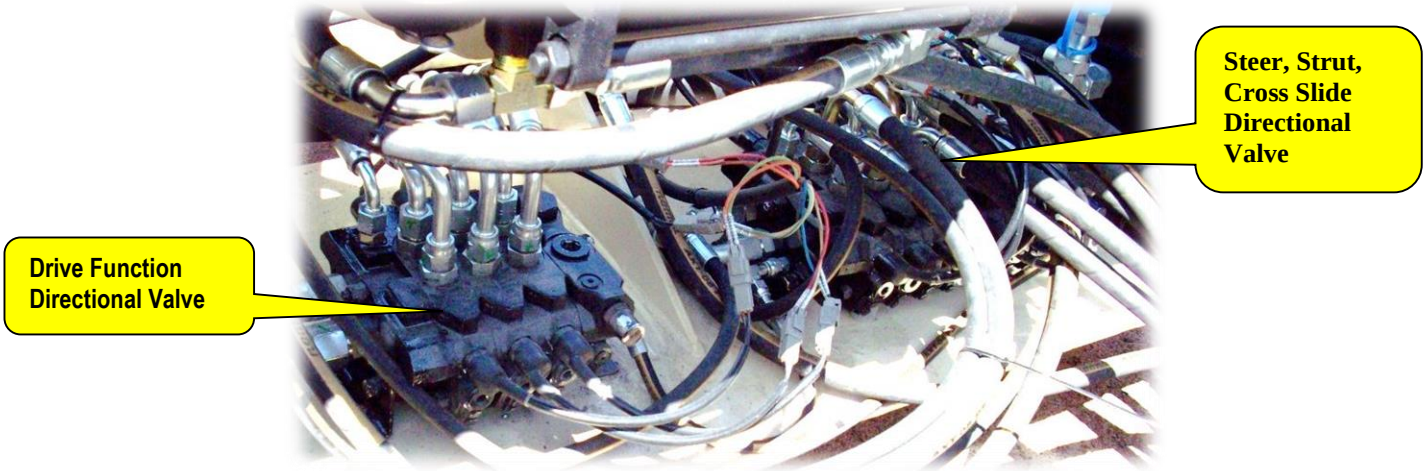
The Hydraulic Piston Pump is pressure compensated, load and torque sense controlled. The Hydraulic Piston Pump is bolted to the Diesel Engine.

Pressure Filter
The purpose of the Pressure Filter is to protect the hydraulic system from wear and tear as a result of the Hydraulic Piston Pump.



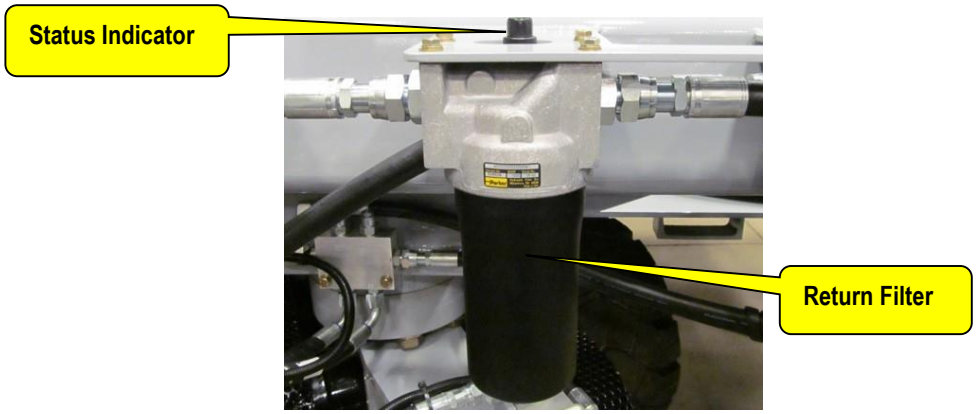
The pressure filter is mounted inside the rear right side of the Multi Handler's main frame to the right of the return filter and is equipped with a visual element change status indicator.

Directional Valve Assembly
Two (2) Directional Valve Assemblies included on the Multi Handler, one for drive functions and the other for the Multi Handler's steer, strut and cross slide functions. Both of the Directional Valve Assemblies are load sensed proportionally controlled 12VDC solenoid operated.



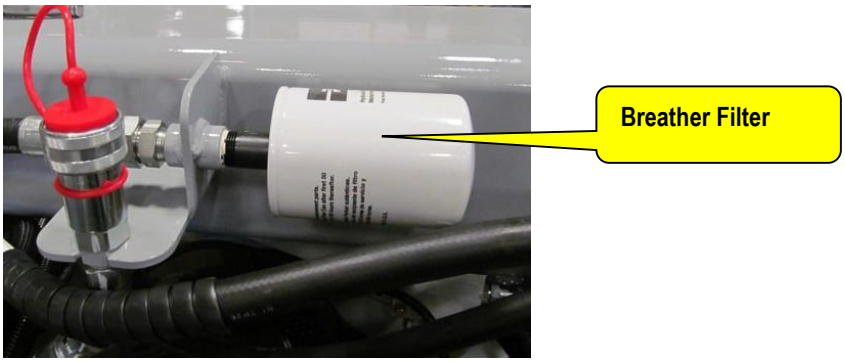
Both of the Directional Valve Assemblies are located inside the Multi Handler's Main Frame, below a Protective Guard.

Return Filter
The purpose of the Return Filter is to remove dirt particles injected into the Hydraulic System. The Return Filter captures the dirt particles before the hydraulic fluid is returned to the Fluid Reservoir.



The return filter is mounted inside the rear center of the Multi Handler's main frame.

