



MANUFACTURING, INC.

1198 PERSHALL RD.
ST. LOUIS, MO 63137, USA
Telephone: 314-388-2254
Fax: 314-388-1218
Website: www.mktpileman.com

SERVICE, OPERATING, MAINTENANCE AND PARTS MANUAL FOR V-2Esc HYDRAULIC VIBRATORY PILE DRIVER/EXTRACTOR SYSTEM



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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-2Esc 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.**

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-2Esc Hydraulic Vibratory Pile Driver/Extractor System. The manual for the Rototilt mounting system that attaches the V-2Esc 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-2Esc before each use as specified in this manual and 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-2Esc 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-2Esc 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-2Esc** vibratory is designed to deliver a driving force of about **25 tons** to a pile at a rate of **1,700 vibrations per minute**.

II. SAFETY INSTRUCTIONS



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-2Esc 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-2Esc 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-2Esc 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-2Esc hammer's suspension assembly or excess stresses will be put on the suspension assembly damaging one or more parts.
11.  **CAUTION** Whenever the V-2Esc 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-2Esc VIBRATORY
PILE DRIVER/EXTRACTOR SYSTEM

A. OPERATING DATA - V-2Esc DRIVER/EXTRACTOR

Free Hanging Frequency	1700 CPM
Rated Drive Pressure	2500 PSI
Rated Flow.	30 GPM
Free Hanging Amplitude75 IN.
Driving Force @ 1800 CPM.	25 TONS
Clamp Circuit Pressure	2500 PSI
Clamping Force @ 2500 PSI.	16 TONS
Maximum Pull Force (bottom clamp only)	16 TONS
Maximum Crowd Force (bottom clamp only).8 TONS
Maximum Pull Force when attached to pile with side clamp8 TONS
Maximum Crowd Force when attached to pile with side clamp.8 TONS
Standard Clamp Jaw Opening.	2.12 IN.
Clamp Cylinder Travel	2.50 IN.
Net Weight with side clamp & Rototilt	5300 LBS.
Maximum Pile Weight	4000 LBS.

IV. EXCAVATOR REQUIREMENTS

- A. The excavator size, stick width and pin dimensions must be compatible with the Rototilt width, pin dimensions and size restrictions.
- B. The excavator must be equipped with a uni-directional auxiliary circuit that can supply 40 gpm to the V-2Esc at 2,500 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.
- C. The auxiliary hydraulic circuit must supply at least 40 gpm and must flow oil in one direction only (uni-direction), it cannot have reverse flow, or damage to the V-2Esc hydraulic manifold may result. The circuit should be controlled by an electric on/off switch, not a bi-directional foot pedal

V. OPERATING INSTRUCTIONS

DRIVING MODE

A. OPERATING THE V-2Esc SYSTEM - DRIVING MODE

1. First, check that the lifting capacity of the excavator, at the working radius, exceeds the combined weight of the V-2Esc 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.

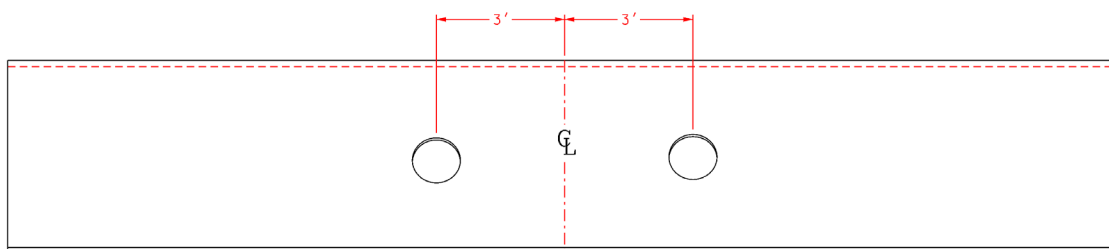


Figure 1

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 4 tons and crowd force limited to 4 tons. If the side clamp jaws slip on the pile stop the hammer and move to the bottom clamp.
6. The V-2Esc 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-2Esc 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-2Esc 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-2Esc exciter and its suspension assembly. If the V-2Esc is mounted to an excavator or backhoe do not apply more crowd force than the maximum recommended.

⚠ CAUTION Whenever the V-2Esc 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-2Esc/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-2Esc 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.

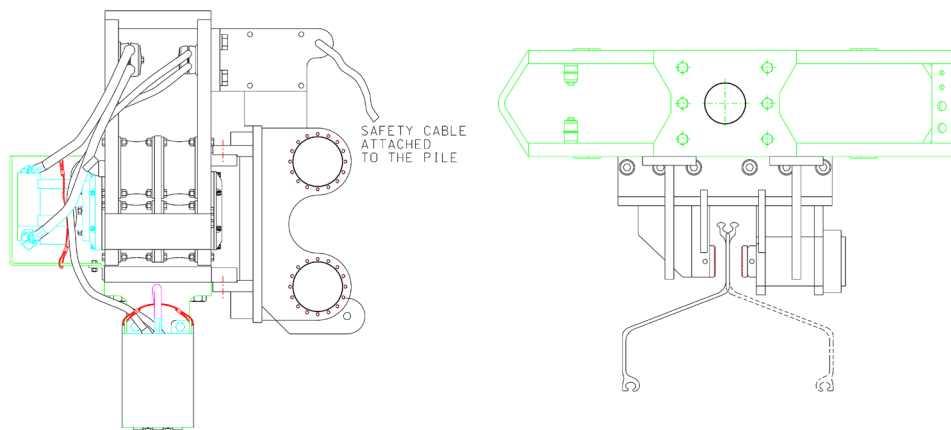


Figure 2


EXCAVATOR MOUNT

B. OPERATING THE V-2Esc SYSTEM - EXTRACTING MODE

1. For pile extracting operations, the V-2Esc hammer should be fitted with a shackle and an auxiliary line attached to the pad eye on the suspension assembly. The V-2Esc 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-2Esc 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-2Esc 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-2Esc hammer jaws are opened allowing the pile to hang by the line and shackle. The V-2Esc 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 4 tons and crowd force limited to 4 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.

