



MODEL MHV16 Series

Self Contained, Hydraulically Driven
SIDE-MOUNT Air Conditioning and Heating Unit

- **INSTALLATION**
- **OPERATION**
- **MAINTENANCE**

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9301 Old Staples Mill Road, Richmond, VA 23228
Toll-Free: 888-622-2663 Ph: 804-264-3603 Fx: 804-264-3070
www.macbone.com sales@macbone.com

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HELPFUL HINTS FROM THE FIELD

1. The MacBone MHV16 series hydraulically driven air conditioning unit is very different, and really has to be installed carefully and correctly, so please read the book before you install. Questions, call us 24/7, toll free, at 888-MACBONE.
2. On all external hydraulic hose fittings, USE TWO WRENCHES. For quiet and smooth operation, the entire hydraulic circuit inside the unit, including the motors, shafts, compressor, fans and couplings are a single shock mounted assembly. Twisting the fittings on the end of the steel tubes can distort the adjustment of the assembly resulting in motor bearing failure, noisy operation and hydraulic fitting leaks.
3. Power is connected to a voltage selector that will automatically switch between 12 or 24 VDC. The voltage selector is a black box with a red nut located on top where +12 or 24 VDC is connected. Battery ground is connected to the voltage selector bracket ground screw.
4. Don't run the compressor for cooling with the panel off. Without the panel, cooling air does not flow through the condenser. Without air, the condenser over-heats, the head pressure rises and the safety plug blows out of the back of the compressor.
5. The device with the black knob on it is a comfort thermostat, NOT a freeze stat. DO NOT unwrap the capillary tube from around the thermostat and stick it in the evaporator coil. Leave it coiled around the thermostat as originally assembled.
6. The discharge air into the cab is sensitive to being restricted so don't attach any ducts, deflectors or other gadgets to it without giving us a call for comments, 24/7, 888-MACBONE.
7. There is a suction line fitting in the refrigeration circuit which we use to charge the unit with a total of 9 ounces, plus or minus ½ ounce, of R134 A refrigerant, but this port is not for field use. If it does not cool, call us, 24/7, at 888-MACBONE.
8. This unit has no belts, idlers, side loaded bearings, grease fittings or items to oil, adjust, tweak, replace or repair. If it blows cool and heats, it's OK. If not, or if it makes any terrible noises, call 888-MACBONE for assistance.
9. The most frequent deviation from our specific instructions is in providing the hydraulic drive oil supply. Please use a dedicated pump sized to deliver 3.25 to 6.00 GPM at MAXIMUM engine speed. Bootleg oil, taken from shared pumps using priority valves, flow controllers and the like will not work unless carefully done. Call 888-MACBONE for assistance if you must do it this way.
10. Questions or issues, don't do it alone, call 888-MACBONE!

PRODUCT DESCRIPTION

The MacBone Series MHV16, 16,000 BTU/hr., air conditioning unit, is a side mounted, unitary, or self-contained unit, with a closed, precharged refrigeration circuit, driven by two, integral, hydraulic motors. Heating is derived from the circulation of hot engine coolant, engine oil or hydraulic oil through the unit. Heating capacity is 18,000 BTU/Hr. at a fluid flow rate of 1.0 GPM at 140° F, and cooling capacity is 16,000 BTU's/HR. at input oil flow of 3.5 GPM at 2300 PSIG. The design concept is derived from the need for an operator's cab air conditioning unit for industrial machines and vehicles where the unit can be quickly removed for service without involving the sealed refrigeration circuit. Cooling is provided by a thermostatically controlled refrigeration system, using refrigerant 134A. The condenser and evaporator blowers share a common shaft, driven by a hydraulic motor with sufficient power to produce substantial condenser air flow even with a filter on the outside coil, thus insuring reliable performance even in a heavily dust laden environment. Substantial power delivered to the inside air blower also assures delivery of full system capacity under all conditions. Induction of 10% outside air provides cab pressurization to exclude dust and other contaminants from entering the cab environment. An auxiliary outside air filter and cab pressurizer is available for additional pressurization.

Hydraulic drive input is from a dedicated pump driven by the vehicle's engine delivering from 3.50 to 6.00 GPM from 1000 PSIG at fan only and about 2300 PSIG with the compressor running for cooling. Or tap a compensated pressure source ranging from 2300 PSI to 4000 PSI, capable of a sustained flow rate of 3.50 GPM. Electrical input of 0.8 amps, at 12 or 24 VDC, is used to activate the compressor bypass valve, which allows for the compressor to be cycled by the thermostat. If the MacBone outside air filter / cab pressurizer is used, it will operate at an additional 4.0 amps at 12 or 24 VDC.