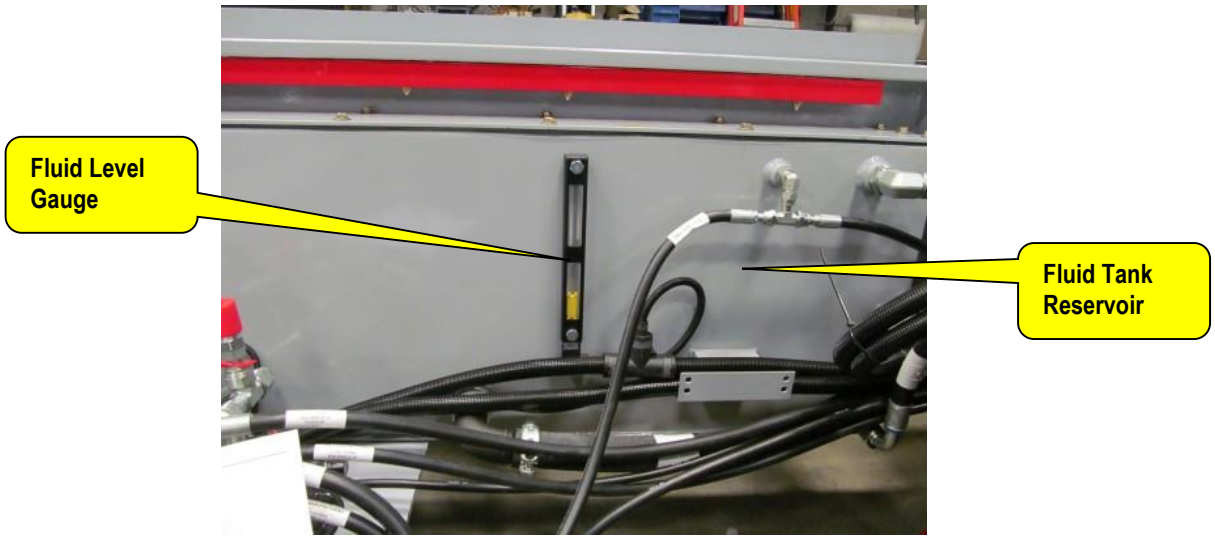
Breather Filter
The purpose of the Breather Filter is to protect the Hydraulic System from air borne particles of dirt being injected into the Fluid Tank Reservoir.



The breather filter is mounted inside the rear center of the Multi Handler's main frame to the left of the return filter.

Fluid Level Gauge & Reservoir
Fluid Level Gauge provides a visual indication of the hydraulic fluid level remaining in the Reservoir.

The Fluid Level Gauge includes a low level switch that is displayed on the Display Module when a low hydraulic fluid level occurs.



The Fluid Tank Reservoir is located inside the right side of the Multi Handler's Main Frame.

Refer to the **Service Manual** for maintenance requirements for your Multi Handler.

Motion Controls
Six (6) Motion Controls have been included in the design of the Multi Handler's Hydraulic System.

Each Drive Wheel Assembly, three (3) in total, includes a dual motion control/counter balance valve. The Motion Control provides hydrostatic braking capabilities to the Multi Handler's Drive Wheel Assemblies and control the movement of the Drive Wheels to prevent mechanical runaway of the Multi Handler.

*****IT IS IMPORTANT TO NOTE THAT A HOSE FAILURE OR LEAK BETWEEN THE MOTION CONTROL VALVE AND THE HYDRAULIC MOTOR WOULD CAUSE THE MACHINE BRAKING CAPABILITY TO BECOME COMPROMISED.*****

Each Strut Assembly, three (3) in total, includes a motion control. The Motion Control prevents the Strut Assemblies from being lowered in the event of a hydraulic hose failure. The Motion Control also includes an embedded flow control to assist in controlling the lowering speed of the Strut Assemblies by limiting the flow rate of the hydraulic oil exiting the cylinders (actuators).

Actuators
Hydraulic Cylinders are incorporated into each of the following components on the Multi Handler.

- Front Left Strut Assembly
- Front Right Strut Assembly
- Rear Strut Assembly
- Front Steer Assembly
- Rear Steer Assembly
- Front Cross Slide Assembly
- Rear Cross Slide Assembly

Hydraulic Motors are incorporated into each of the following components on the Multi Handler.

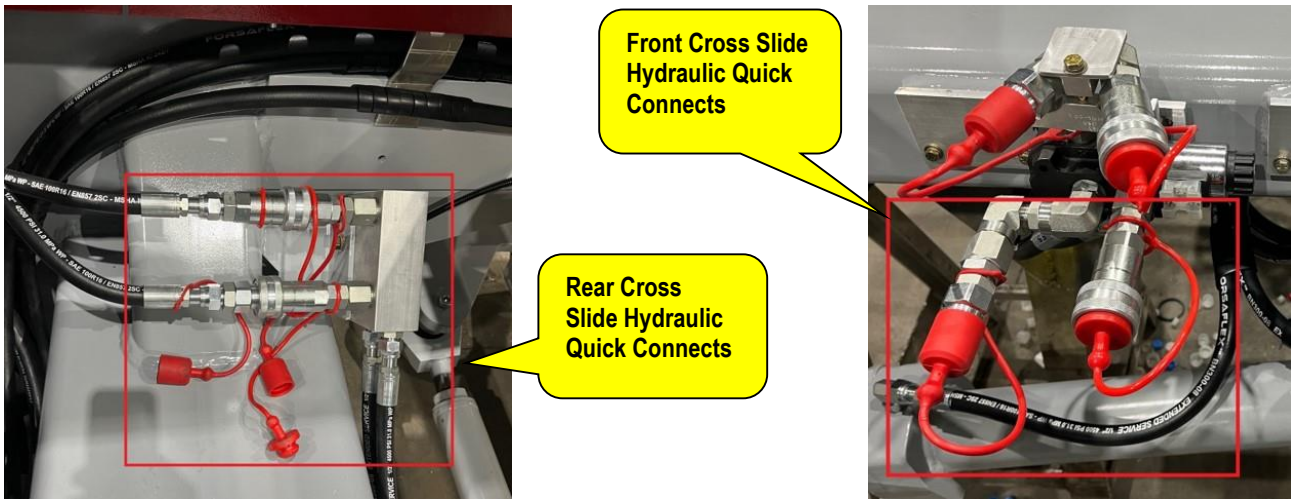
- Front Left Drive Wheel Assembly
- Front Right Drive Wheel Assembly
- Rear Drive Wheel Assembly