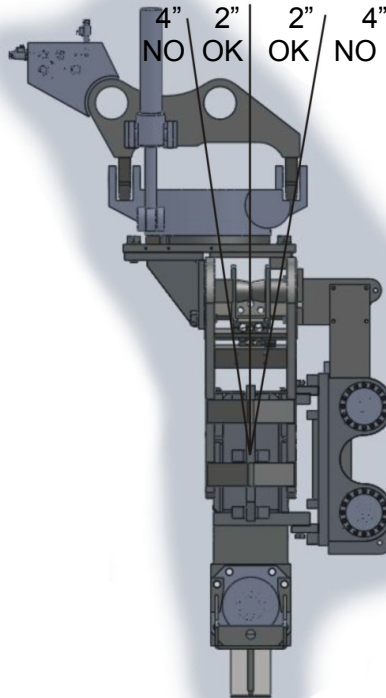
3. The amount of pull which can be exerted on the V-2Esc hammer is limited by the rating of the suspension assembly and the strength of the pile.

 **DANGER** Do not pull in excess of the rating of the V-2Esc hammer suspension assembly or excess stresses will be put on the suspension assembly damaging one or more parts.

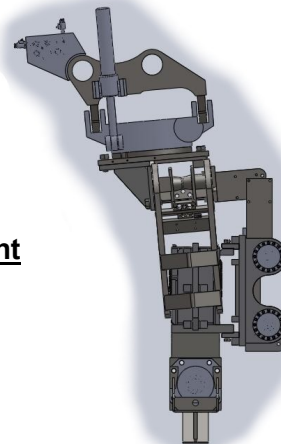
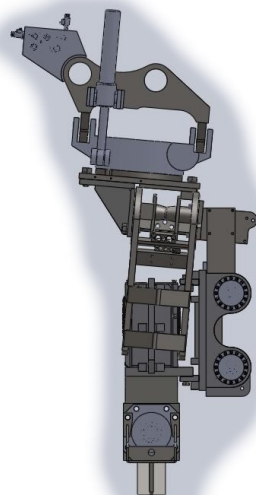
4.  **WARNING** Always maintain proper vertical alignment between the suspension and the pile when driving and pulling the pile.

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.**

VI MAINTENANCE AND SERVICE INSTRUCTIONS

- A. The V-2Esc hammer 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. Inspect the V-2Esc hammer daily for loose fasteners.



Stand a safe distance away from the pile and from below the V-2Esc hammer during vibrating operations. Any unobserved or unconnected, loose nut or other fastener may fall.

- C. Assure that the proper lube oil level is maintained in the V-2Esc 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.
- D. Daily Maintenance Check Lists - Check the entire unit prior to and during start-up each shift.
 - a) 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.
 - b) Look for any damage to the unit, in general that might cause it to fail when put into operation.
 - c) Check the V-2Esc exciter case lube oil level.
 - d) Check the V-2Esc 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-2Esc on piling without the Jaw Shields could result in jaw damage if the hammer is dropped onto the pile.

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

- a) Visually, from a safe distance, inspect the hydraulic lines for leaks.
- b) Before attaching to pile, open and close clamp jaws to verify fast and positive action.
- c) Be sure that there are no kinks in the lines and that they hang uniformly.
- d) Always maintain a close check on the lifting cable to assure no fraying has occurred.
- e) Check for overheated bearing housings.

F. Clamp Pressure - 2,500 PSI

G. Hydraulic Oil Temperature - 115 degrees Fahrenheit to 165 degrees Fahrenheit

VII. SERVICE TROUBLE SHOOTING

1. Hydraulic Fluid Overheating

Running the V-2Esc overloaded for long periods of time (drive pressure at 2500 PSI) dumps oil over the relief valve generating heat. Simply keep the V-2Esc operating but relax the load below the 2500 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. Increase in 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.

4. Exciter Overheating in Specific Local Areas

Checking the temperature of the bearing side covers 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-2Esc is run at full frequency over an extended period of time. Check the lower magnetic plug for metal which might indicate excessive wear of gears or bearings.

5. Internal Noise in Exciter

Unusual noise in exciter generally means something is wrong - either a bearing gear, or a hydraulic motor problem. Lube oil level should be checked.

6. V-2Esc 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.

7. Erratic Suspension Movement

Unusual soil conditions or underground boulders may cause a rebound and effect the suspension isolation. If the V-2Esc when started comes up to speed too slowly, it is possible the suspension will bounce out of sync with the frequency.

8. Slow Clamp Movement

Generally, slow clamping is caused by air in the hydraulic hoses. Bleed both directions of the clamp cylinder.

9. Jaws Slipping on Pile

If jaws are worn too much there may be a lack of clamping jaw travel. The clamp jaw travel is two and one eighth inches. Check clamping pressure. Air may be in the clamp line requiring cylinder bleeding.

10. No Vibration But Drive Pressure at 2500 PSI When Put in Vibrate Mode

Assuming the drive quick disconnects are not faulty and connected full and correctly, there may be a locked bearing, gear, or motor.