All side mount units utilize non-CFC, R-134A refrigerant, measure 28 x 20 3/8 x 10 inches high and weigh 104 pounds. Hydraulic lines are #6, supply and return. The motors have external case drains to protect the shaft seals. These are teed together inside the unit and require a #4 drain line back to tank up to 20'. Over 20', use #6 drain line. Four mounting studs provide for quick removal for service or replacement. Recommended operating time before overhaul is 3,000 hours. Recommended unit life is four overhaul cycles.

The MHV16 series MacBone units are recommended for operator's cabs in the range of 4' wide x 6' long, but is not suitable for larger cabs unless the cab insulation is significant.

UNCRATING

The MacBone Series MHV16 shipping pallet usually contains the following 4 components which are assembled together.

1. The subbase (“L” shaped mounting structure)
2. The MHV16 Series unit. (With securing studs in place securing it to the subbase)
3. The unit weather cover. (With securing bolts in place securing it to the unit)
4. Supply and return air ducts.

Remove the assembly from the pallet. Using a 9/16” wrench, remove the (6) 3/8” bolts, which hold the weather cover. Then remove the weather cover and set it aside. Remove the (4) tall studs to release the unit from the subbase. Using a suitable hoist, lift the unit clear of the subbase by the green lifting ring. At this time, note that there are (8) holes, in the subbase, marked by the green dots, which are to be used to secure the subbase to the cab wall. **DO NOT** put fasteners in any other locations – only the (8) points marked by the green dots. If you feel you must use fasteners in others locations, call us to review the reasons why not and to review how to proceed if you must.

SUBBASE INSTALLATION

GENERAL: The subbase is designed to be secured to the side of the cab to be cooled, with the large surface against the cab wall, and the smaller surface down and parallel to the ground. The cab side surface to which the subbase is attached must be flat, continuous, and strong enough to support the 104 pound total weight of the MHV16 Series air conditioning unit and subbase. For installation on surfaces which are not flat or continuous, consult MacBone directly for specific instructions. Installation of the subbase on other than a FLAT surface will distort the subbase resulting in air leaks, rainwater leaks, condensate leaks and poor performance. Also, the securing studs will not line up with the bolt holes in the top cover if the subbase is distorted.

LOCATION: When installed, the area around the unit must be open on the bottom and right side, so as not to obstruct the condenser air inlet into the condenser coil. Located on the bottom, along with the connecting hoses, is the condenser hot air discharge. Leave room below the unit to make hose connections and for the hot condenser air to escape. Do not allow the hot condenser discharge air to be deflected so as to merge with the condenser inlet air.

When installed, holes will be cut in the cab side to match the rectangular return air hole and the square discharge air hole in the subbase. Be sure this cutting will not sever any vital structures. Since the system controls are accessed by the operator by reaching into the return air area, this area must be accessible by the operator from the cab. The supply air, at full fan speed, is discharged at very high velocity, so the discharge air should not be located where it will blow directly onto an operator's station. Also, the discharge air must be free to flow, unimpeded, in the cab. If this air impinges on a console, seatback or similar surface which may deflect it toward or into the return air, steps must be taken to eliminate this recirculation situation. Cold discharge air entering the return air will result in degraded capacity and possible evaporator coil freeze up.

SECURING THE SUBBASE: When a suitable location has been selected, use the subbase as a template, and mark the (8) holes noted by the green dots. (these are the subbase to wall securing bolt or screw holes) and mark the square and rectangular air holes. Remove the subbase and drill for the securing bolts and cut the air holes the same size as, or up to 1/4" larger than the marks made. DO NOT EXCEED 1/4" larger and DO NOT go any smaller.

Clean the wall well, and on the mating surface of the subbase, run a bead of caulking, like silicone, around the outside edge, around the return air and supply air holes and around each of the bolt holes.

Secure the subbase with the bolts inserted from outside the cab, with the nuts inside the cab. Fastener heads must not exceed 1/4" in height to insure they will not hit the bottom of the unit when the unit is secured to the subbase.

UNIT INSTALLATION: MODEL MHV16-5

GENERAL: The MHV16 series unit is designed to be installed on the special subbase and will not operate satisfactorily unless the special subbase as described beginning on page 4 is used.

