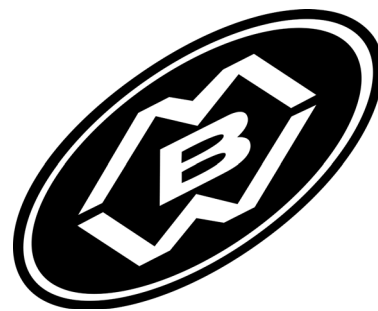


# OPERATOR'S SAFETY AND SERVICE MANUAL



## VAPOR EXTRACTION UNIT

This manual covers the following serial numbers  
and higher for each model listed:

85422D.....8540050



## UTILITY DIVISION

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# TABLE OF CONTENTS

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|                                   |          |   |           |
|-----------------------------------|----------|---|-----------|
| <b>SAFETY INFORMATION</b> .....   | <b>1</b> | Sensor Maintenance .....                      | 7         |
| Introduction .....                | 1        | Sensor Relay/Alarm Testing .....              | 7         |
| Safety Precautions .....          | 1        | Oiling the blower for long term storage ..... | 7         |
| Safety Decals .....               | 1        |   |           |
| <b>SPECIFICATIONS</b> .....       | <b>3</b> | <b>SERVICE</b> .....                          | <b>8</b>  |
| <b>OPERATION</b> .....            | <b>4</b> | Torque Chart .....                            | 8         |
| Introduction .....                | 4        | Service Tools .....                           | 8         |
| Before Starting & Operating ..... | 4        | Replacing Shaft Coupler .....                 | 8         |
| Assembling Probes .....           | 4        | Parts Replacement Cycles and Tolerances ..... | 9         |
| Starting Engine .....             | 4        |   |           |
| Operating .....                   | 4        | <b>REPLACEMENT PARTS</b> .....                | <b>11</b> |
| Stopping Engine .....             | 5        | Main Assembly .....                           | 12        |
| <b>MAINTENANCE</b> .....          | <b>6</b> | Canister and Blower Assembly .....            | 14        |
| Maintenance Schedule .....        | 6        | Sensor Stand Assembly .....                   | 16        |
| Engine Maintenance .....          | 6        | Control Assembly .....                        | 18        |
| Draining Fuel Tank .....          | 6        | Plug Assembly .....                           | 20        |
| Engine Speed .....                | 6        | Door Assembly .....                           | 22        |
| Blower Maintenance .....          | 6        | Engine Assembly .....                         | 24        |
| Cleaning Blower Air filter .....  | 6        | Probe and Hose Assemblies .....               | 26        |
|                                   |          | Wiring Schematic .....                        | 28        |
|                                   |          | <b>WARRANTY</b> .....                         | <b>30</b> |



# **WARNING**



## **CALIFORNIA PROPOSITION 65 WARNING**

Engine exhaust and some of its constituents are known in the state of California to cause cancer, birth defects, and other reproductive harm.

# SAFETY INFORMATION

## Introduction



This Safety Alert Symbol is used to call attention to items or operations which may be dangerous to those operating or working with this equipment.

The symbol can be found throughout this manual and on the unit. Please read these warnings and cautions, along with all decals, carefully before attempting to operate the unit. Make sure every individual who operates or works with this equipment is familiar with all safety precautions.



### WARNING



GENERAL WARNING. Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment and/or severe bodily injury or death.



### CAUTION



GENERAL CAUTION. Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment.

## Safety Precautions



**LETHAL EXHAUST GAS:** An internal combustion engine discharges carbon monoxide, a poisonous, odorless, invisible gas. Death or serious illness may result if inhaled. Operate only in a properly ventilated area. NEVER OPERATE IN A CONFINED AREA!



**DANGEROUS FUELS:** Use extreme caution when storing, handling and using fuels, as they are highly volatile and explosive in vapor state. Do not add fuel while engine is running. Stop and cool the engine before adding fuel. DO NOT SMOKE!



**SAFETY GUARDS:** It is the owner's responsibility to ensure that all guards and shields are in place and in working order.



**IGNITION SYSTEMS:** Breakerless, magneto, and battery ignition systems can cause severe electrical shocks. Avoid contacting these units or their wiring.



**SAFE DRESS:** Do not wear loose clothing, rings, wristwatches, etc. near machinery.



**NOISE PROTECTION:** Wear OSHA specified hearing protection devices.



**EYE PROTECTION:** Wear OSHA specified eye shields, safety glasses, and sweat bands.



**FOOT PROTECTION:** Wear OSHA specified steel-tipped safety shoes.

**HEAD PROTECTION:** Wear OSHA specified safety helmets.



**OPERATOR:** Keep children and bystanders off and away from the equipment.

**DUST PROTECTION:** Machining, crushing or handling of stone, concrete, masonry, metal and other materials may generate dust, mist and fumes containing chemicals such as

silica, known to cause serious or fatal injury or illness, such as respiratory disease, silicosis, cancer, birth defects, or other reproductive harm.

- Control dust, mist and fumes at the source where possible. Water should be used to control dust whenever feasible.
- Use good work practices and follow the recommendations of the manufacture, OSHA/NIOSH and other occupational trade associations.
- When hazards cannot be eliminated the operator and any bystanders should always wear a OSHA specified respirator for materials being handled.

**REFERENCES:** For details on safety rules and regulations in the United States, contact your local Occupational Safety and Health Administration (OSHA) office. Equipment operated in other countries must be operated and serviced in accordance and compliance with any and all safety requirements of that country. The publication of these safety precautions is done for your information. MBW does not by the publication of these precautions, imply or in any way represent that these are the sum of all dangers present near MBW equipment. If you are operating MBW equipment, it is your responsibility to insure that such operation is in full accordance with all applicable safety requirements and codes. All requirements of the United States Federal Occupational Safety and Health Administration Act must be met when operated in areas that are under the jurisdiction of that United States Department.

## Safety Decals

Carefully read and follow all safety decals. Keep them in good condition. If decals become damaged, replace as required. If repainting the unit, replace all decals. Decals are available from authorized MBW distributors. Order the decal set listed on the following page(s).

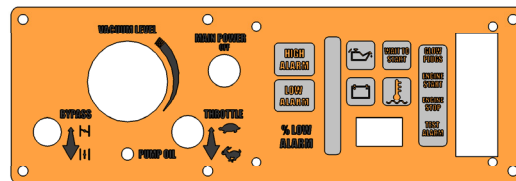
**DIESEL  
FUEL**

01623  
(ON FUEL TANK)

**CAUTION**

DO NOT expose sensor to shock or vibration.  
Allow sensor to finish warm-up cycle prior to use.  
Calibrate sensor prior to first use, and as directed by manual

19257  
(ON SENSOR STAND)



20123

**VAPOR EXTRACTION UNIT**

20241

**WARNING**

Operating, servicing and maintaining this equipment can expose you to chemicals, including engine exhaust, phthalates and lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm. Avoid breathing engine exhaust. Do not operate equipment in confined areas. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

21820

U.S. PATENT 7,210,336

19380

**OPERATING INSTRUCTIONS**

1. Ensure gas concentration in work area is safe for open ignition sources. DO NOT use machine in areas that are unsafe.
  2. Open bypass valve fully, close all vacuum supply valves on canister, open valves on probes.
  3. Plug sensor lead into socket below engine control box.
  4. The "Wait to start" light will light during the sensor's 4 minute warm-up routine. Engine will not run until this period is complete.
  5. Start engine. If cold, wait for glowplugs.
  6. Warm up engine at idle.
  7. Run engine speed up to approximately 30%.
  8. While watching LEL percent on sensor, slowly begin opening vacuum supply valve.
- NOTE:** Gas stream through the VEU must remain below 25% LEL. If Low alarm is triggered, close vacuum supply valve, open bypass valve, and start again. If High alarm is reached, engine will shut down. Press "Reset" button, and start at step 5.
9. After vacuum supply valve is open fully, run engine up to full throttle, and begin to close bypass valve. See note above.
  10. After bypass valve is closed fully, run engine as needed to evacuate ground of gas.
  11. If desired, turning off individual probes can help locate leak.
  12. Before shutting down engine, allow it to idle 1-2 minutes to cool.

19259

**CAUTION**

Read the Operating Instructions before operating this piece of equipment.  
Keep unauthorized and untrained people away from this equipment.  
**ROTATING & MOVING PARTS!** Make sure all guards and safety devices are in place.  
Wear approved hearing protection, foot protection, eye protection and head protection.  
**SHUT OFF** the motor before servicing or cleaning.  
**DO NOT RUN** in an enclosed area. The engine produces carbon monoxide, a **POISONOUS GAS**.  
Failure to comply could result in serious bodily injury.

13483

**SENSOR STAND PLUG**

Engine will not run unless sensor is plugged in

19240

19240

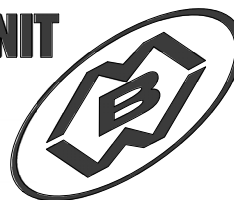
**WARNING**



High suction can cause serious injury.  
Keep all body parts away from vacuum ports.