11. V-2Esc 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.

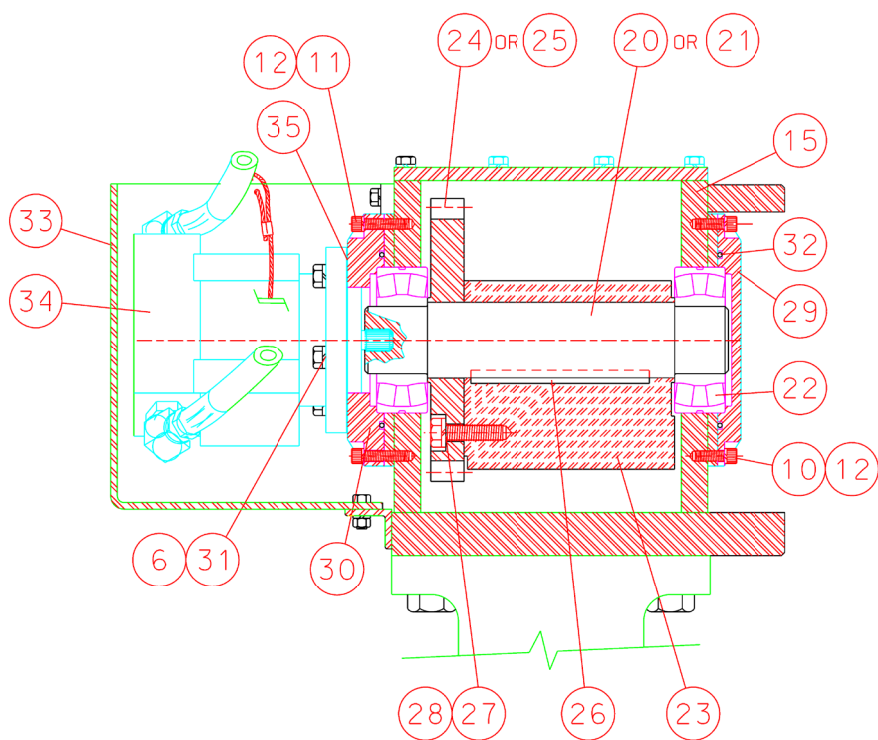
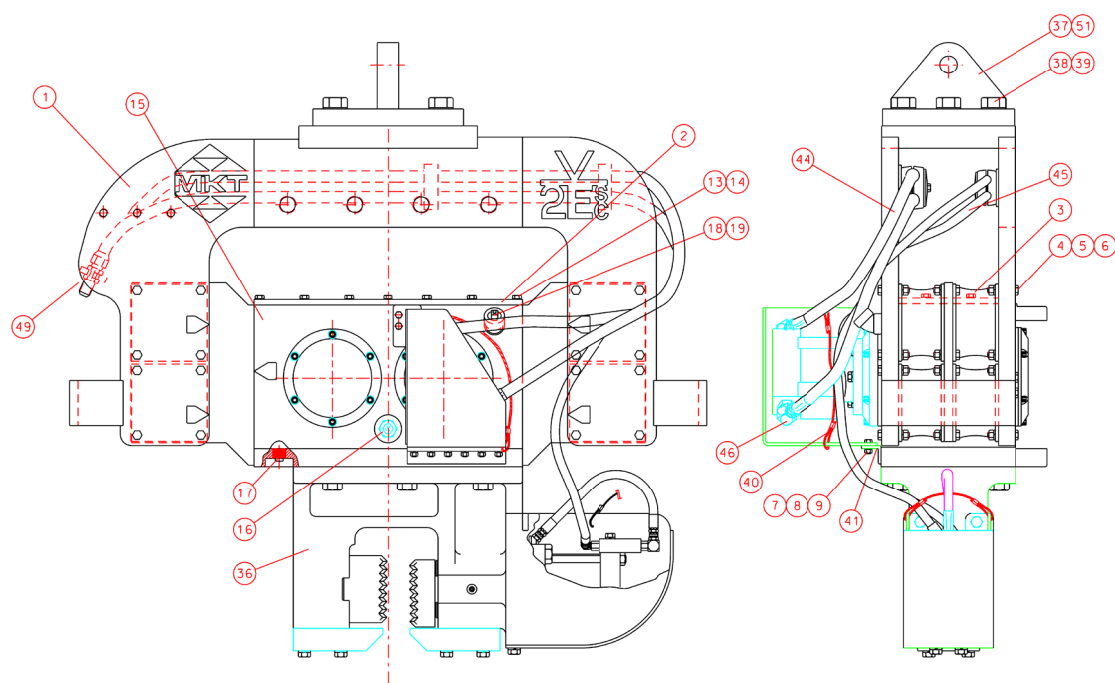
12. V-2Esc Frequency Low But Pressure High

The motor seal might have blown filling the V-2Esc Exciter Case with oil. Check the lube oil level. Might have a bearing failure. Check for excessive exciter case heat.

VIII. DRAWINGS AND PARTS LISTS

- A. V-2Esc GENERAL ASSEMBLY AND PARTS LIST 20 - 22
- B. V-2Esc HYDRAULIC CLAMP ASSEMBLY AND PARTS LIST 23 - 24
- C. SIDE CLAMP ASSEMBLY AND PARTS LIST 25 - 28
- D. V-2Esc EXCAVATOR MOUNT SCHEMATIC (CONSULT FACTORY)
- E. HP-85T3 POWER UNIT GENERAL ASSEMBLY AND PARTS LIST 29 - 32
- F. HP-85T3 HYDRAULIC SCHEMATIC AND PARTS LIST 33 - 34
- G. HP-85T3 HYDRAULIC HOSE BUNDLE AND PARTS LIST 35 - 36
- H. ROTOTILT MANUAL

A. V-2ESC GENERAL ASSEMBLY AND PARTS LIST (402 06 00)



SHAFT SECTION VIEW

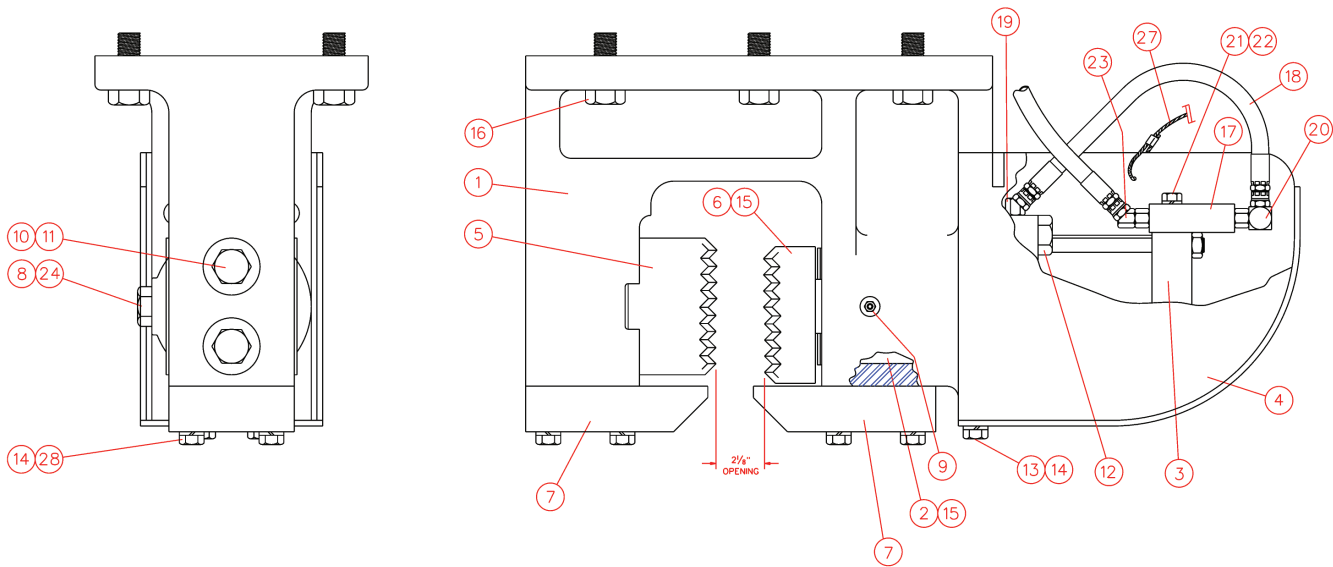
A. V-2ESC GENERAL ASSEMBLY AND PARTS LIST (402 06 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	402 06 06	SUSPENSION HOUSING	1
2	402 05 12	EXCITER CASE COVER	1
3	941 00 24	SHEAR BLOCK	8
4	901 57 21	HEX HEAD CAP SCREW	32
5	900 50 05	HEX NUT	48
6	903 06 08	LOCKWASHER	52
7	901 55 13	HEX HEAD CAP SCREW	10
8	900 50 03	HEX NUT	6
9	903 06 06	LOCKWASHER	11
10	905 05 11	SOCKET HEAD CAP SCREW	18
11	905 05 15	SOCKET HEAD CAP SCREW	6
12	903 04 11	HIGH COLLAR LOCKWASHER	24
13	901 56 13	HEX HEAD CAP SCREW	18
14	903 06 07	LOCKWASHER	18
15	402 06 05	EXCITER	1
16	931 04 79	WINDOW GAUGE	1
17	931 00 02	MAGNETIC PLUG	1
18	942 00 11	VENTED RELIEF	1
19	402 02 07	FILL PLUG	1
20	402 05 04	MOTOR SHAFT	1
21	402 05 03	SHAFT	1
22	914 01 11	BEARING	4
23	402 05 06	ECCENTRIC WEIGHT	2
24	402 00 24	MOTOR GEAR	1
25	402 00 25	DRIVEN GEAR	1
26	402 00 18	ECCENTRIC KEY	2
27	901 58 17	HEX HEAD CAP SCREW	10
28	903 06 09	LOCKWASHER	10
29	402 00 15	BEARING COVER	3
30	402 00 16	MOTOR BEARING COVER	1
31	901 57 11	HEX HEAD CAP SCREW	4
32	913 01 91	O-RING	4
33	402 02 05	MOTOR GUARD	1
34	910 01 54	HYDRAULIC MOTOR	1
35	402 00 21	GASKET	1
36	402 05 23	CLAMP ASSEMBLY	1
37	495 05 04	LIFTING BAIL	1
38	901 62 21	HEX HEAD CAP SCREW	6
39	903 06 04	LOCKWASHER	6
40	402 00 28	SAFETY CABLE	1
41	402 05 13	MOUNT BRACKET	1
42	499 02 13	NAMEPLATE	1