SETTING THE UNIT IN PLACE: Lower the unit down onto the lower horizontal "shelf" of the subbase. As the unit is lowered, use the rectangular air hole underneath as a guide. Make sure the black heater hose falls through the heater hose slot in the subbase. After the unit is in place, jog it to get the (4) holes in the unit chassis to line up with the (4) threaded nuts welded onto the subbase. The holes will match exactly – just jog the unit until they do.

SECURING THE UNIT IN PLACE: Secure the unit to the subbase with the (4) special studs removed earlier. On the upper end of each stud is a number. Referring to the decal on top of the blower, put the studs in the right spots. Make sure the sealing washer is in place on the threaded end of the stud. By hand, the studs must bottom out, then torque to about 10 foot pounds. (About 1/16 of a turn) No need to go real tight. Leave the top and the (6) top retaining bolts aside until later.

-WARNING-

If the studs are over tightened, the nut, which is welded to the subbase, can be jacked up off the base, breaking the welds. Then the subbase has to be replaced.

ELECTRICAL CONNECTIONS

GENERAL: The electrical requirement is either 12 or 24 VDC at 0.8 amps to operate the solenoid actuated compressor motor bypass valve. This valve is cycled by the 60° to 90° F comfort thermostat. When de-energized, the valve is open (bypass position) so the compressor does not run. When energized, the valve closes and diverts drive oil through the motor which drives the compressor. In the electrical circuit are the following elements:

1. An operator accessible toggle switch which, when on, activates the compressor run circuit for cooling. Switch off, no cooling.
2. An operator accessible, adjustable thermostat, which cycles the compressor at the operator selected set point within its temperature range of 60° to 90° F, to maintain cab temperature.
3. A fan speed control micro switch, which activates the compressor circuit when the fan reaches about 1/3 speed, which prevents the compressor from lugging at low fan speeds.

- NOTE -

The compressor will not run for cooling until the switch is on, and the unit speed is up to about 1/3, and the thermostat is set lower than the cab temperature.
If the cab temperature is below 60° F, the compressor will not run.

MAKING ELECTRICAL CONNECTIONS:

1. When the weather cover is removed during installation locate the black box with a red nut. This is the connection point for the 12 or 24 VDC power feed. The power feed should come from a source that will shut off power when the engine shuts off. The 12 or 24 VDC power feed may be routed through a black plug with a hole in the middle located on the unit hookup side near the evaporator coil. The + 12 or 24 VDC wire will be connected to the red nut on the black box, and the battery (-) ground will be connected to the black box bracket ground (GND) screw.
2. The power feed may be fused at 2 amps for 12 or 24 VDC. If an optional P150V-1 pressurizer is used, the fuse must be replaced with a 5 amp fuse.
3. Secure the wires to the roof in an appropriate manner, bearing in mind that when the unit is removed, the wires must be disconnected from the MacBone unit.

- NOTE -

When the MHV16 series unit is removed for service or replacement, the 12 or 24 VDC power feed must be removed from the voltage selector (black box w/ red nut) and ground screw when the weather cover top is removed.

4. With the cooling toggle switch off (down), and the machine ignition switch on, test the circuit by checking for machine voltage, 12 or 24 VDC, between the machine's ground and either end of the 3 inch long brown resistor located just above the control switch.

- CAUTION -

This test must be made with the ignition switch ON and with the COOLING SWITCH OFF or the results will be confusing.

MAKING HYDRAULIC CONNECTIONS

WARNING – WARNING – WARNING

When tightening or loosening the four hydraulic hose connections on the MHV16 series units use two wrenches.

The fittings are attached to the unit internally and if turned without a second wrench they will be twisted resulting in motor and control valve damage.

GENERAL: The MHV16 series units may be operated in either of two ways. Constant pressure, from a 2700 to 4000 PSI compensated pressure source, at a flow rate from 0 to 3.50 GPM, or from a constant volume source from 0 to 2800 PSI at a flow rate from 3.50 to 6 GPM. In the constant pressure mode, the unit is connected directly to a compensated pressure source and in the constant volume mode, the unit is connected directly to a constant or variable volume, dedicated pump. Please note that pressure requirements increase as outside temperature increases.

CONSTANT VOLUME OPERATION

The oil flow for a constant volume drive oil supply is best accomplished with a dedicated, engine driven, hydraulic pump. Sharing a pump with other functions usually results in a lot of unneeded aggravation so do your best not to go that way. However, if you must, please talk with us. In the most basic form, the dedicated pump can be sized to deliver 3.50 GPM whenever air conditioning is needed. This can occur using an inexpensive, fixed displacement pump being driven at a constant and proper speed whenever the air conditioning is intended to be used. The difficulty here is finding a pump which will deliver exactly 3.50 GPM at the designated engine speed and the disadvantage of not being able to sustain full air conditioning capacity at lower engine speeds. However, this is the most hydraulically efficient approach.