Hydraulic Connections for Optional Attachments

This section describes the Multi Handler's hydraulic connections for the various optional attachments; Cross Slide Assemblies, WMHA-CGT, WMHA-FSRT, WMHA-PB:

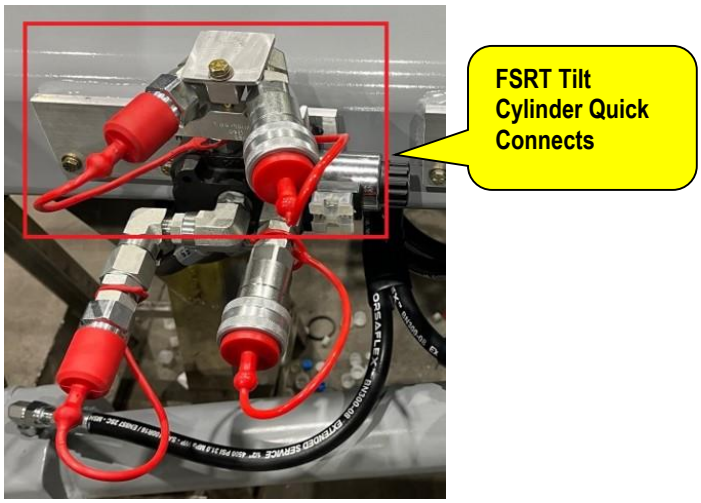
Cross Slide Assembly Hydraulic Connections

There are 2 sets of hydraulic quick connects for the WMH's cross slide assemblies, 1 for the front cross slide assembly and 1 for the rear cross slide assembly. The quick connects for the front cross slide are located below the FCS diverter valve assembly and the quick connects for the rear cross slide are located inside the left center of the WMH's main frame.



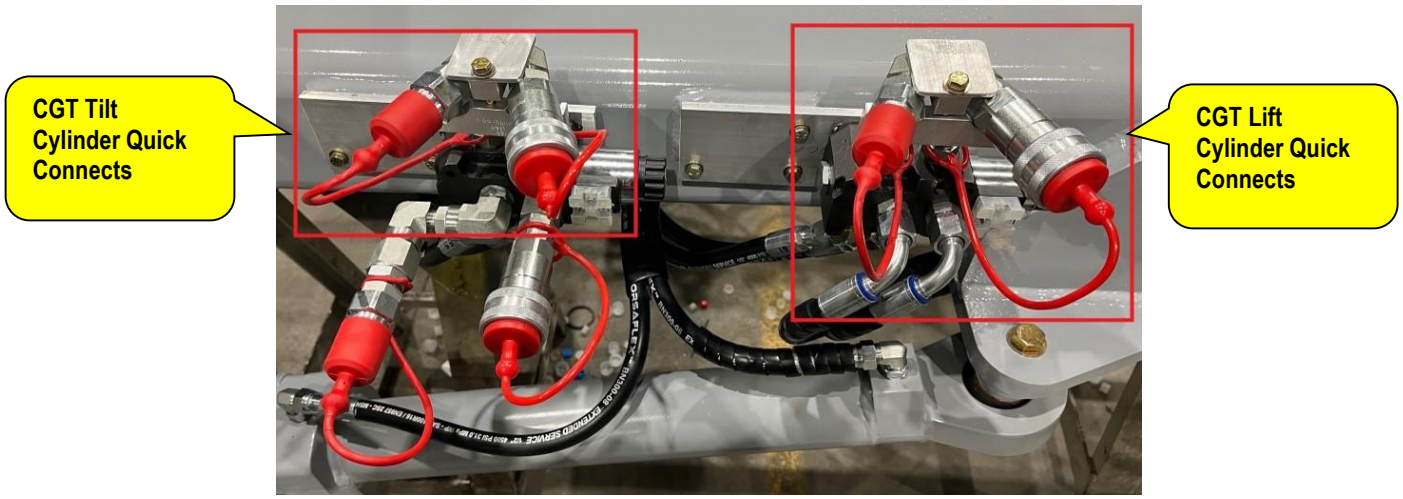
Front Strut Removal Tool Hydraulic Connection

There is 1 set of hydraulic quick connects for the WMHA-FSRT tilt cylinder hydraulic hoses. The quick connects for the FSRT are located above the FCS diverter valve assembly.