A. V-2ESC GENERAL ASSEMBLY AND PARTS LIST (402 06 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
43	099 06 00	DECAL, EAR PROTECTION	1
44	402 06 12	HYD. HOSE	2
45	402 05 19	HYD. HOSE	2
46	923 09 09	ADAPTER	2
47	943 02 82	HOSE CLAMP	2
48	901 55 11	HEX HEAD CAP SCREW	1
49	923 11 95	BULKHEAD ADAPTER	2
50	923 11 96	BULKHEAD ADAPTER	2
51	943 03 86	17 TON SHACKLE	1
52	901 57 17	HEX HEAD CAP SCREW	16

B. V-2ESC HYDRAULIC CLAMP ASSEMBLY AND PARTS LIST(402 05 23)



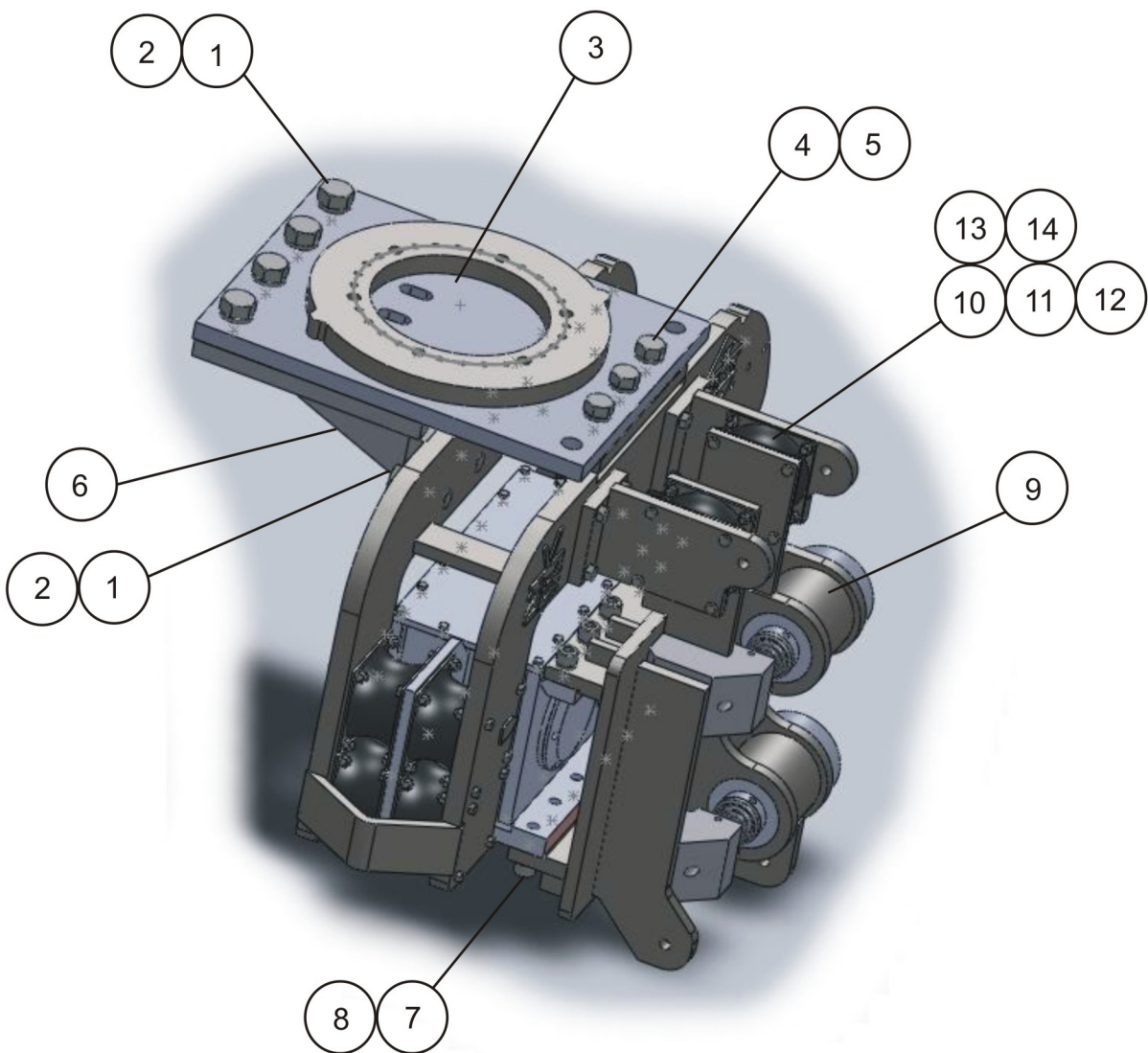
NOTES - "LOCKTITE 271" SHOULD BE APPLIED TO ALL FASTENERS DURING ASSEMBLY.
- GREASE CLAMP SLIDE AFTER ASSEMBLY.

