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SERVICE, OPERATING, MAINTENANCE AND PARTS MANUAL FOR V-5Esc/HP-185T3A HYDRAULIC VIBRATORY PILE DRIVER/EXTRACTOR SYSTEM

Proposition 65

WARNING
THIS PRODUCT MAY CONTAIN OR EMIT CHEMICALS SUCH AS DIESEL ENGINE EXHAUST AND SOME OF ITS CONSTITUENTS THAT ARE KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS, AND OTHER REPRODUCTIVE HARM.

OCCUPATIONAL HEALTH WARNINGS:

1. Construction equipment frequently operates at very high sound levels. Such sound levels can be harmful to the human hearing system. Sustained exposure to such high sound levels can permanently impair one's hearing. **Hearing protection should be worn by anyone and everyone within close proximity to a Vibratory Pile Driver/Extractor System.**

2. Do not install, operate, or service the V-5Esc until having thoroughly read this manual and having received instructions from an MKT factory authorized service representative or properly trained, experienced operator. **Make this manual available to all persons responsible for the operation, installation, servicing and maintenance of this product. Also wear proper clothing and personal protection equipment such as, safety shoes, safety goggles, hearing protection and hard hat.**

MANUAL NUMBER 101202

MKT MANUFACTURING, INC.
STANDARD NEW PRODUCT WARRANTY

EXPRESS LIMITED PARTS WARRANTY FOR NEW PRODUCTS

MKT MANUFACTURING, INC. ("MKT") warrants to the first user ("User") of any new product (whether such new product is sold directly to the customer by MKT or through a distributor) that such new product will be free from defects in material or workmanship for a period of ninety (90) days beginning on the date that such new product is delivered to the User. This Express Limited Parts Warranty ("Warranty") applies only to the first User of the new product, and not any subsequent users, regardless of whether such subsequent user becomes the owner of the new product or uses the product within such ninety (90) day warranty period. In no event shall this Warranty extend for more than twelve (12) months from the date that MKT ships the product, whether to a User or to a distributor which may or may not use the product. This Warranty applies to new products only. This Warranty is subject to the following terms and conditions.

If User believes that the product has a defect in the materials or workmanship, User shall send notice of such defect in writing to MKT within the ninety (90) day warranty period. MKT shall have the right to inspect the product for defects, and any parts which appear to MKT upon inspection to have been defective in material or workmanship shall be repaired or replaced at MKT's option. MKT shall have no other liability to User except for such repair or replacement of those parts determined to be defective. Such repair or replacement parts shall be provided at no cost to the User at such location and during such hours as determined by MKT. This Warranty shall not apply to component parts or accessories of products not manufactured by MKT, or to normal maintenance of the product or to normal maintenance parts required therefor. Replacement or repair parts installed in the products covered by this Warranty are warranted only for the remainder of the Warranty as if such parts were original components of said product. **EXCEPT AS EXPRESSLY SET FORTH IN THIS WARRANTY, MKT MAKES NO OTHER WARRANTIES, AND FURTHER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.**

THIS WARRANTY IS NOT APPLICABLE TO ANY ITEM WHICH MKT SELLS THAT IS WARRANTED DIRECTLY TO THE USER BY THE MANUFACTURER OF SUCH ITEM (IF SUCH MANUFACTURER OF SUCH ITEM IS NOT MKT).

MKT EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES WITH RESPECT TO THE MANUFACTURE OR SUPPLY OF THE PRODUCT.

MKT shall not be liable to User or any third party for any loss of profits, loss of use, interruption of business, or any indirect, incidental, special, punitive or consequential damages of any kind whatsoever related to the product or the use or operation of the product. In particular, MKT assumes no liability for the results of User and its affiliates based on User's use of the products furnished by MKT. The maximum total liability of MKT shall be limited to the cost of those parts which MKT has agreed to repair or replace. This limitation applies to all causes of action in the aggregate, including without limitation, breach of contract, breach of warranty, negligence, strict liability, misrepresentations, and other torts. In any jurisdiction in which the above limitations of liability are restricted, MKT's liability is limited to the greatest extent permitted by law.

Notwithstanding anything in this Agreement to the contrary, MKT shall not be responsible for any costs or charges of User and/or any third party, including but not limited to transportation charges, shipping costs, cost of installation, duty, taxes or any other charges whatsoever including but not limited to any charges or damages due to any delays. If requested by MKT, products or parts for which a warranty claim is made are to be returned transportation prepaid to MKT at MKT's home office. Any improper use, including operation after discovery of defective or worn parts, operation beyond rated capacity, substitution of parts not approved by MKT, or any alteration or repair by others in such manner as in MKT's judgment affects the Product materially and adversely, shall void this Warranty.

NO EMPLOYEE OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY UNLESS SUCH CHANGE IS MADE IN WRITING AND SIGNED BY AN OFFICER OF MKT AT ITS HOME OFFICE.

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I. INTRODUCTION

This manual is exclusively for the MKT V-5Esc Hydraulic Vibratory Pile Driver/Extractor System. The manual for the Rototilt mounting system that attaches the V-5Esc to the excavator is included with this manual. **It is your responsibility to read and understand this manual, the Rototilt/Indexator manual, and the excavator manufacturer's manuals before operating this hydraulic construction tool. Make the following points part of your regular workday.**

- Know the limitations and operating characteristics of the Vibratory Pile Driver/ Extractor System.
- Inspect the V-5Esc before each use as specified in this manual and by your employer.
- NEVER use attachments that are not approved by the manufacturer.
- NEVER remove or modify any parts of the equipment.
- Know the location of other personnel and equipment and make sure they are at a safe distance before operating.
- All visitors or other personnel in the immediate area of operating equipment must wear all necessary personal protective equipment.

The MKT V-5Esc Hydraulic Vibratory Pile Driver/Extractor System is used for installing or removing piling. The five major components of an MKT Vibratory Pile Driver/Extractor include rotating eccentric weights housed in a gear box that generate the vibratory forces to the pile, an elastomer suspension system to isolate the vibratory forces from the excavator, a bottom hydraulic clamp and side clamp system to grip the pile and Rototilt system to position the hammer.

There are two rotating eccentric weights in the V-5Esc mounted in special heavy duty spherical roller bearings. A fixed displacement gear-type hydraulic motor is used to drive one of the eccentric weights. The second eccentric weight is, in turn, gear driven and timed off the first weight.

When operating within its load capabilities, the **V-5Esc** vibratory is designed to deliver a driving force of about **53 tons** to a pile at a rate of **1,700 vibrations per minute**.

II. SAFETY INSTRUCTIONS

⚠ DANGER

FAILURE TO COMPLY WITH THE FOLLOWING SAFETY INSTRUCTION AND LOCAL REGULATIONS WILL RESULT IN PROPERTY DAMAGE, SEVERE INJURY OR DEATH.

The following safety instructions are contained in the text of this manual. Read the entire manual before operating the hammer. Remember SAFETY IS UP TO YOU! Good safety practices not only protect you but also protect the people around you.

The following signal words will be found in this manual and may also be found in other manufacturer's manuals. These words are intended to alert the operator to a hazard and the degree of severity of the hazard.

⚠ DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION indicates a hazardous situation which, if not avoided, could result in minor injury or moderate injury.

NOTICE **indicates a property damage message.**

1. **⚠ DANGER For each lift the operator must review the excavator lifting capacity to determine that the weight of the hammer/ Rototilt assembly plus the load being lifted is within the rated capacity of the excavator.**
2. **⚠ WARNING Check that all personnel are clear of the V-5Esc unit prior to start up.**
3. **⚠ DANGER Keep hands clear of all three clamps at all times.**
4. **⚠ DANGER Always use pile handling/ safety line to attach the pile to the hammer.**
5. **⚠ DANGER Leave the pile handling/ safety line attached to the pile at all times if the pile is not stuck securely in the ground.**

6. **⚠ DANGER The V-5Esc side clamp attachment is designed to handle a single pile with a MAXIMUM weight of 2 tons. Appropriate pile handling rigging should be supplied by the end user to handle the pile in a safe manner. Attach safe handling cable(s) to lifting eye(s) on the hammer to allow for pile placement in the jaws as shown in figure 1.**

7. **⚠ CAUTION Before closing the jaws of the bottom clamp, assure that the pile head is firmly against the clamp housing. Gripping the pile with merely the lower end of the jaws will damage the jaws, the clamp slide and/ or other clamp assembly components.**

8. **⚠ DANGER Stand a safe distance away from the pile and from below the V-5Esc hammer during vibrating operations. Any unobserved or unconnected, loose nut or other fastener may fall.**

9. **⚠ DANGER Do not unclamp the jaws from the pile while the hammer is vibrating.**

10. **⚠ WARNING Do not pull in excess of the rating of the V-5Esc hammer's suspension assembly or excess stresses will be put on the suspension assembly damaging one or more parts.**

11. **⚠ CAUTION Whenever the V-5Esc hammer is observed "dancing or chattering" in place, it should be hoisted until the action stops. Failure to move a pile with the hammer "dancing or chattering" should be cause to promptly abandon the effort before serious damage is done to the hammer. To continue operations the obstruction must be removed or penetrated by switching to another driving system such as a larger vibro or a MKT diesel or air pile hammer.**

IMPORTANT SAFETY INFORMATION

Virtually all accidents that involve product operation, maintenance and repair are caused by failure to keep fundamental safety rules or precautions. An accident can often be avoided by identifying potentially unsafe situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly. Do not operate or perform any lubrication, maintenance or repair on this equipment until you have read and understand the applicable information in the Operation and Maintenance Manual.

MKT cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in the manuals and on the equipment are therefore not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended by MKT is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the equipment will not be damaged or made unsafe by the operation, lubrication, maintenance or repair procedures you choose.

The information, specifications, and illustrations in the manuals are based on information available at the time it was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service given to the product. Obtain the complete and most current information before starting any job. MKT and MKT distributors have the most current information available.

GENERAL HAZARD INFORMATION

Use caution when removing filler caps, grease fittings, pressure taps, breathers or drain plugs. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure.

Wear a hard hat, protective glasses, hearing protection and other protective equipment as required by job conditions.

Do not wear loose clothing or jewelry that can catch on controls or other parts of the equipment.

Make certain all protective guards and covers are secured in place.

Use all cleaning solutions with care.

Never put maintenance fluids into glass containers since glass containers can break.

Report all needed repairs.

UNLESS INSTRUCTED DIFFERENTLY, PERFORM ALL MAINTENANCE AS FOLLOWS

Stop the hammer or drill. Stop the engine.

Disconnect the battery whenever performing any maintenance or before servicing the electrical system. If the engine has electric starters, disconnect and tape the battery ground leads to prevent accidental starting.

Do not attempt any repairs or adjustments to the engine or hammer or drill while it is running.

Do not attempt repairs you do not understand. Use proper tools; replace or repair broken or damaged equipment.

Block or restrain the equipment, if applicable before operating or performing maintenance.

Do not adjust, or set, hydraulic pressures higher or lower than those specified in the manual.

PRESSURIZED AIR AND WATER

Pressurized air can cause personal injury. When using pressurized air for cleaning, wear a protective face shield, protective clothing and protective shoes.

The maximum air pressure must be below 30 psi (205 kPa) and maximum water pressure must be below 40 psi (275 kPa) for cleaning purposes.

FLUID PENETRATION

Wear eye protection at all times when cleaning the cooling system. Pressurized water could cause debris and/or hot water to be blown and result in personal injury.

Always use a board or cardboard when checking for a leak. Escaping fluid under pressure, even a pin-hole size leak, can penetrate body tissue, causing serious injury or possible death.

If fluid is injected into your skin, it must be treated by a doctor familiar with this type of injury immediately.

HOSES, LINES, AND TUBES

Do not pull on, or attempt to move equipment, with hydraulic hoses. Move power unit closer to work if hoses do not reach.

Do not operate this equipment with hydraulic hoses that are damaged or kinked. Replace damaged hoses immediately.

Do not lift, or support, hydraulic hoses with wire rope slings.

Do not pull kinks in the hoses. Kinks will reduce the hose safety factor by 50 percent.

Do not bend or strike high pressure lines. Do not install bent or damaged lines, tubes or hoses.

Repair any loose or damaged fuel and oil lines, tubes and hoses. Leaks can cause fires.

Inspect all lines, tubes and hoses carefully. Do not use your bare hands to check for leaks. Tighten all connections to the recommended torque.

Check for the following:

- **End fittings damaged, leaking or displaced.**
- **Outer covering chafed or cut and wire reinforcing exposed.**
- **Outer covering ballooning locally.**
- **Evidence of kinking or crushing.**

Make sure that all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts, and excessive heat during operation.

OILS

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact the skin.

FIRE OR EXPLOSION PREVENTION

All fuels, most lubricants, hydraulic oil, and some coolant mixtures are flammable.

Diesel fuel is flammable. Gasoline is flammable. The mixture of diesel and gasoline fumes are extremely explosive.

Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

Clean and tighten all electrical connections. Check regularly for loose or frayed electrical wires. Refer to maintenance schedules for interval. Have all loose or frayed electrical wires tightened, repaired or replaced before operating the equipment.

Wiring must be kept in good condition, properly routed and firmly attached. Routinely inspect wiring for wear or deterioration. Loose, unattached, or unnecessary wiring must be eliminated. All wires and cables must be of the recommended gauge and fused if necessary. Do not use smaller gauge wire or bypass fuses. Tight connections, recommended wiring and cables properly cared for will help prevent arcing or sparking which could cause a fire.

FIRE EXTINGUISHER

Have a fire extinguisher available and know how to use it. Inspect and have it serviced as recommended on its instruction plate.

CRUSHING OR CUTTING PREVENTION

Support equipment and attachments properly when working beneath them.

Never attempt adjustments while the engine is running unless otherwise specified in this manual.

Stay clear of all rotating and moving parts. Guards should be in place whenever maintenance is not being performed.

Keep objects away from moving fan blades. They will throw or cut any object or tool that falls or is pushed into them.

Wear protective glasses when striking objects to avoid injury to your eyes.

Chips or other debris can fly off objects when struck. Make sure no one can be injured by flying debris before striking any object.

MOUNTING AND DISMOUNTING

Do not climb on, or jump off the equipment or stand on components which cannot support your weight. Use an adequate ladder. Always use steps and handholds when mounting and dismounting.

Clean steps, handholds and areas of the equipment you will be working on or around.

BEFORE STARTING HAMMER OR DRILL

Make sure that all lifting equipment, including cranes, wire rope, slings, hooks, shackles, etc., are properly sized for the worst case loads anticipated during operations. Check wire rope clips for tightness, and check wire ropes for wear daily.

If there are any questions about the weights, specifications, or performance of the hammer or drill, contact MKT before handling or operating the equipment.

Do not attempt to connect the quick-disconnect couplers when the power unit is running.

Make sure that ground vibrations will not damage adjacent structures or excavations.

Make sure no one is working on or close to the equipment before starting.

HAMMER OR DRILL OPERATION

Only well trained and experienced personnel should attempt to operate or maintain this equipment.

Do not stand any closer to this equipment than necessary when it is in operation. Parts may loosen and fall. Piling may shatter or break.

Do not operate the hammer, crane boom, piles, leads, wire rope and other equipment within 15’ (5m) of electrical power lines, transformers and other electrical equipment, or within such distance as required by applicable safety codes.

Do not side-load crane boom or hammer. Dangerous crane boom or hammer damage may result. Always be sure that the crane line is aligned with the centerline of the pile.