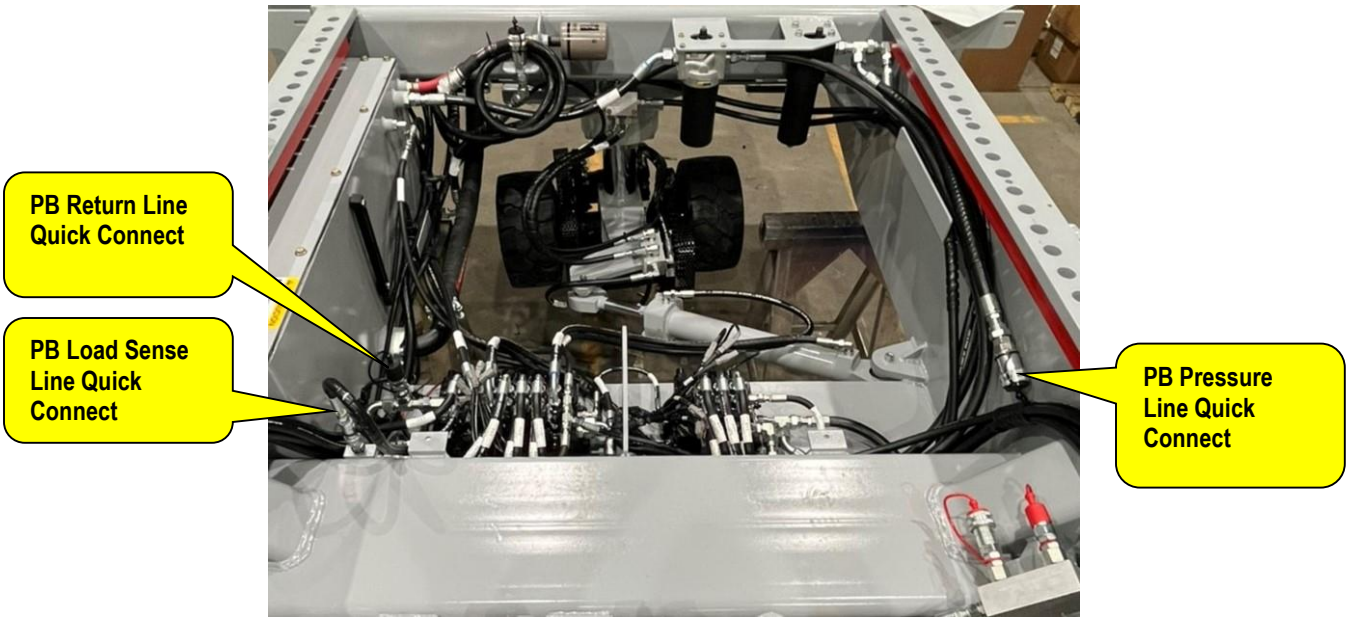
Corner Group Tool Hydraulic Connections

There are 2 sets of hydraulic quick connects for the WMHA-CGT tilt cylinder and lift cylinder hydraulic hoses. The quick connects for the FSRT are located above the FCS diverter valve assembly.



Pedestal Boom Hydraulic Connections

There are 3 individual hydraulic quick connects for the WMHA-PB's hydraulic hoses. 1 quick connect for the PB's pressure hose located in the left side of the WMH's main frame, 1 quick connect for the PB's return line hose and 1 quick connect for the PB's load sense line hose. The return and load sense quick connects are located in the right side of the WMH's frame.



Note: You must first disconnect the WMH's load sense hydraulic hose from the load sense quick coupler prior to plugin in the pedestal boom's load sense hydraulic line.

Remember to plug the WMH's load sense hydraulic hose back into the load sense quick coupler after the pedestal boom has been removed from the WMH.

Operating Procedures

This section of the Manual describes the following Multi Handler operating procedures.

- Pre-Start Safety Check of your Multi Handler
- Starting your Multi Handler
- Shutting Down your Multi Handler
- Steering your Multi Handler
- Driving your Multi Handler
- Raising/Lowering your Multi Handler Struts
- Moving Multi Handler Cross Slides
- Sounding the Audible Warning Horn
- Sounding the Audible Motion Beeper
- Raising/Lowering your Multi Handler Outriggers
- Storing your Multi Handler

NEVER permit anyone to operate, or perform maintenance on, or perform troubleshooting on your Multi Handler without first receiving proper training. Failure to do so could result in serious injury or death to personnel.

- Read and understand this Manual before you operate or perform maintenance or troubleshooting on your Multi Handler.
- Read the Cautions, Warnings, Dangers and General Lockout Procedure in the **Safety** section before you operate or perform maintenance on, or perform troubleshooting on your Multi Handler.
- Read instructions and procedures thoroughly before you start to operate or perform maintenance on, or perform troubleshooting on your Multi Handler.
- Review all warnings, cautions and dangers that accompany any instruction or procedure.
- Review the **Safety** section and all relevant cautions, warnings and dangers each time you prepare to perform maintenance on or troubleshoot on your Multi Handler.
- Safety decals on the Multi Handler serve as additional reminders for safe operating practices around the Multi Handler.
- Contact B&D Manufacturing for additional training opportunities.

CAUTION	
	**Training Caution.**

The operator must first become extremely comfortable with all the machine's operating functions before utilizing the Multi Handler.

Pre-Start Safety Check

The operator **must** understand all outlined potential hazards described in the **Safety** section located at the front of this manual prior to operating the Multi Handler.

The operator **must** follow all specific site guidelines when operating the Multi Handler. In **no circumstance** shall the instructions and procedures outlined in this manual take precedence over your established specific site guidelines.

Use the following procedure to perform the Pre-Start Safety Check on your Multi Handler.