STANDARD JAWS ITEMS 5 AND 6 ALSO PROVIDE AN OPENING FOR UP TO 4 1/2" DIA. PILES.
OPTIONAL TIMBER SHEETING JAWS ITEMS 25 AND 26 (NOT SHOWN) PROVIDE A 4 1/2" OPENING.

B. V-2ESC HYDRAULIC CLAMP ASSEMBLY AND PARTS LIST(402 05 23)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	402 05 22	CLAMP BODY	1
2	402 01 04	CLAMP SLIDE	1
3	402 01 03	CLAMP CYLINDER	1
4	402 01 02	CYLINDER GUARD	1
5	405 02 84	FIXED JAW	1
6	405 00 76	MOVABLE JAW	1
7	402 01 14	JAW SHIELD	2
8	405 00 91	SLIDE KEY BOLT	2
9	942 00 01	GREASE FITTING	1
10	901 61 29	HEX HEAD CAP SCREW	2
11	903 01 21	LOCKWASHER	2
12	901 61 21	HEX HEAD CAP SCREW	4
13	901 58 13	HEX HEAD CAP SCREW	4
14	903 01 15	LOCKWASHER	12
15	924 00 30	ROLL PIN	2
16	901 61 13	HEX HEAD CAP SCREW	6
17	931 05 10	CHECK VALVE	1
18	402 01 15	HOSE	1
19	923 11 34	ADAPTER	3
20	923 09 58	ADAPTER	1
21	905 04 15	SOCKET HEAD CAP SCREW	2
23	923 09 13	ADAPTER	2
24	405 00 89	SLIDE KEY	1
25	402 01 09	TIMBER SHEETING-FIXED JAW (OPTIONAL)	1
26	402 01 07	TIMBER SHEETING-MOV. JAW (OPTIONAL)	1
27	402 01 13	SAFETY CABLE	1
28	901 58 25	HEX HEAD CAP SCREW	8
29	495 05 06	VYNAL SHEETING-FIXED JAW(OPTIONAL)	1
30	495 05 07	VYNAL SHEETING-MOV. JAW(OPTIONAL)	1

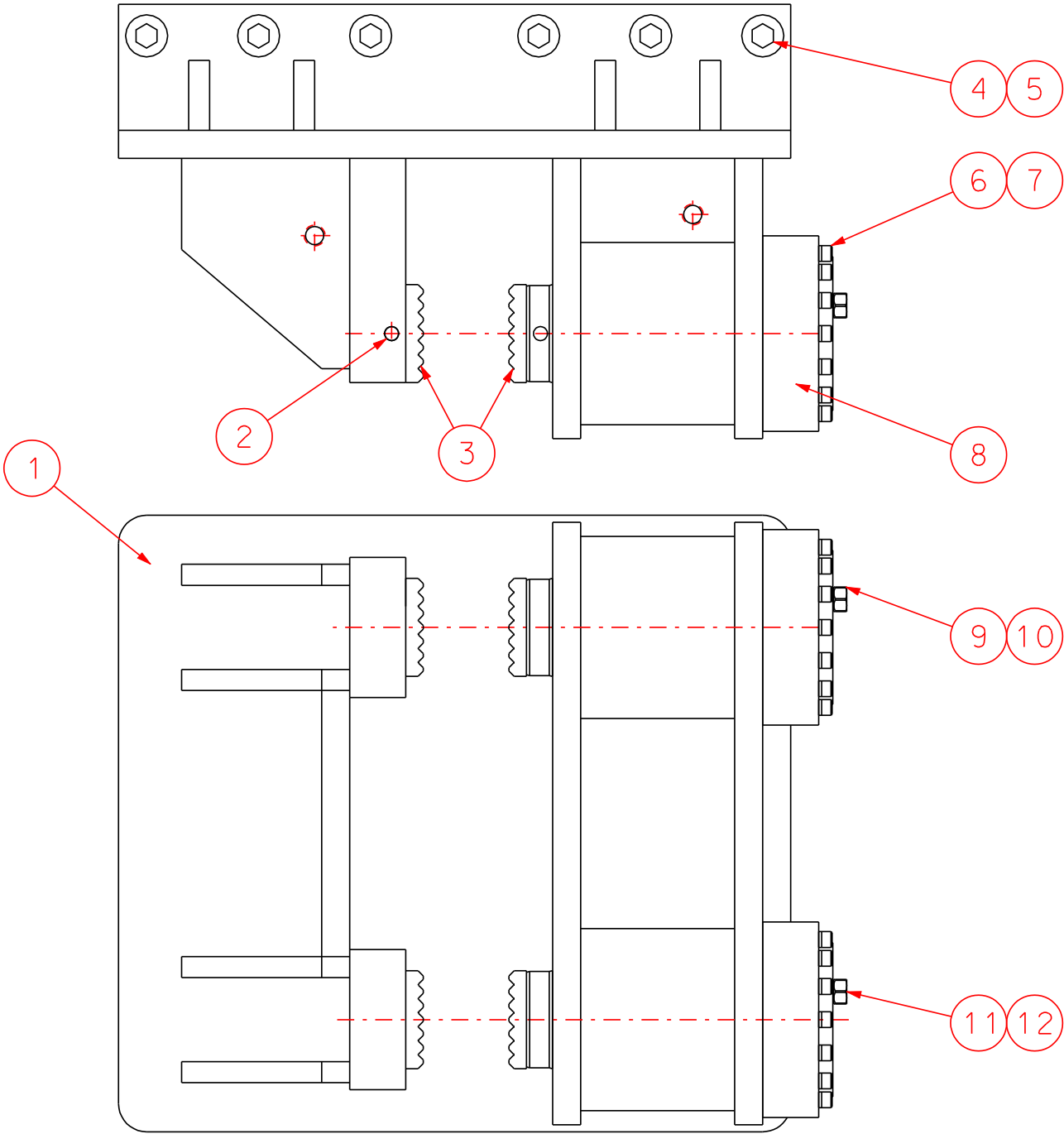
C. SIDE CLAMP ASSEMBLY AND PARTS LIST (495 05 97)