The next constant volume option is to use a bit larger pump which will deliver between 3.50 and no more than 6 GPM at full engine speed and then utilize the unit's internal priority valve to use 3.50 GPM and bypass the excess to tank. This will allow full engine speed setting to be varied while full air conditioning capacity is sustained at engine speeds from full, down to about half of full speed. This option is the best balance of cost, efficiency and performance.

CONSTANT VOLUME HOSE CONNECTIONS: From the drive oil pump, a #6 hose with a working pressure no less than 3500 PSI connects to a relief valve, set at 3250 PSI, sized to handle the full capacity of the pump. From the relief valve to the unit's input, marked SUPPLY, a #6 hose rated at least 3500 PSI is required. Unit fitting is #6, 37° male flare.

For constant volume operation, the BYPASS and RETURN ports must be teed together and routed to tank. This hose must be rated for a minimum working pressure of 250 PSI. Unit fittings are #6, 37° male flare. From the CASE DRAIN directly to tank, a #4 hose is needed, rated for a minimum working pressure of 250 PSI. Unit fitting is #4, 37° male flare. Case drain back pressure at the unit must not exceed 75 PSIG.

- WARNING -

The CASE DRAIN hose **MUST** be connected **DIRECTLY TO THE TANK**. A restriction in the CASE DRAIN hose may result in motor seal failure. Do not fail to tee the bypass and return together at the unit and route this combined oil directly to the tank.

CONSTANT VOLUME HYDRAULIC DRIVE OIL CHECKOUT: Temporally, place a 0-5000 PSI pressure gauge, a ball valve, and a 0-6 GPM flow meter, all piped in series, in that order, in the SUPPLY line at the unit.

Set the system relief valve to its lowest pressure setting.

Close the temporary ball valve which will dead head the pump downstream of the gauge.

Place the unit's red handle in the horizontal position so the heat will be off.

Place the unit's blue handle in the horizontal position so the fan will be off.

Place the cooling toggle switch in the off position (Left) so the compressor will not run.

Start the vehicle's engine at idle to bring on the drive oil pump and observe that the pressure is consistent with the low setting on the relief valve.

CHECK FOR LEAKS
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Remedy any leaks found.

Bring the hydraulic oil temperature to at least 100° F.

Increase the engine speed to max operating RPM.

At full RPM, adjust the relief valve until the gauge reads 3250 PSI. Lock the relief valve in place and double check for 3250 PSI or less as the engine is operated between idle and full speed.

- NOTE -

If the pressure varies very much with engine speed, the relief valve is too small in capacity for the application.

Idle the engine and then open the temporary ball valve to its full open position to allow drive oil to flow through the MacBone unit. This oil flow will be the pump's capability at engine idle. Increase engine speed to maximum. Oil flow should not exceed 6 GPM. At full engine speed, flow anywhere between 3.5 and 6 GPM is good.

UNIT OPERATION CHECKOUT: Before operating the unit, install the cover by securing it with the six bolts and sealing washers which were removed when the unit was first unpacked. If the tops of the studs do not line up with the bolt holes in the cover, double check to see that the studs, stamped 1, 2, 3 and 4, are in the right place. If still not lined up, deflect the studs enough to bend them slightly to come into alignment. If the

subbase was screwed down on an un-flat surface, the studs will probably not line up with the bolt holes in the cover.

- WARNING -
*DO NOT OPERATE THE
COMPRESSOR FOR COOLING
WITH THE COVER REMOVED.*

With the cover removed, air will not flow through the condenser resulting in a blowout of the high pressure safety plug, located in the rear of the compressor, which is not repairable in the field.

Before starting the MacBone unit, confirm that the drive oil, at full normal operating engine speed, is flowing through the unit between 3.50 and 6 GPM with the pressure gauge showing very little pressure. This rate of flow, whatever it is, as setup on this particular machine, is the “normal constant” flow rate. With constant engine speed, this flow should remain constant whether the MacBone unit is off, running only the fan or at full cooling. Only the pressure will change as engine and pump speed changes.