19242

**VAPOR EXTRACTION UNIT**

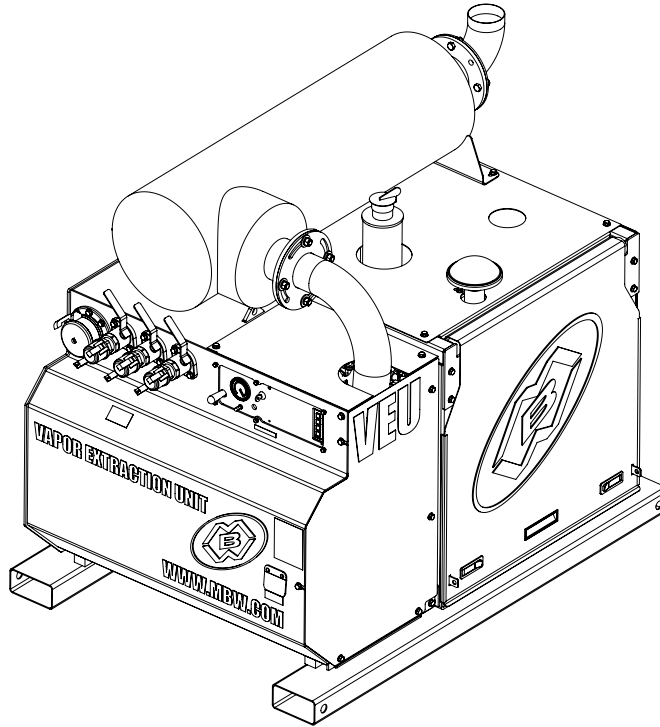


**WWW.MBW.COM**

20240

Safety Decals

# SPECIFICATIONS



|  |                                     |
|--|-------------------------------------|
|  |                                     |
| <b>Operating Weight</b>                  | 1430 LBS (648 KG)                   |
| <b>Height</b>                            | 47.5" (113 cm)                      |
| <b>Width</b>                             | 43" (109 cm)                        |
| <b>Length</b>                            | 65" (165cm)                         |
| <b>Engine</b>                            | Isuzu 3CH1                          |
| <b>Recommended Engine RPM</b>            | 2500 rpm                            |
| <b>Fuel Consumption</b>                  | 1.0 Gal/hr                          |
| <b>Fuel Capacity</b>                     | 8 gallons (30.3L)                   |
| <b>Blower</b>                            | Tuthill 850 cfm                     |
| <b>Recommended Vacuum</b>                | 6"Hg                                |
| <b>Operating Noise Level<sup>1</sup></b> | 90-100 db                           |
| <b>Gas Monitor</b>                       | Industrial Scientific Itrans w/ LEL |
| <b>Alarm Threshold</b>                   | 35% LEL                             |
| <b>Engine Stop Threshold</b>             | 50% LEL                             |
| <b>Max Flow Rate Per Probe</b>           | 19 cfm                              |

Specifications subject to change without notice

1. Noise levels are taken at the operating position and are based on operating conditions. Background noise will increase noise levels.

# OPERATION

## Introduction

This parts manual contains only standard parts. Variations of these parts as well as other special parts are not included. Contact your local MBW distributor for assistance in identifying parts not included in this manual.

## Before Starting & Operating

- Operating VEU creates a possible source of ignition for flammable gas plume. **BE CERTAIN ATMOSPHERE IS SAFE BEFORE OPERATING THIS MACHINE!**
- REMEMBER! It is the owner's responsibility to communicate information on the safe use and proper operation of this unit to the operators.
- Review ALL of the Safety Precautions listed on page 1 of this manual.
- Familiarize yourself with the operation of the machine and confirm that all controls function properly.
- Know how to STOP the machine in case of an emergency.
- Make sure hands, feet, and clothing are at a safe distance from any moving parts or high suction areas.
- OIL LEVEL - Check the oil level in the engine. For more information see "Lubrication" under the respective engine's "Owners Manual" or the Maintenance section of this manual.
- ENGINE AIR CLEANER - Check to ensure element is in good condition and properly installed.
- BLOWER AIR CLEANER - Check to ensure element is in good condition and properly installed
- FUEL SUPPLY - The engines on MBW equipment require an automotive grade of clean, fresh, diesel fuel.
- FUEL FILTER - If clogged or damaged, replace.
- GAS SENSOR - Be familiar with operation of gas sensor. Refer to sensor manual. Be certain that the sensor has been calibrated and is in working order. MBW recommends the sensor be calibrated at least every 3 months.

## Assembling Probes

1. Place probes into ground
2. Connect probes to VEU with hose assemblies.

**Note: The MBW VEU probes can be connected to the VEU in many ways. Each utility should develop**

**their own best practice to make the connections. To avoid a significant pressure drop, MBW recommends not connecting more than 6 (six) probes to a single 1-1/2" branch hose. If more probes are desired, they should be connected to a new branch line coming off the VEU.**

3. Open all valves on VEU probes.
4. Cap all open hose ends with CAM-Loc plugs/caps.
5. Close unused manifold valves on VEU.
6. Fully open Air-Bypass valve before starting engine.

## Starting Engine

For detailed instructions refer to the engine "Owner's Manual".



### WARNING



**Ensure gas concentration in work area is safe for open ignition sources. DO NOT use machine in areas that are unsafe.**



### WARNING



**Ensure sampling line and cup are in place at bottom of sensor. DO NOT use machine if the sampling line is not connected.**

7. Plug sensor/vacuum combo plug into socket on canister housing.

**Note: Engine will NOT run without sensor plugged in.**

8. When power is supplied to the sensor stand assembly the sensor will start a warm up cycle. **This cycle will take approximately 4 minutes and engine will NOT RUN until the "Wait to Start" light turns off.**
9. Open bypass valve fully, close all vacuum supply valves on canister, open valves on probes.
10. Turn toggle switch to "ON".
11. Press glow plug button if engine is cold. Glow plugs will cycle each time button is pressed.
12. Press engine start button to engage starter.
13. Allow engine to warm up for one or two minutes.

## Operating

1. Ensure proper operation of gas sensor.
2. Run engine speed up to approximately 30%.



3. While watching LEL percent on sensor or bar graph on control panel, slowly begin opening vacuum supply valve.



## **WARNING**



**Gas stream through the VEU must remain below 35% LEL. If Low alarm is triggered, close vacuum supply valve, open bypass valve, and start at step 3. If High alarm is reached, engine will shut down. Engine will not start until LEL is below 50%.**

4. After vacuum supply valve is open fully, run engine up to full throttle, and begin to slowly close the bypass valve. See note above. Operating point will be determined by these factors:

- Configuration of probes
- Gas concentration in ground
- Recommended engine speed

- Recommended vacuum level

5. After bypass valve is closed fully, run engine as needed to evacuate ground of gas.
6. If desired, turning off individual probes can help locate leak.

## **Stopping Engine**

1. Fully open air-bypass valve to unload engine.
2. Move throttle to idle position.
3. Let engine idle for one or two minutes.
4. Press engine stop button, or turn off toggle switch.



## **WARNING**



**Always stop the engine before:**

**Adding fuel.**

**Leaving the equipment unattended for any amount of time.**

**Before making any repairs or adjustments to the machine.**



# MAINTENANCE



## WARNING



Always exercise the stopping procedure before servicing or lubricating the unit.

After servicing the unit, replace and fasten all guards, shields, and covers to their original positions before resuming operation.



## CAUTION



Always verify fluid levels and check for leaks after changing fluids.

Do not drain oil onto ground, into open streams, or down sewage drains.

## Maintenance Schedule

| SYSTEM              | MAINTENANCE   | DAILY | EVERY 25 HOURS | EVERY 300 HOURS | YEARLY |
|---------------------|---|-------|----------------|-----------------|--------|
| Vac air filter      | Check and clean                                     | X     |                |                 |        |
| Engine              | Refer to engine operator/owner manual               | X     |                |                 |        |
| Fuel                | drain tank  |       |                |                 | X      |
| Hardware            | Check and tighten as needed <sup>1</sup>            |       | X              |                 | X      |
| In Line Fuel Filter | Replace   |       |                | X               | X      |
| Blower              | Refer to Blower operators/owners manual             | X     |                |                 |        |
| Gas Sensor          | Calibrate <sup>2</sup> (Refer to Gas Sensor manual) |       |                |                 | 4x     |
|                     | Test  | X     |                |                 |        |

1. Check all hardware after the first 5 hours of use, then follow the maintenance schedule.
2. Calibrate sensor before using VEU. Sensor is NOT calibrated from the factory.

## Engine Maintenance

Refer to the engine owner's manual for maintenance intervals and procedures.

- Check the engine air cleaner element at least once daily.
- Check the engine oil level by removing the dipstick (the engine must be level). The oil level should be between the marks on the dipstick. See the "Check Engine Oil" section of the engine "Owner's Manual" for information.
- See the "Change Engine Oil" section of the engine "Owner's Manual" for information on the oil change intervals.
- Disconnect battery for long term storage.

## Draining Fuel Tank

Refer to Main Assembly, page 12.

1. Remove brackets holding tank.
2. Loosen hose clamps and remove hoses.
3. Drain until all water and contaminants are cleared.

4. Properly dispose of drained fuel.

## Engine Speed

Engine speed is factory set according to the speed listed in the Recommended Engine RPM, page 3 of this manual. Refer to the engine owners manual for procedure on setting operating speed if necessary.

## Blower Maintenance

The blower contains both a grease lube system and an oil bath system. Refer to blower manual for service instructions.

## Cleaning Blower Air filter

Refer to Canister and Blower Assembly, page 14.

1. Remove outer knob (# 18) and outer door (#6).
2. Remove inner knob (# 17) and Inner door (# 28).
3. Slide filter out of housing.
4. Remove prefilter and wash with clean warm water.

5. Wash filter with low pressure water, Such as from a garden hose. DO NOT use a high pressure sprayer. If any holes or thin spots are apparent in filter, It must be replaced.
6. Let filters air dry.
7. Put prefilter around filter, and slide into canister housing. The rear of the filter is supported by a tab welded to the back wall of canister.
8. Install front cover making sure filter is straight and seated against rear wall and cover. Tighten knob snugly against cover.
9. Install front cover and knob.

## Sensor Maintenance

Sensor must be calibrated before first use. Sensor is NOT calibrated at the factory.

Sensor programming mode is password protected. To enter programming mode, remove cover of sensor and enter "Mode, Mode, Up, Down, Up, Enter." For non-intrusive operation, see sensor manual. See Sensor manual for further instructions.

The sensor is a sensitive piece of electronic equipment and should be treated as such. DO NOT expose the sensor to vibration. DO NOT expose to temperatures below -4° F or above 122° F.

## Sensor Relay/Alarm Testing

1. Plug Electronics stand into VEU.
2. Start engine after sensor warm-up is complete. Refer to Starting Engine, page 5.
3. Press test button on control panel. Engine should shut down within seconds. Alarm and all lights should activate. If it does not, Do Not use the VEU until it is fixed.

## Oiling the blower for long term storage

If the VEU will be stored more than one week without use, it is required that the user oil the blower to prevent surface corrosion or the internal vanes.

1. Run the machine at idle, with the bypass valve in the open position.
2. Remove the small rubber cap located under the vacuum gauge.
3. Spray a light lubricating oil, such as WD-40 into the hole for several seconds.

**The spray must not contain silicone. Silicone may damage the sensor.**

4. Replace the rubber cap and stop the machine.

# SERVICE

Assembly and disassembly should be performed by a service technician who has been factory trained on MBW equipment. The unit should be clean and free of debris. Pressure washing before disassembly is recommended.