C. SIDE CLAMP ASSEMBLY AND PARTS LIST (495 05 97)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	901 63 11	HEX HEAD CAP SCREW	8
2	903 06 16	LOCK WASHER	8
3	495 06 16	ROTO TILT MOUNT PLATE	1
4	901 62 19	SOCKET HEAD CAP SCREW	3
5	903 06 14	LOCK WASHER	3
6	495 06 18	ROTO TILT MOUNT BRACKET	1
7	905 11 11	SOCKET HEAD CAP SCREW	12
8	903 04 21	HIGH COLLAR LOCK WASHER	12
9	495 05 97	SIDE CLAMP ASSEMBLY	1
10	941 00 33	SHEAR BLOCK	2
11	901 57 15	HEX HEAD CAP SCREW	8
12	901 57 17	HEX HEAD CAP SCREW	8
13	900 50 05	HEX NUT	16
14	903 06 08	LOCK WASHER	16
15	901 59 29	HEX HEAD CAP SCREW	8
16	903 06 10	LOCK WASHER	8
17	900 50 07	HEX NUT	8

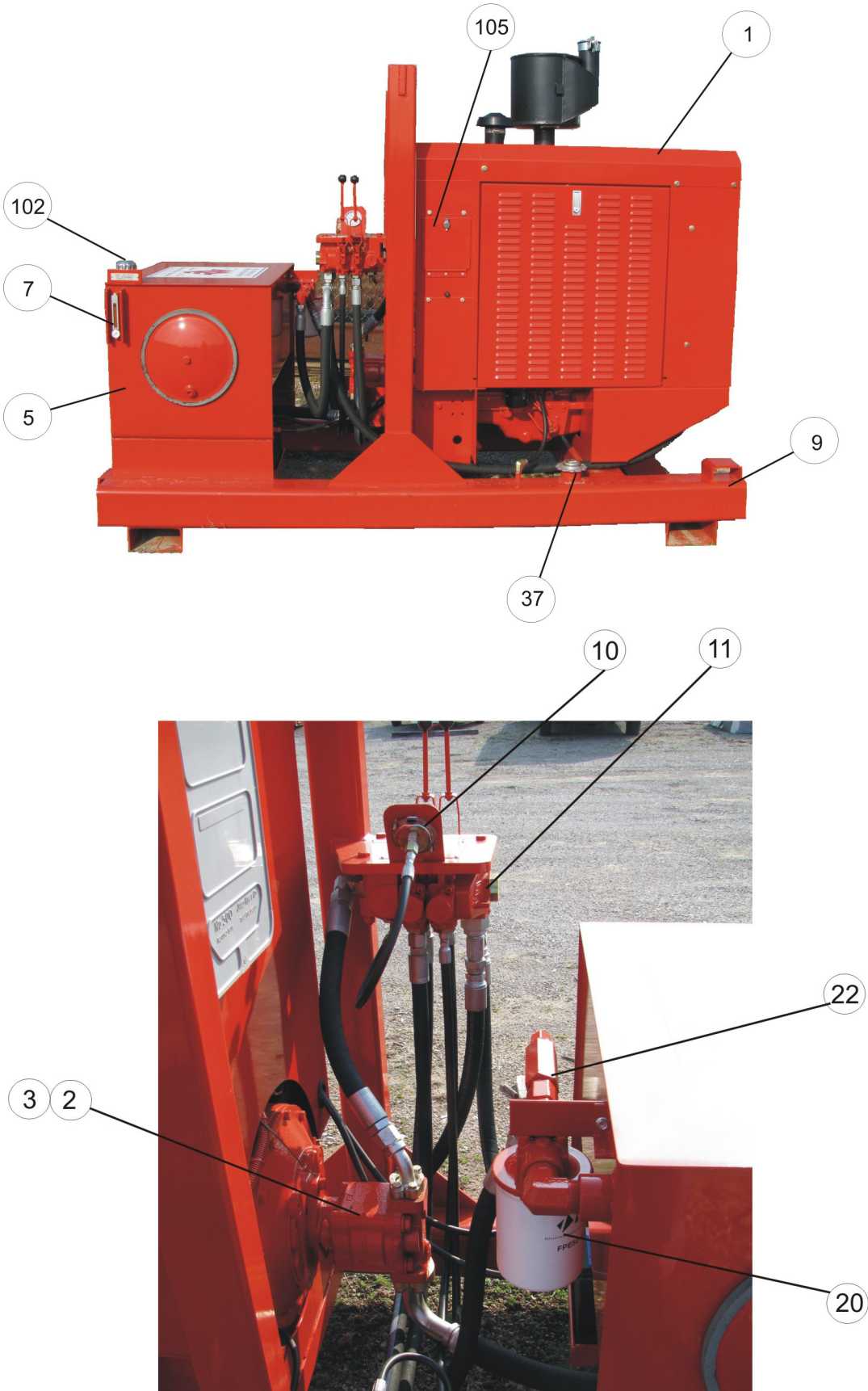
C. SIDE CLAMP ASSEMBLY AND PARTS LIST (495 05 97)



C. SIDE CLAMP ASSEMBLY AND PARTS LIST (495 05 97)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	495 05 96	HOUSING – SIDE CLAMP	1
2	924 00 72	ROLL PIN	4
3	495 05 98	JAW	4
4	905 11 11	SOCKET HEAD CAP SCREW	12
5	903 04 21	LOCK WASHER	12
6	903 04 11	LOCK WASHER	32
7	905 05 25	SOCKET HEAD CAP SCREW	32
8	402 06 02	HYDRAULIC CYLINDER	2
9	923 12 75	ADAPTER	2
10	923 11 56	ADAPTER	2
11	923 09 12	ADAPTER	2
12	402 06 13	HOSE ASSEMBLY	2