III. SPECIFICATIONS

SPECIFICATIONS FOR THE V-5ESC/HP-185T3A VIBRATORY PILE DRIVER/EXTRACTOR SYSTEM

A. OPERATING DATA - V-5Esc DRIVER/EXTRACTOR

Free Hanging Frequency	1700 CPM
Rated Drive Pressure	3000 PSI
Rated Flow	75 GPM
Free Hanging Amplitude	3/4 IN
Driving Force @ 1700 CPM	53 TONS
Clamp Circuit Pressure	2500 PSI
Clamping Force @ 2500 PSI	62 TONS
Maximum Pull Force (8 Shear Blocks)	30 TONS
Maximum Pull Force with Side Clamp Assembly	15 TONS
Maximum Suspension Crowd with Side Clamp Assembly	15 TONS
Standard Clamp Jaw Opening	1.25 IN
Clamp Cylinder Travel	2 IN
Side Clamp Jaw Opening	3 IN
Net Weight	6,200 LBS
Net Weight with Side Clamp and Roto Tilt	10,000 LBS
Maximum Pile Weight	4,000 LBS

B. OPERATING DATA - HP-185T3A HYDRAULIC POWER UNIT

Diesel Engine	DEERE 6068HF185T3
Engine Operating Speed	2100 RPM
Electrical Control & Diesel Starting	12 V.D.C.
Diesel Fuel Capacity	55 GAL.
Hydraulic Fluid Tank Capacity	120 GAL
Hydraulic Hose Capacity	20 GAL
Net Weight With Oils	5750 LBS.
Length	114 IN
Width	52 IN
Height	75 IN

C. HOSE BUNDLE (100’ TOTAL LENGTH)

4 Pieces - 50 ft.	1 1/4” I.D. Motor Line (4100404)
4 Pieces - 50 ft.	3/4” I.D. Clamp Line (4100415)
2 Pieces - 50 ft.	3/4” I.D. Drain Line (4100426)

*NOTE: Frequency and engine RPM are set to maximize performance on a normal pile, and normal duty cycle. Should overheating occur to either exciter or engine due to high duty cycle, it is important that the unit be stopped and allowed to cool down. If overheating persists, reduce engine speed 100 to 200 RPM and monitor temperature. If exciter temperature remains high (above 180 degrees Fahrenheit), contact your Factory Authorized Distributor for assistance.

IV. EXCAVATOR REQUIREMENTS

A. The excavator size, stick width and pin dimensions must be compatible with the Rototilt width and pin dimensions.

B. The excavator must be equipped with a uni-directional auxiliary circuit that can supply 80 gpm to the V-5Esc at 3,000 psi. The auxiliary circuit flow must have priority over the boom and stick functions, or greater flow and additional modifications may be required to maintain hammer speed when operating boom or stick functions. If excavator is not equipped with priority flow auxiliary circuit, hammer speed will decrease when boom, stick or bucket function is activated.

C. The auxiliary hydraulic circuit must supply at least 80 gpm and must flow oil in one direction only (uni-direction), it cannot have reverse flow, or damage to the V-5Esc hydraulic manifold may result. The circuit should be controlled by an electric on/off switch, not a bi-directional foot pedal

D. The excavator must have adequate lifting capacity to lift the combined weight of the hammer and pile at the required working radius.

E. **⚠ WARNING** The Rototilt RT80 has a maximum connecting pin size of 90mm and a maximum digging force of 44,960 lbs. If using an excavator with larger than 90mm pins or more than 44,960 lbs of digging force you must reduce the pin size to 90mm and lower the digging force to 44,960 lbs. Consult your excavator supplier for the proper way to make these modifications.

V. SYSTEM SET-UP INSTRUCTIONS

A. HP-185T3A HYDRAULIC POWER UNIT

The HP-185T3A Hydraulic Power Unit is assembled on a Skid Base which also serves as a fuel tank. The skid base is fitted with a steel lifting bail with a lifting eye. The power unit is thus designed to be lifted by a crane line using a chain of adequate strength. Locate the HP-185T3A Power Unit on firm ground with an unobstructed operator view to the intended operation of the V-5Esc hammer.

B. CONNECTION OF HOSES

All V-5Esc hammers are thoroughly tested at the factory and consequently all hoses will be filled with hydraulic fluid. Generally, the hose bundle assembly filled with oil, is disconnected from the hydraulic power unit. Therefore, it is necessary when reconnecting to make the correct hose connections to the power unit. There are five hoses in the bundle, each 100 feet long, two 1-1/4” I.D. lines for the hydraulic motor, two 3/4” I.D. lines for the hydraulic clamp assembly and one 3/4” I.D. line for the case drain. Hose connections at the hydraulic power unit are made easily by quick disconnects with check valves. If hoses are replaced or are otherwise unfilled with oil, take necessary steps to fill them before starting the hammer.

1. When the hoses are attached to the vibratory unit, care should be made to have the bundle hanging free. Extreme care should be made at all times not to kink any of the hoses.

   As an example, the motor line 1-1/4” I.D. hoses have a minimum bend radius of 16-1/2”. Even though these hoses have a minimum bursting pressure of 12,000 PSI, a kink will weaken the multiple spiral wire wrap reinforcement and ruptures could result at high operating pressures.

   Any damaged hose within the hydraulic power unit hose bundle or vibratory hammer should be replaced with a hose of equivalent ratings.

2. Before making any hydraulic hose connections, assure that the connectors are wiped clean of any dirt or contamination to prevent damage to the components in the hydraulic system.

3. Do not permit mobile equipment to run over the hydraulic hose bundle. The hydraulic hose in the bundle, even though filled with hydraulic oil, is not able to withstand external compression forces.

4. The ends of the hoses in the hose bundle should be carefully wiped clean and connected, according to size, to the short hoses which are part of the V-5Esc Assembly.

5. Make it a habit whenever hydraulic lines are subsequently disconnected to immediately cap or plug them to avoid becoming dirty and introducing contamination, into and damage to, the components of the hydraulic system. Assure that the caps and plugs are wiped clean of any dirt or contamination before using.

C. V-5Esc DRIVER/EXTRACTOR

The V-5Esc hammer is factory fitted with its suspension assembly and is shipped flat on its side. It is designed to receive a 7/8” multiple loop wire rope sling properly sized and clamped to provide a factor of safety of five times the 30 ton maximum line pull capacity of the hammer, which in turn, can be slipped over a lifting crane hook. The V-5Esc hammer can be lifted from the horizontal to the vertical without danger of excessive stresses upon its connecting parts or structure.

1. Hanging in the air, the V-5Esc hammer should be hoisted, swung, and rotated to assure that the hose bundle hangs free of any loops or entanglements.

2. Manipulating the V-5Esc hammer in the air during the foregoing procedure, as well as later when setting the hammer upon a pile, will be made possible by fastening a ground handling rope to one of the V-5Esc Clamp Jaw Shields before hoisting the hammer aloft.

D. V-5Esc JAW SHIELDS

The Jaw Shields are generally shipped connected to the V-5Esc Clamp Assembly. Before using the V-5Esc, assure that the Jaw Shields are tightly connected (each with four hex head cap screws and lock washers) to the V-5Esc Clamp Assembly. The Jaw Shields not only act as guides for positioning the V-5Esc on a standing pile, but are also necessary to protect the jaws and the clamp assembly from unnatural impact shock and resulting damage.

VI. START-UP PROCEDURES

A. ENGINE FLUIDS

Make all lubricant, fuel, radiator, and preventive maintenance checks recommended in the Engine Manufacturer's Operating and Maintenance Manual before starting the diesel engine.

B. HYDRAULIC FLUID

Check the level of the hydraulic fluid in the reservoir on the HP-185T3A Power Unit. Do not operate the HP-185T3A with the hydraulic oil level below the gauge. If hydraulic fluid must be added to the system, do not allow foreign matter to enter the hydraulic system and use proper hydraulic oil for the HP-185T3A system. See the lubricant and hydraulic fluid requirements for the V-5Esc/HP-185T3A system.

C. HYDRAULIC VALVES

The hydraulic valves in the HP-185T3A Power Unit have already been set for proper pressures during the factory break-in and operation of the V-5Esc/HP-185T3A system. **DO NOT MAKE ADJUSTMENTS TO THE VALVES WITHOUT THE ASSISTANCE OF A FACTORY TRAINED SERVICE REPRESENTATIVE.**

The hydraulic return line filter is located on the back side of the hydraulic reservoir. The filter has a full size bypass valve that protects the filter element and system with a minimum of pressure loss. Therefore, the filter, as it becomes clogged, will bypass contaminated oil to the tank. Frequent changes of the filter element will be required.

D. HYDRAULIC SYSTEM CIRCUITRY

The repetitive functions to be performed hydraulically for the operation of the V-5Esc hammer are to clamp onto a pile, vibrate the pile, stop vibrating, and unclamp from the pile. A basic open loop hydraulic circuit has been used with a single pump performing both clamping and vibrating operations. The principle of using one pump is dependent on a clamping hydraulic cylinder that has an integrated holding pressure check valve, meaning once the pressure has been applied and immediately removed, the pressure will be locked into the cylinder. The hydraulic control valve consists of an inlet section with a pressure relief cartridge, a motor work section, a cylinder work section with work-port relief, and an outlet section.

The hydraulic fluid from the reservoir passes through the suction strainer and manual shutoff valve. **THE SHUTOFF VALVE SHOULD BE USED FOR MAINTENANCE PURPOSES ONLY.** The flow from the reservoir continues through a suction hose and enters the gear-type pump. After the flow leaves the hydraulic pump it enters the directional control valve which will be used to operate either the clamp circuit or vibrate circuit. A quick and full movement of the right-hand control lever will operate the clamp close cylinder in a short amount of time. This control lever will spring back to the neutral position and by the use of a pilot operated check valve, maintain clamping pressure. The second control lever will operate the vibrate circuit. This control lever is detented and may only be pulled toward the operator or pushed to the neutral position.

Warm oil returning from the control valve back to the tank will be directed through an oil cooler then a return line filter before entering the tank. Cool oil will select a path which will bypass the oil cooler and enter the tank through the return line filter.

E. CHARACTERISTICS OF THE V5C/HP-185T3A

The dynamic force generated by the V-5Esc hammer will vary according to the operating frequency. The two eccentric weights in the hammer are fixed in size and the resulting dynamic force of the hammer is directly proportional to the square of the frequency. The power of the hammer is generally referred to as the hydraulic flow and pressure of the hydraulic motor. The drop in hammer frequency while driving a pile is mainly a result of both motor and pump losses at elevated pressures, some engine speed droop, and oil passing over the system relief valve.

The hydraulic power unit engine speed determines pump flow. The recommended engine operating speed is 2100 RPM, and the maximum operating drive pressure is 3000 PSI at the power unit. As the hammer resistance is increased calling for higher pressure, hydraulic oil may pass over the relief valve causing the hammer to slow down.

VII. OPERATING INSTRUCTIONS

DRIVING MODE

A. OPERATING THE V-5Esc SYSTEM - DRIVING MODE

1. First, check that the lifting capacity of the excavator, at the working radius, exceeds the combined weight of the V-5Esc assembly and the pile. Then, lift the pile using an appropriately sized cable between the pad eye on the suspension assembly and the lifting hole in the pile. (Refer to figures 1 and 2). Once the pile is hanging nearly vertical, guide it into the hammer jaws or thread the pile into an already driven pile. Position the jaws on the pile (see figure 2) and close the jaws and start the hammer. The vibration, coupled with the down crowd force of the excavator drives the pile. Do not exceed the down crowd force rating.

   ⚠ DANGER Always use the pile handling/ safety line to attach the pile to the hammer.

2. Cut pile handling holes 2ft. or more above center of the pile on either side of center as required to position pile in jaws as shown in figure 1.

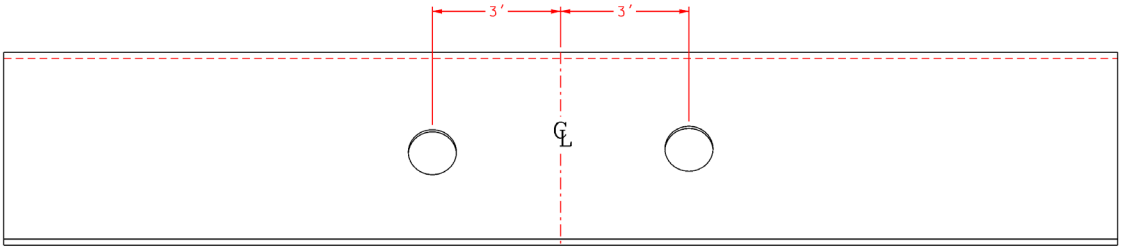


Figure 1

3. The worksite needs to be level to maximize the speed of handling and driving the pile.

4. As soon as headroom allows, move the pile to the bottom clamp to maximize driving speed.

5. The side clamp jaws are intended to be used to start and drive the pile in soft driving conditions. For best results and longer hammer life, the bottom clamp should be used whenever possible. When using the side clamps, line pull should be limited to 15 tons and crowd force limited to 10 tons. If the side clamp jaws slip on the pile stop the hammer and move to the bottom clamp.

6. The V-5Esc will vibrate with the jaws opened or closed. **NOTICE Do not start hammer with jaws open.**

7. **⚠ WARNING Always maintain proper vertical alignment between the suspension and pile when driving or pulling the pile.**

8. Occasionally the inability of the V-5Esc hammer to continue to move a pile will be the result of the pile striking an impenetrable soil material or an obstruction. The observable action of the V-5Esc hammer and clamped pile will be to note a considerable fall-off of drive pressure and the exciter will “dance” in place often causing erratic interaction of the V-5Esc exciter and its suspension assembly. If the V-5Esc is mounted to an excavator or backhoe do not apply more crowd force than the maximum recommended.

⚠ CAUTION Whenever the V-5Esc hammer is observed “dancing or chattering” in place, it should be hoisted until the action stops. Failure to move a pile with the hammer “dancing or chattering” should be cause to promptly abandon the effort before serious damage is done to the hammer. To continue operations the obstruction must be removed or penetrated by switching to another driving system such as a larger vibro or a MKT diesel or air pile hammer.

⚠ DANGER For each lift, the operator must review the excavator lifting capacity to determine that the weight of the V-5Esc/Rototilt assembly plus the load being lifted is within the rated capacity of the excavator.

⚠ DANGER Keep hands clear of all three clamps at all times.

⚠ DANGER Leave the pile line attached to the pile at all times that the pile is not stuck securely in the ground.

⚠ DANGER The V-5Esc side clamp attachment is designed to handle a single pile with a MAXIMUM weight of 2 TONS. Appropriate pile lifting rigging should be supplied by the end user to handle the pile in a safe manner. Attach cable(s) to lifting eye(s) on the hammer to allow safe handling of the pile and placing it in the jaws as shown in figure 2.

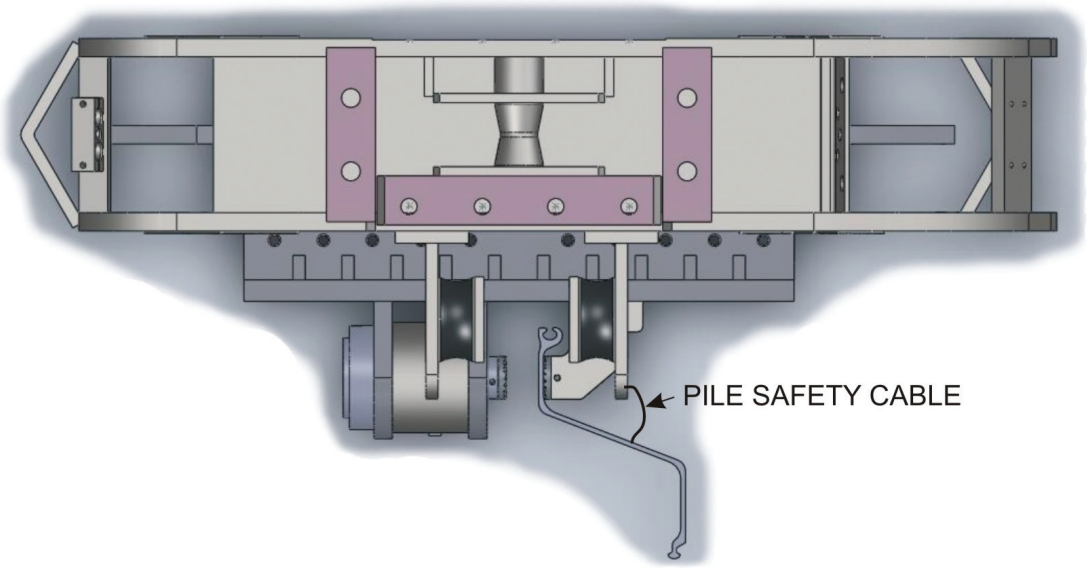


Figure 2

EXCAVATOR MOUNT

B. OPERATING THE V-5Esc SYSTEM - EXTRACTING MODE

1. For pile extracting operations, the V-5Esc hammer should be fitted with a shackle and an auxiliary line attached to the pad eye on the suspension assembly. The V-5Esc hammer is clamped to a steel sheet pile to be pulled and the auxiliary line is fastened into a lifting hole in the pile. The V-5Esc hammer is operated to extract the pile until the pile can be easily lifted out of place exclusively by the extraction force of the excavator. The V-5Esc hammer is then stopped by pushing the vibrate lever to neutral. The pile is pulled out of the ground and the hammer and pile are swung to where the pile will be stacked. The lower end of the pile is set on the ground and the V-5Esc hammer jaws are opened allowing the pile to hang by the line and shackle. The V-5Esc hammer and pile are then lowered to the ground where the line is disconnected from the pile.

