ROTTLER

MANUFACTURING

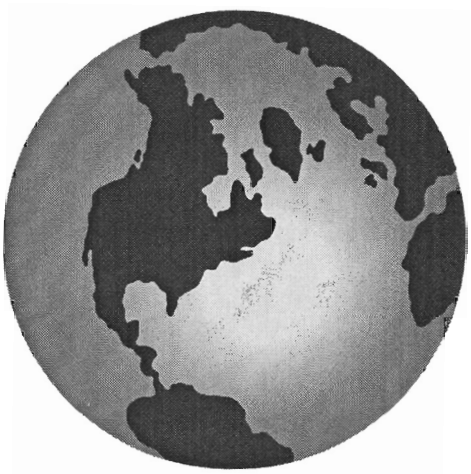
HP2A

HONING MACHINE

MACHINE SERIAL NUMBER

_____

OPERATIONS AND MAINTENANCE
MANUAL



MANUFACTURED BY:

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NOTE: WHEN ORDERING REPLACEMENT PARTS, PLEASE GIVE THE MODEL AND SERIAL NUMBER.

ORDER BY PART NUMBER.

THERE IS A MINIMUM ORDER OF $25.00

DESCRIPTION

The Model HP2A Automatic Honing Machine is a wet complete cylinder block and general purpose honing machine. Hone rotating power is supplied by a totally enclosed AC motor driving a belt and gear reduction drive mounted within a rocker arm arrangement. The honing head is driven through a universal joint.

An air cylinder with a hydraulic check system provides stroking power. Stroking may also be manually operated.

The support carriage is air floated and air clamped to provide simple and easy hole-to-hole setup.

Convenient devices are provided to properly control honing operations and provide easy handling.

A "V" fixture is provided to efficiently hold V-6, V-8 and in-line blocks for honing. Optional clamps are available to clamp most any kind of in-line block or similar work piece.

A splash tank is located within the main frame and a sump pump tank is located under the machine. A switch is provided within the control planel to operate this coolant system.

GUARANTEE

LIMITED

Rottler Manufacturing Company Model HP2A Hone, Parts and Equipment are guaranteed as to workmanship and material, THIS LIMITED GUARANTEE REMAINS IN EFFECT FOR ONE YEAR FROM THE DATE OF DELIVERY. PROVIDED THE MACHINE IS OWNED AND OPERATED BY THE ORIGINAL PURCHASER AND IS OPERATED AND MAINTAINED AS PER INSTRUCTION IN THIS MANUAL.

Standard air and electric components are warranted by their respective manufacturers.

We accept no responsibility for defects caused by external damage, wear, abuse, or misuse. Neither do we accept any obligation to provide compensation for other direct or indirect costs in connection with cases covered by the warranty.

Guarantee does not cover shipping or freight charges.

I M P O R T A N T

OPERATING SAFETY AND EMERGENCY PROCEDURES

ELECTRICAL POWER - Make sure all electrical equipment has the proper electrical overload protection.

MACHINE OPERATOR - Operator of this HP2A Honing machine should be a skilled machinist carftsman: that is, well versed in the caution, care, and knowledge required to safely operate a metal cutting tool.

If the operator is not a skilled machinist, the operator must pay strict attention to the operating procedure outlined in this manual, and must get instruction from a qualified machinist in both the productive and safe operation of this HP2A Honing Machine.

Rottler HP2A Honing equipment has the following areas of exposed moving parts that you must train yourself to respect and stay away from when they are in motion:

1. WORK CLAMPING - Be sure work is clamped securely in accordance with the instructions.

2. LOWER STOP - Set lower limit carefully so that webs or other obstruction below the cylinder surface in the bore do not interfere with the guides or stones of the hone.

3. Keep hand completely away from the rotating honing head at ALL times.

4. Do not operate power stroking without upper travel limit lever locked.

5. Familiarize yourself with the exact location of the stop pushbutton so you can immediately react to an emergency.

6. Do not engage rotation power when hone head is out of a cylinder.

REMEMBER

Metal cutting tools have the speed and torque to severely injure any part of the human body exposed to them.

MACHINE LOCATION

The Hone must be located under a hoist, preferably powered for efficient block handling.

UNPACKING

Carefully uncrate the HP2A Machine. Remove all equipment in splash tank except the "V" fixture frame.

Completely clean these articles as well as the machine base upper table with solvent, also clean the upper and lower travel limit stop rods. Rust inhibitor is applied to the machine at the time of shipment and must be removed before operating this machine.

The Hone carriage is generally shipped with the hold-down system locked See page 6 for machine set-up.

POWER SOURCES REQUIRED

HONE DRIVE MOTOR	-	3 Ø, 208/230 Volt, AC Current.
*AIR SUPPLY	-	3.5 Cubic feet per minute at 100 PSI Compressed air (a minimum 1 HP Air Compressor output)
COOLANT PUMP	-	3 Ø, 208/230 Volt, AC Current

WARNING

Model HP2A Honing Machine will have 2 electrical power sources. One for the hone drive motor and one for coolant pump.
Disconnect all power before servicing this hone.

ELECTRICAL HOOK UP - Make sure the electrical installation is in accordance with the National Electrical Code and your local electrical codes and that the panel is properly placarded for the second power source.

*NOTE: To assure a long service life, for your HP2A machine, the air supply must be moisture free. If there is any doubts about the air supply install a water trap.

LEVELING

Four square head set screws, jam nuts, and chamfered washers are provided with the machine for leveling. Insert the screws with nuts into the bottom of the base. Place the washer chamfered side up under the base at these points.

Using a precision level, level the upper table within .002" per foot in both directions. (Except favor the high setting to the front for best coolant return.)

MACHINE SET UP

Remove cover plate on top of carriage. Pull out cotter pin in slotted nut. Hand tighten slotted nut. Back off nut approximately 1/4 turn. Insert cotter pin.

Turn float clamp switch to clamp. Attach air supply to filter-regulator on the back of the main base.

Set regulator on main base to 100 PSI. (Push down to set, pull up to lock.)

CAUTION:

This Hone cannot be run on 440 Volts.
If necessary, a transformer must be
added to supply the correct voltage.