To start the unit, leave the cooling switch off (left) and move the blue handle toward vertical. As the unit fan starts to run slowly, the flow should remain constant but the pressure should rise. At full fan speed, with the blue handle vertical, the pressure should be around 1000 PSI, with the flow unchanged. **THE BLUE HANDLE CONTROLS FAN SPEED.**

To start the compressor for cooling, turn the thermostat fully clockwise and push the cooling toggle switch right for ON. The compressor should start, the unit should blow cold air and the drive oil flow should remain constant, but the pressure should rise to between 2400 and 2800 PSI.

- IMPORTANT -
If flow rate and pressures are not as described, call MacBone, 888-MACBONE, for assistance. Don't look for adjustments to make in the unit – there are none.

When the cab temperature reaches a satisfactory level, turn the thermostat counterclockwise until you hear the compressor cycle off. In this position, the compressor will cycle to maintain cab temperature. Thermostat knob at mid range is a setting of 75°

- NOTE -
The thermostat fully clockwise controls at 60° F. Fully counterclockwise controls at 90° F. In the middle, is 75° F.

With the unit at full speed and the compressor on, slow the engine gradually until the flow drops to 3.50 GPM. Note this engine RPM. This is the lowest engine speed which will give the operator full air conditioning capacity. As engine speed drops below this level, oil flow will drop below 3.5 GPM, the fan will slow down and cooling output will drop.

This completes the constant volume hydraulic drive oil and unit checkout. Stop the unit by moving the blue handle to the horizontal position. Turn the cooling switch off. Remove the temporary flow meter gauge/valve test assembly and connect the supply hose directly to the unit. See the bottom of page 12 for unit operation.

CONSTANT PRESSURE OPERATION

In the constant pressure mode, the MacBone unit's supply port is connected directly to a compensated pressure source with a minimum sustained pressure of 2700 PSI and a continuous flow capability of 3.50 GPM. Maximum supply pressure is 4000 PSI. Inside the unit is an operator controlled valve which operates as a flow controller in the constant pressure mode. Be sure to consider the hydraulic inefficiency when using a compensated pressure source with an operating pressure greater than the 3000 PSI minimum required. DO NOT EXCEED 4000 PSI.

CONSTANT PRESSURE HOSE CONNECTIONS

From the compensated pressure source, a #6 hose with a working pressure rating to match the source pressure, will connect directly to the unit's input marked SUPPLY. Unit fitting is #6, 37° male flare.

From the unit's RETURN port, a #6 hose rated at a minimum working pressure of 250 PSI must be routed to tank. The unit fitting is #6, 37° male flare.

The unit's BYPASS port must be capped with a cap rated to match the source pressure. The unit fitting is #6, 37° male flare.

From the CASE DRAIN fitting, directly to tank, a #4 hose is needed, rated for a minimum working pressure of 250 PSI. Unit fitting is #4, 37° male flare.

HYDRAULIC DRIVE OIL CHECKOUT: Temporarily place a 0-5000 PSI pressure gauge, a ball valve, and a 0-6 GPM flow meter, all piped in series, in that order, in the supply line at the unit.

Close the temporary ball valve which will prevent oil flow to the unit.

Place the unit's red handle in the horizontal position so the heat will be off.

Place the unit's blue handle in the horizontal position so the fan will be off.

Place the cooling toggle switch in the off position (LEFT) so the compressor will not run.

Start the vehicle's engine at idle to bring up the pressure of the compensated pressure source. Check the gauge to verify the system pressure is between 2700 and 4000 PSI. If the pressure is less or more, adjust the pressure source to be between 2700 and 4000 PSI or change to the constant volume approach using a dedicated pump.

Bring the oil temperature up to at least 100° F. Open the ball valve to admit system pressure to the unit.

CHECK FOR LEAKS

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Remedy any leaks found.

With the engine still at idle speed, move the blue handle, which controls the unit's fan speed, all the way vertical.

Note the rate of flow. If it is below 3.50 GPM, increase the engine speed until the flow reaches 3.50 GPM.

Note this engine RPM which will provide a clue as to how well the compensated pressure source will be able to handle the unit's flow requirements 3.50 GPM at a low engine speed indicates good reserves and high speed for 3.50 GPM indicates low reserves.

HEATING CONNECTIONS

GENERAL: The MHV16 series units have one section of heating tubes as part of the evaporator / heater coil. Hot fluid, water or oil, is circulated through this section by the engine water circulating pump or other means. The MHV16 unit does not have its own pump. The heating circuit consists of #8 male flare brass fittings piped to the copper coil by rubber hose rated for oil or water not to exceed 180° F or a static pressure of 60 PSIG. The differential pressure required for full flow of 1 GPM is about 6 PSI. Heating capacity is manually controlled by an operator accessible ball valve with a red handle. Handle horizontal is off, handle vertical is full heating capacity. Midway is mid heat.