2. The side clamp jaws are intended to be used to pull the pile in soft extracting conditions. For best results and longer hammer life, the bottom clamp should be used whenever possible. When using the side clamps line pull should be limited to 15 tons and crowd force limited to 10 tons. If the side clamp jaws slip on the pile stop the hammer and move to the bottom clamp.

   ⚠ DANGER Do not unclamp the jaws from the pile while the hammer is vibrating.

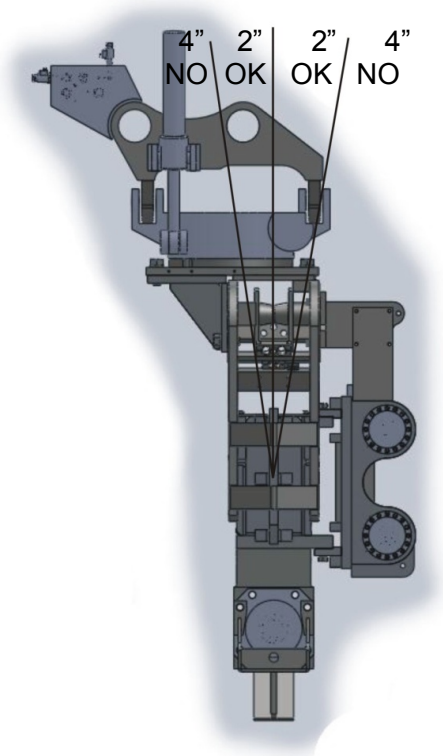
3. The amount of pull which can be exerted on the V-5Esc hammer is limited by the rating of the suspension assembly and the strength of the pile.

   ⚠ DANGER Do not pull in excess of the rating of the V-5Esc hammer suspension assembly or excess stresses will be put on the suspension assembly damaging one or more parts.

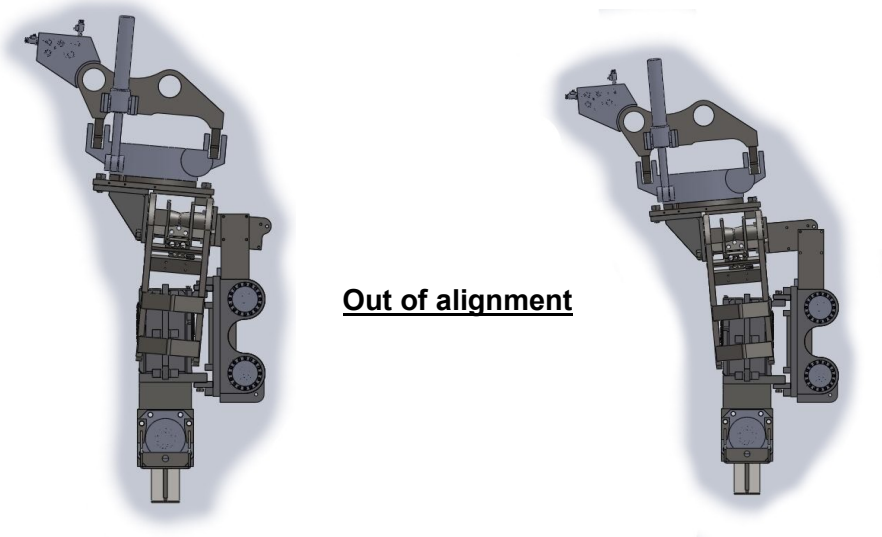
4. **⚠ WARNING Always maintain proper vertical alignment between the suspension and the pile when driving or pulling the pile.**

WARNING!

The hammer and suspension must be kept in alignment with each other, and with the pile, when driving or extracting. Failing to do so will result in damage to the jaws and clamp cylinders.



Hammer, suspension and pile inline



Out of alignment

If the jaws slip on the pile STOP DRIVING AND IDENTIFY THE PROBLEM.

VIII. MAINTENANCE AND SERVICE INSTRUCTIONS

A. The V-5Esc hammer and the HP-185T3A hydraulic power unit should be inspected regularly to help keep it in good operating condition. The time interval between necessary adjustments and repairs depends primarily on how much and how hard the machine has been used. Repair or replace broken or damaged parts as soon as they are discovered. Periodic cleaning and repainting will help keep all parts in better working order and prolong the machine's life.

B. Maintenance procedures for the diesel engine in the HP-185T3A are described in the Engine Manufacturer's Manual.

C. Properly maintaining the total V-5Esc/HP-185T3A system begins with cleanliness; assuring that no dirt or foreign material enters the hydraulic fluid circuit. Contamination of the components of the hydraulic system pumps, motors, valves, etc., will result in erratic operation, down-time, shortened equipment life, damaged parts and expensive repair or replacement parts costs.

   Return to tank oil is passed through a ten micron filter element. The factory installed filter element should be changed after first 50 hours of operation. During normal operation, the filter element change interval may range from 2 times per year or after 200 hours of operation in average atmosphere conditions.

   The hydraulic oil in the reservoir passes through a suction strainer in the tank before entering the suction line and the pump. This strainer has a bypass valve and should be cleaned whenever the hydraulic tank is serviced.

D. The hydraulic fluid level in the system should be maintained at all times. Leaks in the hydraulic system, particularly noticeable after transport and re-set-up of this system, should be eliminated by checking, tightening or replacing leaking parts . Hose connections may leak as a result of manipulating and straightening the lines and should be promptly tightened. **THE CAUSE OF HYDRAULIC LEAKS WHICH CANNOT BE CORRECTED SHOULD BE ELIMINATED BY CALLING FOR FACTORY AUTHORIZED DISTRIBUTOR SERVICE ASSISTANCE.**

   1. Check the hydraulic fluid level on the HP-185T3A tank gauge before and during operation of the V-5Esc/HP-185T3A system. **DO NOT OPERATE THE V-5Esc/ HP-185T3A IF THE HYDRAULIC FLUID REGISTERS BELOW THE TANK FLUID GAUGE.**

   2. In normal, safe operation of the V-5Esc/HP-185T3A system, the hydraulic fluid temperature should remain in its normal range of 115 degrees Fahrenheit to 165 degrees Fahrenheit. The temperature can be read on the thermometer which is integral to the reservoir fluid level gauge. **IF THE HYDRAULIC OIL TEMPERATURE BECOMES EXCESSIVE (ABOVE 180 DEGREES FAHRENHEIT), STOP OPERATIONS AND CONSULT WITH THE NEAREST FACTORY AUTHORIZED SERVICING DISTRIBUTOR.**

If the hydraulic oil approaches 170 degrees Fahrenheit when operating at maximum hammer load, just run the power unit without load and the temperature should lower.

E. Daily check all hoses in the hydraulic line hose bundle for cuts or other damage. Hoses are sometimes cut or bruised by dragging them across the pile heads while setting the V-5Esc hammer. Stop V-5Esc hammer operations that may damage hoses and redirect the hose bundle to avoid dragging and damage. Damaged hose sections must be replaced to eliminate failure and down-time during operations.

F. Inspect the V-5Esc hammer for normal hanging posture and tightened fasteners, particularly on the suspension and clamp assemblies before and during operation.

⚠ WARNING STAND AWAY FROM THE PILE AND FROM BELOW THE V-5Esc HAMMER DURING VIBRATING OPERATIONS. ANY UNOBSERVED, UNCORRECTED, LOOSE NUT OR OTHER FASTENER MAY FALL.

G. Assure that the proper lube oil level is maintained in the V-5Esc exciter case. If the level of oil is above the sight gauge or the lube oil volume is increasing, this will indicate that the hydraulic motor is leaking hydraulic fluid through the motor drive shaft seal. The seal leakage must be corrected immediately. Exciter lube oil must be changed if seal failure occurs.

H. The V-5Esc/HP-185T3A system normally has the HP-185T3A hydraulic reservoir, the hose bundle, and the V-5Esc hammer lines and components filled with hydraulic fluid. Whenever the system has been completely or partially drained (as when a new hose section is replaced in the hose bundle), the hydraulic lines must be purged of air. To purge the motor lines, connect the hoses to the V-5Esc and HP-185T3A. Run the engine at an idle speed of about 800 to 1000 RPM while pulling the hammer handle for the vibrate mode. Hydraulic fluid may have to be added to the hydraulic tank after this procedure is completed. To purge the clamp lines, bleed the hydraulic clamp cylinder at the high pressure side of the cylinder. It is not necessary to run the engine at full speed when bleeding the clamp cylinder with the clamp control lever engaged.

I. Daily Maintenance Check Lists - Check the entire unit prior to and during start-up each shift.

1. Prior to starting the engine at each shift, check as follows:

a) Make all daily lubrication and preventive maintenance checks indicated in the Engine Manufacturer's Operating and Maintenance Manual.
b) Check the hydraulic fluid level before starting the engine. Recheck this level after filling the lines to be sure it remains in the safe operating range. Do not operate the unit with the hydraulic fluid level below the gauge.
c) Visually check all hoses for signs of damage or cuts that might cause hose failure during operation. Be sure all connections are tight, especially the quick disconnects.

d) Look for any damage to the unit, in general that might cause it to fail when put into operation.
e) Be sure there is fuel in the tank.
f) Be sure there is cooling fluid in the radiator.
g) Check the V-5Esc exciter case lube oil level. With exciter cold, lube level should be mid level of sight glass.

h) Check the V-5Esc clamping jaws for excessive wear, cracks or loose fasteners. If it is necessary, the removal of the movable jaw is done by pushing out the 3/4” roll pin either up or down. The single vertical roll pin captivates the movable jaw. The fixed jaw is held tight against the housing with two one-inch bolts. Also, operating the V-5Esc on piling without the Jaw Shields could result in jaw damage if the hammer is dropped onto the pile.

2. After start up and the V-5Esc is vibrating, check as follows:

a) Inspect the hydraulic lines for leaks.

b) Inspect the oil seal areas in the pump drive and control valves for leaks.

c) Allow hydraulic oil temperature to come up slightly above the oil pour temperature, preferable to 30 degrees Fahrenheit before starting the hammer.

d) Before attaching to pile, open and close clamp jaws to verify fast and positive action.

e) Be sure that there are no kinks in the lines and that they hang uniformly.

f) Always maintain a close check on the lifting cable to assure no fraying has occurred.

g) Check for overheated bearing housings.

J. The HP-185T3A hydraulic reservoir and V-5Esc exciter case have been filled with the proper fluids at the factory. Use the following list for adding fluids which are compatible with those used at the factory:

1. **V-5Esc ExciterLube Oil**
Texaco Meropa 220 . . . . . Capacity - 8 Gallons

2. **HP-185T3A Hydraulic Fluid**
76 Ecoterra Hyd 32 . . . . . Capacity - 120 Gallons

3. **Main hydraulic filter**

   a) Change after initial 50 hours of driving time or after the hydraulic oil has been changed, sooner if contaminated or discolored.

   b) Change at least two (2) times per year or after every 200 hours of driving time, sooner if contaminated or discolored.

4. **V-5Esc exciter case lube oil**

   a) Change after every 50 hours of driving time, sooner if contaminated or discolored.

K. Normal gauge reading during operation of the HP-185T3A Hydraulic Power Unit:
   1. Engine Speed - 2100 RPM
   2. Drive Pressure - 1200 to 3000 PSI
   3. Clamp Pressure - 2500 PSI
   4. Hydraulic Oil Temperature - 115 degrees Fahrenheit to 165 degrees Fahrenheit

L. Replacement Filter Part Number Listing:

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	944 02 43	ENGINE OIL FILTER	1
2	944 02 44	ENGINE FUEL FILTER	1
3	944 02 46	ENGINE AIR FILTER	1
4	931 05 78	HYDRAULIC RETURN FILTER	2

IX. SERVICE TROUBLE SHOOTING

A. HYDRAULIC POWER UNIT

1. **Hydraulic Fluid Overheating**
   Running the V-5Esc overloaded for long periods of time (drive pressure at 3000 PSI) dumps oil over the relief valve generating heat. Simply keep the V-5Esc operating but relax the load below the 3000 PSI level and the temperature should drop.

2. **Clamp Will Not Open Or Close**
   Clamp line quick disconnects may not be engaged completely or their check valves may be locked closed. There also may be too much air in the line to overcome clamp cylinder friction.

3. **Clamp Or Drive Pressure Will Not Register**
   There may be either a defective gauge, air in the gauge line or the hydraulic pump may be malfunctioning.

4. **Engine Drops Below 2000 RPM At Full Load**
   With the maximum relief pressure setting at 3000 PSI and the V-5Esc frequency at 1700 cycles per minute free hanging, the engine is not overloaded. Check both the V-5Esc frequency and the maximum drive pressure setting. It is possible that the fuel filter is clogged or that the fuel filter is not sealing correctly, causing fuel to bypass. Possible engine service is required if the problem lies with the injectors, speed control rack or fuel pump.

5. **Engine Will Not Come Up to 2100 RPM**
   Engine service is necessary to adjust the rack governor or other problem. (Ref. John Deere Engine Manual)

B. V-5Esc VIBRATORY HAMMER

1. **Increase In Exciter Lube Oil Level**
   This is a sure sign that the hydraulic motor has a shaft seal failure. If submerged under water, water may have seeped into the exciter case.

2. **Exciter Overheating In Specific Local Areas**
   Checking the side covers for the bearings will give an indication of an overheating bearing. This bearing should be checked for excessive binding or wear. Make sure the oil level is correct. It is not unusual for the temperature of the exciter housing to go up to 200 degrees Fahrenheit if the V-5Esc is run at full frequency over a long period of time. Check the lower magnetic plug for metal which might indicate excessive wear of gears or bearings

3. **Internal Noise In Exciter**
   Unusual noise in exciter generally means something is wrong - either a bearing is starting to fail, gear train restriction, or a hydraulic motor problem causing excessive drive loading. Lube oil level should be checked.

4. **V-5Esc Frequency Fluctuation**
   Frequency is a function of pump flow and motor speed. If the pump flow is not even or a hydraulic motor is failing, it is possible the frequency will not be constant especially as the load goes a little higher (before going over relief). Check for exciter hotspots which may indicate a bearing is failing.

5. **Erratic Suspension Movement**
   High blow count soil conditions or underground obstructions may cause the hammer energy to rebound into the suspension and affect the suspension isolation. The suspension will bounce out of sync with the frequency, that will eventually cause the elastomers to overheat and fail.

6. **Slow Clamp Movement**
   Generally, slow clamping is caused by air in the hydraulic hoses. Bleed both clamp close and clamp open bleeders of the clamp cylinder.

7. **Jaws Slipping on Pile**
   a) If jaws are worn too much there may be a lack of clamping jaw travel. The clamp jaw travel is two and one half inches.

   b) Check clamping pressure.

   c) Air may be in the clamp line requiring cylinder bleeding.

8. **No Vibration But Drive Pressure at 3000 PSI When Put In Vibrate Mode**
   Assuming the drive quick disconnects are not faulty and connected fully and correctly, there may be a locked bearing, gear, or motor.

9. **V-5Esc Not Coming Up To Speed And/Or Pressure Very Low**
   Relief valve in the directional control valve may be clogged. May have a worn out pump or motor.

10. **V-5Esc Frequency Low But Pressure High**
    The motor seal might have blown filling the V-5Esc Exciter Case with oil. Check the lube oil level. Might have a bearing failure. Check for excessive exciter case heat.