Attach 3 phase wiring to the L1, L2, and L3 terminal on top of the hone motor starter: Left starter, see Illustration on page 30.

Turn stroke toggle switch on control station to 'OFF'.

Pull the hone rocker arm down into its operating range to test run.

Push starter button, check hone head rotation. The hone head should turn clockwise looking from the top. Exchange 2 wires on the L1, L2, L3, terminal on the starter, to change rotation.

Attach hone head assembly.

COOLANT PUMP SYSTEM

Attach 208/230 Volt 3 phase wiring to the Ll, L2, and L3 terminal on top of the coolant pump's motor starter: Right starter see Illustration on Page 30.

Turn coolant pump's toggle switch to 'on' and check pumps rotation as indicated on side on motor, exchange 2 wires on Ll, L2, and L3, terminal to change rotation.

Pour 15 Gallons of honing oil into splash tank - (Mobil Met 33 or Upsilon or any equivalent light honing oil.)

HONING IN GENERAL

Rottler Honing Equipment is designed to remove a nominal .0012" of stock from the diameter of a bored cylinder with one set of stones unless you require a better than 20 micro inch finish with fine stones. 120/180 grit stones generally will remove the .0012" stock in about 30 seconds in a 4" diameter x 6" long bore.

80 grit stones should be used when you require more stock removal. They will generally remove stock at about .004 diameter per minute in a 4" diameter x 6" long cast iron bore.

Many automotive cylinder bores present a through stroke limitaiton at the bottom. You must be careful to have at least a 1/2" through stone extension at the bottom and be sure the area is completely relieved of webs or other obstructions. Grind them away if necessary.

You can favor lower bore inaccuracy (small at bottom) by short stroking at the bottom. Press the button on the right side of the carriage to short stroke at bottom.

Remember, once you taper the stones and guides by the wrong treatment at the bottom, they must be trued up again in a hole with adequate through stroke.

In general, allow 3/4 to 1" of stone through travel at the top of bore.

Correct stone bond hardness allow stones to break down, which in turn provide new cutting edges on stones, provided proper attention is also given to the guides. Make sure the bond is not too hard so there is no break down, which will cause cylinder glazing, which in turn will cause a ring seat in problem.

Rapid deterioration of the stones will indicate a too-soft bond condition.

Control your power stroking with dwelling to stabilize the load meter. You will find the meter provides excellent information on sizing the bore. A fluctuation of the meter indicate a small area in the bore. The highest reading indicate the tightest spot. A temporary reduction in the stroking speed can facilitate reading of the meter. The knob on the right side of the carriage control stroking. Turn knob clockwise to reduce speed, return knob to it's full out position for normal honing. If you need to dwell at any spot, turn knob all the way in to stop stroke.

When through stroking is limited, you will find 3" length stones will require less attention to achieve an accurate bore.

A barrel shape pattern can usually be eliminated by using 3" stones. 4" stones can be easily trimmed down, by removing 1" from the top of the stones, with the aid of a bench grinder.

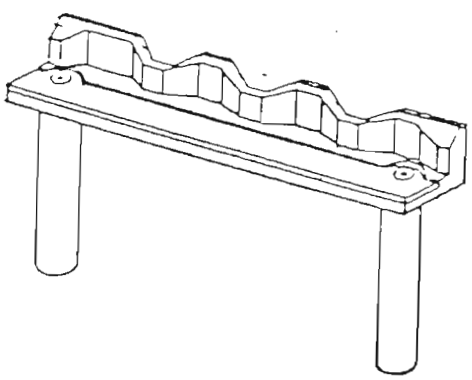
In general, the following approximate micro inch finish in cylinder block cast iron will result from the following stone grits:

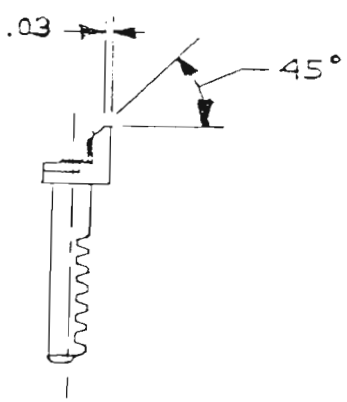
50	- 80 Grit	-	40-70
120	"	-	28-35 RMS
150	"	-	24-32
180	"	-	20-25
220	"	-	15-21
280	"	-	10-16
320	"	-	8-15

IMPORTANT GENERAL FACTS ON HONING

1. Hone head will tend to chatter or squeal when stones wear down. This problem is caused by too much pressure on the guides. To correct this problem take guide out of head and dress them down as shown in the sketch below.

2. The heat generated in honing will expand the bore diameter beyond its roomtemperature size with more expansion in the thin wall mid-section. Expect approximately a .0005" reduction in size after cooling to room temperature.





STONE AND GUIDE INSTALLATION

To install new stones, lift inner adjusting shaft and rotate clockwise, till it latches. Pivot hone head 90 degrees so that centering pinion can be withdrawn.