- Make certain the operator knows the location of the Safety Lock-out Switch situated on the rear right side of the Multi Handler's Diesel Engine Cover.
- Know the locations of Emergency Stop Pushbutton located on the electrical enclosure if an emergency arises and the equipment must be turn off immediately.
- Insert your keyed lock and safety tag into the Safety Lock-out Switch. As a minimum, ensure that your name is on the safety tag.
- Refer to and perform the recommended procedures of maintenance located in the B&D manufacturing Service Manual.
- Visually inspect and verify that the Operator Work Deck's Safety Gate is in good operating condition.
- Ensure that the Operator Work Deck's Safety Gate is properly closed.
- Visually inspect the Drive Wheel Assemblies and ensure that the Chain Guards are in place.
- Ensure that the Electrical Panel Assembly door is closed and latched.
- Visually inspect and check the Multi Handler's components for any apparent abnormalities.
- Visually inspect the Safety Perimeter around the Multi Handler. Remove all debris that exists around or within the Safety Perimeter of the Wheel Motor Handler. Rectify all potential hazards that may exist around or within the Safety Perimeter of the Wheel Motor Handler. Advise all other personnel around or within the Safety Perimeter to immediately move away from and clear the Safety Perimeter area around the Wheel Motor Handler.
- **Use the Pre-Start Safety Checklist on the next page before operating your Multi handler.**

Pre-Start Safety Checklist

Multi Handler Pre-Start Safety Checklist

While adhering to all specific site regulations & guidelines use the following checklist to perform a pre-start safety check.

Unit #: **Date:**

Multi Handler	OK	Defect
Faults Previous Day		
Catwalk Condition		
Handrails		
Step Ladder Condition		
Gate Condition		
Damaged Hydraulic Hoses		
Visible Damages		
Tires & Strut Assembly		
Grease Drive Chains, Wheel and Axle		
Drive Safety Guards, Covers		
Damaged Electrical Harness or Wires		
Cross Slide Condition		
All Grease Points Lubricated		
General Cleanliness		
Bodywork		

Fluids	OK	Defect
Fuel Level		
Hydraulic Oil Level		
Hydraulic Filter Condition		
Engine Oil Level		
Coolant Level		
Leaks		
Operator Controls	**OK**	**Defect**
Display Module		
Radio Remote, Base Unit & Batteries		
Emergency Stop		
Safety Lockout Switch		
Horn		
Motion Beeper		
Other Checks	**OK**	**Defect**
A.		
B.		
C.		
D.		

Defects: *(specified notes to defect found & corrective action)*

-
-
-
-
-

Operator Name:	**Signature**
Supervisor Name:	**Signature**

Pre-Start Safety Checklist – What to Look for

Faults Previous Day. Check the previous pages (or book). This will identify what may have been wrong the previous day or shift. You should check these items carefully to ensure that the fault has been rectified.

Catwalk Condition. Verify the catwalks visually for any missing or damaged walkway, missing fasteners to ensure the operators safety.

Handrails. Verify that all handrails are in place are not damaged and that no fasteners are missing.

Step Ladder Condition. Verify that both step ladders are present on each side of the equipment and that all its fasteners are present.

Gate Condition. Verify that both Gates are present on each side of the equipment, is not damaged and that all its fasteners are present.

Damaged Hydraulic Hoses. Verify visually all hydraulic hoses for any cracks, leaks or any signs of rubbing.

Visible Damages. Visually check for damaged components, broken welds, damaged or bent bodywork that might be a sign of physically compromised components.

Tires & Strut Assembly. Visually check both all Multi Handlers strut assembly and tires. Make sure all tires have sufficient thread, verify that any components are not missing, damaged. Verify that the strut for any leaks

Grease Drive Chains, Wheel and Axle. Check that drive chains are lubricated and that visible wear is not present.

Drive Safety Guards, Covers & Rear Steering Guard. Check that all guards and covers are properly fastened and secured. A flapping cover can be a hazard to your colleagues as well as yourself.

Damaged Electrical Harness or Wires. Verify visually that all electrical harness and wires are not damaged or frayed. If so they must be replaced.

Cross Slide Condition. Verify visually that both Cross Slides are properly fastened are not damaged or compromised and that there are hydraulics leaks.

All Grease Point lubricated. Verify that all grease points have been lubricated in accordance with operator's manual.

General Cleanliness. Check that machine has been cleaned so that any visible issues are easier to identify.

Bodywork. Visually check around equipment for damaged bodywork may indicate other problem areas. Check the areas carefully.

Fluids

Fuel Level. Check the level and refuel as needed. Remember to wear protective gloves and keep away from spark or combustion hazard

Hydraulic Oil Level. Check and top up as needed. Oil must be clean, if any visible condensation is noticed notify supervisor so that further contamination and damage of components does not occur.

Hydraulic Filter Condition. Verify oil filter sigh gauge before use. If dirty replace oil filter element.

Leaks. Verify that any fluid leaks are not present. If leaks are present notify supervisor so that the issue can be resolved. Failure to do so can result is in premature failure, fire or injury.

Operator Controls

Display Module. Check that display module is visible and not broken or severely scratched. This may compromise Operators visibility to any display features or warnings.

Radio Remote & Batteries. Verify that Radio Remote is in good working condition and that both batteries have been charge. Also verify that Radio Remote base pendant has not been damaged.

Emergency Stop. Ensure when pressed it will immediately shut down Multi Handler

Disconnect Switch. Ensure that in off position the Multi Handler will not start.

Safety Gate. Ensure safety is in good order and functions correctly.

Horn. Ensure the warning horn located on underneath the electrical panel sounds.

Selector Switches, Indicator Light and Pushbutton. Visually inspect the selector switches, indicator light and pushbutton located on the electrical panel door for any signs of damage.

Motion Beeper. Check that in the forward and reverse direction that Drive Motion Alarm (beeper0 is operating.

Other Checks

Other items may need to be checked. These may be listed on a separate sheet. Discuss this with your supervisor.

Starting Procedures

Prior to starting your Multi Handler you **must** perform the Pre-Start Safety Check procedure described above.