E. HP-85T3 POWER UNIT GENERAL ASSEMBLY AND PARTS LIST(403 06 00)



E. HP-85T3 POWER UNIT GENERAL ASSEMBLY AND PARTS LIST(403 06 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	944 02 49	DIESEL ENGINE	1
2	911 01 85	PUMP ADAPTER	1
3	911 02 35	PUMP	1
4	931 05 96	SHUT-OFF VALVE	1
5	403 00 02	HYDRAULIC RESERVOIR	1
7	931 05 51	LIQUID LEVEL GAUGE	1
8	931 05 13	SUCTION STRAINER	1
9	403 06 07	HP-85T3 SKID	1
10	931 06 58	PRESSURE GAUGE	1
11	931 07 65	DIRECTIONAL CONTROL VALVE	1
12	931 05 16	ONE-WAY CHECK VALVE	1
13	927 00 06	QUICK DISCONNECT	1
14	927 00 24	DUST PLUG	1
15	927 00 25	DUST CAP	1
16	927 00 05	QUICK DISCONNECT	1
17	923 00 02	DUST PLUG	1
18	923 00 03	DUST CAP	1
19	934 00 18	OIL COOLER	1
20	931 05 18	RETURN FILTER	1
21	931 05 19	FILTER REPLACEMENT ELEMENT	1
22	931 05 50	1" CHECK VALVE	1
23	933 03 41	BATTERY	1
24	403 05 07	POS. BATTERY CABLE	1
25	403 05 08	NEG. BATTERY CABLE	1
26	170 01 39	NAMEPLATE	1
27	417 01 01	NAMEPLATE	1
28	170 01 00	NAMEPLATE	1
29	411 00 22	NAMEPLATE	1
30	411 00 23	NAMEPLATE	1
31	411 00 20	NAMEPLATE	1
32	411 00 21	NAMEPLATE	1
33	699 02 77	SAFETY CAUTION SIGN	1
34	893 02 53	MKT NAMEPLATE	1
35	931 07 05	FUEL FILTER	1
36	931 07 06	OIL FILTER	1
37	406 00 18	FUEL CAP	1
38	403 01 01	HOSE	1
41	403 05 02	HOSE	1
42	403 05 03	HOSE	1
43	403 05 04	HOSE	1

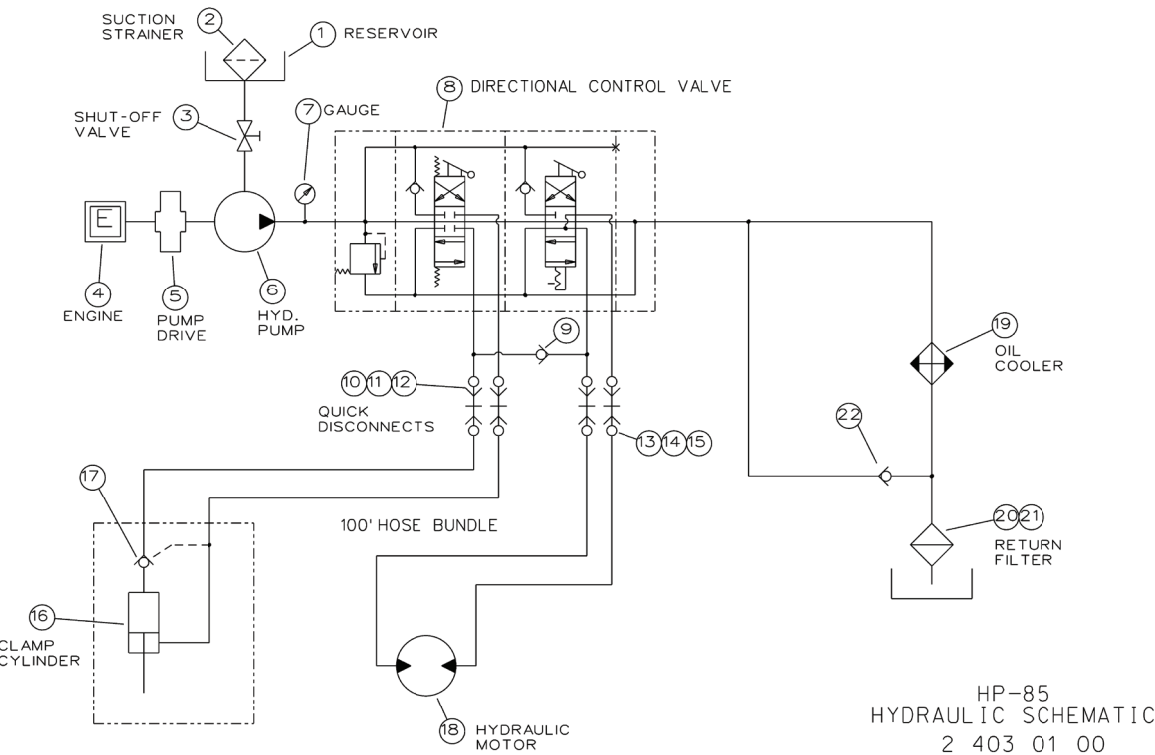
E. HP-85T3 POWER UNIT GENERAL ASSEMBLY AND PARTS LIST(403 06 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
44	403 05 05	HOSE	1
45	403 05 06	HOSE	1
46	403 06 02	HOSE	1
47	403 01 12	HOSE	2
48	403 01 13	HOSE	2
49	946 00 22	HOSE	1
50	946 00 23	HOSE	1
51	923 09 85	ADAPTER	1
52	923 09 19	ADAPTER	1
53	923 11 32	ADAPTER	2
54	923 01 23	ADAPTER	2
55	923 04 87	ADAPTER	1
56	923 10 61	ADAPTER	2
57	923 03 76	ADAPTER	2
58	923 04 83	ADAPTER	1
59	923 04 38	ADAPTER	1
60	923 10 62	ADAPTER	1
61	923 04 39	ADAPTER	1
62	923 10 46	ADAPTER	1
63	923 00 40	ADAPTER	3
64	941 00 26	ADAPTER	2
65	923 10 63	ADAPTER	1
66	923 00 39	ADAPTER	1
67	923 10 64	ADAPTER	1
68	923 04 73	ADAPTER	1
69	923 10 04	FLANGE KIT	1
70	923 10 65	ADAPTER	1
71	923 05 24	FLANGE KIT	1
72	403 00 07	MODIFIED ADAPTER	1
73	923 01 92	ADAPTER	1
74	923 10 66	ADAPTER	1
75	923 09 37	ADAPTER	2
76	923 09 66	ADAPTER	1
77	923 01 09	ADAPTER	1
78	941 00 27	GROMMET	1
79	923 09 62	ADAPTER	1
80	923 09 61	ADAPTER	1
81	923 09 63	ADAPTER	1
82	923 05 06	ADAPTER	1
83	901 28 15	HEX HEAD CAP SCREW	4
84	903 01 15	LOCKWASHER	4
85	900 00 17	HEX NUT	4