X. DRAWINGS AND PARTS LISTS

This manual includes the following Drawings and Parts Lists:

A. V-5Esc GENERAL ASSEMBLY AND PARTS LIST

B. V-5Esc HYDRAULIC CLAMP ASSEMBLY AND PARTS LIST

C. 100’ HYDRAULIC HOSE BUNDLE AND PARTS LIST

D. V-5Esc/HP-185T3A HYDRAULIC SCHEMATIC AND PARTS LIST

E. ECCENTRIC SHAFT ASSEMBLY AND PARTS LIST

F. MOTOR SHAFT ASSEMBLY AND PARTS LIST

G. HP-185T3A HYDRAULIC POWER UNIT GENERAL ASSEMBLY AND PARTS LIST

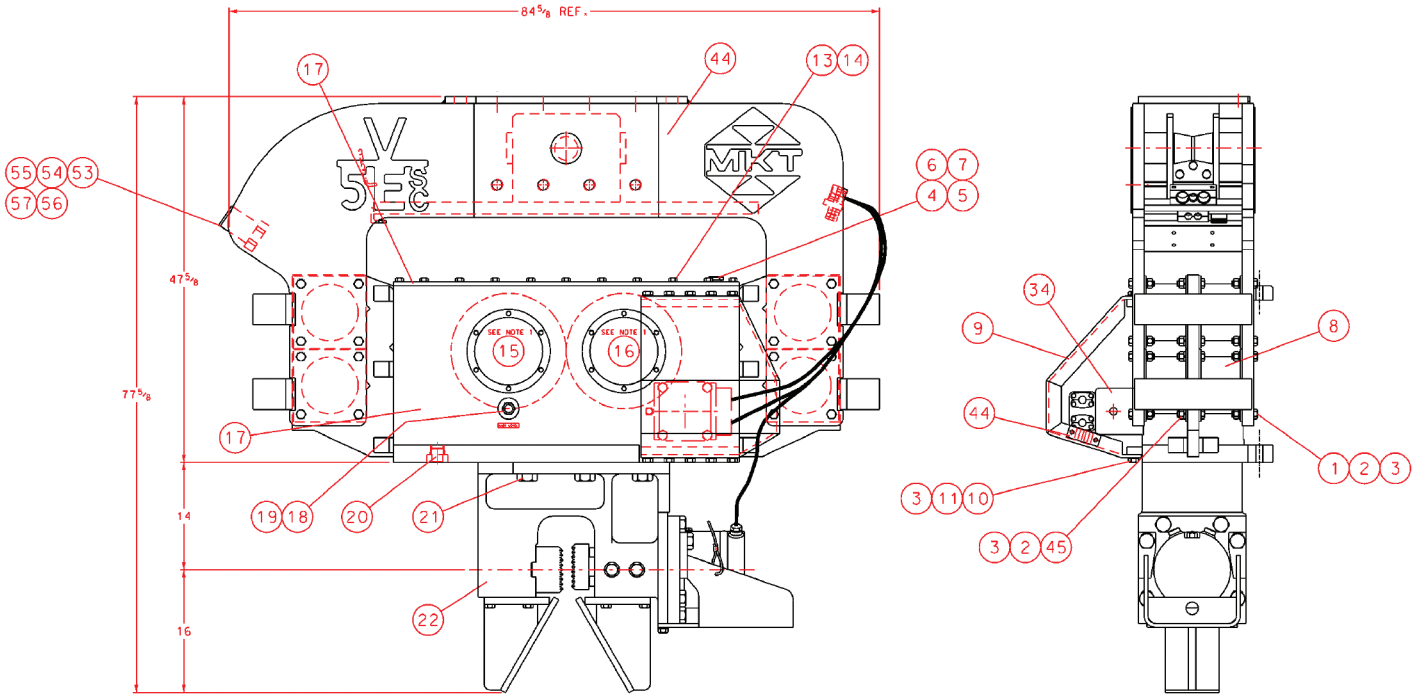
H. SIDE CLAMP ASSEMBLY

J. ELECTRICAL SCHEMATIC

This information is included for the user to have a point of reference while discussing trouble shooting actions with his factory authorized distributor’s service department. Call your nearest MKT factory authorized distributor’s service department to remedy any abnormal occurrences in the operation of your V-5Esc/HP-185T3A system.

Successful internal repairs and general overhaul of a V-5Esc/HP-185T3A hydraulic vibratory pile driver/extractor system must be handled as a clean shop procedure. MKT factory authorized distributors are properly equipped and should be contacted to provide such service.

For the name and address of the nearest MKT factory authorized distributor call **MKT Manufacturing Inc., St. Louis, Missouri at 314/388-2254**.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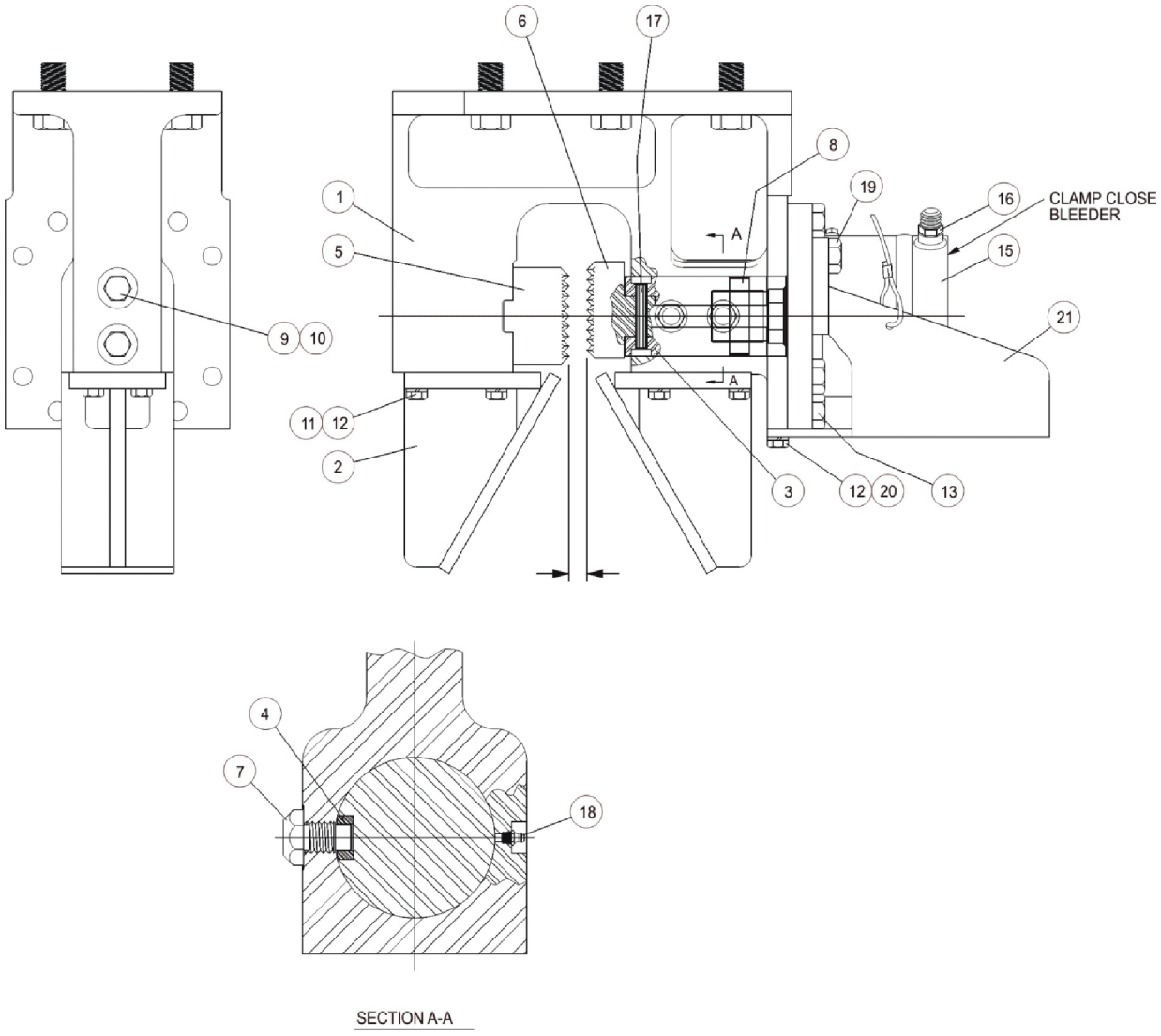
V-5ESC GENERAL ASSEMBLY (405 11 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	901 59 23	HEX HEAD CAP SCREW	32
2	900 50 07	HEX NUT	48
3	903 06 10	LOCK WASHER	58
4	402 02 07	FILL PLUG	1
5	942 00 11	RELIEF FITTING	1
6	420 00 82	NAMEPLATE – LUBE OIL	1
7	405 01 02	NAMEPLATE - LUBE FILL	1
8	941 00 14	ELASTOMER SHEAR BLOCK	8
9	405 11 07	HYDRAULIC MOTOR GUARD	1
10	416 01 21	MOTOR GUARD SUPPORT BLOCK	2
11	901 59 13	HEX HEAD CAP SCREW	10
12	405 11 05	EXCITER COVER	1
13	901 58 13	HEX HEAD CAP SCREW	24
14	903 06 09	LOCK WASHER	24
15	420 10 05	ECCENTRIC SHAFT ASSEMBLY	1
16	420 10 06	ECCENTRIC SHAFT ASSEMBLY	1
17	405 12 02	EXCITER HOUSING	1
18	931 04 79	WINDOW SIGHT	1
19	405 01 00	NAMEPLATE – LUBE LEVEL	1
20	931 00 02	MAGNETIC PLUG	2
21	901 63 11	HEX HEAD CAP SCREW	6
22	405 03 10	HYDRAULIC CLAMP ASSEMBLY	1
23	923 09 98	SPLIT FLANGE KIT	1
24	499 02 13	NAMEPLATE – MODEL & SERIAL NO.	1
25	099 06 00	DECAL, EAR PROTECTION	1
26	430 01 36	COVER MOTOR SHAFT	1
27	905 05 05	SOCKET HEAD CAP SCREW	6
28	430 00 22	GASKET, MOTOR SHAFT COVER	1
29	914 01 07	ROLER BEARING, PINION	2
30	405 03 40	PINION & SHAFT	1
31	405 03 00	GASKET, HYDRAULIC MOTOR	1
32	901 59 17	HEX HEAD CAP SCREW	4
33	902 05 15	WASHER	4
34	910 00 69	HYDRAULIC MOTOR	1
35	923 12 08	ADAPTER	1
36	405 02 83	DRAIN RELIEF	1
37	430 01 17	BEARING COVER	4
38	914 01 06	ROLLER BEARING	4
39	430 00 42	GASKET, BEARING COVER	4
40	905 05 07	SOCKET HEAD CAP SCREW	48
41	419 00 18	HOSE BLOCK	1
42	901 57 33	HEX HEAD CAP SCREW	8

V-5ESC GENERAL ASSEMBLY

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
43	903 06 08	LOCK WASHER	12
44	405 12 03	SUSPENSION HOUSING	1
45	901 59 25	HEX HEAD CAP SCREW	16
46	923 05 88	ADAPTER	1
47	923 09 47	ADAPTER	2
48	923 12 06	ADAPTER	2
49	923 11 95	ADAPTER	1
50	923 09 17	ADAPTER	3
51	923 09 49	ADAPTER	2
52	923 11 53	ADAPTER	4
53	405 02 73	HOSE BLOCK	1
54	405 03 41	BACK UP PLATE	1
55	901 57 35	HEX HEAD CAP SCREW	4
56	902 00 03	FLAT WASHER	4
57	901 57 17	HEX HEAD CAP SCREW	4
58	405 12 26	MOTOR LINES – 120”	2
59	405 12 27	DRAIN LINE – 127”	1
60	405 12 28	CLAMP LINES – 132”	2



NOTE: Press fit pin, item 8, thru slide,item 3, and into hydraulic cylinder, item 15, shaft before assembling into clamp housing, item 1.

CLAMP BLEEDING PROCEDURE

THE FOLLOWING PROCEDURE MUST BE DONE TO ENSURE PROPER CLAMPING FUNCTION
-JAW DAMAGE WILL OCCUR IF NOT DONE-

1 START HAMMER WITH HAMMER HANGING VERTICAL.

2 PULL AND HOLD CLAMP CLOSE LEVER ON POWER UNIT VALVE.

NOTICE **VERIFY THAT ALL PERSONNEL ARE CLEAR OF CLAMP ASSEMBLY**

3 WITH CLAMP PRESSURE ON REGISTERED ON GAUGE (V-5C & E @ 2,500 PSI) BLEED CLAMP CYLINDER AT INDICATED BLEEDER PORT WITH 1/8 ALLEN WRENCH

⚠ CAUTION **HYDRAULIC OIL UNDER PRESSURE**
DO NOT BACK BLEEDER OUT MORE THAN ONE COMPLETE TURN
FOR ASSISTANCE CALL 1-800-869-8600

V-5ESC HYDRAULIC CLAMP ASSEMBLY(405 03 10)

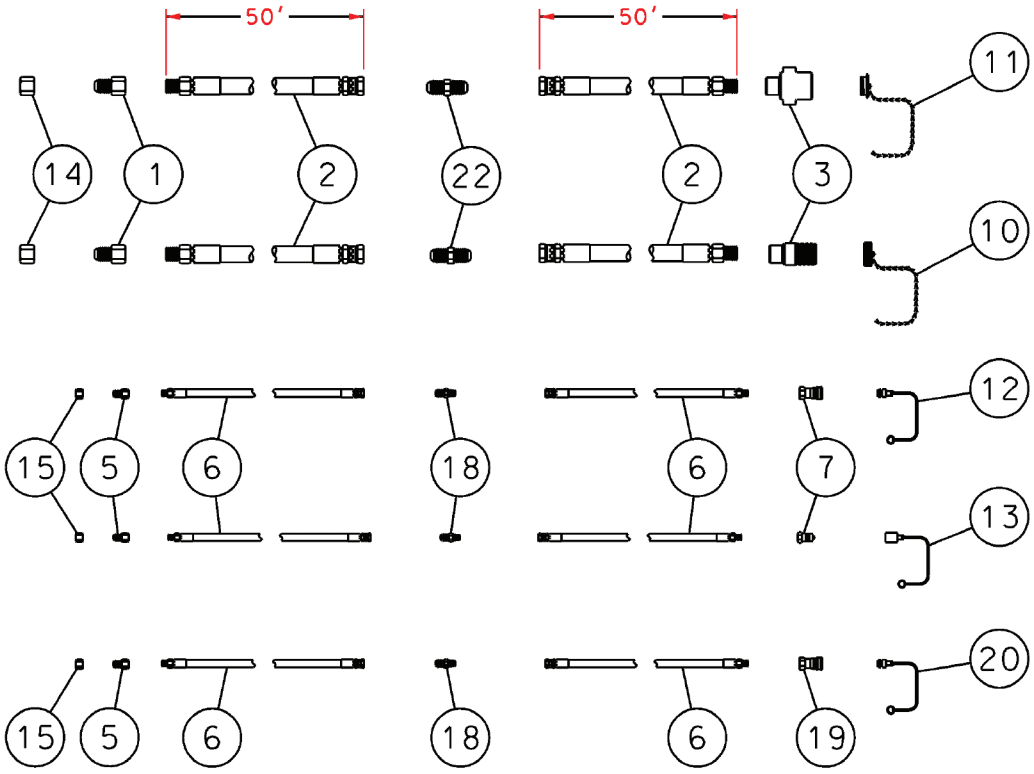
1	405 03 07	CLAMP HOUSING	1
2	405 01 34	JAW SHIELD	2
3	405 03 11	CLAMP SLIDE	1
4	405 00 89	SLIDE KEY	1
5	405 02 84	SCREW TYPE JAW - FIXED END	1
6	405 00 76	SCREW TYPE JAW - MOVABLE END	1
7	405 00 91	SLIDE-KEY BOLT	2
8	420 01 38	PIN, CLAMP SLIDE	1
9	901 61 37	HEX HEAD CAP SCREW	2
10	903 01 21	LOCK WASHER	2
11	901 59 17	HEX HEAD CAP SCREW	8
12	903 01 17	LOCK WASHER	12
13	901 62 18	HEX HEAD CAP SCREW	6
15	416 01 31	HYDRAULIC CLAMP CYLINDER	1
16	923 02 23	ADAPTER	1
	923 11 23	ADAPTER	1
17	924 00 55	SPIROL PIN	1
18	942 00 01	GREASE FITTING	1
19	901 62 24	HEX HEAD CAP SCREW	2
20	901 59 13	HEX HEAD CAP SCREW	4
21	405 03 04	CLAMP CYLINDER SHIELD	1
22	938 00 81	SAFETY CABLE	1
23	938 00 82	SWEDGE CLAMP	2