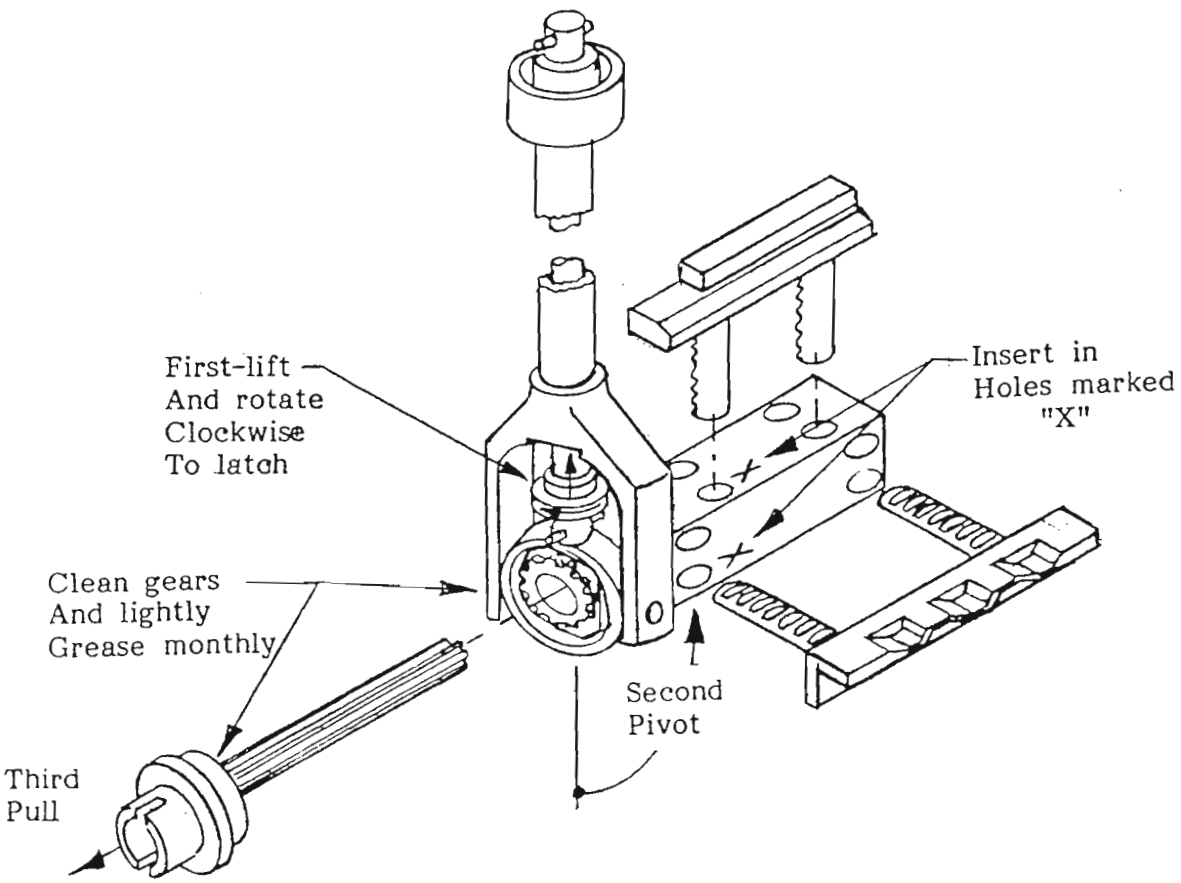
NOTE:

Stones and guides will fall out when centering pinion is removed and head is pivoted 90 degrees.

Insert stones and guides with rack teeth facing center of hone head into hole marked with 'X'.

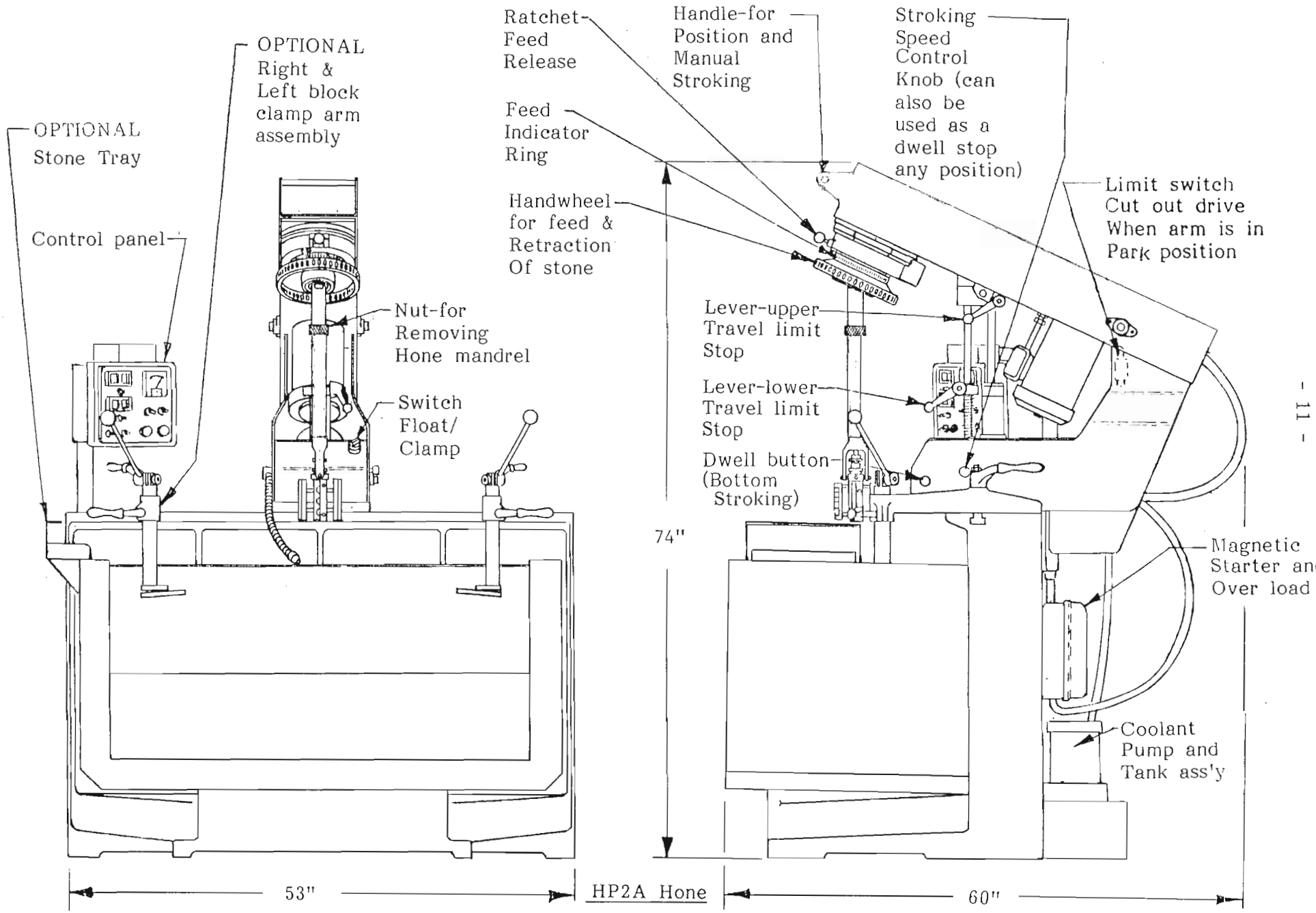
Hold stones and guides in, then pivot hone head 90 degrees (Horizontal) and insert center pinion into head.