- Prior to assembly, wash all parts in a suitable cleaner or solvent.
- Check moving parts for wear and failure. Refer to the Replacement section in this manual for tolerance and replacement cycles.
- All shafts and housings should be oiled prior to pressing bearings. Also, ensure that the bearings are pressed square and are seated properly.
- All bearings should be replaced when rebuilding any exciter or gearbox.
- All gaskets and seals should be replaced after any disassembly.

## Torque Chart

| SIZE  | GRADE 2    | GRADE 5     | GRADE 8     |
|---|------------|-------------|-------------|
| 1/4-20  | 49 in·lbs  | 76 in·lbs   | 9 ft·lbs    |
| 1/4-28  | 56 in·lbs  | 87 in·lbs   | 10 ft·lbs   |
| 5/16-18   | 8 ft·lbs   | 13 ft·lbs   | 18 ft·lbs   |
| 5/16-24   | 9 ft·lbs   | 14 ft·lbs   | 20 ft·lbs   |
| 3/8-16  | 15 ft·lbs  | 23 ft·lbs   | 33 ft·lbs   |
| 3/8-24  | 17 ft·lbs  | 26 ft·lbs   | 37 ft·lbs   |
| 7/16-14   | 24 ft·lbs  | 37 ft·lbs   | 52 ft·lbs   |
| 7/16-20   | 27 ft·lbs  | 41 ft·lbs   | 58 ft·lbs   |
| 1/2-13  | 37 ft·lbs  | 57 ft·lbs   | 80 ft·lbs   |
| 1/2-20  | 41 ft·lbs  | 64 ft·lbs   | 90 ft·lbs   |
| 9/16-12   | 53 ft·lbs  | 82 ft·lbs   | 115 ft·lbs  |
| 5/8-11  | 73 ft·lbs  | 112 ft·lbs  | 159 ft·lbs  |
| 5/8-18  | 83 ft·lbs  | 112 ft·lbs  | 180 ft·lbs  |
| 3/4-16  | 144 ft·lbs | 200 ft·lbs  | 315 ft·lbs  |
| 1-8   | 188 ft·lbs | 483 ft·lbs  | 682 ft·lbs  |
| 1-14  | 210 ft·lbs | 541 ft·lbs  | 764 ft·lbs  |
| 1-1/2-6   | 652 ft·lbs | 1462 ft·lbs | 2371 ft·lbs |
| M 6   | 3 ft·lbs   | 4 ft·lbs    | 7 ft·lbs    |
| M 8   | 6 ft·lbs   | 10 ft·lbs   | 18 ft·lbs   |
| M 10  | 10 ft·lbs  | 20 ft·lbs   | 30 ft·lbs   |
| <b>CONVERSIONS</b><br>in·lbs x 0.083 = ft·lbs<br>ft·lbs x 12 = in·lbs |            |             |             |

| SIZE                   | GRADE 2 | GRADE 5 | GRADE 8 |
|------------------------|---------|---------|---------|
| ft·lbs x 0.1383 = kg·m |         |         |         |
| ft·lbs x 1.3558 = N·m  |         |         |         |

## Service Tools

| PART NO. | DESCRIPTION             |
|----------|-------------------------|
| 19279    | KIT, SENSOR CALIBRATION |
| 20350    | SERVICE KIT, VEU, ISUZU |

## Replacing Shaft Coupler

Refer to Main Assembly, page 12.

1. Remove the four nuts and bolts securing Silencer inlet adapter (# 16) to the silencer(# 20)
2. Remove the Blower End Side panel (# 6)
3. Remove the air cleaner outer door.
4. Loosen the six mounting bolts (# 44) which secure the canister weldment to the frame. Remove all but the front most bolt on the air cleaner side.
5. Carefully pivot the blower end of the weldment away from the engine, making sure not to stress any wiring or cables. It will only be necessary to move the end about 3" to remove the coupler (# 3).
6. Replace the coupler and slide the canister back into place, aligning the splines of the drivers and coupler.
7. Ensure that the shoulders of the drivers are flush with the ends of the coupler, and that the shafts are still aligned.
8. Replace the canister mounting bolts (# 44), sealing the three bolts in the air filter end with silicone sealant.
9. Reinstall the four bolts securing the silencer inlet adapter to the silencer and the blower end side panel.

## Parts Replacement Cycles and Tolerances

|                            |  |
|----------------------------|--|
| <b>Engine Components</b>   | Refer to your engine manufacturer's Owner's Manual.  |
| <b>Hardware</b>            | Replace any worn or damaged hardware as needed. Replacement hardware should be grade 5 and zinc plated unless otherwise specified. |
| <b>Safety Decals</b>       | Replace if they become damaged or illegible.   |
| <b>Seals &amp; Gaskets</b> | Replace if a leak is detected and at every overhaul or teardown.   |

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# REPLACEMENT PARTS

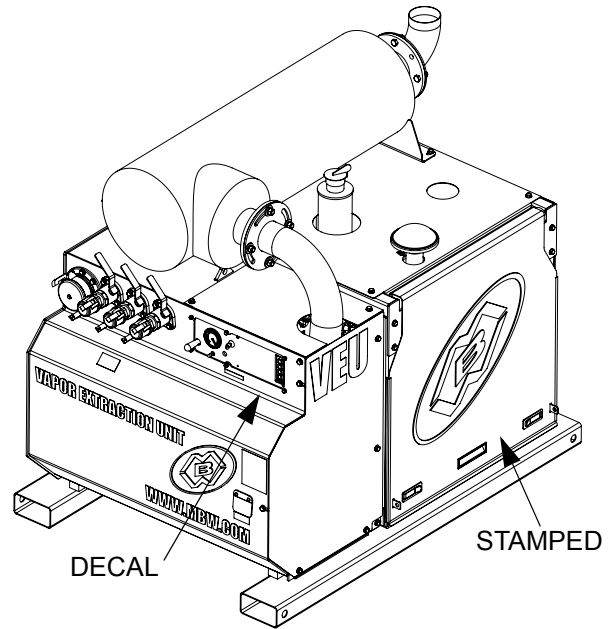
The warranty is stated in this book on page 14. Failure to return the Warranty Registration Card renders the warranty null and void.

MBW has established a network of reputable distributors/dealers with trained mechanics and full facilities for maintenance and rebuilding, and to carry an adequate parts stock in all areas of the country. Their sales engineers are available for professional consultation. If you cannot locate an MBW distributor in your area, contact MBW or one of our Sales Branches listed below.

When ordering replacement parts, be sure to have the following information available:

- Model and Serial Number of machine when ordering MBW parts
- Model and Serial Number of engine when ordering engine parts
- Part Number, Description, and Quantity
- Company Name, Address, Zip Code, and Purchase Order Number
- Preferred method of shipping

**REMEMBER - You own the best! If repairs are needed, use only MBW parts purchased from authorized MBW distributors.**



The unit's serial number can be found in the following locations:

- Stamped into the engine mounting rail on the frame
- Decal placed below control panel

**Write Model Number here**

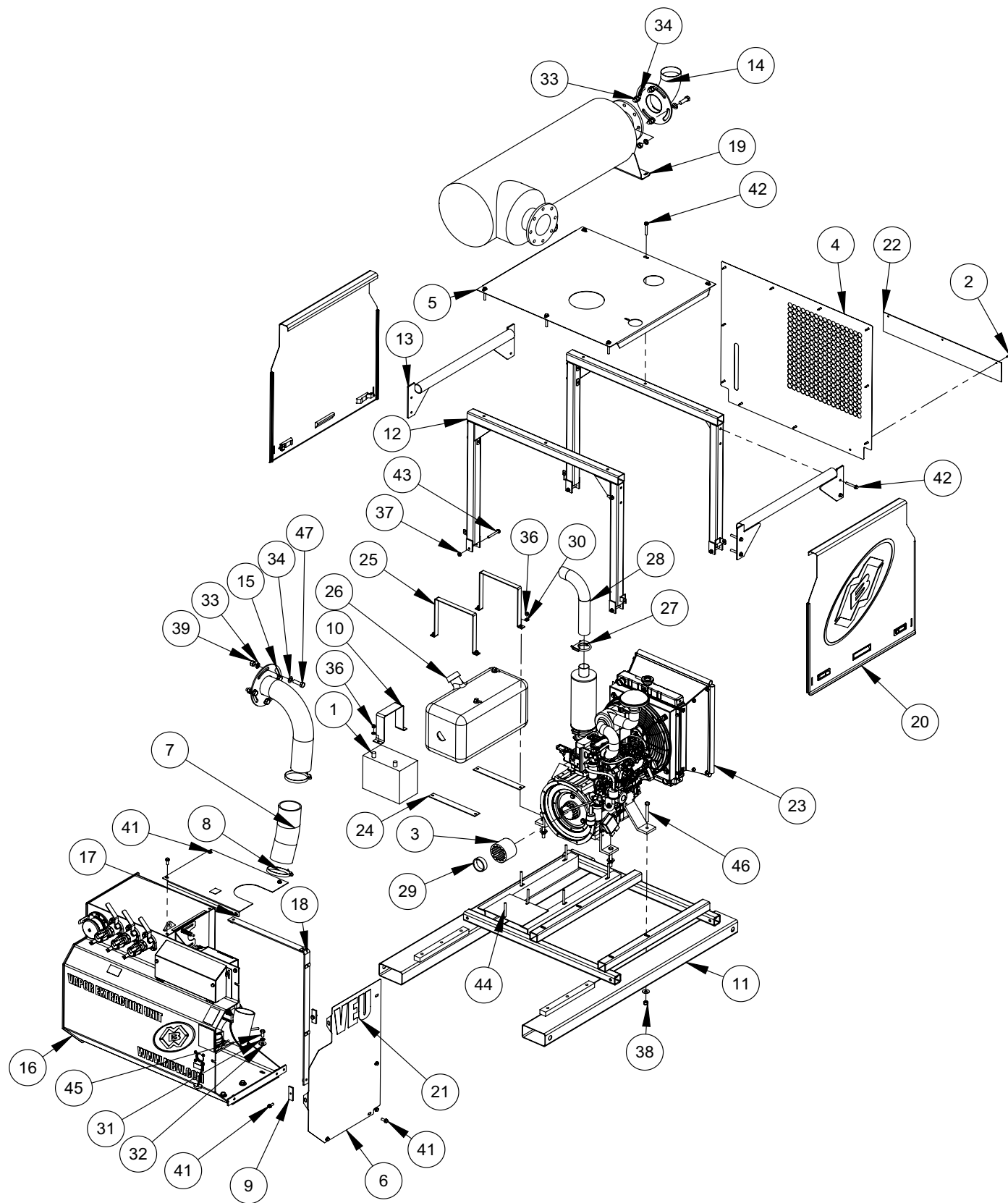
**Write Serial Number here**

## Contact Information

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Fax: 01204 387797  
Email: [mbwuk@btinternet.com](mailto:mbwuk@btinternet.com)