1¼ I.D.
DRIVE INLET HOSE

1¼ I.D.
DRIVE RETURN HOSE

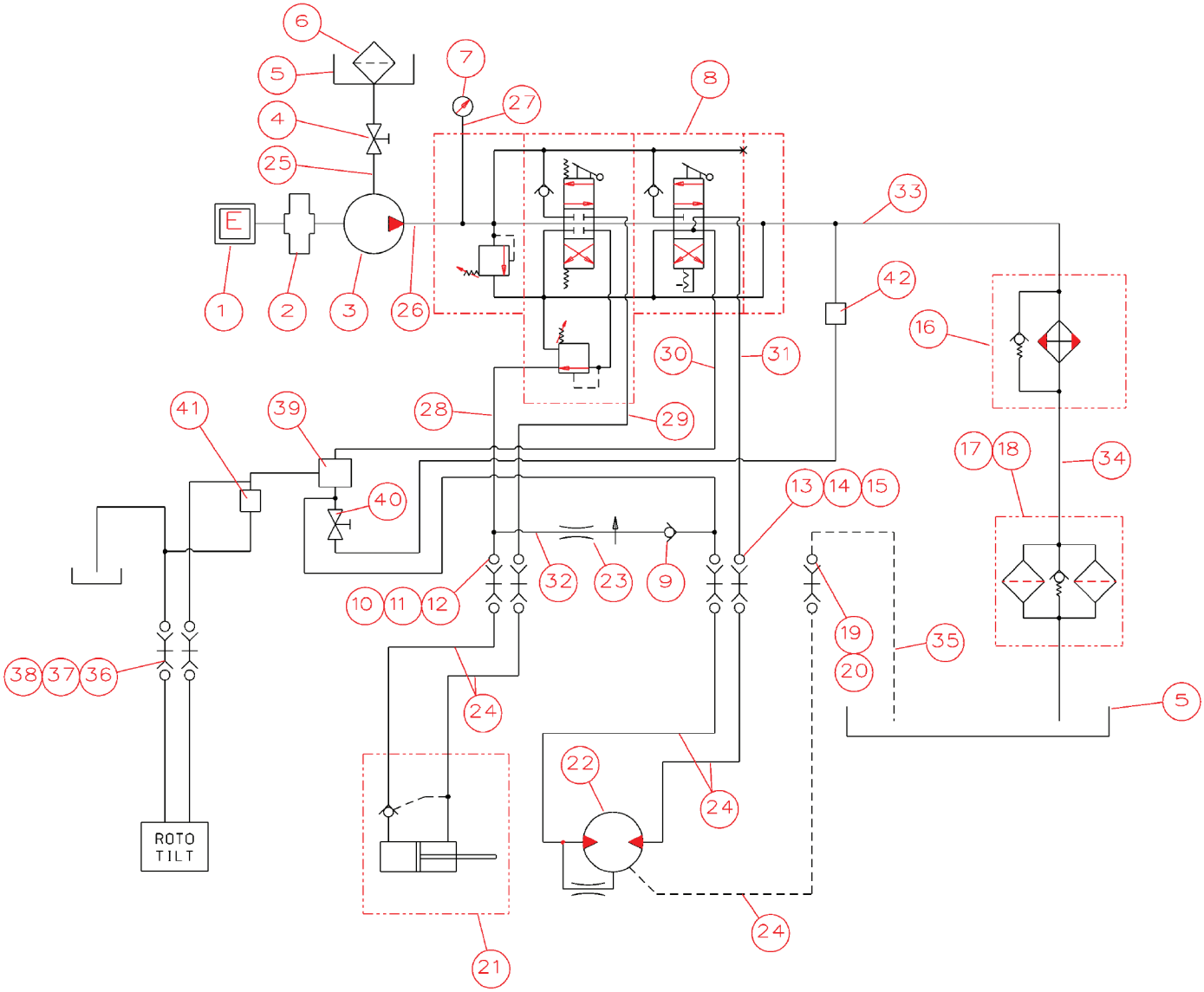
¾ I.D.
CLAMP HOSES

¾ I.D.
CASE DRAIN HOSE



HP-185T3A HYDRAULIC HOSE BUNDLE (170 01 10)

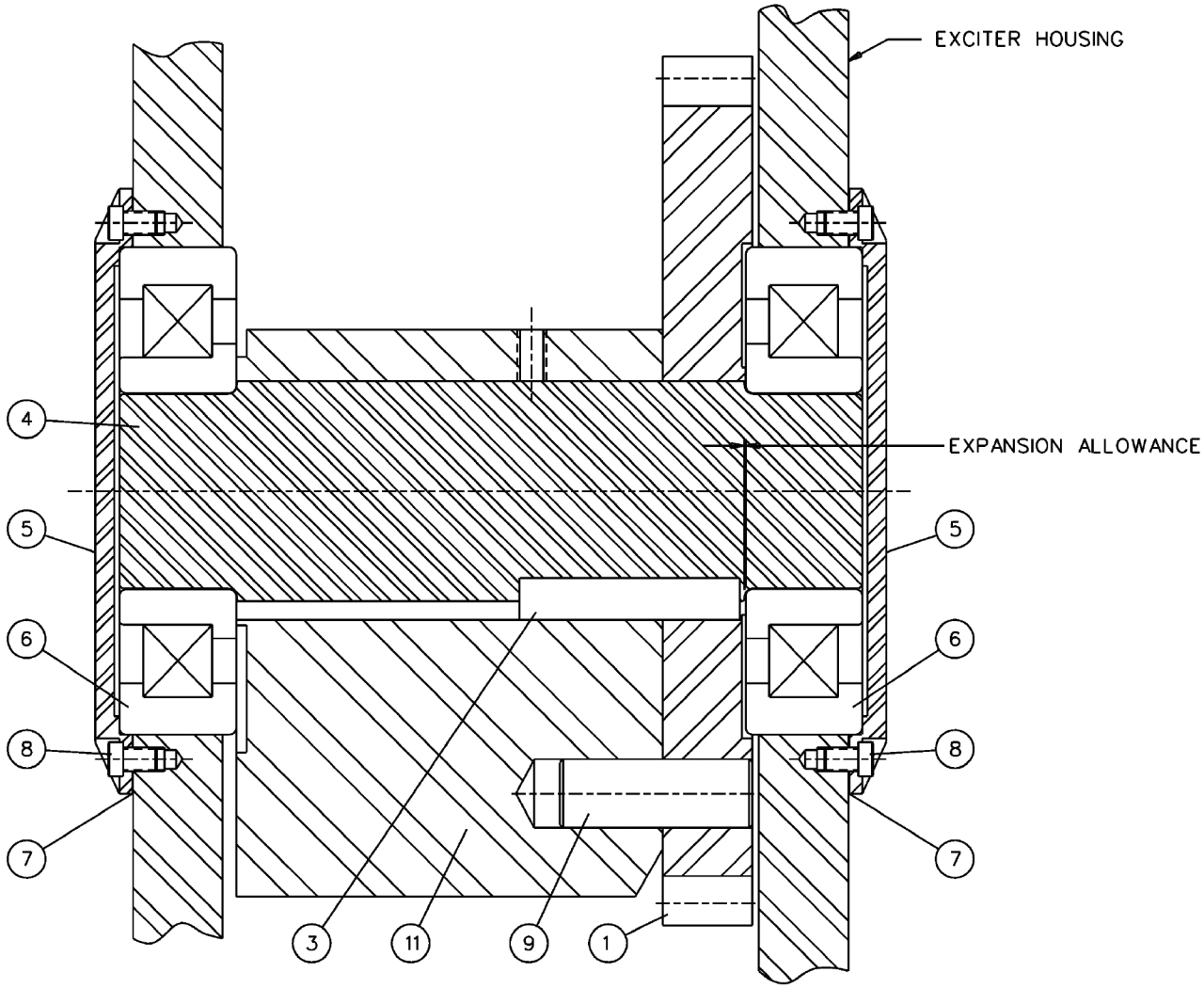
ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	923 00 08	ADAPTER	2
2	410 04 04	MOTOR LINE HOSE (50 FT.)	4
3	927 00 43	QUICK DISCONNECT COUPLING	1
5	923 00 07	ADAPTER	3
6	410 04 15	CLAMP LINE HOSE (50 FT.)	4
7	927 00 05	QUICK DISCONNECT COUPLING	1
10	927 00 45	DUST CAP	1
11	927 00 44	DUST PLUG	1
12	923 00 02	DUST PLUG	1
13	923 00 03	DUST CAP	1
14	923 00 13	CAP NUT	2
15	923 00 12	CAP NUT	3
17	410 04 26	DRAIN HOSE - 50 FT.	2
18	923 03 89	ADAPTER	3
19	927 00 10	ADAPTER	1
20	923 00 62	DRAIN DUST PLUG	1
22	923 00 14	ADAPTER	2