HOT FLUID OPTIONS: Within the 180° and 60 PSIG limits, the heating fluid may be water, water and antifreeze, engine oil or hydraulic oil.

- CAUTION -

If engine oil or hydraulic oil is used as the heating fluid, use appropriate controls to ensure that high pressure does not inadvertently reach the heating coil circuit.

HOSE CONNECTIONS: Connect the heating fluid supply hose to the lower of the two #8 male, brass 45° flare fittings located on the side of the unit near the bottom. The return hose connects to the #8 male, brass 45° flare return fitting just above the supply fitting. Since these fittings are brass, they will accommodate steel 37° JIC female flare fittings if 45° fittings are not available.

- NOTE -

When using engine coolant, the differential pressure across the engine's cooling water circulation pump typically generates more than sufficient differential pressure for circulation.

MACBONE UNIT OPERATION

1. Set the RED handle and BLUE handle to horizontal and the cooling toggle switch to the left.
2. Start the machine's engine, warm the oil to 100° F minimum and set the speed at working RPM. (Cold oil will result in low unit fan speed.)
3. To bring on the MacBone air conditioning unit's fan, move the BLUE handle slowly upward toward vertical. As the handle is moved, the fan speed will increase to maximum when the handle reaches vertical or slightly further. Set the handle for the desired fan speed.
4. For cooling, turn the black knob on the comfort thermostat all the way clockwise, this is the 60° F cab air temperature setting. Push the toggle switch, just below the thermostat, to the right to start the compressor for cooling. If the MHV16 unit is equipped with the P150-1 filter / pressurizer, turn the pressurizer on by moving the toggle switch below the cooling toggle switch right. Move it left for off.

- NOTE -

When the filter / pressurizer is on, 80 CFM of filtered outside air will be pumped into the cab to provide pressurization and ventilation. However this will add to the heat load on the unit and decrease the unit's ability to cool the cab.

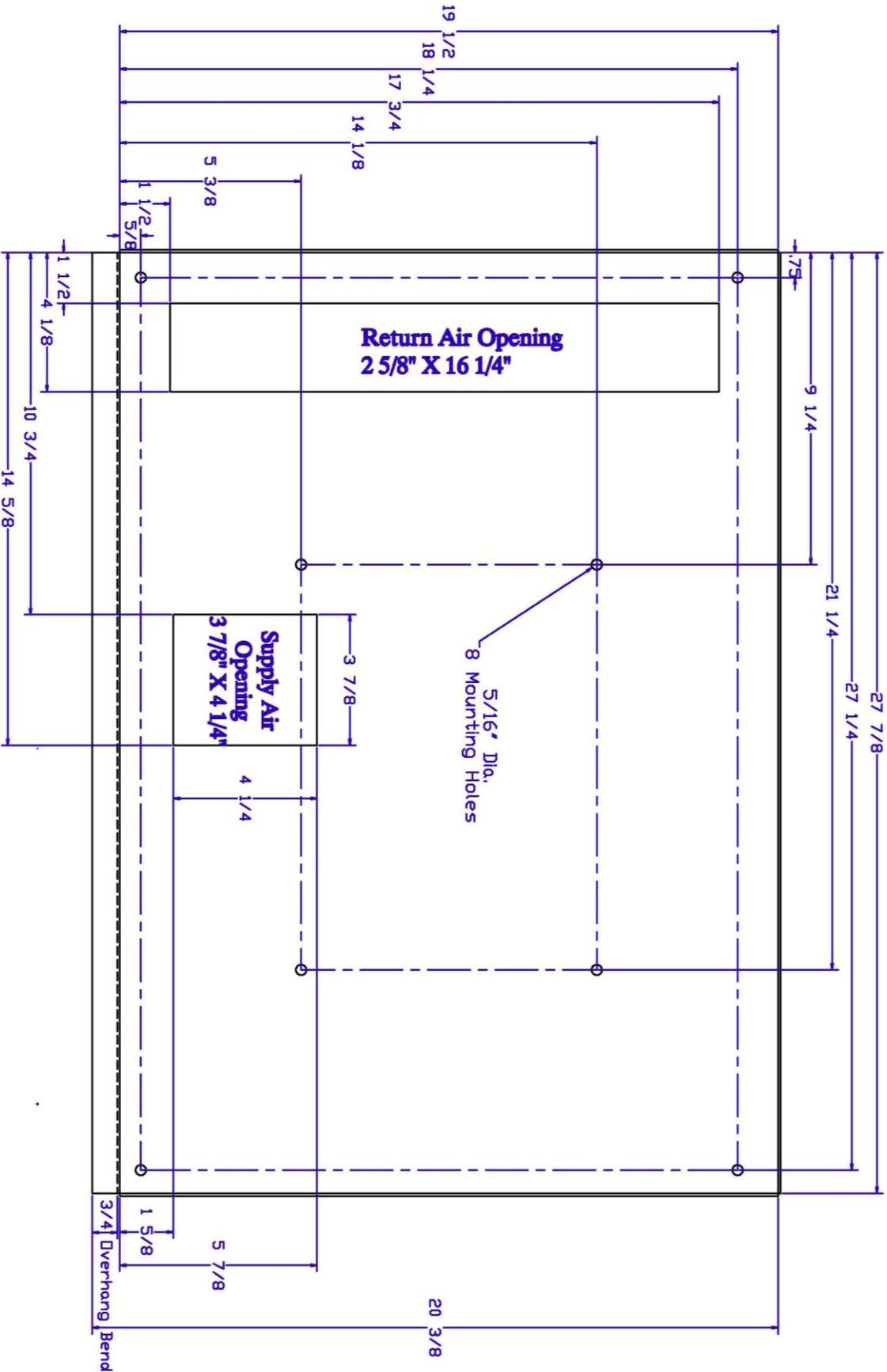
5. To turn the MacBone unit off, you may leave the toggle switch in the left or on position and simply pull the blue handle down to the horizontal position. As the blue handle is moved to reduce fan speed, at about 1/3 fan speed, a micro switch will turn the compressor off. When the unit is restarted, as the blue handle is pushed toward vertical, at about 1/3 fans speed, the micro switch will turn the compressor back on.