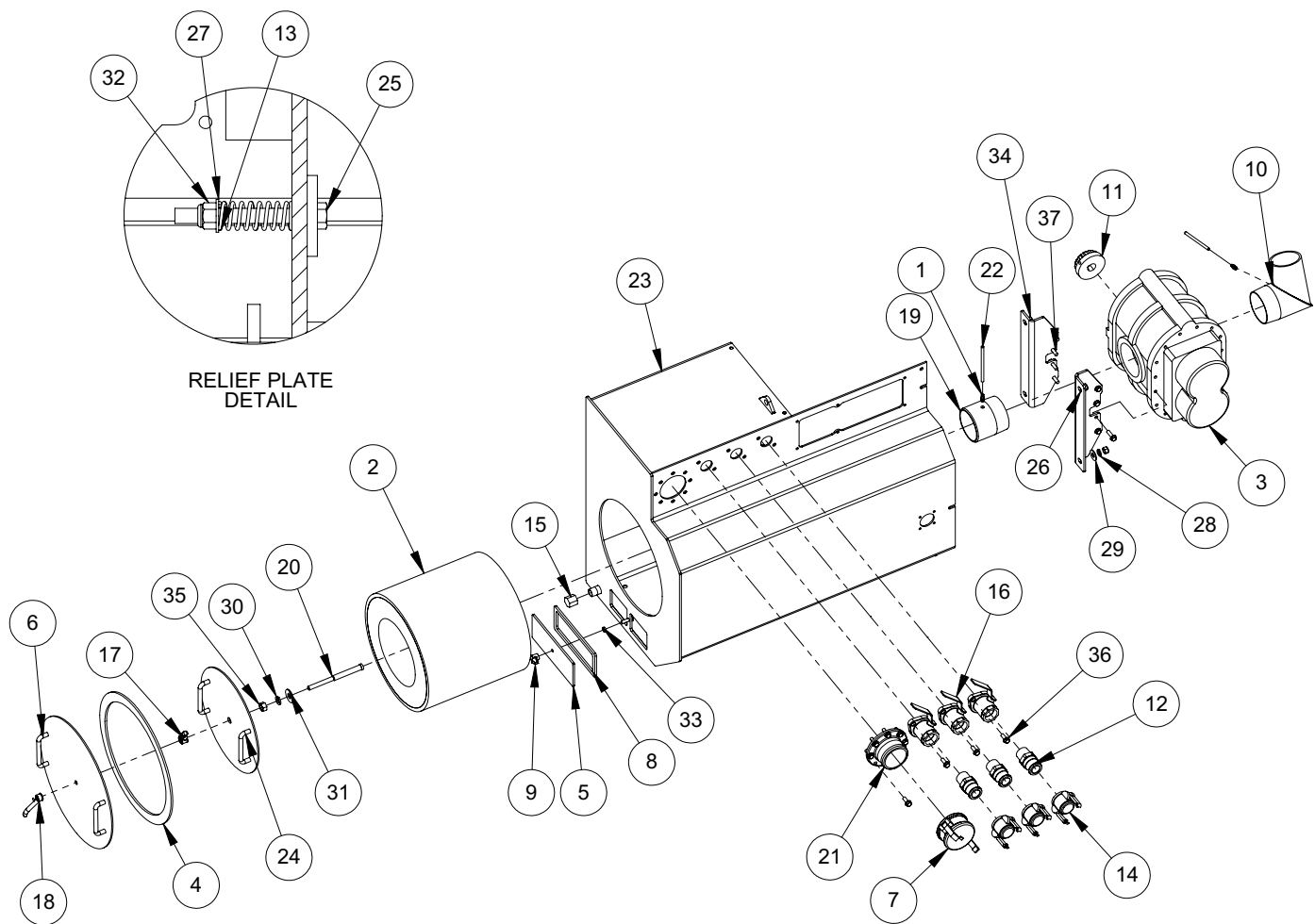
**MBW France S.A.R.L.**  
Phone: +33 (0) 3 44 07 15 96



## Main Assembly

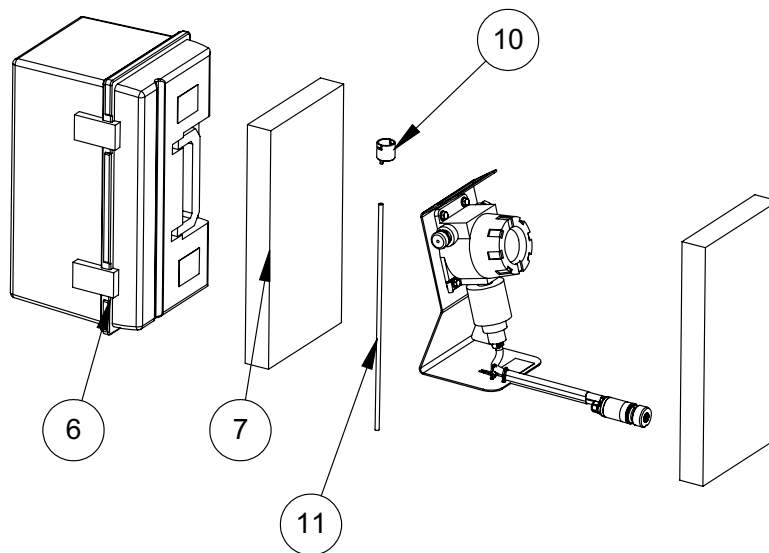
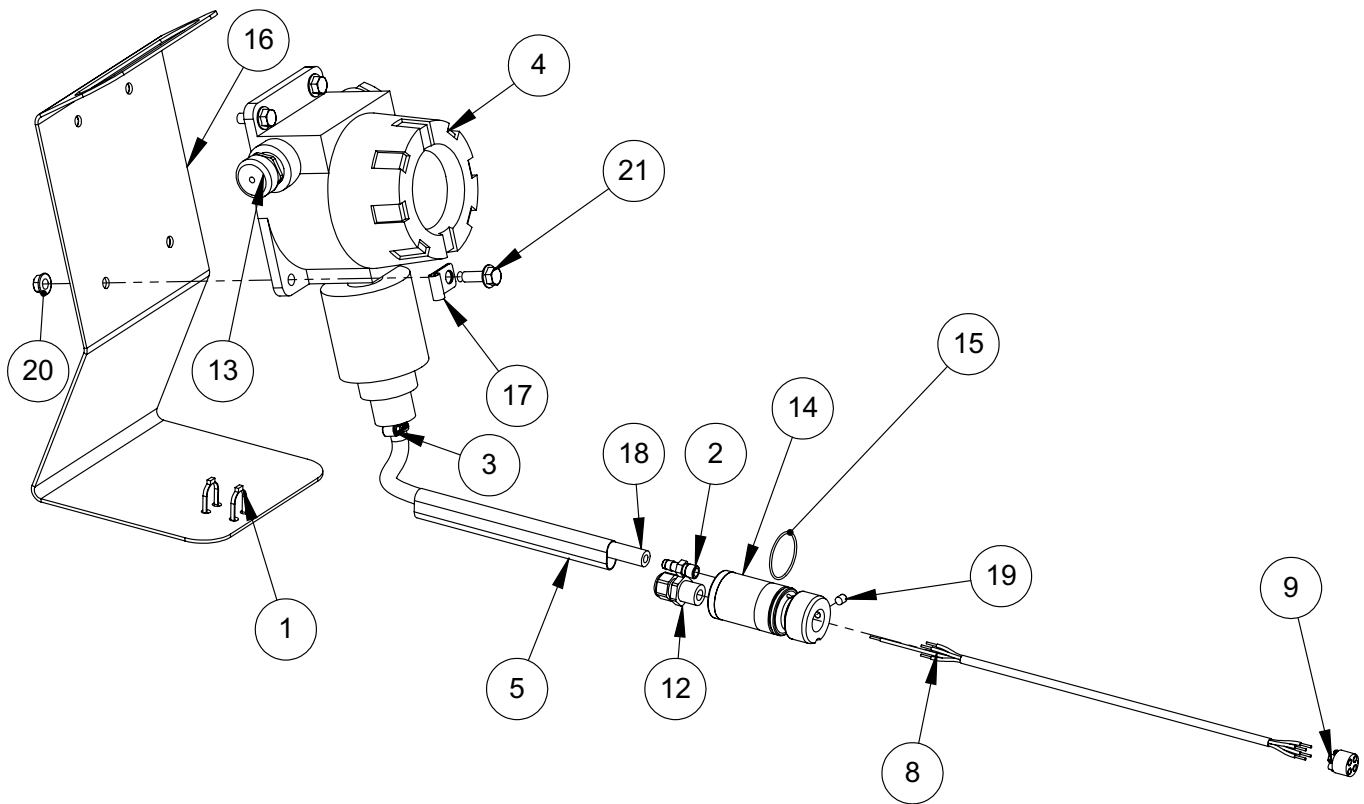