V-5ESC/HP-185T3A HYDRAULIC SCHEMATIC
2 406 01 00

V-5ESC/HP-185T3A HYDRAULIC SCHEMATIC (406 01 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	944 02 42	DIESEL ENGINE	1
2	911 01 88	PUMP DRIVE	1
3	911 01 87	HYDRAULIC PUMP	1
4	931 05 59	SHUT-OFF VALVE	1
5	406 00 03	HYDRAULIC RESERVOIR	1
6	931 05 57	SUCTION STRAINER	1
7	931 06 34	PRESSURE GAUGE	1
8	931 08 57	DIRECTIONAL CONTROL VALVE	1
9	931 05 65	ONE-WAY CHECK VALVE	1
10	927 00 05	QUICK DISCONNECT COUPLING	1
11	923 00 02	DUST PLUG	1
12	923 00 03	DUST CAP	1
13	927 00 43	QUICK DISCONNECT COUPLING	1
14	927 00 44	DUST PLUG	1
15	927 00 45	DUST CAP	1
16	934 00 16	OIL COOLER	1
17	931 05 77	RETURN FILTER	1
18	931 05 78	RETURN FILTER REPLACEMENT ELEMENTS	2
19	927 00 36	QUICK DISCONNECT COUPLING	1
20	923 00 63	DUST CAP	1
21	416 01 31	HYDRAULIC CLAMP CYLINDER	1
22	910 00 45	HYDRAULIC MOTOR	1
23	931 05 66	FLOW CONTROL VALVE	1
24	417 01 10	HYDRAULIC HOSE BUNDLE (100 FT.)	1
25	406 11 62	HOSE	1
26	406 01 02	HOSE	1
27	406 01 03	HOSE	1
28	406 11 69	HOSE	1
29	406 11 73	HOSE	1
30	406 11 70	HOSE	1
31	406 11 71	HOSE	1
32	406 01 08	HOSE	1
33	406 11 61	HOSE	1
34	406 11 72	HOSE	1
35	406 01 11	HOSE	1
36	927 00 06	QUICK DISCONNECT	1
37	923 00 04	DUST PLUG	1
38	923 00 05	DUST CAP	1
39	931 07 96	PRIORITY FLOW CONTROL	1
40	931 07 93	BALL VALVE	1
41	931 07 94	SOLENOID VALVE	1
42	931 07 95	SOLENOID VALVE	1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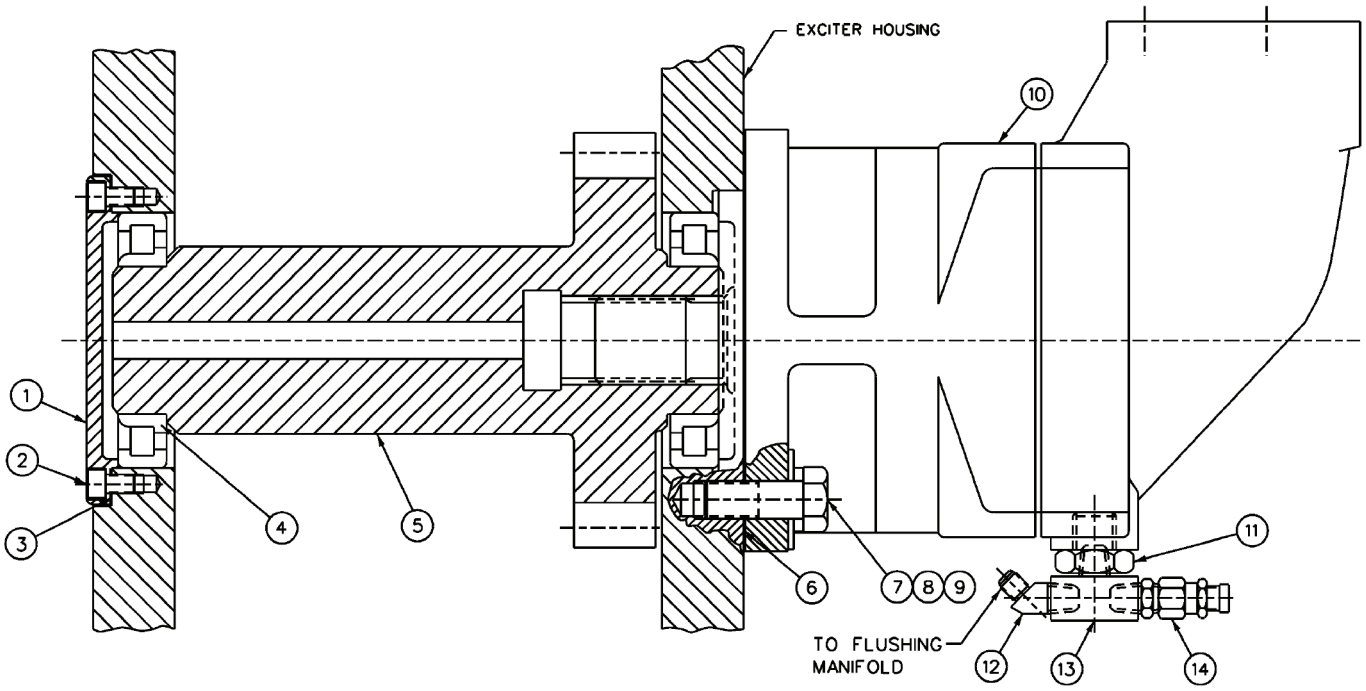
V-5ESC ECCENTRIC SHAFT ASSEMBLY (420 10 05/06)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	416 01 53	ECCENTRIC GEAR	1
2	416 01 54	ECCENTRIC GEAR	1
3	430 00 41	ECCENTRIC KEY	1
4	430 00 13	ECCENTRIC SHAFT	1
5	430 01 17	BEARING COVER	2
6	914 01 06	CYLINDRICAL ROLLER BEARING	2
7	430 00 42	GASKET, BEARING COVER	2
8	905 05 07	SOCKET HEAD CAP SCREW	12
9	430 00 43	PIN	1
10	905 09 15	SOCKET HEAD CAP SCREW (NOT SHOWN ON DRAWING)	4
11	416 01 55	ECCENTRIC	1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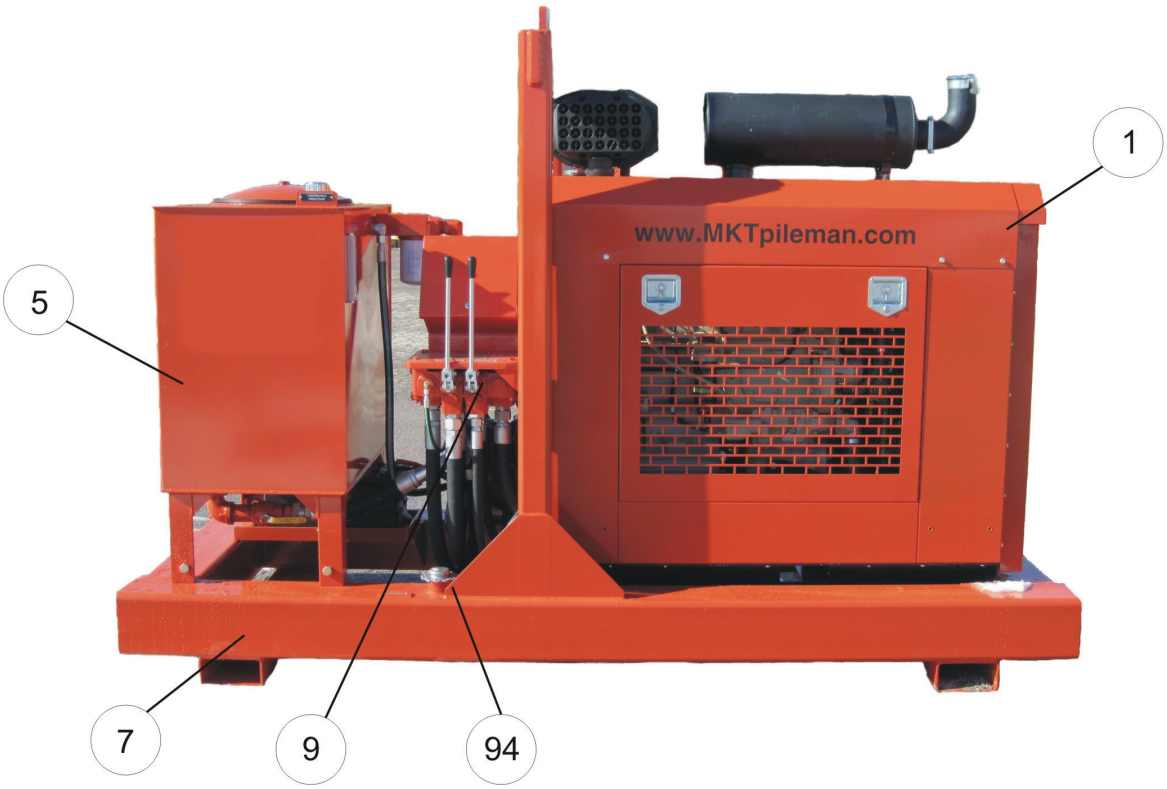
V-5ESC MOTOR SHAFT ASSEMBLY (405 03 39)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	430 01 36	MOTOR SHAFT COVER - MACHINING	1
2	905 05 05	SOCKET HEAD CAP SCREW	6
3	430 00 22	GASKET, MOTOR SHAFT COVER	1
4	914 01 07	BEARING	2
5	405 03 40	ONE-PIECE PINION AND SHAFT	1
6	405 03 00	GASKET, HYDRAULIC MOTOR	1
7	901 59 17	HEX HEAD CAP SCREW	4
8	903 01 17	LOCK WASHER	4
9	902 05 15	FLAT WASHER	4
10	910 00 69	HYDRAULIC MOTOR	1
11	923 12 08	ADAPTER	1
12	923 05 43	ADAPTER	1
13	923 03 13	ADAPTER	1
14	405 02 83	DRAIN RELIEF VALVE ASSEMBLY	1
15	9230526	ADAPTER	1
16	405 10 03	FLANGE KIT, MODIFIED	1
17	923 12 07	FLANGE KIT	1
18	923 12 06	ADAPTER	2
19	405 03 01	ORIFICE FITTING	1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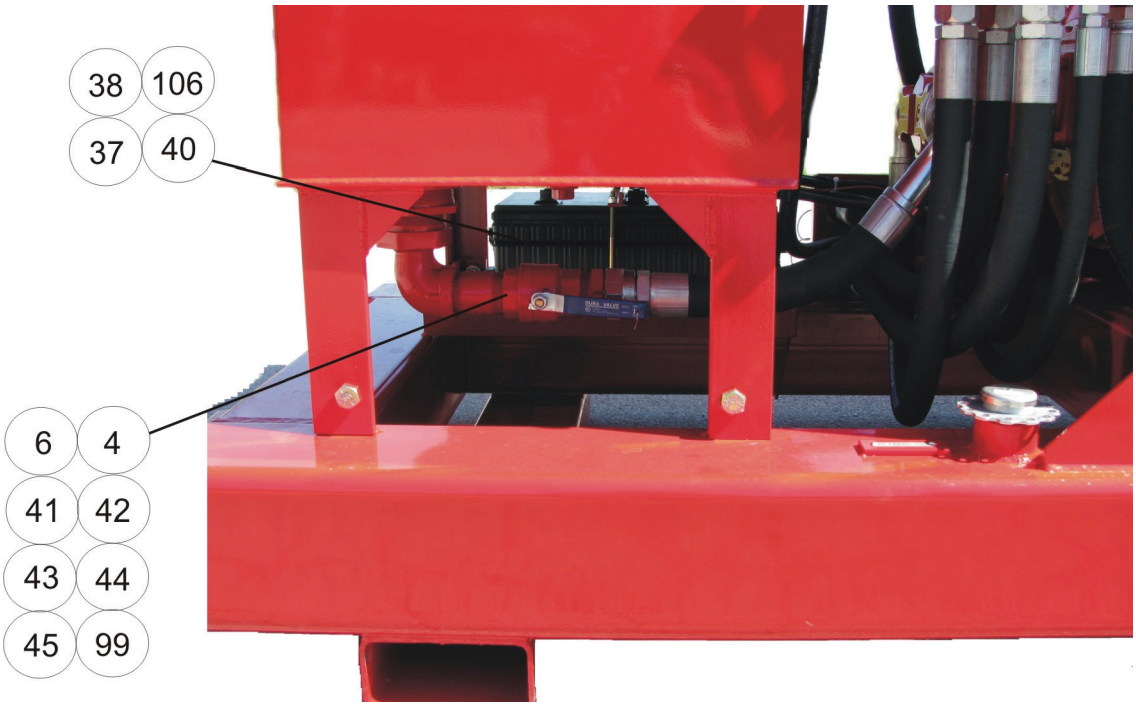
www.MKTpileman.com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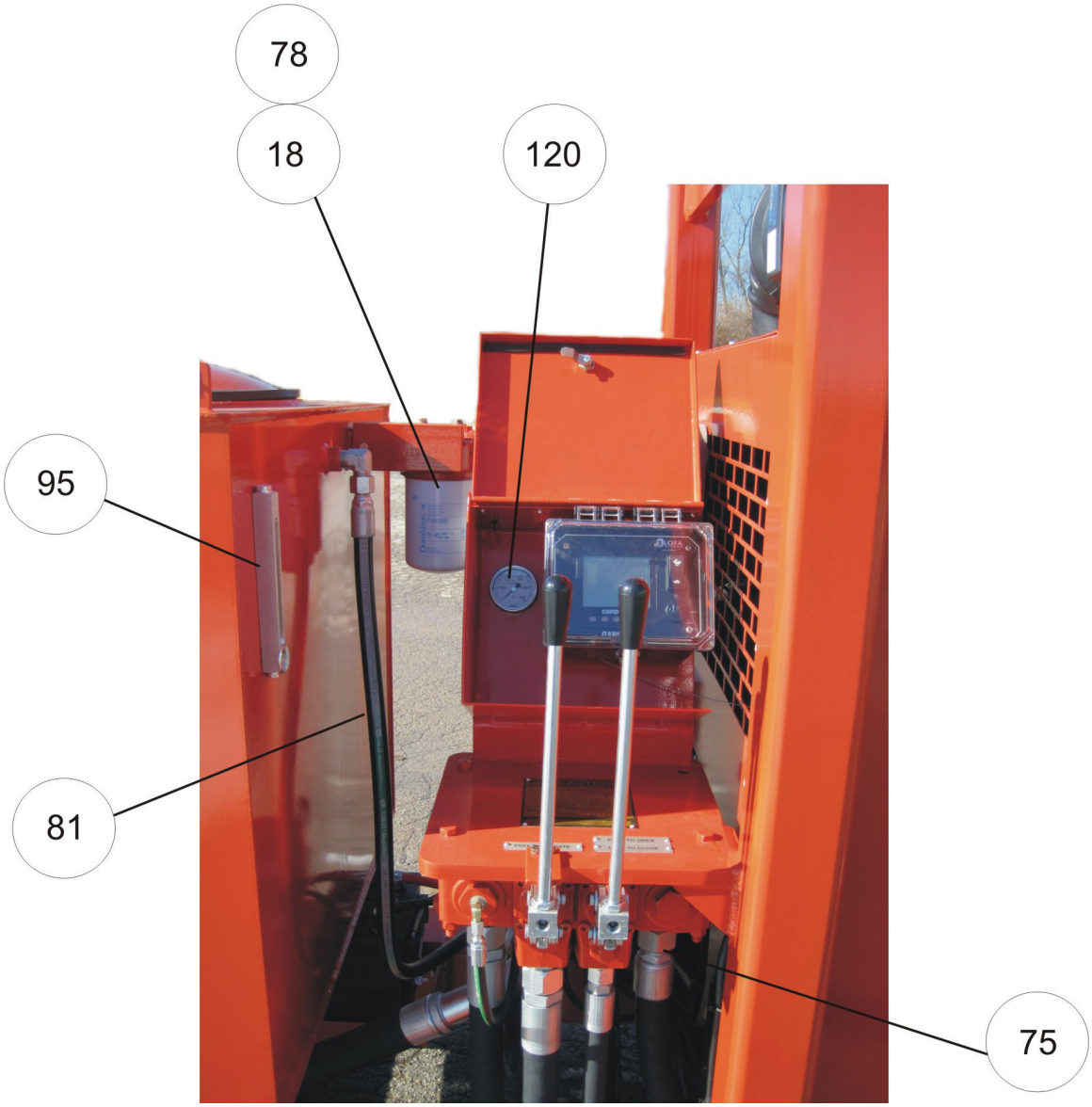
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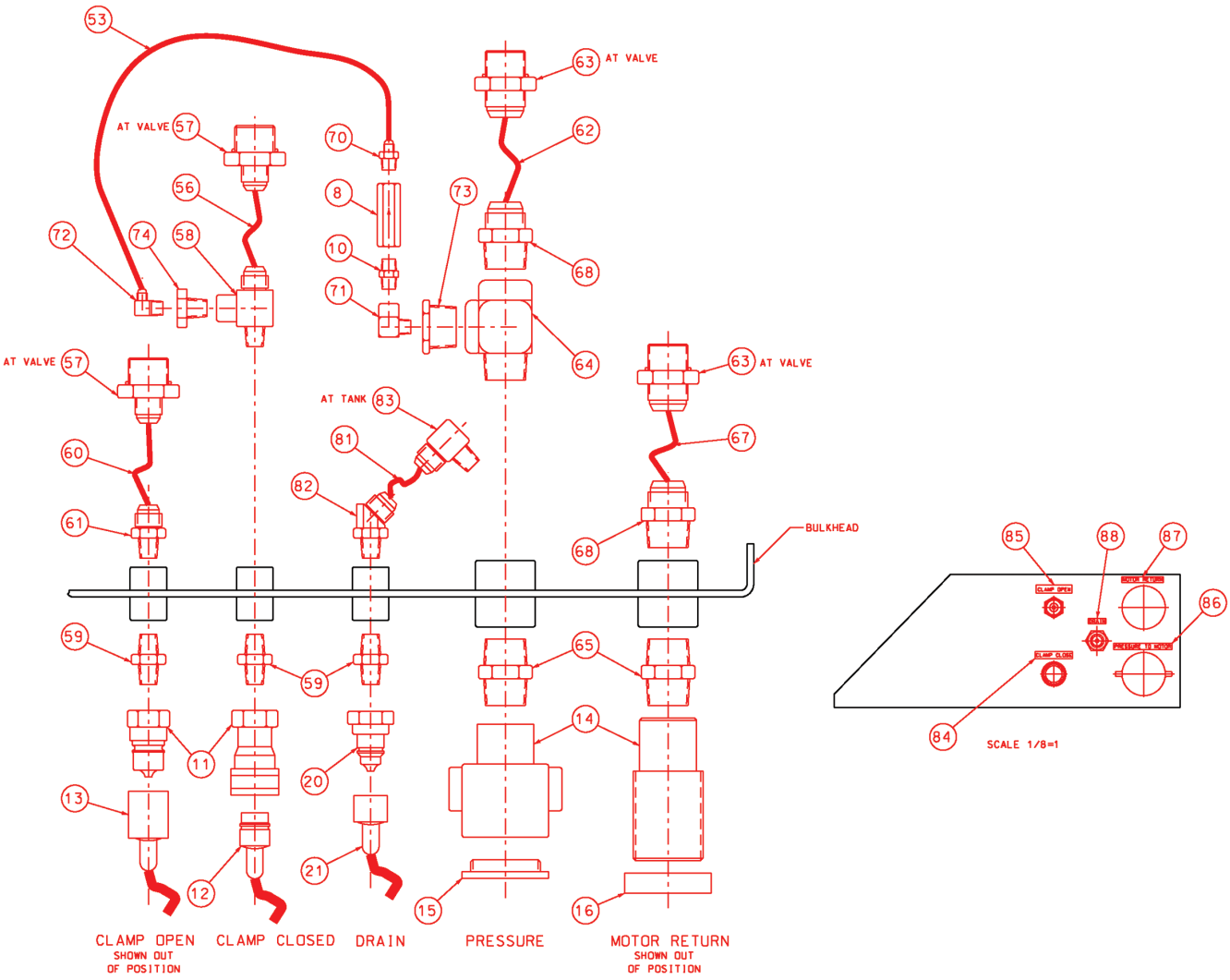


HP-185 POWER UNIT
HYDRAULIC HOOK-UP
2 406 03 00

HP-185T3A HYDRAULIC POWER UNIT GENERAL ASSEMBLY

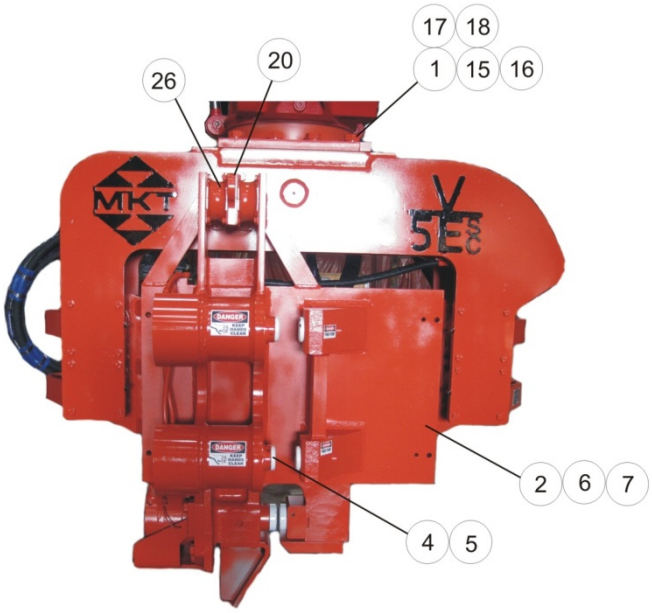
ITEM NO.	PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	944 02 42	DIESEL ENGINE	1
2	901 58 17	HEX HEAD CAP SCREW	4
3	911 01 87	HYDRAULIC PUMP	1
4	931 05 59	SHUT-OFF VALVE	1
5	406 00 03	HYDRAULIC RESERVOIR	1
6	931 05 57	SUCTION STRAINER	1
7	406 11 65	SKID	1
8	931 05 66	FLOW CONTROL VALVE	1
9	931 08 57	DIRECTIONAL CONTROL VALVE	1
10	931 05 65	ONE-WAY CHECK VALVE	1
11	927 00 05	QUICK DISCONNECT COUPLING	1
12	923 00 02	DUST PLUG	1
13	923 00 03	DUST CAP	1
14	927 00 43	QUICK DISCONNECT COUPLING	1
15	927 00 44	DUST PLUG	1
16	927 00 45	DUST CAP	1
17	934 00 16	OIL COOLER	1
18	931 05 77	RETURN FILTER	1
19	931 05 78	RETURN FILTER REPLACEMENT ELEMENTS	2
20	927 00 10A	QUICK DISCONNECT COUPLING	1
21	923 00 63	DUST CAP	1
24	903 06 06	LOCK WASHER	2
26	901 57 13	HEX HEAD CAP SCREW	4
27	903 01 13	LOCK WASHER	4
28	901 55 15	HEX HEAD CAP SCREW	2
29	900 50 03	HEX NUT	2
30	901 59 17	HEX HEAD CAP SCREW	4
31	903 06 10	LOCK WASHER	4
32	900 50 07	HEX NUT	4
33	901 57 37	HEX HEAD CAP SCREW	3
34	903 06 09	LOCK WASHER	4
35	900 50 06	HEX NUT	4
36	901 25 07	HEX HEAD CAP SCREW	2
37	406 03 04	BATTERY RETAINER	1
38	406 03 05	HOLD DOWN ROD	2
40	933 03 41	8D BATTERY	1
41	406 11 62	HOSE	1
42	903 02 07	ADAPTER	1
43	930 00 53	ADAPTER	1
44	930 00 37	BUSHING	1
45	923 09 73	SPLIT FLANGE KIT	1