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

Use the following procedure to start your Multi Handler.

- Attach the Radio Terminal to your waist using the Radio Terminal's Waist Belt
- Turn the Lock-out Switch located on the rear right side of the multi handler's diesel engine cover to the "on" position.
- Visually inspect the Safety Perimeter around the multi handler. If any potential hazards or other personnel are within the Safety Perimeter **do not** continue any further with attempting to start your Multi Handler. Rectify all potential hazards around the Multi Handler and advise all personnel to immediately clear the Safety Perimeter area around the Multi Handler.
- Deactivate the Emergency Stop Pushbutton located on the Electrical Panel Assembly's door by pulling up on the pushbutton's head.
- Turn the key switch located on the Diesel Engine Micro Panel in the clockwise direction to the heat position to activate the glow plugs on the Multi Handler's Diesel Engine.
- The Pre-Heat indicator on the Diesel Engine Micro Panel will flash for several seconds while the glow plugs are being activated. When the Pre-Heat indicator stops flashing turn the key switch in the clockwise direction to the Start position to start the Multi Handler's Diesel Engine.
- After a few seconds, the display module should be powered and ready for operation. Refer to the Display Module section of this manual for more information regarding the description and operation of the IQAN-MD4.
- The Display module will automatically display the following error message after powering up: "Error: Cavotec Remote Base Unit, No Contact".
- The Display's module will also display the following alarm message: "Alarm: Cavotec Base/Pendant Comms, Communications has failed between the Base Unit and Remote Pendant".
- Deactivate the Emergency Stop Pushbutton located on the Radio Terminal by pulling up on the pushbutton's head.
- Ensure the System Start/Stop control toggle switch located on the Radio Terminal is at the 'Stop' position.
- Ensure the Speed Fast/Slow control toggle switch located on the Radio Terminal is at the 'Slow' position.
- Turn the key switch located on the Radio Terminal to the 'On' position. The Radio Terminal's Diagnostic Status LED should display a steady illuminated light; it should be on solid and not be flashing. The Radio Terminal Comms Status Indicator on the Display module should change from "Not OK" to "Comms OK".

- Push the System Start/Stop control toggle switch in the upward direction towards the Start label.
- Verify the Pump Main Pressure displayed on the Display Module measure page is greater than 300 psi. If the Pump Main Pressure is not greater than 300 psi refer to the **Service** manual for troubleshooting

Shutting Down Procedures

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

Use the following procedure to shut down your Multi Handler.

- Visually inspect the Safety Perimeter around the Multi Handler. If any potential hazards are within the Safety Perimeter steer and drive the Multi Handler to a hazard free location.
- Push the speed Fast/Slow control toggle switch located on the radio terminal in the downward direction towards the slow label.
- Push the System Start/Stop control toggle switch located on the Radio Terminal in the downward direction towards the Stop label.
- Activate the Emergency Stop pushbutton located on the Radio Terminal by pushing down on the pushbutton's head.
- Turn the key switch located on the Radio Terminal to the 'Off' position
- Turn the key switch located on the Diesel Engine Micro Panel in the counterclockwise direction to the Stop position to stop the Multi Handler's diesel engine.
- Activate the Emergency Stop pushbutton located on the electrical enclosure door by pushing down on the pushbutton's head.
- Disconnect the electrical power supply to the Multi Handler's electrical system by turning the Safety Lock-out Switch's handle to the 'off' position.

Steering

The Multi Handler must only be steered and driven along paths with level ground surfaces. **Do not** attempt to steer and along non-level ground surfaces, uneven ground surfaces, up or down inclined ground surfaces. **Failure to do so could result in serious injury or death to personnel, and damaged equipment to your Multi Handler.**

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

Both front left & right wheel assemblies are linked together, the operator is able to manipulate both wheel assemblies with one function located on the Radio Terminal. The front wheel assemblies and rear wheel assembly are independently controlled from each other by two separate functions located on the Radio Terminal.

Use the following procedure to steer your Multi Handler.

- Start your Multi Handler by following the **Starting Procedure** described above.
- Push the Mode Selector control toggle switch located on the Radio Terminal in the left direction towards the WMH label.
- Visually inspect the path that you plan on steering the Multi Handler through. If any potential hazards or other personnel are within your planned steering path **do not** continue any further with attempting to steer your Multi Handler
- Pushing the left Joystick on the Radio Terminal in the left direction towards the Front Steer Left label will cause both the Front Left and Front Right Drive Wheel Assemblies to pivot towards the left direction. Pushing the left Joystick on the Radio Terminal in the right direction towards the Front Steer Right label will cause both the Front Left and Front Right Drive Wheel Assemblies to pivot towards the right direction.

- Pushing the right Joystick on the Radio Terminal in the left direction towards the Rear Steer Left label will cause the Rear Drive Wheel Assembly to pivot towards the left direction. Pushing the right Joystick on the Radio Terminal in the right direction towards the Rear Steer Right label will cause the Rear Wheel Assembly to pivot towards the right direction.

Driving Multi Handler

The Multi Handler must only be steered and driven along paths with level ground surfaces. **Do not** attempt to steer and along non-level ground surfaces, uneven ground surfaces, up or down inclined ground surfaces. **Failure to do so could result in serious injury or death to personnel, and damaged equipment to your Multi Handler.**

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

The operator must use a combination of the right & left joystick in order to drive and steer the Multi Handler. The driver is able to with the Drive Joystick Selector Switch configure which joystick to he would like to utilize to drive.

Use the following procedure to steer your Multi Handler.