| ITEM | PART NO.   | DESCRIPTION  | QTY |
|------|------------|--|-----|
| 1.   | 09247      | BATTERY  | 1   |
| 2.   | 11162      | SCREW, 1/4 X 1 TEKS  | 12  |
| 3.   | 18923      | COUPLER, GEAR GRIP, TUBE   | 1   |
| 4.   | 20050      | PANEL, RADIATOR  | 1   |
| 5.   | 20051      | PANEL, ROOF  | 1   |
| 6.   | 20052      | PANEL, BLOWER END  | 1   |
| 7.   | 20053      | HOSE, 4.0 X 12   | 1   |
| 8.   | 20054      | HOSE CLAMP, 4"   | 2   |
| 9.   | 20055      | PLATE, THREADED  | 2   |
| 10.  | 20057      | STRAP, BATTERY   | 1   |
| 11.  | 20061      | FRAME, VEU   | 1   |
| 12.  | 20068      | UPPER FRAME, VEU   | 2   |
| 13.  | 20074      | CROSS MEMBER, UPPER VEU FRAME  | 2   |
| 14.  | 20077      | ELBOW, EXHAUST   | 1   |
| 15.  | 20080      | INLET ADAPTER, SILENCER  | 1   |
| 16.  | 20082      | ASM, CANISTER AND BLOWER (See Canister and Blower Assembly, page 14) | 1   |
| 17.  | 20091      | PANEL, BLOWER ROOF   | 1   |
| 18.  | 20104      | SUPPORT, ROOF AND WALL   | 1   |
| 19.  | 20106      | SILENCER ASM   | 1   |
| 20.  | 20109      | DOOR ASM, VEU  | 2   |
| 21.  | 20242      | DECAL, VEU CANISTER, SIDE  | 1   |
| 22.  | 20443      | SHROUD, FRONT, VEU   | 1   |
| 23.  | 20961      | ENGINE ASM, ISUZU 3CH1   | 1   |
| 24.  | 20989      | SUPPORT, FUEL TANK, 8 GALLON   | 2   |
| 25.  | 20990      | STRAP, FUEL TANK   | 2   |
| 26.  | 20994      | FUEL TANK, 8 GALLON  | 1   |
| 27.  | 21070      | EXHAUST CLAMP, 2 3/8   | 1   |
| 28.  | 21321      | EXHUAUST OUTLET, VEU   | 1   |
| 29.  | 21676      | TUBE, INSERT   | 1   |
| 30.  | F06PW      | WASHER, 13/32 X 13/16 X 1/16 ZP                                      | 6   |
| 31.  | F08LW      | LOCKWASHER, 1/2 ZP   | 6   |
| 32.  | F08SW      | WASHER, 9/16 X 1-3/8 X 12GA ZP                                       | 10  |
| 33.  | F10LW      | LOCKWASHER, 5/8 ZP   | 8   |
| 34.  | F10PW      | WASHER, 5/8 X 1-1/4 X 12GA ZP  | 8   |
| 35.  | F0518FN    | NUT, FLANGE WHIZ-LOCK 5/16-18 ZP                                     | 1   |
| 36.  | F0616ELN   | LOCKNUT, 3/8-16 NYLOC ZP   | 6   |
| 37.  | F0616FN    | FLANGE WHIZ-LOCK NUT, 3/8-16   | 5   |
| 38.  | F0813ELN   | LOCKNUT, 1/2-13 NYLOC ZP   | 4   |
| 39.  | F1011HN    | NUT, HEX 5/8-11 ZP   | 8   |
| 40.  | F051806FWS | FWLS, 5/16-18 X 3/4 ZP   | 1   |
| 41.  | F061608FWS | FWLS, 3/8-16 X 1 ZP  | 11  |
| 42.  | F061620FWS | FWLS, 3/8-16 X 2-1/2 ZP  | 14  |
| 43.  | F061624FWS | FWLS, 3/8-16 X 3 ZP  | 4   |
| 44.  | F061628CB  | CAR BOLT, 3/8-16 X 3-1/2   | 6   |
| 45.  | F081308HCS | HHCS, 1/2-13 X 1 GR5 ZP  | 6   |
| 46.  | F081332HCS | HHCS, 1/2-13 X 4 GR5 ZP  | 4   |
| 47.  | F101116HCS | HHCS, 5/8-11 X 2 GR5 ZP  | 8   |
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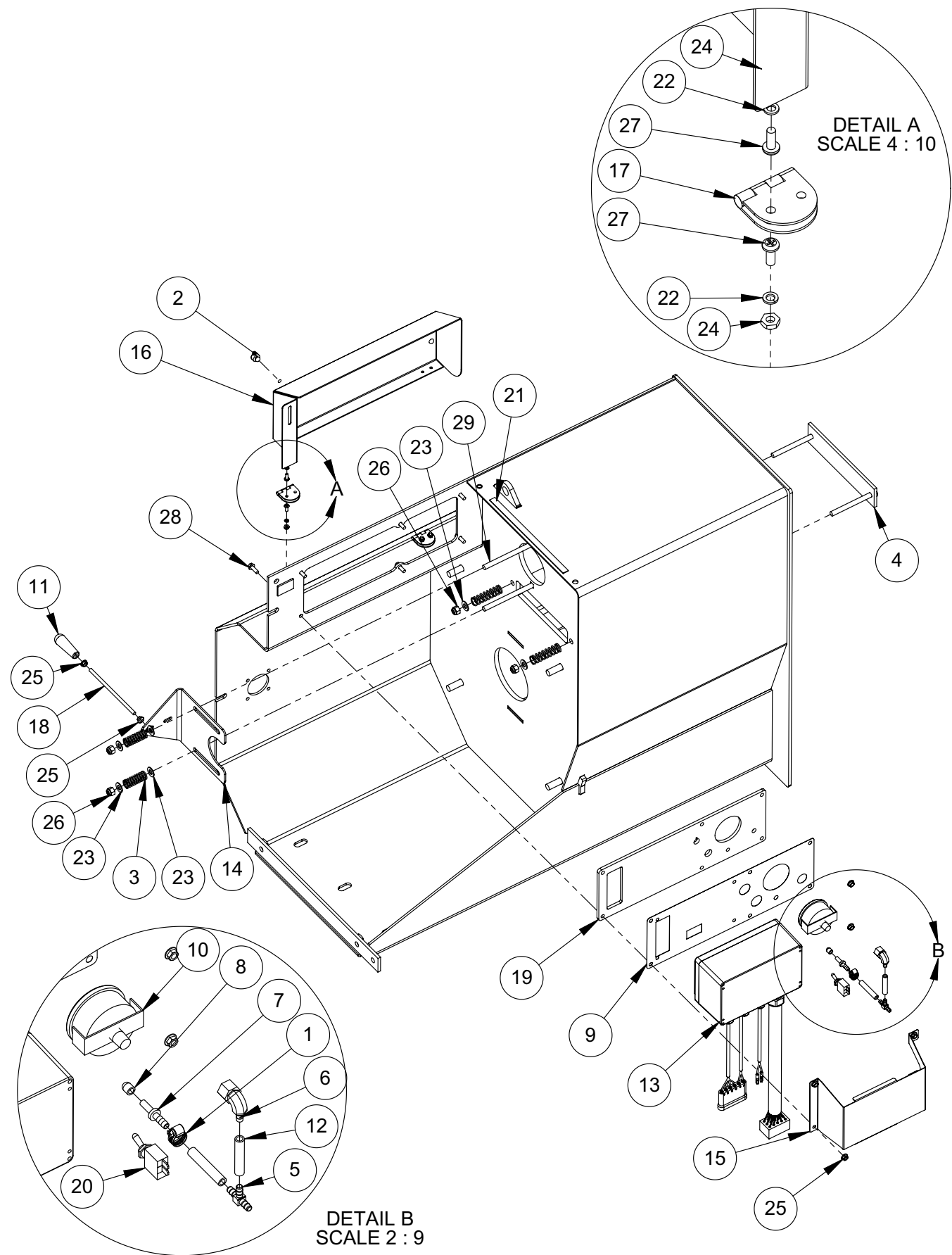
## Canister and Blower Assembly

| ITEM | PART NO.   | DESCRIPTION                     | QTY |
|------|------------|---------------------------------|-----|
| 1.   | 05803      | MALE PIPE ADAPTER               | 2   |
| 2.   | 18920      | FILTER, VEU                     | 1   |
| 3.   | 18927      | BLOWER, TUTHILL                 | 1   |
| 4.   | 18960      | GASKET, DOOR                    | 1   |
| 5.   | 18966      | COVER, SUMP                     | 1   |
| 6.   | 18972      | DOOR, WELDMENT                  | 1   |
| 7.   | 18984      | COVER, 3" CAMLOCK               | 1   |
| 8.   | 18988      | GASKET, BILGE                   | 1   |
| 9.   | 18989      | KNOB, THUMB                     | 1   |
| 10.  | 18996      | ELBOW, SILENCER                 | 1   |
| 11.  | 19047      | COUPLER, GEARGRIP, 1-1/8        | 1   |
| 12.  | 19185      | COUPLING, 1-1/4 NPT, CAM LOCK   | 3   |
| 13.  | 19190      | SPRING, COMPRESSION, RELIEF     | 2   |
| 14.  | 19256      | DUST CAP, 1-1/4 FEMALE          | 3   |
| 15.  | 19455      | PIPE CAP, HEX                   | 1   |
| 16.  | 20083      | VALVE, FLANGE MOUNT             | 3   |
| 17.  | 20084      | HANDLE, 5/8-11                  | 1   |
| 18.  | 20085      | HANDLE, 1/2-13                  | 1   |
| 19.  | 20087      | ADAPTER, BLOWER                 | 1   |
| 20.  | 20088      | DOOR ROD, CANISTER              | 1   |
| 21.  | 20092      | FITTING, 3" CAMLOCK             | 1   |
| 22.  | 20093      | HOSE, 1/4 x 18                  | 2   |
| 23.  | 20095      | CANISTER, WELDMENT              | 1   |
| 24.  | 20102      | FILTER CAP, WELDMENT            | 1   |
| 25.  | 20103      | ASM, RELIEF PLATE               | 1   |
| 26.  | 20210      | MOUNTING FOOT, BLOWER, PAINTED  | 2   |
| 27.  | F06PW      | WASHER, 13/32 x 13/16 x 1/16 ZP | 2   |
| 28.  | F08LW      | LOCKWASHER, 1/2 ZP              | 4   |
| 29.  | F08SW      | WASHER, 9/16 x 1-3/8 x 12GA ZP  | 4   |
| 30.  | F10LW      | LOCKWASHER, 5/8 ZP              | 1   |
| 31.  | F10SW      | WASHER, 11/16 x 1-3/4 x 12GA ZP | 1   |
| 32.  | F0616ELN   | LOCKNUT, 3/8-16 NYLOC ZP        | 2   |
| 33.  | F0616HJN   | NUT, HEX JAM 3/8-16 ZP          | 1   |
| 34.  | F0813HN    | NUT, HEX 1/2-13 ZP              | 4   |
| 35.  | F1011HN    | NUT, HEX 5/8-11 ZP              | 1   |
| 36.  | F061608FWS | FWLS, 3/8-16 x 1 ZP             | 14  |
| 37.  | F061610FWS | FWLS, 3/8-16 x 1-1/4 ZP         | 8   |
|      |            |                                 |     |
|      | 19263      | BLOWER OIL, 1 QT                |     |
|      | 19821      | PREFILTER, FOAM                 |     |
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## Sensor Stand Assembly