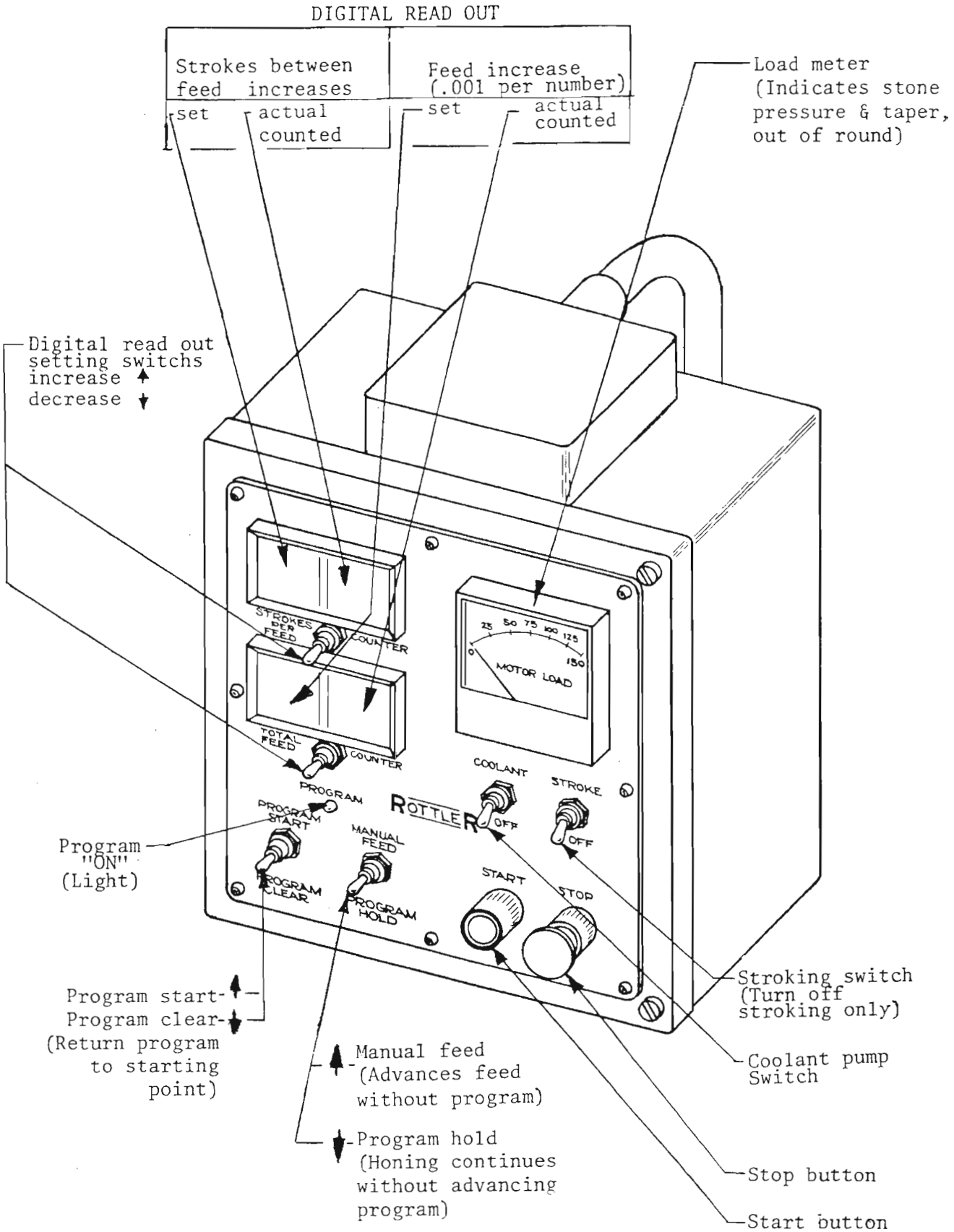
Return hone head to honing position. Lift and turn adjusting shaft counter clockwise to unlatch. Check for free expansion and retraction of stones.



NOTE:

Used stones and guides that are to be reused must be kept in sets.


OPTIONAL
Stone Tray
OPTIONAL
Right &
Left block
clamp arm
assembly
Control panel
Nut-for
Removing
Hone mandrel
Switch
Float/
Clamp
Ratchet-
Feed
Release
Handle-for
Position and
Manual
Stroking
Stroking
Speed
Control
Knob (can
also be
used as a
dwell stop
any position)
Feed
Indicator
Ring
Handwheel
for feed &
Retraction
Of stone
Limit switch
Cut out drive
When arm is in
Park position
Lever-upper
Travel limit
Stop
Lever-lower
Travel limit
Stop
Dwell button
(Bottom
Stroking)
74"
Magnetic
Starter and
Over load
Coolant
Pump and
Tank ass'y
53"
HP2A Hone
60"



CONTROL PANEL
Indentification

HONING PROCEDURES

BLOCK LOADING

Block hold down fixture can be used for inline, "V", and "Y" blocks.

BLOCK LOADING,

Move hone carriage to the far right.

Place block support onto cradle with key engage into slot. "UP" for block with pan rails and main bearing on the same center line, down (flat) for block with raised main bearing.

NOTE: Main bearing cap must be "ON".

Place clamp bar thru main bearing of block.

Pivot clamp screw back.

Lower the block into the fixture, aligning the clamp bar with the front clamp bar guides on the cradle ends. Pull the block toward you after the bar engages the front guides which will rotate the clamp bar into its clamping position. Allow the clamp bar to slide down these guides as the block is lowered.

Pivot clamp screws forward and evenly clamp the bar.

HONE HEAD POSITIONING

Turn float clamp switch to float and position hone head over first hole. Turn switch to clamp.