E. HP-85T3 POWER UNIT GENERAL ASSEMBLY AND PARTS LIST(403 06 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
86	901 27 15	HEX HEAD CAP SCREW	4
87	903 01 13	LOCKWASHER	9
88	901 27 25	HEX HEAD CAP SCREW	1
89	900 00 15	HEX NUT	3
90	901 25 07	HEX HEAD CAP SCREW	8
91	901 25 11	HEX HEAD CAP SCREW	12
92	903 01 11	LOCKWASHER	24
93	901 07 13	HEX HEAD CAP SCREW	2
94	930 05 97	SOCKET HEAD PIPE PLUG	1
95	901 55 13	HEX HEAD CAP SCREW	4
96	406 03 05	BATTERY HOLD-DOWN ROD	2
97	406 03 04	BATTERY RETAINER	1
98	901 57 21	HEX HEAD CAP SCREW	2
99	406 00 20	VALVE HANDLE STOP	1
100	908 00 08	HYDRAULIC FLUID	50 GAL.
101	406 00 05	NAMEPLATE	1
102	946 00 30	RESERVOIR FILLER/BREATHER	1
103	411 00 31	SPECIFICATION TAG - POWER UNIT	1
104	946 00 27	MANUAL BOX	1
105	406 11 75	CONTROL PANEL COVER	1
106	943 04 46	SPLIT RING	2
107	916 00 32	SASH CHAIN	4
108	930 01 86	STREET ELBOW	1

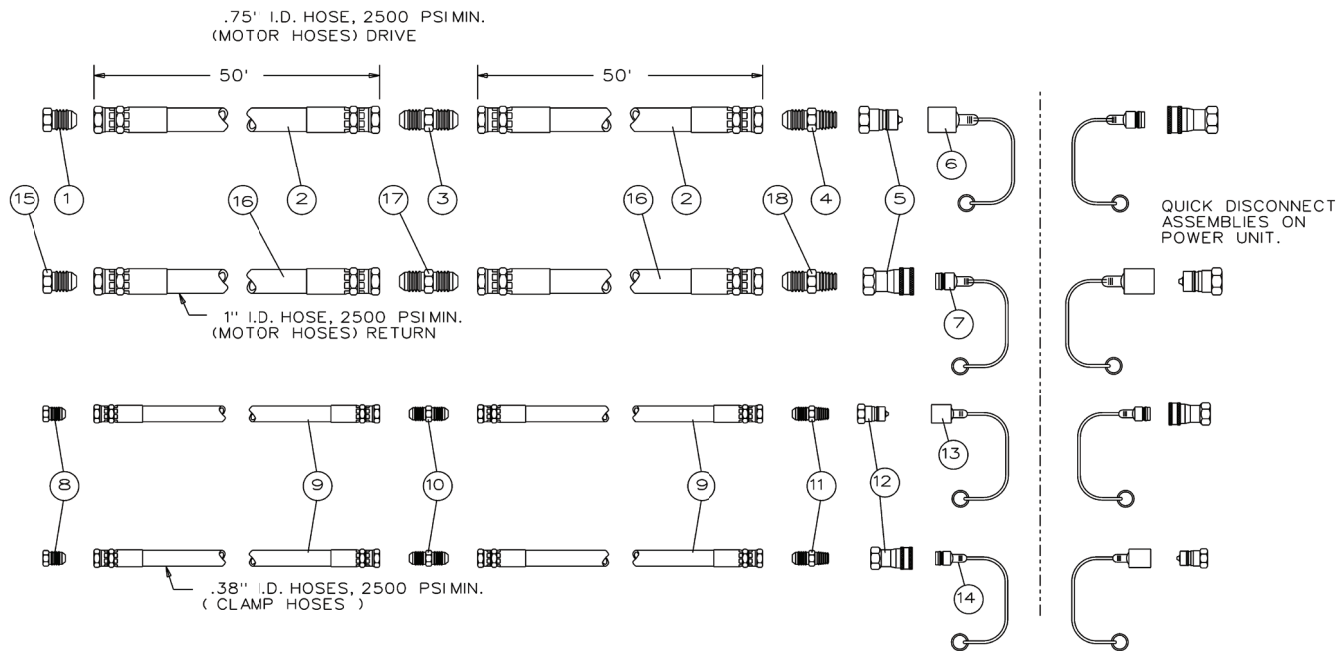
F. HP-85T3 HYDRAULIC SCHEMATIC AND PARTS LIST(403 01 00)



F. HP-85T3 HYDRAULIC SCHEMATIC AND PARTS LIST(403 01 00)

ITEM NO.	MKT PART NO.	DESCRIPTION	QUANTITY REQUIRED
1	403 00 02	HYDRAULIC RESERVOIR	1
2	913 05 13	STRAINER	1
3	931 05 14	SHUT-OFF VALVE	1
4	944 02 49	DIESEL ENGINE	1
5	911 01 85	PUMP ADAPTER	1
6	911 02 35	PUMP	1
7	931 05 74	PRESSURE GAUGE	1
8	931 07 65	DIRECTIONAL CONTROL VALVE	1
9	931 05 16	CHECK VALVE	1
10	927 00 06	QUICK DISCONNECT	2
11	927 00 24	DUST PLUG	2
12	927 00 25	DUST CAP	2
13	927 00 05	QUICK DISCONNECT	2
14	923 00 02	DUST PLUG	2
15	923 00 03	DUST CAP	2
16	402 01 03	CLAMP CYLINDER	1
17	931 05 16	CHECK VALVE	1
18	910 00 52/56	MOTOR	1
19	934 00 18	OIL COOLER	1
20	931 05 18	RETURN FILTER	1
21	931 05 19	FILTER REPLACEMENT ELEMENT	1
22	931 05 50	CHECK VALVE	1

G. HP-85T3 HYDRAULIC HOSE BUNDLE AND PARTS LIST (403 02 00)
G V-2ESC, V-2/HP-70 100' HOSE BUNDLE ASSEMBLY (403 02 00)



G. HP-85T3 HYDRAULIC HOSE BUNDLE AND PARTS LIST (403 02 00)
G V-2ESC, V-2/HP-70 100' HOSE BUNDLE ASSEMBLY (403 02 00)

ITEM NO.	QUANTITY MKT PART NO.	DESCRIPTION	REQUIRED
1	923 00 10	ADAPTER	1
2	403 02 01	HOSE	2
3	923 00 29	ADAPTER	1
4	923 00 20	ADAPTER	1
5	927 00 05	QUICK DISCONNECT	1
6	923 00 03	DUST CAP	2
7	923 00 02	DUST PLUG	2
8	923 00 09	ADAPTER	2
9	403 02 02	HOSE	4
10	923 00 31	ADAPTER	2
11	923 00 37	ADAPTER	2
12	927 00 06	QUICK DISCONNECT	1
13	927 00 25	DUST CAP	1
14	927 00 24	DUST PLUG	1
15	923 07 66	ADAPTER	1
16	403 02 04	HOSE	2
17	923 01 27	ADAPTER	1
18	923 0081	ADAPTER	1