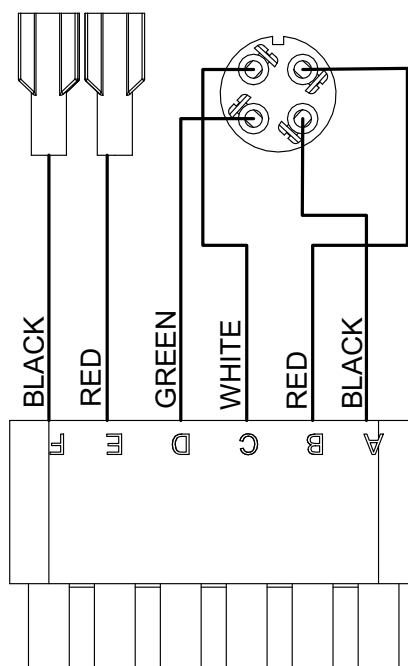
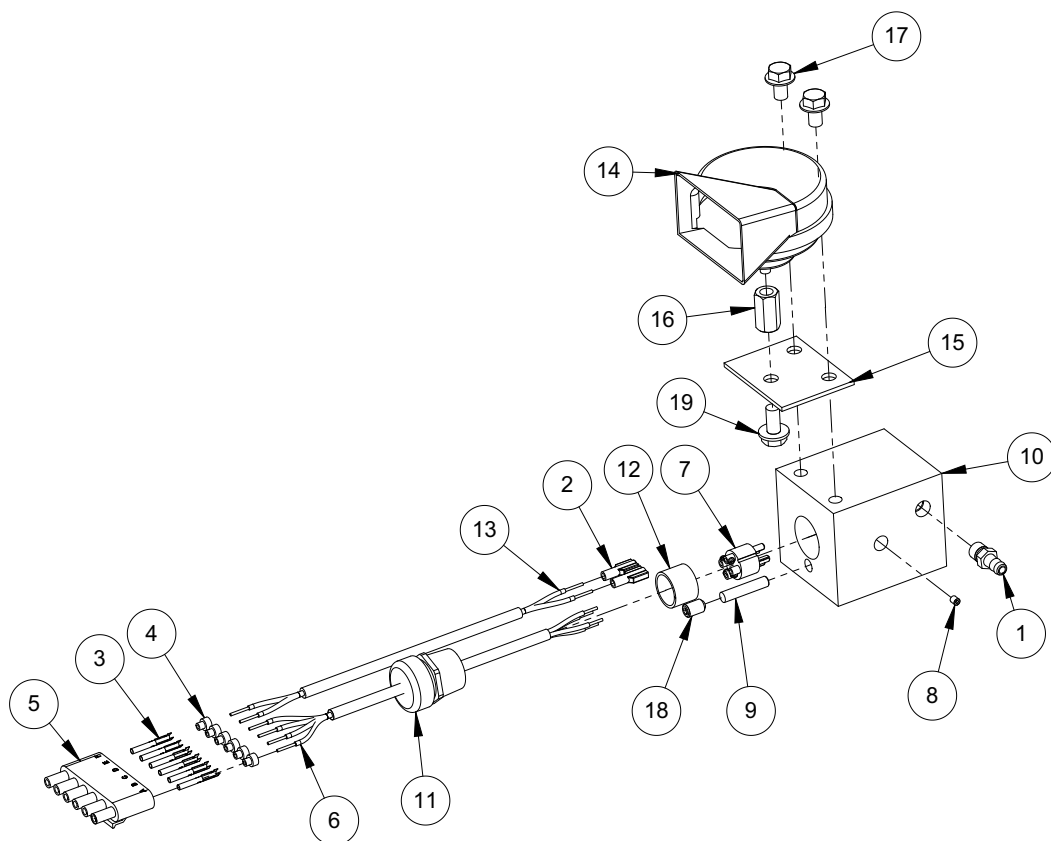




# Control Assembly

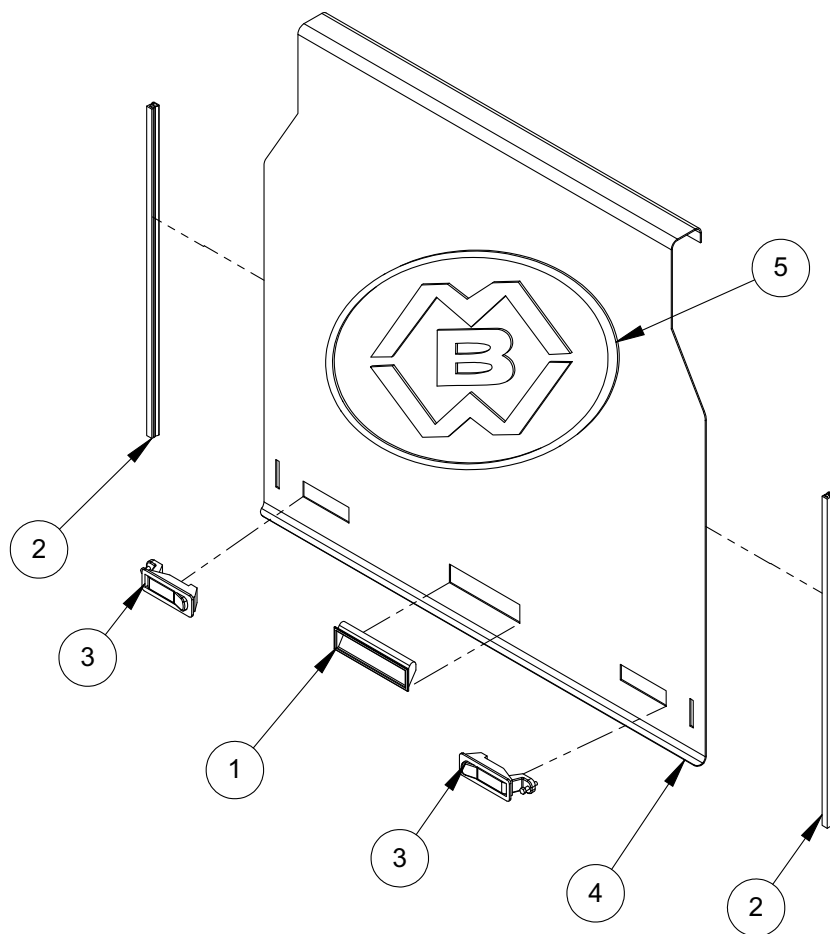
| ITEM | PART NO.   | DESCRIPTION                     | QTY |
|------|------------|---------------------------------|-----|
| 1.   | 08442      | CLAMP, WORM DRIVE, SS           | 1   |
| 2.   | 11161      | BUMPER, RUBBER                  | 2   |
| 3.   | 19190      | SPRING, COMPRESSION, RELIEF     | 4   |
| 4.   | 20103      | ASM, RELIEF PLATE               | 1   |
| 5.   | 20116      | T FITTING .25 HOSE              | 1   |
| 6.   | 20117      | ADAPTER, 1/4 NPT X 1/4 HOSE, 90 | 1   |
| 7.   | 20119      | PRESSURE PORT                   | 1   |
| 8.   | 20121      | PUSH ON CAP                     | 1   |
| 9.   | 20123      | INSERT, CONTROL PANEL           | 1   |
| 10.  | 20155      | VACUUM GAGE, PANEL MOUNT        | 1   |
| 11.  | 20207      | HANDLE, BYPASS                  | 1   |
| 12.  | 20245      | BULK PVC HOSE, 1/4"             | 4"  |
| 13.  | 20402      | ELECTRICAL ASM, VEU             | 1   |
| 14.  | 20969      | BYPASS VALVE, PAINTED           | 1   |
| 15.  | 20970      | SUPPORT, CONTROL BOX, PAINTED   | 1   |
| 16.  | 20973      | COVER, CONTROL PANEL, PAINTED   | 1   |
| 17.  | 20974      | HINGE, COVER                    | 2   |
| 18.  | 20976      | STUD, 1/4-20 X 6                | 1   |
| 19.  | 20983      | COVER, CONTROL PANEL, TOGGLE    | 1   |
| 20.  | 20999      | SWITCH, SPST, QC                | 1   |
| 21.  | 21069      | FOAM TAPE, 1/2 X 1/16           | 10" |
| 22.  | F03LW      | LOCKWASHER, #10 ZP              | 8   |
| 23.  | F06PW      | WASHER, 13/32 X 13/16 X 1/16    | 6   |
| 24.  | F0332HN    | NUT, HEX #10-32 ZP              | 8   |
| 25.  | F0420FN    | FLANGE WHIZ LOCK NUT, 1/4-20    | 9   |
| 26.  | F0616ELN   | LOCKNUT, 3/8-16 ZP              | 4   |
| 27.  | 21607      | PMS #10-32 UNC X 1/2            | 8   |
| 28.  | F042006FWS | FWLS, 1/4-20 X 3/4              | 6   |
| 29.  | F061640CB  | CAR BOLT, 3/8-16 X 5            |     |
|      |            |                                 |     |
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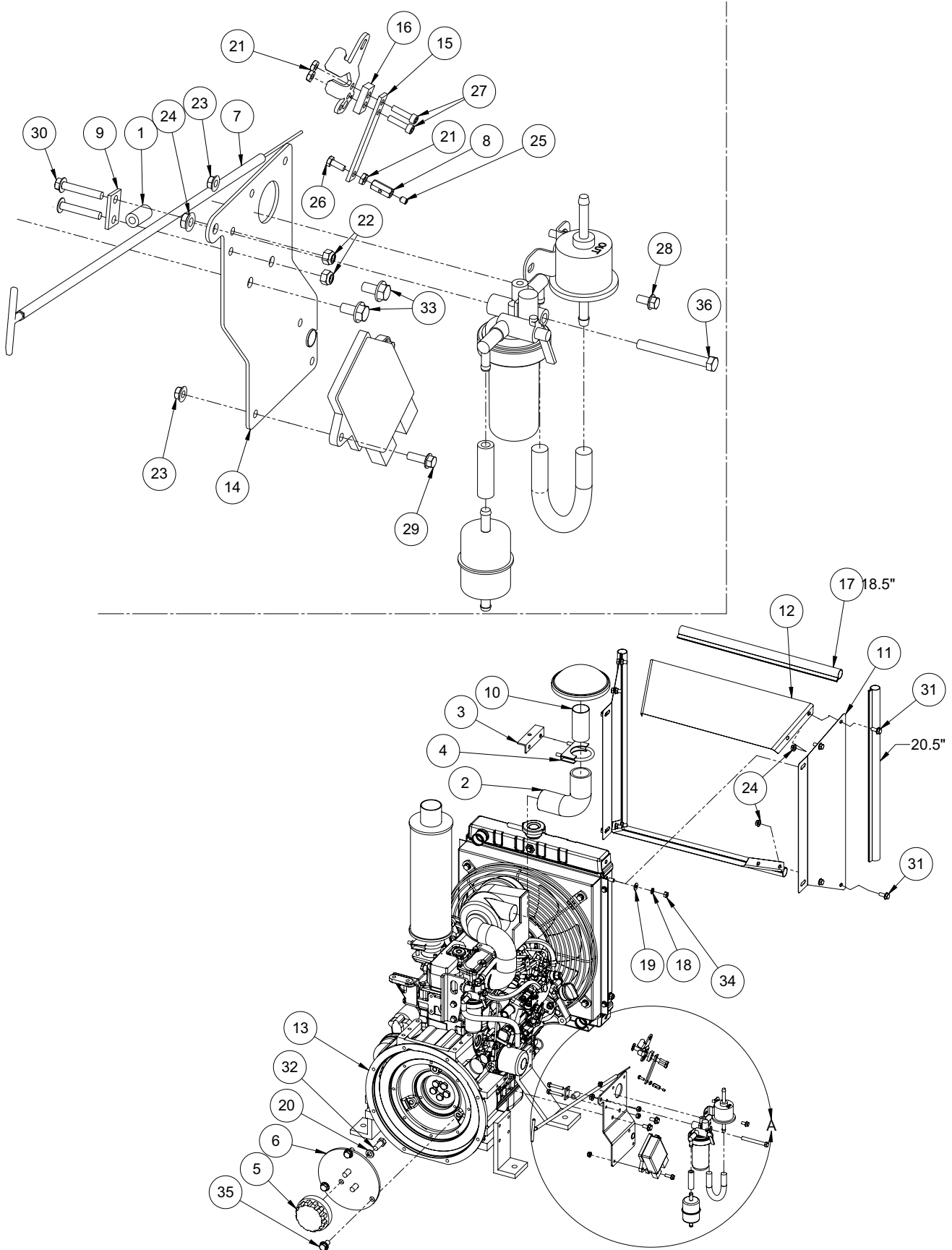
## Plug Assembly