LOWER TRAVEL LIMIT SETTING

Expand or contract the stone to the approximate bore size.
Expanding - Turn handwheel counter clockwise.
Contracting - Pull and turn ratchet feed release, turn handwheel clockwise.

LARGE MOVEMENT OF STONE

Lift inner adjusting shaft at hone head and rotate clockwise till it is latched.

Lift centering pinion of hone head off of it's gear and rotate pinion to expand or contract stone.

Reingage gear of centering pinion.

Lift and turn adjusting shaft counter clockwise to unlatch.

HONING PROCEDURES CONT'D

LOWER TRAVEL LIMITSETTING CONT'D

Check for obstruction in lower part of all cylinders. Release both upper and lower travel limit stop levers. Lower hone head into cylinder and position at lowest point of stroke.

NOTE:

Stones and guides should have adequate over travel (approximately 3/4"). If there is interference with main bearing, webs, or other obstruction, the over travel can be reduced.

At this position expand stones lightly against cylinder walls to hold rocker arm. Unclamp lower travel limit stop lever and set to stop rocker arm at this position.

NOTE:

Lower travel limit setting will not have to be changed in this block unless there is an obstruction in one of the other cylinder.

UPPER TRAVEL LIMIT SETTING

Release stone pressure by pulling and turning ratchet feed release, then turn hand wheel clockwise. Raise hone head until stones extend about 1" out of block lock upper stroke limit.

FEED SETTING

Set strokes required between feed ups by holding stroke per feed toggle switch up to increase and down to decrease. Read in upper digital display. Set number between feed ups by holding total feed toggle switch up to increase and down to decrease. Read in lower digital display.

NOTE:

The following honing examples, taken in a GMC block with a 4" bore and a 5 7/8" length of bore, are an approximation and will vary with stone hardness, honed material etc.

Finish honing, .002 stock removal, 180 grit stones in a cast iron block--set strokes to 8 and total feed to 3.

Rough honing, .010 stock removal, 80 grit stones in a cast iron block--set strokes to 9 and total feed to 17.

HONE CYCLE

Turn stroke switch on control panel to 'ON' position. Turn toggle switch on control panel to 'ON' to start coolant.

Press start button.

HONING PROCEDURES CONT'D

REMEMBER: A limit switch in the rocker arm will not allow the motor to operate when the hone head is in park position.

Turn handwheel counter clockwise with ratchet engaged to bring load up to 80 to 100% on meter. If you go over 100%, you can release pressure by pulling and holding ratchet feed release knob, then turning handwheel clockwise.

FEED INDICATOR RING

Each mark on the feed ring is .001 on the diameter. Each ratchet click is .001 on the diameter.

Turn feed ring to 'O', after stones are brought up to honing load.

The movement of the 'O' mark on the feed ring away from the index mark on the gear box will give you a indication of how much stock you have removed.

Due to stone break down it will be somewhat less then indicated by the feed ring.

PROGRAM START

Flip program start toggle switch up to start program.

LOAD METER

A large swing of needle indicates a small area in cylinder. The small area being the highest reading, usually at the bottom of the cylinder. Dwell in this area to open it up.

A temporary reduction in the stroking speed can facilitate reading of the meter.

The knob on the right side of the carriage control stroking speed.

Turn clockwise to reduce speed, return to full out position for normal honing.

DWELL BUTTON (SHORT STROKE)

Push BLACK dwell button on right side of carriage. Hone will short stroke at bottom of stroke.
NOTE: If thru bottom over travel is less than 1/2", use lower dwell (short stroke) early in cycle.

SIZE CHECKING

(WHEN IN PROGRAM CYCLE)
To check bore size, first reduce stone press. Press stop button (program will stop and hold at this point.)

Place left hand on rocker arm handle. Release upper travel limit lever. Move hone head out of way. After checking size, reset upper travel limit lever, press start button and bring load up with handwheel.

HONING PROCEDURES CONT'D

HONE CYCLE COMPLETE

After program is finished, hone will stop in the up position. Release stone press. Place left hand on rocker arm handle, release upper travel limit lever. Turn float/clamp switch to float and move to next cylinder.

FINISH PLATEAU

If a plateau is required press start button at end of hone cycle and hone for 6 to 10 strokes, at approximately 20% reduce pressure.

MANUAL STROKING

To hand pump rocker arm, turn toggle switch on top of control panel to 'off' position. Release upper travel limit lever. All functions will operate with exception of the power stroking. Use stop button to stop hone.

CAUTION: Do not operate power stroking without upper travel limit lever locked. If you inadvertently start machine with power stroking on and lever unlocked, the air cylinder will go to the bottom of stroke and remain there.

To return it, press stop button. Check to make sure upper travel limit lever is completely unlocked. Keep your hands well clear of all mechanisms.

Manually bring the rocker arm down to the lower stop or use a pencil or screwdriver to depress the lower limit valve and the cylinder will return to the top.

IMPORTANT

MAINTENANCE

□ 1. Lightly grease the two grease fittings on the rocker arm pivot. Grease fitting on upper cylinder pivot pin. Grease fitting on the handwheel, three grease fittings on the block hold down fixture and the fitting on the control enclosure mount with UNOBA or F2 lubricant, or lubriplate #930AA, or any equivalent lithuim barium grease every month.

○ 2. Check oil level in the gear box on rocker arm every 6 months. Check by removing plug on upper rear of gear box. Check with rocker arm in horizontal position. Oil level should be up to this hole. If oil is needed lower rocker arm and add oil in same hole.

CAUTION: Do not over fill. If over filled, oil will come out breather cap. Drain oil by removing one round head screw from ratchet actuator housing cover.

Use Tellus #32 or Mobil DTE Light or any equivalent light machine oil.

3. Remove adjusting pinion of hone head and clean gears in pinion. (Lightly grease) monthly.

⊙ 4. Lubricate daily the universal joint that drive the hone head adjusting/ drive shaft assembly with 30 weight machine oil.

LUBRICATION - PNEUMATIC STROKING CIRCUIT

△ Add when needed, Shell oil "Tellus #32" or Mobil DTE light oil to the lubricator on the back of the main base, or any equivalent highly refined, turbine, or hydraulic S.A.E. #10 or lighter petroleum oil (nondetergent) with a medium aniline point (ASTM oil #2).