- VERY IMPORTANT -

Please get in the habit of turning the MacBone unit off before stopping the vehicle's engine. If you don't, when the engine is restarted, the unit will come on line with full torque on all of the drive components which is an abusive procedure. In your truck, you can wind up the engine and drop the clutch but it's dumb to do so. Same with the air conditioning unit. Make sure it's off, blue handle horizontal, before starting the engine and then bring the unit on line slowly.

SPECIFICATIONS & DIAGRAMS

Refer to the drawings following this page.



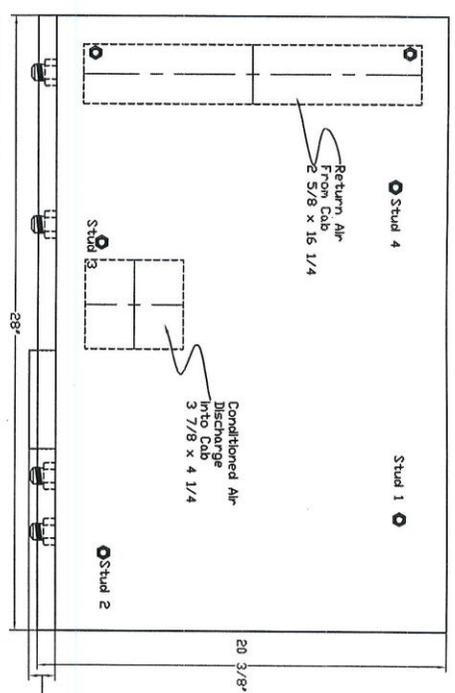
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DRAWN BY: JDR		8790 PARK CENTRAL DR. RICHMOND, VA. 23227	
APPROVED BY: LJC		INDUSTRIES LTD.	
DATE: 1/26/09		Macone	
STATUS: CURRENT		8790 PARK CENTRAL DR. RICHMOND, VA. 23227	
MHV16 Series Subbase		Macone	

MODEL: MHV16
Hydraulically Driven Air Conditioning Unit, Side or Vertically Mounted, Providing Operator's Cab Cooling, Heating, Dehumidification, Ventilation and Pressurization.