- Start your Multi Handler by following the **Starting Multi Handler procedure** described above.
- Push the Mode Selector control toggle switch located on the Radio Terminal in the left direction towards the WMH label.
- Visually inspect the path that you plan on driving the Multi Handler through. If any potential hazards or other personnel are within your planned driving path **do not** continue any further with attempting to drive your Multi Handler.
- In order to drive the Multi Handler using the left control joystick on the Radio Terminal, the Drive Joystick Selector switch must be in the "left" position. With the Drive Joystick Selector switch in the left position, pushing the left joystick in the upward direction towards the Drive Forward label will cause the front and rear tires to rotate in the forward direction.

- Pushing the left joystick in the downward direction towards the Drive Reverse label will cause the front and rear tires to rotate in the reverse direction.
- With the Drive Joystick Selector switch on the Radio Terminal in the right position, pushing the right control joystick in the upward direction towards the Drive Forward label will cause the front and rear tires to rotate in the forward direction.

- Pushing the right joystick in the downward direction towards the Drive Reverse label will cause the front and rear tires to rotate in the reverse direction.

Raising/Lowering Multi Handler Struts

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

The Front Left Strut Up/Down, the Front Right Strut Up/Down and the Rear Strut Up/Down control toggle switches on the Radio Terminal consist of three-position spring return momentary control operators, strut up control in the upwards direction and strut down control in the downwards direction.

Use the following procedure to raise or lower your Multi Handler Struts.

- Start your Multi Handler by following the **Starting Multi Handler procedure** described above.
- Push the Mode Selector control toggle switch located on the Radio Terminal in the left direction towards the WMH label.
- Pushing the Front Left Strut Up and Down control toggle switch on the Radio Terminal in the upwards direction towards the Up label will cause the Front Left Strut Assembly to raise the front left side of the Multi Handler's Main Frame away from the ground surface.
- Pushing the Front Left Strut Up and Down control toggle switch on the Radio Terminal in the downwards direction towards the Down label will cause the Front Left Strut Assembly to lower the front left side of the Multi Handler's Main Frame towards the ground surface.

- Pushing the Front Right Strut Up and Down control toggle switch on the Radio Terminal in the upwards direction towards the Up label will cause the Front Right Strut Assembly to raise the front right side of the Multi Handler's Main Frame away from the ground surface.
- Pushing the Front Right Strut Up and Down control toggle switch on the Radio Terminal in the downwards direction towards the Down label will cause the Front Right Strut Assembly to lower the front right side of the Multi Handler's Main Frame towards the ground surface.
- Pushing the Rear Strut Up and Down control toggle switch on the Radio Terminal in the upwards direction towards the Up label will cause the Rear Strut Assembly to raise the rear of the Multi Handler's Main Frame away from the ground surface.
- Pushing the Rear Strut Up and Down control toggle switch on the Radio Terminal in the downwards direction towards the Down label will cause the Rear Strut Assembly to lower the rear of the Multi Handler's Main Frame towards the ground surface.

Moving Multi Handler Cross Slides

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

The Front Cross Slide Left/Right and Rear Cross Slide Left/Right control toggle switches on the Radio Terminal consist of three-position spring return momentary control operators, cross slide left control in the upwards direction and cross slide right control in the downwards direction.

Use the following procedure to move your Multi Handler Cross Slides.

- Start your Multi Handler by following the **Starting Multi Handler procedure** described above.
- Push the Mode Selector control toggle switch located on the Radio Terminal in the left direction towards the WMH label.
- Pushing the Front Cross Slide Left and Right control toggle switch on the Radio Terminal in the upwards direction towards the Left label will cause the Front Cross Slide to move towards the left side of the Multi Handler's Main Frame.
- Pushing the Front Cross Slide Left and Right control toggle switch on the Radio Terminal in the downwards direction towards Right label will cause the Front Cross Slide to move towards the right side of the Multi Handler's Main Frame.

- Pushing the Rear Cross Slide Left and Right control toggle switch on the Radio Terminal in the upwards direction towards the Left label will cause the Rear Cross Slide to move towards the left side of the Multi Handler's Main Frame.
- Pushing the Rear Cross Slide Left and Right control toggle switch on the Radio Terminal in the downwards direction towards Right label will cause the Rear Cross Slide to move towards the right side of the Multi Handler's Main Frame.
- If no other control is required of your Multi Handler at this time shut down your Multi Handler by following the Shutting down Multi Handler procedure described above.

Audible Warning Horn

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

The Warning Horn control toggle switch on the Radio Terminal consist of a two-position momentary control operator, sound Horn control in the upwards direction and silence Horn control in the downwards direction.

Use the following procedure to sound the Multi Handler's audible Warning Horn.

- Start your Multi Handler by following the **Starting Multi Handler procedure** described above.
- Pushing the Horn control toggle switch on the Radio Terminal in the upward direction towards the Horn label will cause the Warning Horn to sound.

Audible Motion Beeper

- The Audible motion beeper is a safety device warning the operator and any nearby worker that the Multi handler is in motion. The audible motion beeper is sounded when any drive forward or drive reverse motion is activated on either right or left joystick.

Lock-Out Procedure

The following lockout procedure is the minimum requirement. Additional precautions should be taken depending on established specific site instructions and procedures.

- Locate the safety lock-out switch located on the rear right side of the diesel engine house.
- Turn the safety lock-out switch in counterclockwise direction, off position.
- Insert your keyed lock and safety tag into the safety lock out switch.

Storing Multi Handler

B&D Manufacturing recommends that the Multi Handler be stored indoors to prevent environmental conditions, such as rain, wind, or snow from damaging any of the Multi Handler's components.

Refer to the **Controls System** section of this manual for a detailed description of the Radio Terminal's functions.

Use the following procedure for the storage of your Multi Handler.