CAUTION: Use only an oil that is compatible with nitrile seals and will not cause swelling of seals.

DO NOT use compounded oils containing graphite, silicones, soaps, fillers, hydraulic fluids containing phosphate esters (skydrol, fyrouel, pydraul, etc.) and fire resistant oils containing phosphate esters.

Set lubricator at one drop per minute.

MAINTENANCE CONT'D

FILTER/REGULATOR (AIR)

To maintain maximum filtering efficiency and to avoid excessive pressure drop, the filter/regulator must be kept clean. If the air supply is kept clean the regulator should provide long periods of uninterrupted service. Erratic regulator operation or loss of regulation is most always due to dirt in the disc area.

To clean, depressurize and disassemble the filter/regulator (remove the bowl*, filter and disc assembly). Clean parts with denatured alcohol and blow out body with compressed air. When reassembling, make sure the disc stem fits into center hole of diaphragm assembly. If diaphragm assembly is replaced, make sure disc stem fits into its center hole. Tighten bonnet slightly more than hand tight (to 45 inch pounds torque).

Wash porous filter elements with denatured alcohol.

* Clean plastic bowl only with household soap.

COOLANT PUMP HONING OIL

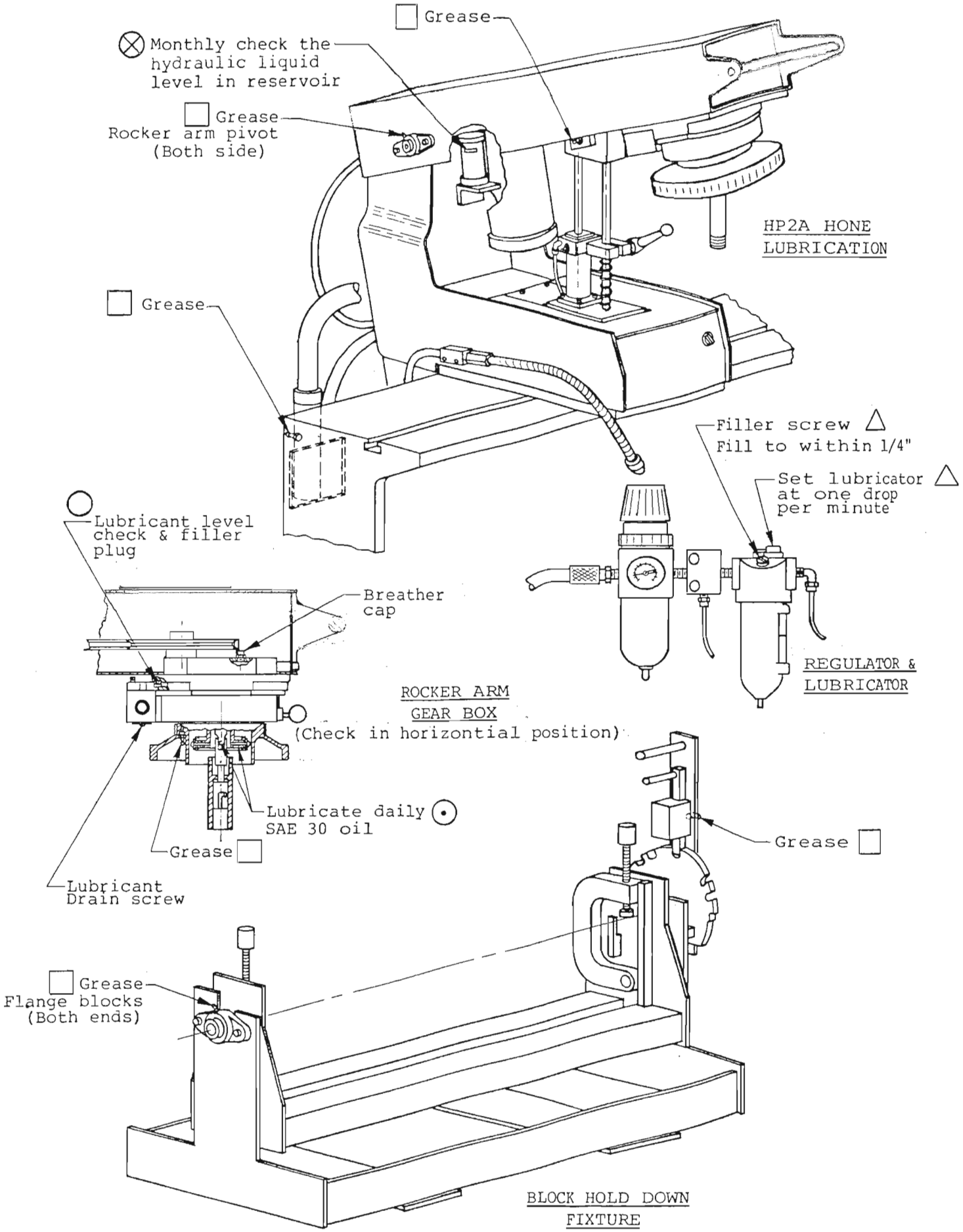
Change honing oil when it gets dirty. Completely clean the sump tank and filter screen when refilling, use 15 gallons of Mobil Met 33 or Upsilon or any equivalent light honing oil. When optional filter is used, change filter element when flow at nozzle is reduced.

HYDRAULIC CHECK SYSTEM

Monthly check the hydraulic liquid level in the reservoir in back of the carriage under the pivot arm. If liquid is needed, add two parts water to one part Ethylene glycol (Prestone) to plug hole on top of reservoir. Remove air from machine while filling:
Fill to mark on reservoir.

BLEEDING AIR OUT OF HYDRAULIC SYSTEM

Turn off power stroking toggle switch, and turn off air to hone. Check hydraulic liquid level. Remove cover on carriage. Open needle valve under cover. Attach a hose to bleed fixture on back side of lower cylinder. Place other end of hose in a jar of water and glycol. Loosen bleed fixture. Pump rocker arm slowly up and down, with upper travel limit lever clamped. Pump until no bubble appears in liquid in jar. Close bleed fixture. Do the same to the bleed fixture on the right side of the upper cylinder. Then close needle valve and unclamp upper travel limit lever.