MODEL: MHV16
Operating on Constant Drive Oil Volume,
16,000 BTU/s/HR Cooling; 18,000 Heating

The MHV series units may be operated from a constant volume (continuous flow) drive oil source, typically a fixed volume, dedicated pump driven at a constant speed delivering 3.25 GPM at pressures from 100 to 2900 PSI. With corresponding loss of hydraulic system efficiency, more flow, up to 6 GPM, is acceptable since the unit's integral speed controller is a priority valve. This valve is operator accessible and is used to control the unit's fan speed. Cooling is controlled by a toggle switch and a comfort thermostat adjustable from 60°F to 90°F.

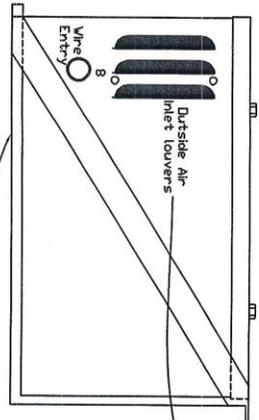
For constant volume operation, see Ports 4 and 5 together and back to the tank. Case drain, Port 6, should be a separate line back to tank. Install a relief valve in the supply line to Port 3, set at 3250 psi, and sized to handle maximum pump flow.



MODEL: MHV16
Operating on Constant Drive Oil Pressure,
16,000 BTU/s/HR Cooling; 18,000 Heating

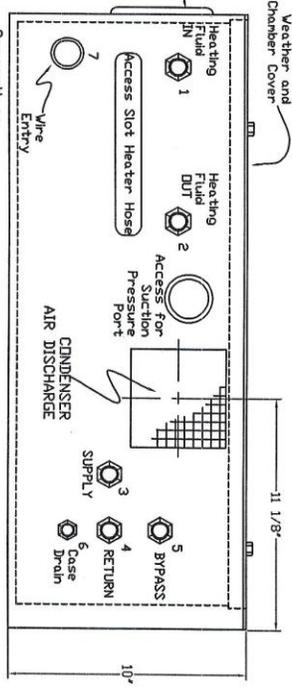
The M series units may be operated from an already installed "constant" or compensated pressure drive oil source with its pressure typically maintained by a variable volume pump. The unit's operator accessible fan speed controller, with the bypass port blocked, functions as an adjustable flow regulator, which allows drive oil to flow from zero to 3.25 GPM. For full speed and capacity the pressure required is 2900 PSI. Higher pressures to a maximum of 4000 PSI are acceptable but hydraulically less efficient. Lower pressure will result in lower unit speed and less cooling capacity. The low pressure limit is about 1600 PSI, which will deliver about 8,000 BTU/s/HR. Cooling is controlled by a toggle switch and a comfort thermostat adjustable from 60°F to 90°F.

For constant pressure operation, cap the bypass port 5, route port 4 back to tank. Case drain, port 6, should be a separate line back to tank.



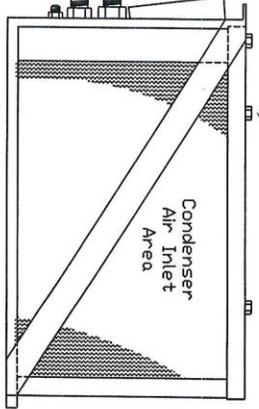
Options:
- Auxiliary remotely mounted outside air filter.
- 75 cm cab pressurizer and filter.
- Condenser air filter.

SUB-BASE PERMANENTLY ATTACHED TO CAB SIDE



- Connections:**
1. Heating Fluid INLET to Unit from Engine #8 45° Male Flare, Brass.
 2. Heating Fluid RETURN from Unit to Engine #8 45° male Flare, Brass.
 3. Drive Oil Supply #6 male JIC Flare.
 4. Drive Oil Return #6 male JIC Flare.
 5. Control Valve Bypass Oil Return #6 male JIC Flare.
 6. Case Drain #4 male JIC Flare. Case Drain must be connected directly to tank without restriction.
 7. Bushing for JIC Control Power Wire, 12 amps @ 12 VDC or 6 amps 24 VDC. With P75-1 Filter/pressurizer, 50 AMPS.
 8. Bushing for P75-1 Pressurizer wiring.

Specifications:
Total Weight: 104 lbs., R134A Refrigerant, 9.0 oz. ± 1/2 oz.
Side Mount, 16,000 BTU/s/HR. Cooling, 18,000 BTU/s/HR. Heating, 550 CFM
325 GPM at Full Speed, 2900 PSI at Full Output



MacBorne "M" Series Air Conditioner

January 2009

Approved by LDC
Not to Scale

MacBorne
INDUSTRIES LTD.
8790 PARK CENTRAL DR., RICHMOND, VA. 23227

DRAWING NO: MHV1002