| ITEM | PART NO.   | DESCRIPTION                    | QTY |
|------|------------|--------------------------------|-----|
| 1.   | 05803      | MALE PIPE ADAPTER              | 1   |
| 2.   | 11444      | TERMINAL, FEMALE DISCONNECT    | 2   |
| 3.   | 12302      | TERMINAL, SLEEVE               | 6   |
| 4.   | 12304      | SEAL, CONNECTOR WIRE           | 6   |
| 5.   | 12309      | CONNECTOR TOWER (M) 6 POS      | 1   |
| 6.   | 19276      | CORD, BULK, 18GA, 4 WIRE       | 1   |
| 7.   | 19476      | PLUG, 4 CONDUCTOR, MALE        | 1   |
| 8.   | 19477      | SET SCREW, 8-32 X 1/4, POINTED | 1   |
| 9.   | 20196      | DOWEL PIN, .25 X 1.25          | 1   |
| 10.  | 20205      | SOCKET, VEU PLUG               | 1   |
| 11.  | 20220      | CORD GRIP, 3/4 NPT             | 1   |
| 12.  | 20589      | INSULATOR, DELRIN              | 1   |
| 13.  | 20591      | CORD, BULK, 18GA, 2 WIRE       | 1   |
| 14.  | 20996      | HORN, 12V, LOW NOTE            | 1   |
| 15.  | 20998      | HORN BRACKET, PAINTED          | 1   |
| 16.  | 21691      | COUPLING NUT, M8 X 1.25        | 1   |
| 17.  | F051804FWS | FWLS, 5/16-18 X 1/2 ZP         | 2   |
| 18.  | F051804SSS | SSS, 5/16-18 X 1/2"            | 1   |
| 19.  | M08C016FWS | FWLS, M8 X 16                  | 1   |
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|      |            |                                |     |
|      | 20592      | PLUG ASM (INCLUDES ITEMS 1-19) | 1   |
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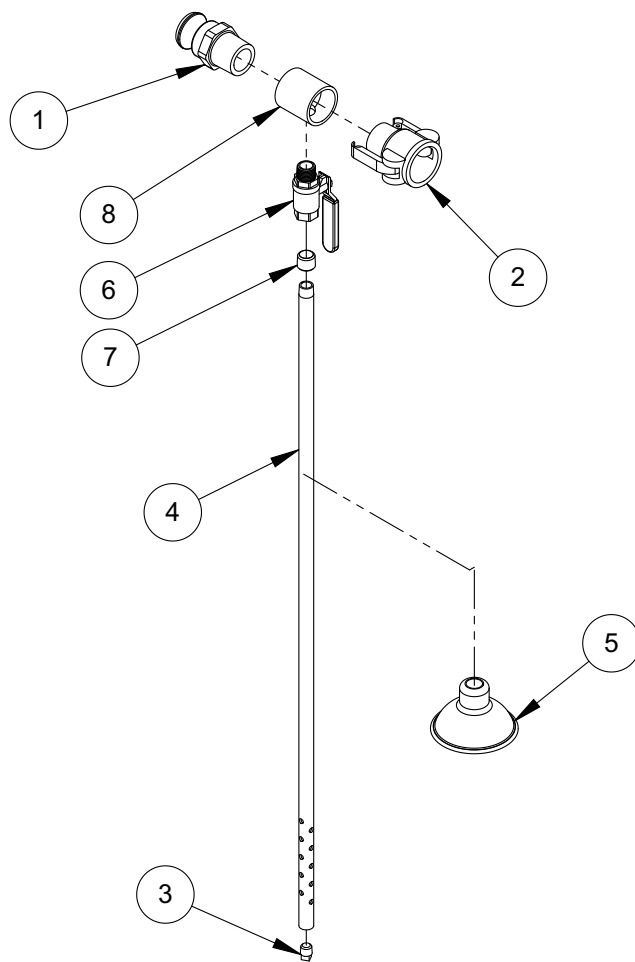
## Door Assembly

| ITEM | PART NO. | DESCRIPTION          | QTY |
|------|----------|----------------------|-----|
| 1.   | 20110    | DOOR HANDLE, SNAP IN | 1   |
| 2.   | 20111    | EDGING, DOOR         | 21" |
| 3.   | 20112    | LATCH, DOOR          | 2   |
| 4.   | 20113    | PANEL, DOOR          | 1   |
| 5.   | 20239    | DECAL, VEU DOOR      | 1   |
| 6.   |          |                      |     |
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## Engine Assembly

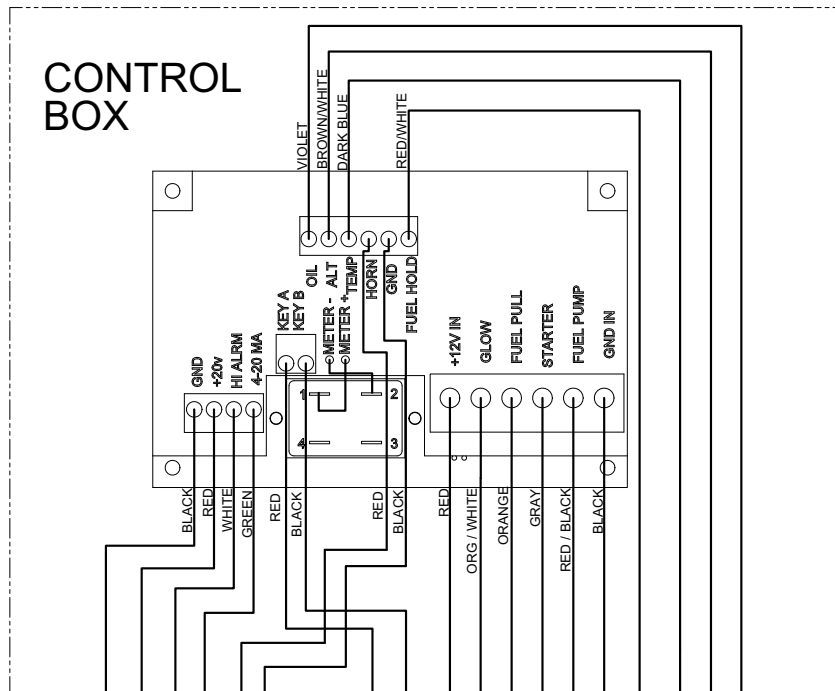
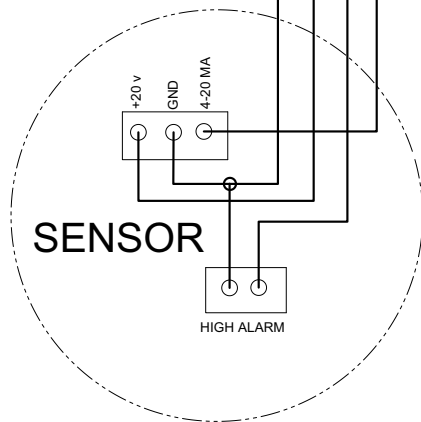
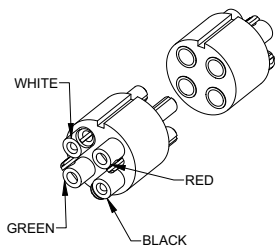
| ITEM | PART NO.    | DESCRIPTION                      | QTY |
|------|-------------|----------------------------------|-----|
| 1.   | 06029       | FUEL LINE, 1/4" BULK             | 1   |
| 2.   | 09214       | PIPE, INLET                      | 1   |
| 3.   | 20059       | BRACKET, INTAKE                  | 1   |
| 4.   | 20060       | EXHAUST CLAMP, 2"                | 1   |
| 5.   | 20131       | COUPLER, GEARGRIP, 1-7/16        | 1   |
| 6.   | 20133       | ADAPTER PLATE, 3CB1              | 1   |
| 7.   | 20136       | CABLE, THROTTLE CONTROL          | 1   |
| 8.   | 20138       | THROTTLE CLAMP SWIVEL            | 1   |
| 9.   | 20140       | THROTTLE CABLE CLAMP             | 1   |
| 10.  | 20147       | TUBE, INTAKE                     | 1   |
| 11.  | 20197       | RAD SHROUD, SIDE, PAINTED        | 2   |
| 12.  | 20198       | RAD SHROUD, TOP, PAINTED         | 2   |
| 13.  | 20962       | ENGINE, ISUZU 3CH1               | 1   |
| 14.  | 20964       | THROTTLE BRACKET, PAINTED        | 1   |
| 15.  | 20965       | THROTTLE EXTENSION               | 1   |
| 16.  | 20967       | THROTTLE SPACER                  | 1   |
| 17.  | 20995       | SEAL, EDGE GRIP                  | 78" |
| 18.  | F05LW       | LOCKWASHER, 5/16 ZP              | 4   |
| 19.  | F05SW       | WASHER, 5/16 X 3/4 X 15GA ZP     | 4   |
| 20.  | F08LW       | LOCKWASHER, 1/2 ZP               | 3   |
| 21.  | F0324HN     | NUT, HEX #10-24 ZP               | 1   |
| 22.  | F0420ELN    | LOCKNUT, 1/4-20 NYLOC            | 5   |
| 23.  | F0420FN     | FLANGE WHIZ-LOCK NUT 1/4-20      | 4   |
| 24.  | F0518FN     | NUT, FLANGE WHIZ-LOCK 5/16-18 ZP | 12  |
| 25.  | F032402SSS  | SSS, #10-24 X 1/4                | 1   |
| 26.  | F032404HCS  | HHCS, #10-24 X 1/2 GR5 ZP        | 1   |
| 27.  | F032406SCS  | SCS, #10-24 X 3/4                | 2   |
| 28.  | F042004FWS  | FWLS, 1/4-20 X 1/2 ZP            | 2   |
| 29.  | F042006FWS  | FWLS, 1/4-20 X 3/4 ZP            | 2   |
| 30.  | F0420012FWS | FWLS, 1/4-20 X 1-1/2 ZP          | 3   |
| 31.  | F051806FWS  | FWLS, 5/16-18 X 3/4 ZP           | 10  |
| 32.  | F081310HCS  | HHCS, 1/2-13 X 1-1/4 GR5 ZP      | 3   |
| 33.  | M08C016FWS  | FWS, M8 X 16                     | 2   |
| 34.  | M08CHN      | NUT, HEX M8 X 1.25 ZP            | 4   |
| 35.  | M12C020FWS  | FWS, M12 X 20                    | 3   |
| 36.  | F051822HCS  | HHCS, 5/16-18 X 2-3/4 GR5 ZP     | 1   |
|      | 20352       | ISUZU OIL FILTER                 |     |
|      | 20351       | ISUZU AIR FILTER                 |     |
|      | 20353       | ISUZU CARTRIDGE FUEL FILTER      |     |
|      | 21040       | ISUZU INLINE FUEL FILTER         |     |