HP-185T3A HYDRAULIC POWER UNIT GENERAL ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QUANTITY REQUIRED
46	923 09 59	PUSH-ON FUEL LINE (SUPPLY)	1
47	923 09 60	PUSH-ON FUEL LINE (RETURN)	1
49	923 09 62	PUSH-ON COUPLING	1
50	923 09 63	PUSH-ON COUPLING	1
51	406 01 02	HOSE	1
52	923 09 74	SPLIT FLANGE KIT	1
53	406 01 03	HOSE	1
54	923 09 85	ADAPTER	1
55	923 04 42	ADAPTER	1
56	406 11 69	HOSE	1
57	923 09 65	ADAPTER	2
58	923 03 96	ADAPTER	1
59	923 03 76	ADAPTER	3
60	406 11 73	HOSE	1
61	923 00 20	ADAPTER	1
62	406 11 70	HOSE	1
63	923 03 14	ADAPTER	2
64	923 03 12	ADAPTER	1
65	923 03 77	ADAPTER	2
67	406 11 71	HOSE	1
68	923 01 61	ADAPTER	2
69	406 00 20	STOP PLATE	1
70	923 04 39	ADAPTER	1
71	923 01 09	ADAPTER	1
72	923 09 19	ADAPTER	1
73	923 09 68	ADAPTER	1
74	923 04 38	ADAPTER	1
75	406 11 61	HOSE	1
76	923 03 14	ADAPTER	2
77	923 10 08	ADAPTER	2
78	406 11 72	HOSE	1
79	923 05 06	ADAPTER	1
80	923 10 94	ADAPTER	1
81	406 01 11	HOSE	1
82	923 05 54	ADAPTER	1
83	923 00 17	ADAPTER	1
84	411 00 23	NAMEPLATE - CLAMP CLOSE	1
85	411 00 22	NAMEPLATE - CLAMP OPEN	1
86	411 00 20	NAMEPLATE - PRESSURE TO MOTOR	1
87	411 00 21	NAMEPLATE - MOTOR RETURN	1
88	411 00 13	NAMEPLATE - DRAIN	1

HP-185T3A HYDRAULIC POWER UNIT GENERAL ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QUANTITY REQUIRED
89	411 00 15	NAMEPLATE - NO. 2 DIESEL FUEL	1
90	170 01 00	NAMEPLATE - PULL TO CLOSE	1
91	170 01 01	NAMEPLATE - PUSH TO OPEN	1
92	420 00 85	NAMEPLATE - HYDRAULIC FLUID	1
93	699 02 77	SAFETY CAUTION SIGN	1
94	406 00 18	FUEL CAP	1
95	931 02 83	TEMP/SIGHT GAUGE	1
96	923 11 31	ADAPTER	1
97	923 09 88	ADAPTER	2
98	923 01 74	ADAPTER	1
99	930 01 61	NIPPLE	1
100	923 04 25	ADAPTER	1
101	944 00 85	CHECK VALVE	1
102	923 12 76	ADAPTER	1
106	920 00 18	NYLOC NUT	2
107	931 06 31	MAGNETIC PIPE PLUG	1
111	946 00 27	MANUAL CASE	1
112	411 00 31	HYDRAULIC POWER UNIT SPEC. TAG	1
115	170 01 39	NAMEPLATE – PULL TO VIBRATE	1
117	943 04 43	RUBBER RECESS BUMPER	1
118	931 06 58	PRESSURE GAGE	1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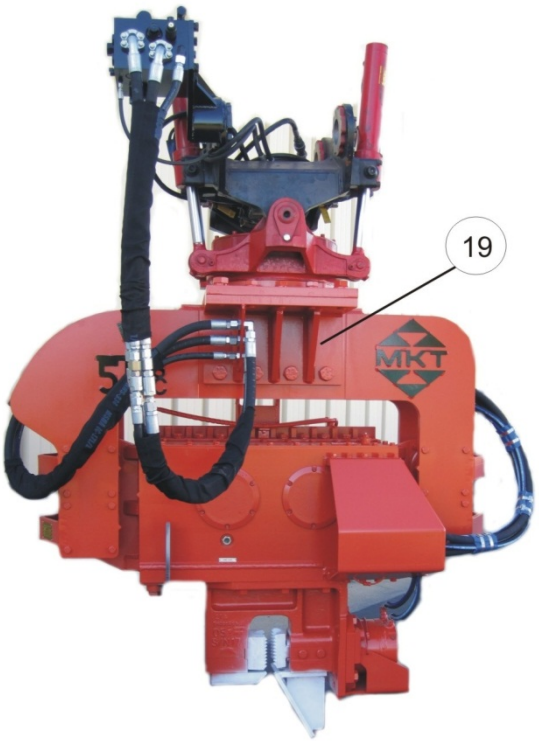
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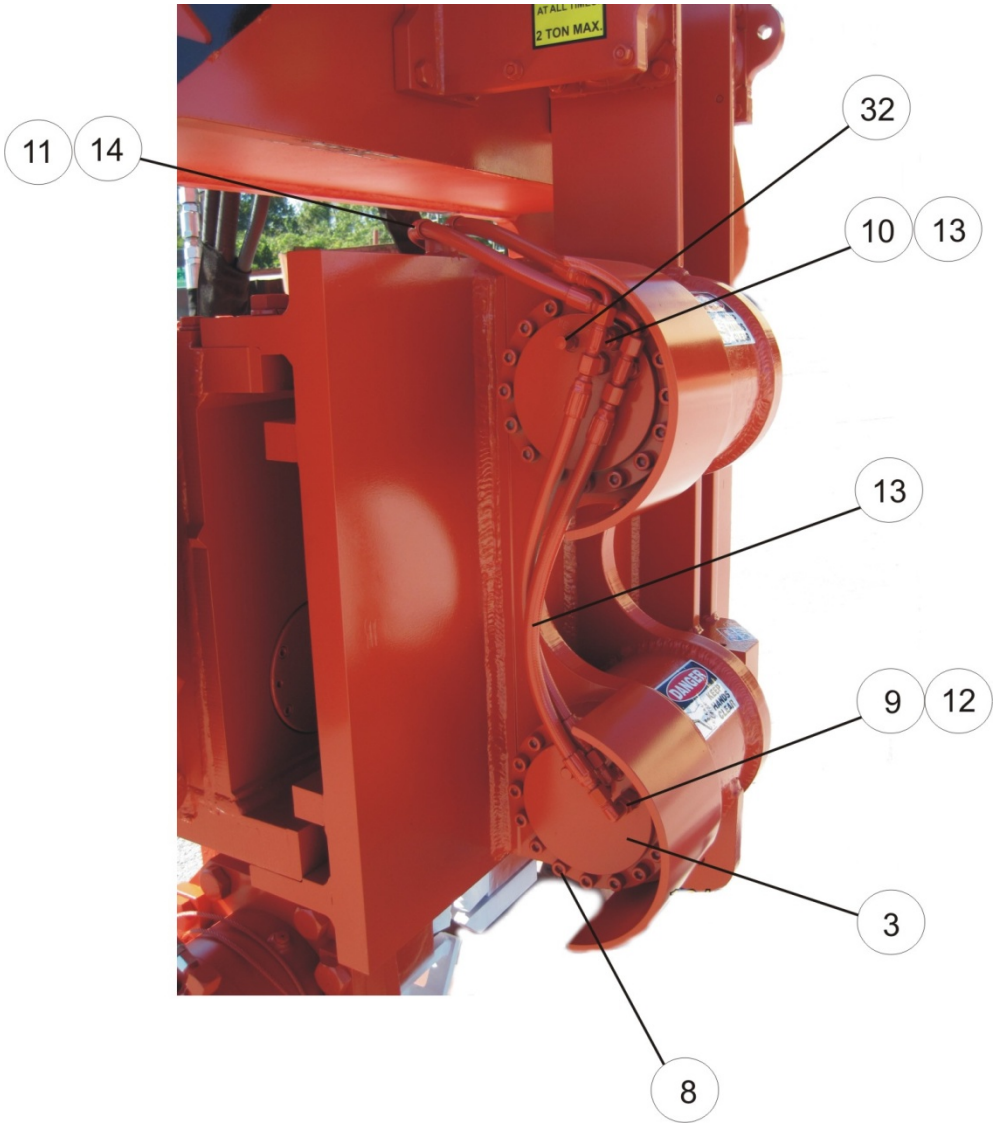
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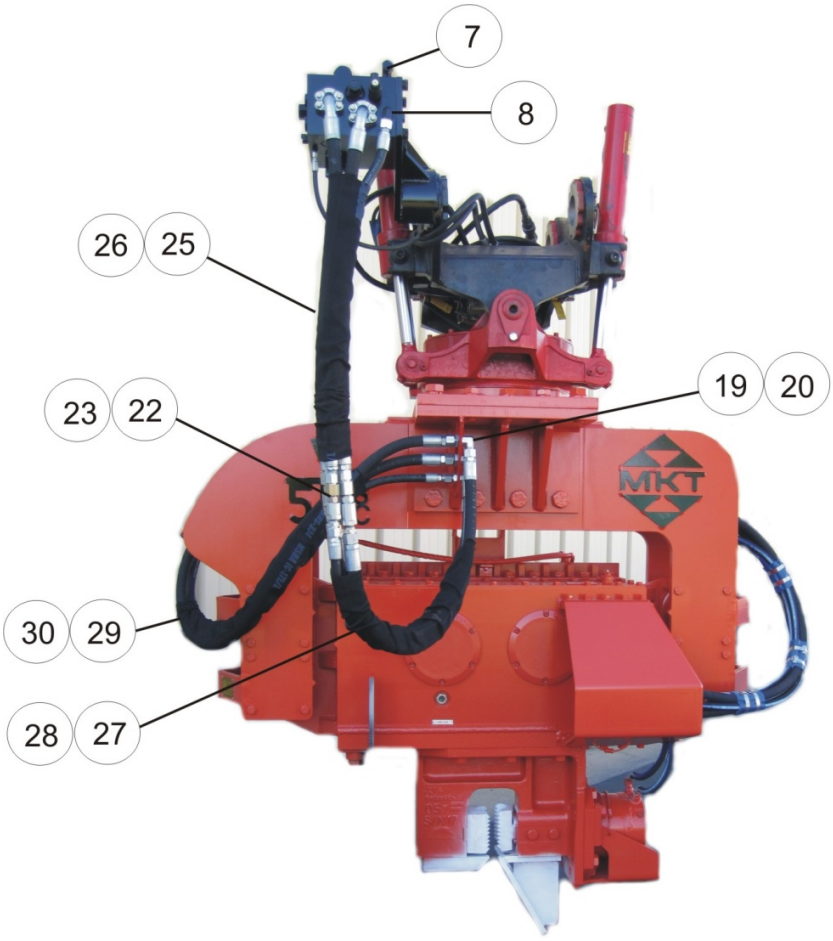
V5Esc SIDE CLAMP ASSEMBLY
PARTS LIST