Grease
Monthly check the hydraulic liquid level in reservoir
Grease
Rocker arm pivot (Both side)
HP2A HONE LUBRICATION
Grease
Filler screw △
Fill to within 1/4"
Set lubricator at one drop per minute △
Lubricant level check & filler plug
Breather cap
REGULATOR & LUBRICATOR
ROCKER ARM GEAR BOX
(Check in horizontial position)
Lubricate daily ⊙
SAE 30 oil
Grease
Grease
Lubricant Drain screw
Grease
Flange blocks (Both ends)
BLOCK HOLD DOWN FIXTURE

V - BELT

ADJUSTMENT - REMOVAL

CAUTION: Disconnect all electrical and air power to hone before making any repairs.

ADJUSTMENT

Remove rear cover on top of rocker arm. Loosen 4 motor cap screws. Push motor back until you have approximately 1/2" play in V-Belt.

CAUTION: Do not over tighten belt.

Retighten capscrews.

REMOVAL

Remove both front and rear cover on top of rocker arm. Loosen the 4 motor capscrews. Pull motor forward. Slip V-belt off pulleys. Remove V-belt through stop rod slot of rocker arm.

REMOVAL - DISASSEMBLY

GEAR BOX

CAUTION: Disconnect all electrical and air power to hone before making any repairs.

REMOVAL

Remove hone head at drive tube nut. Remove both front and rear covers on top of rocker arm.

Remove V-belt from front pulley.

Remove two 1/4 socket head capscrews in front cover of rocker arm.

Remove the two 1/8 airline from feed cylinder.

Remove four gear box mounting 3/8 socket head capscrews, that are inside the rocker arm.

Remove gear box.

DISASSEMBLY

Drain oil.

Remove drive tube and drive yoke by holding pinion drive shaft and unscrewing drive tube.

To disassembly universal joint, remove its four 1/4" button head capscrews, on reassembling make sure all screws are tight.

Remove six 1/4" socket head capscrews on top of upper gear housing. Lift upper half of gear housing off lower. To remove pinion drive gear from upper housing, remove bearing, retainer 514-6-26. Press pinion out of housing.

Back out socket set screw in nut, then remove nut.

Press bearing off shaft.

Remove lower gear housing from cage by removing four 1/4" socket head capscrews on lower gear housing. Cage can now be removed from lower gear housing. On reassembling extreme care must be taken not to damage seal. Ring gear can be lifted out of cage. Note O-ring seal on outer lip.

Remove sun gear 514-6-35, by tapping out it's 1/8" spring pin. Adjusting shaft 514-6-43 can now be removed along with it's two thrust washer.

Remove driven planet gears 514-6-32 by tapping out it's 1/8" spring pin.

REMOVAL - DISASSEMBLY CONT'D

DISASSEMBLY CONT'D

Remove driven shaft 514-6-36 by bending lockwasher tab back, then remove nut and lockwasher. Press driven gear 514-6-28 off shaft. Remove three 1/4" socket head capscrews in bearing retainer 514-2-3C, Remove by inserting a Allen wrench through the access holes in sun gear. Press shaft and sun gear out of upper housing. Press bearing off of shaft then sun gear off of shaft.

Disassamble ratchet gear and handwheel from cage, by removing the four 1/4" socket head capscrew in handwheel hub. On reassembling ratchet gear in cage, extreme care must be taken not to damage seal.

Remove plant gears from ratchet gear, by pressing shaft 700-6-5 out of gear.

Remove feed ring 514-6-72 by pulling it off of handwheel.
NOTE: Balls and springs will fly out when removing.

Remove ratchet pawl carrier from cage by removing one 1/4" socket head mounting capscrew. NOTE: O-ring, seal around hub.

Disassamble ratchet feed release by removing knob and pressing out 1/8" spring pin. Ratchet pawl, spring and o-ring can then be removed from carrier.

Remove auto, feed up housing from ratchet gear cage by removing it's 4 socket head capscrews.

Disassemble auto feed up housing by unscrewing the drag pin housing, with it's spring and drag pin, NOTE: on reassembling drag pin it should be turned in till spring is compressed then back off 1/4 turn. Remove ratchet actuator housing cover by removing it's 2 round headed screw. Remove the shoulder screw in the shifting spool to allow the auto feed ratchet pawl to pivot out, so that it's pivot pin can be removed, then the pawl. Remove the cylinder by unscrewing it's 4 socket head capscrews. Pivot retraction arm in and remove out bottom of slotted hole. Remove piston and shifting spool.

NOTE: On reassembling auto feed up housing assemble to cage, the upper gear housing must be removed so that auto feed up ratchet pawl can be seen when it engages the ratchet, and the spring load ratchet pawl must be attached.

Adjust the engagement of the pawel to the ratchet wheel by loosing the auto feed up housing mounting screw and moving the housing sideways. Ratchet pawl must just miss one ratchet tooth then fully engage the next.

CONTROL FUNCTIONS

To provide a convenient trouble shooting guide in the event of a control failure to your HP2A Hone, the following information describes the sequence of control actions.

THE CONTROL FUNCTIONS ARE DESCRIBED IN CAPITAL TYPE AND THE RESULTING POWER FUNCTIONS IN LOWER CASE, SO A DIFFICULTY MAY EASILY BE ISOLATED.

PARK POSITION LIMIT SWITCH

AN ELECTRICAL LIMIT SWITCH IS LOCATED ON THE CARRIAGE UNDER THE ROCKER ARM PIVOT. THIS NORMALLY OPEN SWITCH IS CLOSED BY A CAM WHEN THE ROCKER ARM IS LOWERED INTO ITS WORKING RANGE. WHEN CLOSED IT ALLOWS THE AIR CONTROL SOLENOID VALVE AND THE MOTOR STARTER TO BE ENERGIZED. WHEN OPEN IT DROPS OUT THE ELECTRICAL CONTROL CIRCUIT.