- Start your Multi Handler by following the **Starting Multi Handler procedure** described above.
- Steer and drive the Multi Handler to the designated storage area using the **Steering Multi Handler procedure** and the **Driving Multi Handler procedure** described above.
- Fully lower the Multi Handler's Main Frame towards the ground surface using the Front Left Strut Up and Down, Front Right Strut Up and Down, Rear Strut Up and down control toggle switches on the Radio Terminal.
- Shut down your Multi Handler by following the **Shutting down Multi Handler procedure** described above.

Specifications

Performance	
Power (diesel) *at sea level*	18 HP / 13.42 kW
Power, High Alt (diesel) *at sea level*	40 HP / 29.83 kW
Motor speed	1800 rpm
Fuel	
Capacity	47L / 12.5 Gal US
Electrical	
Low voltage (controls)	120V
Hydraulics	
Pump	Piston pump, load sensing
Max operating pressure	2500 psi / 172 Bar
Oil flow	17 GPM / 64 LPM
Oil reservoir volume	95L / 25 Gal (US)
Oil filter	5 micron
Steering	
Type	All Wheel Steer, 90° rotation
Drive	
Type	Hydrostatic, 6 wheel drive
Capacity	
Load Rating	50Tons / 45.3 MT
Weight & Dimensions	
Gross weight	18 000lbs / 8165kg
Length	163 in / 4140mm
Width	116 in / 2947mm
Height	69 in / 1753mm
Lift	
Lift height	10in / 254mm

Recommended Fluids

Hydraulic System Oil

Hydraulic Oil: Use premium quality hydraulic oil with a viscosity range between 150-250 SSU (30-50cst.) at 38 C (100 F).
Normal operating viscosity range between 80-1000 SSU (17-180 cst.) and maximum start up viscosity is 4000 SSU (1000 cst.).

Consult your hydraulic fluid supplier for the appropriate hydraulic fluid for your operating environment.

Generally there are only two conditions that necessitate changing the oil in a hydraulic system:

- Base oil degradation
- Additive depletion

Periodic oil sampling and analysis will determine if either of these conditions arises. Consult your hydraulic fluid supplier for their recommended hydraulic fluid sampling frequency.

Your B&D Multi Handler shipped from the factory with hydraulic oil with a ISO Viscosity Grade of 32 (ex: Shell Tellus 32).

Diesel Fuel

Diesel fuel should comply with the following specifications below:

Diesel Fuel Specification	Location
ASTM D975 No.1D S15,S500 No.2D S15, S500	USA
EN590:96	European Union
ISO 8217 DMX	International

Engine Coolant

Always use a 50/50 mix long life coolant (LLC) or an extended life coolant (ELC) that meets or exceeds the following guidelines and specifications.

Alternative engine coolant

If an extended or long life coolant is not available, alternatively, you may use an ethylene glycol or propylene glycol based conventional coolant.

Notes:

1. Always use a mix of coolant and water.
2. Mix coolant and water per the mixing instructions on the coolant container.
3. The engine manufacturers recommend that soft, distilled or demineralized water be used to mix with coolants.
4. NEVER mix extended or long life coolants and conventional coolants.
5. NEVER mix different types and / or color of extended life coolants

Additional Technical Coolant Specifications:

- ASTM D6210, D4985 (US)
- JIS K-2234 (Japan)
- SAE J814C, J1941, J1034 or J2036 (International)

Engine oil

Engine oil should be MIL-L-2104C or have properties of API classification CF or higher. Change the type of engine oil according to the ambient temperature.

Above 25°C (77°F)	SAE30	or	SAE10W-30 SAE15W-40
0°C to 25°C (32°F to 77°F)	SAE20	or	SAE10W-30 SAE15W-40
Below 0°C (32°F)	SAE10W	or	SAE10W-30 SAE15W-40

Warranty

All manufactured goods supplied by this Company are guaranteed against defective workmanship and material for a period of twelve (12) months from the date of shipment. If within that period, the Company receives from the customer, written notice of any alleged defect in, or non-conformances of any such product and if in the Company's sole judgment the product does not conform or is found to be defective in material or workmanship, then the Distributor or Customer shall at the Company's request, return the part or product transportation prepaid and the Company, at its option and expense shall repair or replace the defective part or product, or repay to Distributor or Customer, the full price paid for such part or product by Distributor or Customer. Any repayment of purchase price shall be without interest. Warranty on third party items shall be limited to the warranty passed on to the company by the original manufacturer of such items.

Limitations

The warranties of B&D do not cover, and the Company makes no warranty with respect to:

- Failures not reported to the Company within the warranty period specified above.
- Failures or damage due to misapplication, abuse, improper installation or abnormal condition of temperature, dirt or corrosion matter.
- Failures due to operation, either intentional or otherwise, above rate capacities or in an otherwise improper manner.
- Products which have been in any way tampered with or altered by anyone other than an authorized representative of the Company.
- Expenses incurred by Distributor or Customer in an attempt to repair or rework any alleged defective products.
- The Company shall not be responsible for any special, indirect or consequential damage of any nature arising out of or relating to the manufacture, sale or use of the Company's products. Such excluded damages include, but are not limited to, loss of business profits, revenues, opportunities, loss of goodwill, down time of equipment and facilities, and all other type of damages, direct or indirect, foreseeable or unforeseeable.
- Any damage to the equipment caused by the Customer's personnel, freight forwarder, installation contractor or other personnel handling the equipment, during shipment, installation or prior to completion of commissioning is to be repaired at the Customer's expense.

Unless stated otherwise by the Client, via written exceptions, these terms and conditions are considered accepted by the Client upon receipt of a purchase order.