## Probe and Hose Assemblies

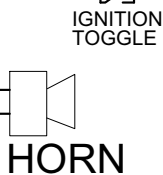




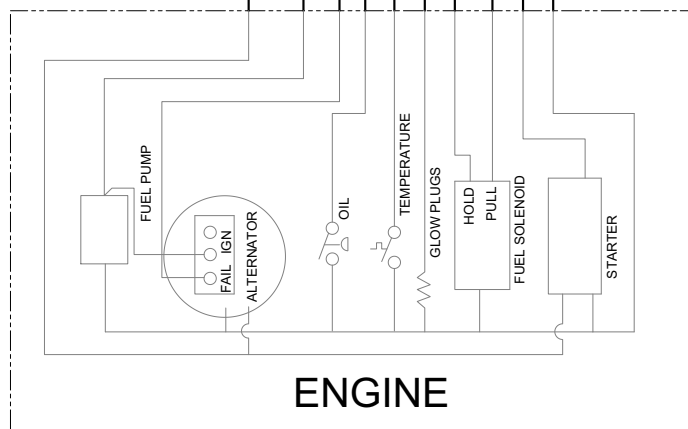


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SEE INSET



IGNITION TOGGLE



# Wiring Schematic

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# WARRANTY

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**WHAT DOES THIS WARRANTY COVER?** MBW, Incorporated (MBW) warrants each New Machine against defects in material and workmanship for a period of twelve (12) months. "New Machine" means a machine shipped directly from MBW or authorized MBW dealer to the end user. This warranty commences on the first day the machine is sold, assigned to a rental fleet, or otherwise put to first use.

MBW warrants each Demonstration Machine against defects in material and workmanship for a period of six (6) months. "Demonstration Machine" means a machine used by MBW or its agents for promotional purposes. This warranty commences on the first day the machine is sold, assigned to a rental fleet, or otherwise put to first use.

This warranty covers the labor cost for replacement or repair of parts, components, or equipment on New Machines or Demonstration Machines, and MBW shall pay labor costs at MBW's prevailing rate to affect the warranted repair or replacement. MBW reserves the right to adjust labor claims on a claim-by-claim basis.

This warranty covers the shipping cost of replacement parts, components, or equipment via common ground carriers from MBW to an authorized MBW dealer. Air freight is considered only in cases where ground transportation is not practical.

**MAY THIS WARRANTY BE TRANSFERRED?** This warranty is non-transferable and only applies to the original end user of a new machine or demonstration machine.

## **WHAT DOES THIS WARRANTY NOT COVER?**

1.This warranty does not cover any Used Equipment. "Used Equipment" means any MBW machine or equipment that is not a New Machine or a Demonstration Machine. All Used Equipment is sold **AS IS/WHERE IS WITH ALL FAULTS**.

2.This warranty does not cover any New Machine, Demonstration Machine, or their equipment, parts, or components altered or modified in any way without MBW's prior written consent. This warranty does not cover the use of parts not specifically approved by MBW for use on MBW products. This warranty does not cover misuse, neglect, shipping damage, accidents, acts of God, the operation of any New Machine or Demonstration Machine in any way other than recommended by MBW in accordance with its specifications, or any other circumstances beyond MBW's control. This warranty does not cover any New Machine or Demonstration Machine repaired by anyone other than MBW factory branches or authorized MBW distributors.

3.This warranty does not cover, and MBW affirmatively disclaims, liability for any damage or injury resulting directly or indirectly from design, materials, or operation of a New Machine or Demonstration Machine or any other MBW product. MBW's liability with respect to any breach of warranty shall be limited to the provisions of this document and in no event shall exceed an amount equal to the purchase price of the New Machine or Demonstration Machine purchased from MBW.

4.This warranty does not cover engines, motors, and other assemblies or components produced by other manufacturers and used on a New Machine or Demonstration Machine, as said engines, motors, and other assemblies or components may have warranties provided by the manufacturer thereof. This warranty does not apply to consumable items, such as v-belts, filters, trowel and screed blades, seals, shock mounts, batteries, and the like, all of which are sold **AS IS/WHERE IS WITH ALL FAULTS**.

5.This warranty does not cover the cost of transportation and other expenses which may be connected with warranty service but not specifically mentioned herein.

6.This warranty does not cover any updates to any New Machine, Demonstration Machine, or any other MBW product. MBW reserves the right to improve or make product changes without incurring any obligation to update, refit, or install the same on New Machines or Demonstration Machines previously sold.

**WHAT MUST YOU DO TO OBTAIN WARRANTY COVERAGE?** Each New Machine or Demonstration Machine is accompanied by a Warranty Registration Card. You must sign, date, and return the Warranty Registration Card to the place of origin of the New Machine or Demonstration Machine, either to MBW, Inc. at P.O. Box 440, Slinger, Wisconsin 53086, MBW (UK), Ltd. at Units 2 & 3 Cochrane Street, Bolton BL3 6BN, United Kingdom or MBW FRANCE SARL at ZA D'Outreville, 5 Rue Jean Baptiste Neron, Bornel 60540 France, within ten (10) days after purchase, assignment to a rental fleet, or first use. This signed warranty card is the buyer's affirmation that he has read, understood, and accepted the warranty at the time of purchase. Failure to return the warranty card as specified herein renders the warranty null and void. In order to receive warranty coverage consideration, warranty claims must be submitted within thirty (30) days after the New Machine or Demonstration Machine fails. Warranty claims must be submitted to MBW, Inc., MBW (UK), Ltd. or MBW FRANCE SARL, and written authorization for the return of merchandise or parts under the warranty must be obtained before shipment to MBW.

**WHAT WILL MBW DO?** MBW's obligation under this warranty is limited to the replacement or repair of parts for a New Machine or Demonstration Machine at MBW factory branches or at authorized MBW distributors, and such replacement or repair is the exclusive remedy provided hereunder. Labor must be performed at an authorized MBW distributor. MBW reserves the right to inspect and render a final decision on each warranty case, and MBW's repair or replacement is solely within the discretion of MBW.

**IT IS EXPRESSLY AGREED THAT THIS SHALL BE THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY. UNDER NO CIRCUMSTANCES SHALL MBW BE LIABLE FOR ANY COSTS, LOSS, EXPENSE, DAMAGES, SPECIAL DAMAGES, INCIDENTAL DAMAGES, OR PUNITIVE DAMAGES ARISING DIRECTLY OR INDIRECTLY FROM THE USE OF THE NEW MACHINE OR DEMONSTRATION MACHINE WHETHER BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY, OR ANY OTHER LEGAL THEORY.**

**THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE, AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITY ON MBW'S PART. MBW NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME ON BEHALF OF MBW ANY OTHER LIABILITY OR WARRANTY IN CONNECTION WITH THE SALE OR SERVICE OF ANY NEW MACHINE, DEMONSTRATION MACHINE , OR ANY OTHER MBW PRODUCT.**

## **EXTENDED RAMMER WARRANTY - MODELS R422, R442, R482 & R483.**

This extended warranty commences on the last day of MBW's standard, one year, "limited warranty" and runs for an additional four years (48 months). This extended warranty is limited to part replacement and shipping costs of rammer **bellows and non-metallic slide bearings only**. This extended warranty does not cover labor, down time, or any other cost beyond that of component replacement and freight. This extended warranty is subject to all limitations set fourth in MBW's "limited warranty", above.