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	495 06 39	ADAPTER PLATE	1
2	405 12 52	SIDE CLAMP MACHINING	1
3	495 06 38	CYLINDER	2
4	495 05 98	JAW	4
5	924 00 72	SPIROL PIN	4
6	901 61 17	HEX HEAD CAP SCREW	20
7	903 06 12	LOCK WASHER	20
8	905 07 25	SOCKET HEAD CAP SCREW	32
9	923 09 12	ADAPTER	2
10	923 11 56	ADAPTER	2
11	943 04 21	CLAMP	6
12	923 12 75	ADAPTER	2
13	405 12 30	HOSE ASSEMBLY	2
14	405 12 29	HOSE ASSEMBLY	2
15	901 63 13	HEX HEAD CAP SCREW	10
16	903 06 16	LOCK WASHER	10
17	901 62 21	HEX HEAD CAP SCREW	3
18	903 06 14	LOCK WASHER	3
19	495 06 19	BRACKET	1
20	405 12 48	RUBBER MOUNT	1
21	405 12 49	RUBBER MOUNT	2
23	901 59 29	HEX HEAD CAP SCREW	8
24	903 06 10	LOCK WASHER	8
25	900 50 07	NUT	8
26	941 00 33	SHEAR BLOCK	2
27	901 57 19	HEX HEAD CAP SCREW	8
28	901 57 09	HEX HEAD CAP SCREW	8
29	903 06 08	LOCK WASHER	12
30	900 50 05	NUT	4
31	943 04 79	SHACKLE	1
33	901 55 11	HEX HEAD CAP SCREW	1
34	901 55 13	HEX HEAD CAP SCREW	2
35	903 06 06	LOCK WASHER	3
36	900 50 03	NUT	2
37	402 06 14	HOSE ASSEMBLY	2
38	923 12 93	ADAPTER	2
39	923 11 53	ADAPTER	4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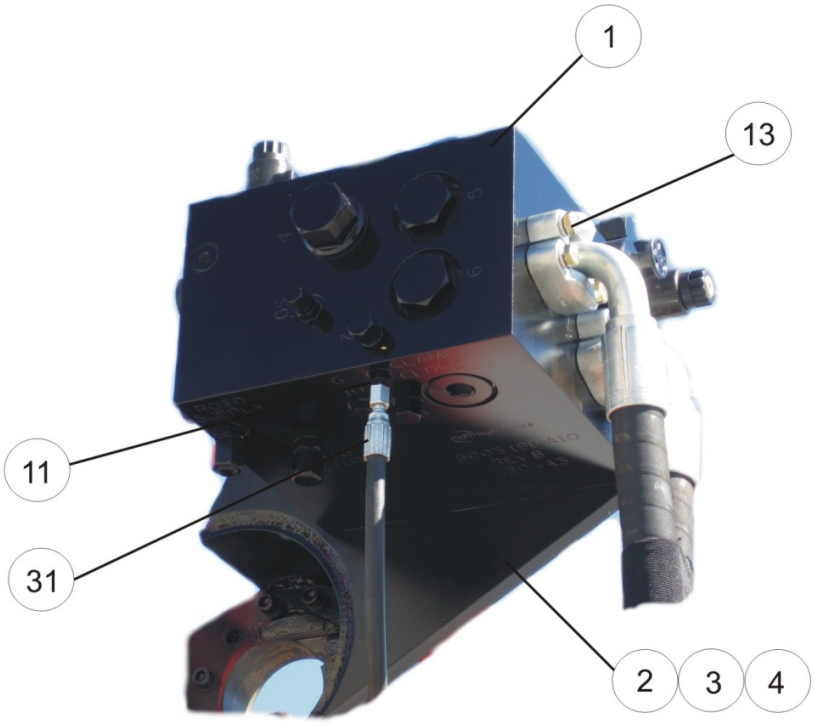
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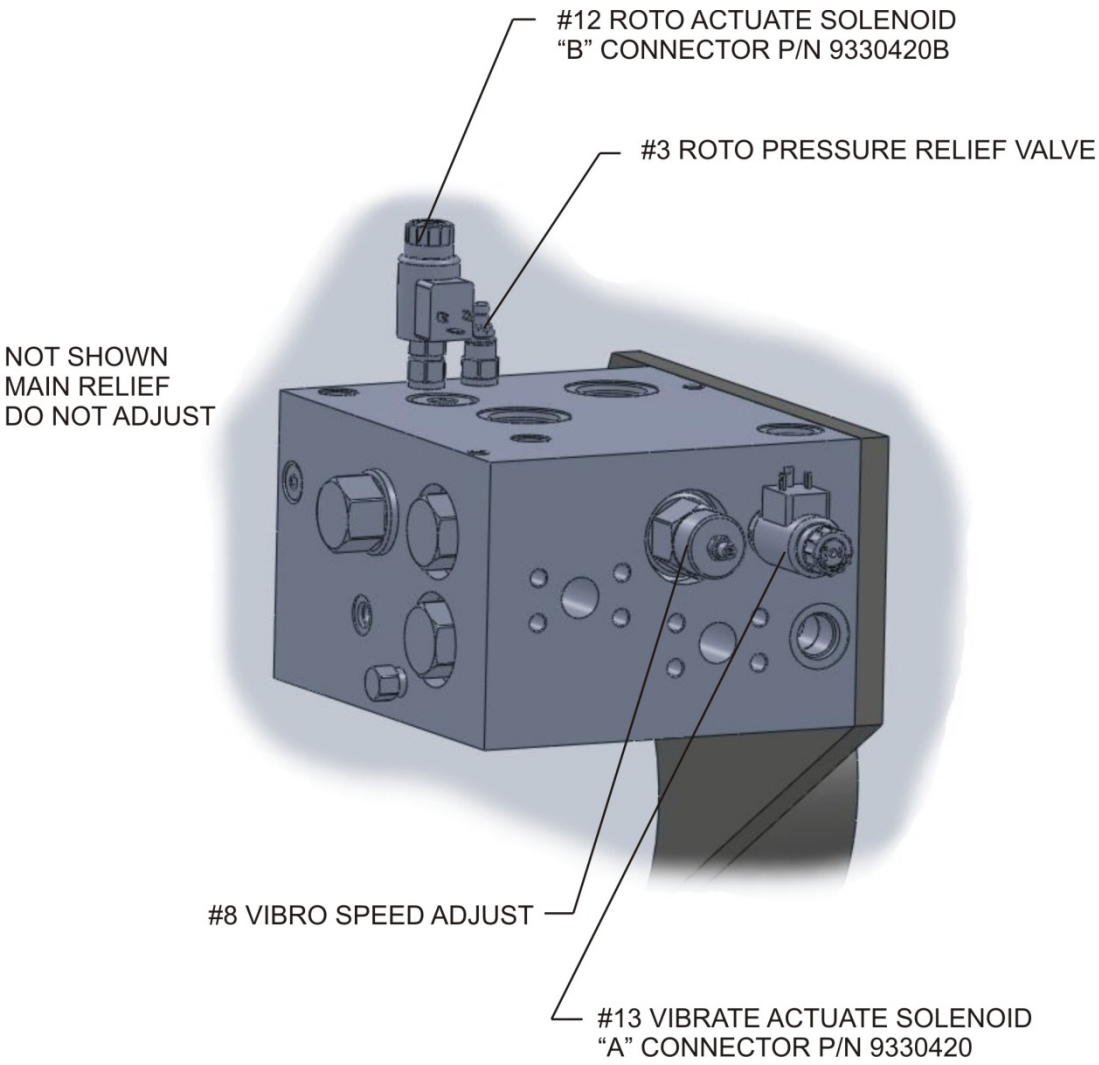
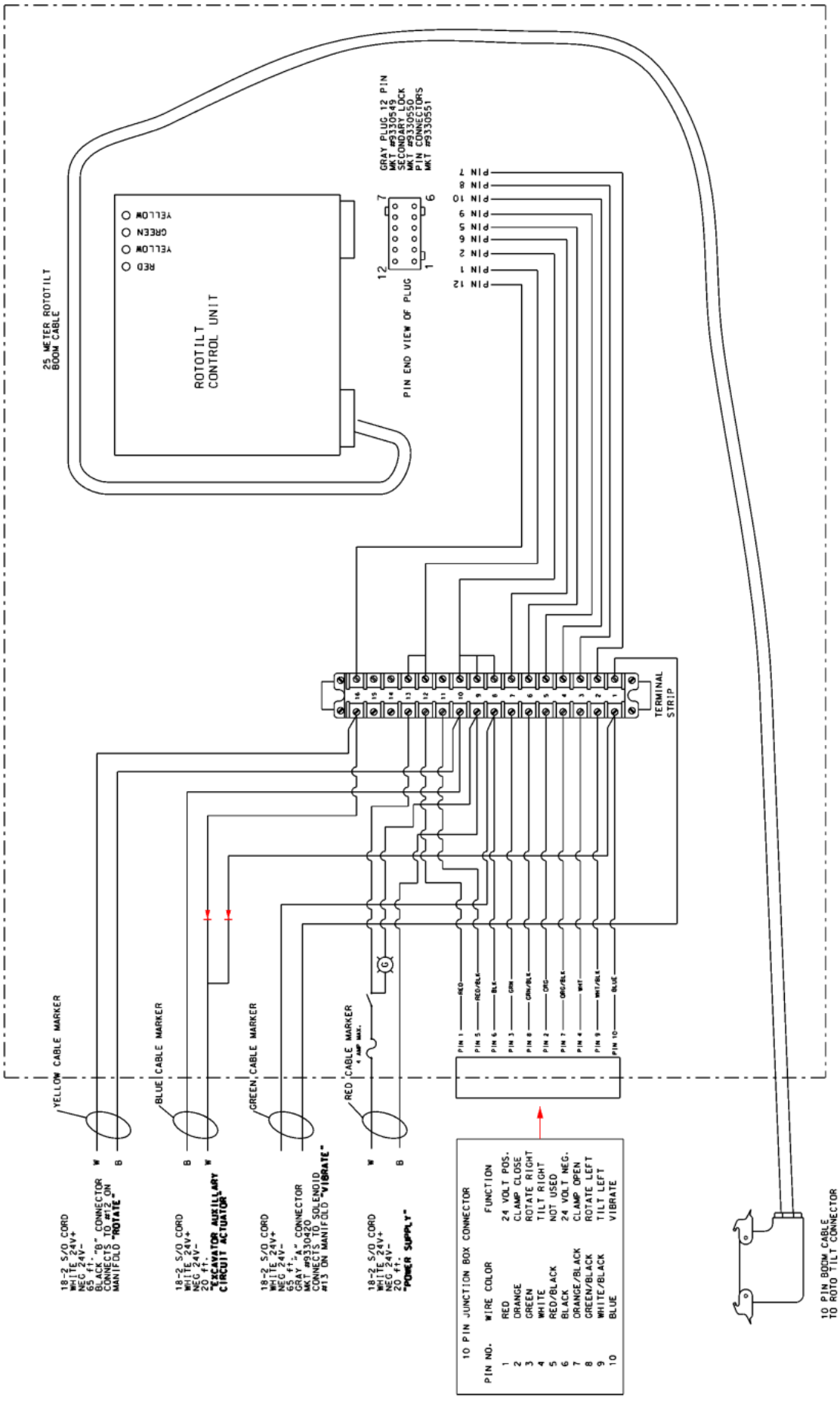
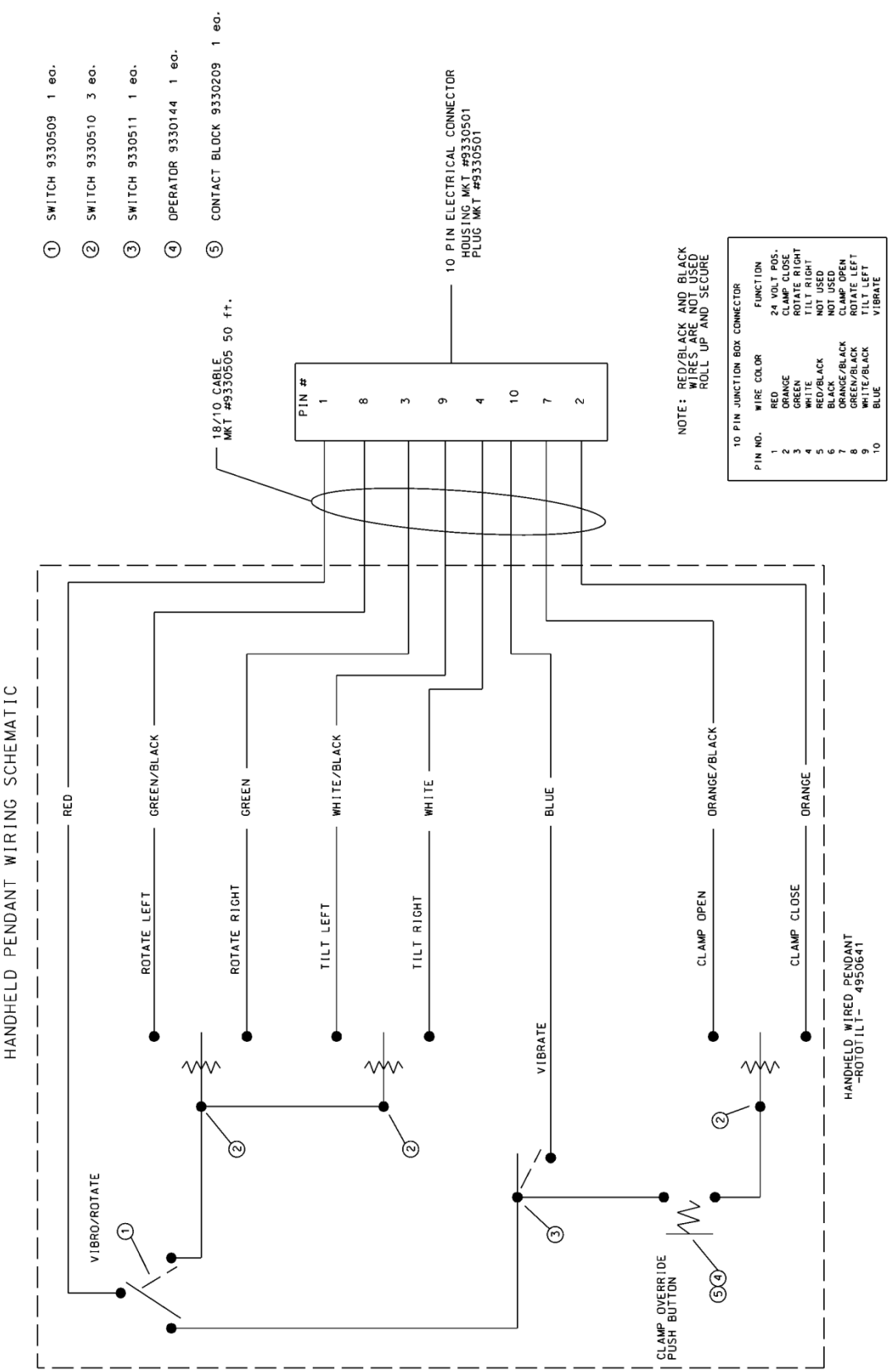
V5Esc MANIFOLD ASSEMBLY
PARTS LIST

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	495 06 34	MANIFOLD	1
2	495 06 37	MOUNT BRACKET	1
3	901 59 17	HEX HEAD CAP SCREW	6
4	903 06 10	LOCK WASHER	6
5	923 00 13	ADAPTER - CAP	2
6	923 00 12	ADAPTER - CAP	1
7	923 11 59	ADAPTER	2
8	923 09 09	ADAPTER	1
9	923 10 77	ADAPTER	1
10	923 11 49	ADAPTER	2
11	923 10 12	ADAPTER	1
12	923 08 36	ADAPTER – PLUG	4
13	923 09 98	SPLIT FLANGE KIT	2
14	923 03 19	ADAPTER	2
15	923 00 40	ADAPTER	2
16	923 01 30	ADAPTER	2
17	923 00 20	ADAPTER	1
18	923 00 07	ADAPTER	1
19	923 13 37	ADAPTER	2
20	923 13 38	ADAPTER	1
21	923 13 39	ADAPTER	1
22	931 08 06	SWIVEL ADAPTER	2
23	931 08 07	SWIVEL ADAPTER	1
24	405 12 40	HOSE ASSEMBLY	2
25	405 12 41	HOSE ASSEMBLY	2
26	405 12 42	HOSE ASSEMBLY	1
27	405 12 43	HOSE ASSEMBLY	2
28	405 12 44	HOSE ASSEMBLY	1
29	405 12 45	HOSE ASSEMBLY	2
30	405 12 46	HOSE ASSEMBLY	1
31	405 12 47	HOSE ASSEMBLY	1


#12 ROTO ACTUATE SOLENOID
“B” CONNECTOR P/N 9330420B
#3 ROTO PRESSURE RELIEF VALVE
NOT SHOWN
MAIN RELIEF
DO NOT ADJUST
#8 VIBRO SPEED ADJUST
#13 VIBRATE ACTUATE SOLENOID
“A” CONNECTOR P/N 9330420


25 METER ROTOTILT
BOOM CABLE
ROTOTILT
CONTROL UNIT
RED
YELLOW
GREEN
YELLOW
GRAY PLUG 12 PIN
MKT #9330540
SECONDARY LOCK
MKT #9330550
PIN CONNECTORS
MKT #9330551
PIN END VIEW OF PLUG
TERMINAL
STRIP
YELLOW CABLE MARKER
BLUE CABLE MARKER
GREEN CABLE MARKER
RED CABLE MARKER
4 AMP MAX.
18-2 S/O CORD
WHITE 24V+
NEG 24V-
65 ft.
BLACK "B" CONNECTOR
CONNECTS TO #12 ON
MANIFOLD "ROTATE"
18-2 S/O CORD
WHITE 24V+
NEG 24V-
20 ft.
"EXCAVATOR AUXILLARY
CIRCUIT ACTUATOR"
18-2 S/O CORD
WHITE 24V+
NEG 24V-
65 ft.
GRAY "A" CONNECTOR
MKT #9330220
CONNECTS TO SOLENOID
#13 ON MANIFOLD "VIBRATE"
18-2 S/O CORD
WHITE 24V+
NEG 24V-
20 ft.
"POWER SUPPLY"
10 PIN JUNCTION BOX CONNECTOR
PIN NO. WIRE COLOR FUNCTION
1 RED 24 VOLT POS.
2 ORANGE CLAMP CLOSE
3 GREEN ROTATE RIGHT
4 WHITE TILT RIGHT
5 RED/BLACK NOT USED
6 BLACK 24 VOLT NEG.
7 ORANGE/BLACK CLAMP OPEN
8 GREEN/BLACK ROTATE LEFT
9 WHITE/BLACK TILT LEFT
10 BLUE VIBRATE
10 PIN BOOM CABLE
TO ROTO TILT CONNECTOR


HANDHELD PENDANT WIRING SCHEMATIC
① SWITCH 9330509 1 ea.
② SWITCH 9330510 3 ea.
③ SWITCH 9330511 1 ea.
④ OPERATOR 9330144 1 ea.
⑤ CONTACT BLOCK 9330209 1 ea.
18/10 CABLE
MKT #9330505 50 ft.
10 PIN ELECTRICAL CONNECTOR
HOUSING MKT #9330501
PLUG MKT #9330501
PIN # 1 8 3 9 4 10 7 2
NOTE: RED/BLACK AND BLACK WIRES ARE NOT USED ROLL UP AND SECURE
10 PIN JUNCTION BOX CONNECTOR
PIN NO. WIRE COLOR FUNCTION
1 RED 24 VOLT POS.
2 ORANGE CLAMP CLOSE
3 GREEN ROTATE RIGHT
4 WHITE TILT RIGHT
5 RED/BLACK NOT USED
6 BLACK NOT USED
7 ORANGE/BLACK CLAMP OPEN
8 GREEN/BLACK ROTATE LEFT
9 WHITE/BLACK TILT LEFT
10 BLUE VIBRATE
RED
GREEN/BLACK
GREEN
WHITE/BLACK
WHITE
BLUE
ORANGE/BLACK
ORANGE
ROTATE LEFT
ROTATE RIGHT
TILT LEFT
TILT RIGHT
VIBRATE
CLAMP OPEN
CLAMP CLOSE
VIBRO/ROTATE
CLAMP OVERRIDE PUSH BUTTON
HANDHELD WIRED PENDANT -ROTOTILT- 4950641

REMTRON RADIO REMOTE CONTROL BOX

ELECTRICAL PLUG PIN NUMBER	WIRE COLOR CODE	REMTRON TERMINAL STRIP #	FUNCTION
1	RED	MLC	24 VOLT POSITIVE
2	ORANGE	K10	CLAMP CLOSE
3	GREEN	K6	ROTATE RIGHT
4	WHITE	K2	TILT RIGHT
5	RED/BLACK	NOT USED	NOT USED
6	BLACK	X2	24 VOLT NEGATIVE
7	ORANGE/BLACK	K9	CLAMP OPEN
8	GREEN/BLACK	K5	ROTATE LEFT
9	WHITE/BLACK	K1	TILT LEFT
10	BLUE	K13	VIBRATE

INCLUDED PARTS

12 ft.	9330505	CABLE 18/10
1 ea.	9330504	ELECTRICAL CONNECTOR HOUSING COVER PLATE
1 ea.	9330502	ELECTRICAL CONNECTOR PLUG
1 ea.	9330501	ELECTRICAL CONNECTOR HOUSING
2 ea.	9330202	CORD GRIP