START PUSH BUTTON

PRESS START BUTTON TO CLOSE CONTACTS ON MOTOR STARTER, Which energizes the motor, which in turn provides rotational power to the hone head, through a V-belt and a gear reduction. IT ALSO ENERGIZES A SOLENOID VALVE, WHICH OPENS TO PROVIDE AIR PRESSURE, FROM THE UPPER LIMIT VALVE, WHICH IS MECHANICALLY HELD OPEN BY A PLUNGER ON THE END OF THE PISTON ROD, TO SHIFT THE SPOOL OF THE STROKING VALVE. The stroking valve allows air pressure to flow to the upper part of the lower cylinder driving it's piston and the rocker arm down. AS THE PISTON ROD MOVES AWAY FROM THE UPPER LIMIT VALVE, IT CLOSES AND EXHAUSTS THE AIR FROM THIS CONTROL LINE. AIR FROM THE UPPER LIMIT IS ALSO USED TO ACTUATE THE PISTON OF THE INTERFACE SENSOR CYLINDER, WHICH SENDS AN ELECTRICAL SIGNAL TO THE PROGRAM FOR COUNTING AND ROCKER ARM LOCATION.

THE UPPER PIVOT OF THE ROCKER ARM CONTINUES DOWN UNTIL ITS ACTUATING SCREW STRIKES THE LOWER LIMIT VALVE. WHICH OPENS AND ALLOWS AIR TO FLOW TO THE OPPOSITE AIR PILOT PORT OF THE RECIPROCATING VALVE, AND TO THE OPPOSITE SIDE OF THE INTERFACE SENSOR CYLINDER. THIS AIR PILOT SHIFT THE SPOOL OF THE RECIPROCATING VALVE. Which exhaust the air from the upper port of the lower cylinder and allows air pressure to flow to the bottom port of the lower cylinder, driving the piston and rocker arm up. AS THE ACTUATING SCREW MOVES AWAY FROM THE LOWER LIMIT VALVE, IT CLOSES AND EXHAUST AIR FROM THIS CONTROL LINE.

CONTROL FUNCTIONS CONT'D

FEED UP (STONE PRESSURE)

THE PROGRAM RELAY OR THE MANUAL FEED UP SWITCH SEND AN ELECTICAL SIGNAL TO THE FEED UP SOLENOID VALVE WHICH SHIFT to allow air pressure to the engagement side of the feed up cylinder. The piston of the cylinder move the spool, which inturn pivot the ratchet pawl into engagement with the ratchet wheel, then rotate the wheel one tooth.

When the solenoid valve is de-energized it moves the air pressure to the retraction side of the cylinder which inturn retracts the pawl, then returns the spool to it's original position.

STOP PUSH BUTTON OR PROGRAM FINISH

THE STOP BUTTON OR PROGRAM FINISH RELAYS OPEN CONTACTS OF THE MOTOR STARTER TO STOP ROTATION OF THE MOTOR. IT ALSO OPENS THE ELECTRICAL CIRCUIT TO THE SOLENOID VALVE CAUSING IT TO CLOSE. THIS RESTRICTS AIR FLOW TO THE "B" AIR PILOT OF THE STROKING VALVE. STROKING WILL STOP AT THE TOP OF THE UP STROKE AND THE SPOOL OF THE STROKING VALVE WILL REMAIN IN THIS POSITION WITH AIR PRESSURE IN THE BOTTOM OF THE LOWER CYLINDER UNTIL START BUTTON IS PRESSED.

STROKING TOGGLE SWITCH

THE STROKING TOGGLE SWITCH IS LOCATED ON THE MIDDLE RIGHT SIDE CONTROL PANEL HOUSING. WHEN THIS SWITCH IS TURNED OFF IT OPENS THE CIRCUIT TO THE SOLENOID VALVE, which stop the power stroking.

STROKING SPEED CONTROL

THE UPPER CYLINDER OF THE ARM PROVIDES SMOOTH CONTROL OF THE STROKING MOTION AND STROKING SPEED CONTROL. THIS HYDRAULIC CYLINDER PUMPS LIQUID BACK AND FORTH THROUGH A NEEDLE VALVE, WHICH IS LOCATED ON THE RIGHT SIDE OF THE CARRIAGE. BY OPENING AND CLOSING THIS VALVE, STROKING SPEED CAN BE CHANGED. A PRESSURIZED RESERVOIR IS LOCATED ON THE CARRIAGE UNDER THE ROCKER ARM PIVOT. THIS RESERVOIR COMPENSATE FOR VOLUME CHANGE DUE TO TEMPERATURE VARIATIONS. THE RESERVOIRS LIQUID IS FED THROUGH A FLOW CONTROL VALVE WHICH IS LOCATED ON TOP OF THE NEEDLE VALVE. THIS VALVE CAN BE OPENED FOR BLEEDING AND REFILLING. A REGULATOR IS LOCATED ON A MANIFOLD IN BACK OF THE CARRIAGE TO REGULATE THE AIR PRESSURE (15 PSI) TO THE RESERVOIR.

SHORT STROKING BOTTON DWELL

AIR SUPPLY TO THE UPPER LIMIT VALVE IS REDUCED BY A FLOW CONTROL VALVE. A CHECK VALVE IS ATTACHED TO THE STOP STROKING SOLENOID VALVE BETWEEN IT AND THE UPPER LIMIT VALVE. A JUMP AIR LINE IS ROUTED AROUND THE CHECK VALVE AND A PUSH BUTTON CONTROL VALVE IS LOCATED ON THIS LINE. WHEN THIS PUSH BUTTON CONTROL VALVE IS PRESSED AIR CAN GET THRU THE CHECK VALVE ONLY, THEN IT IS TRAPPED IN THE AIR LINE. This keeps the spool in the stroking valve shifted to down stroke only. THEN THE LOWER LIMIT VALVE IS ACTUATED. It's higher pressure shifts the spool in the stroking valve to up stroke, BUT AS SOON AS PIVOT ARM MOVES AWAY FROM LIMIT VALVE AND EXHAUST ITS AIR, THE AIR TRAPPED IN THE OTHER CONTROL LINE cause the spool in the stroking valve to shift to down stroke again.

DWELL CONTROL

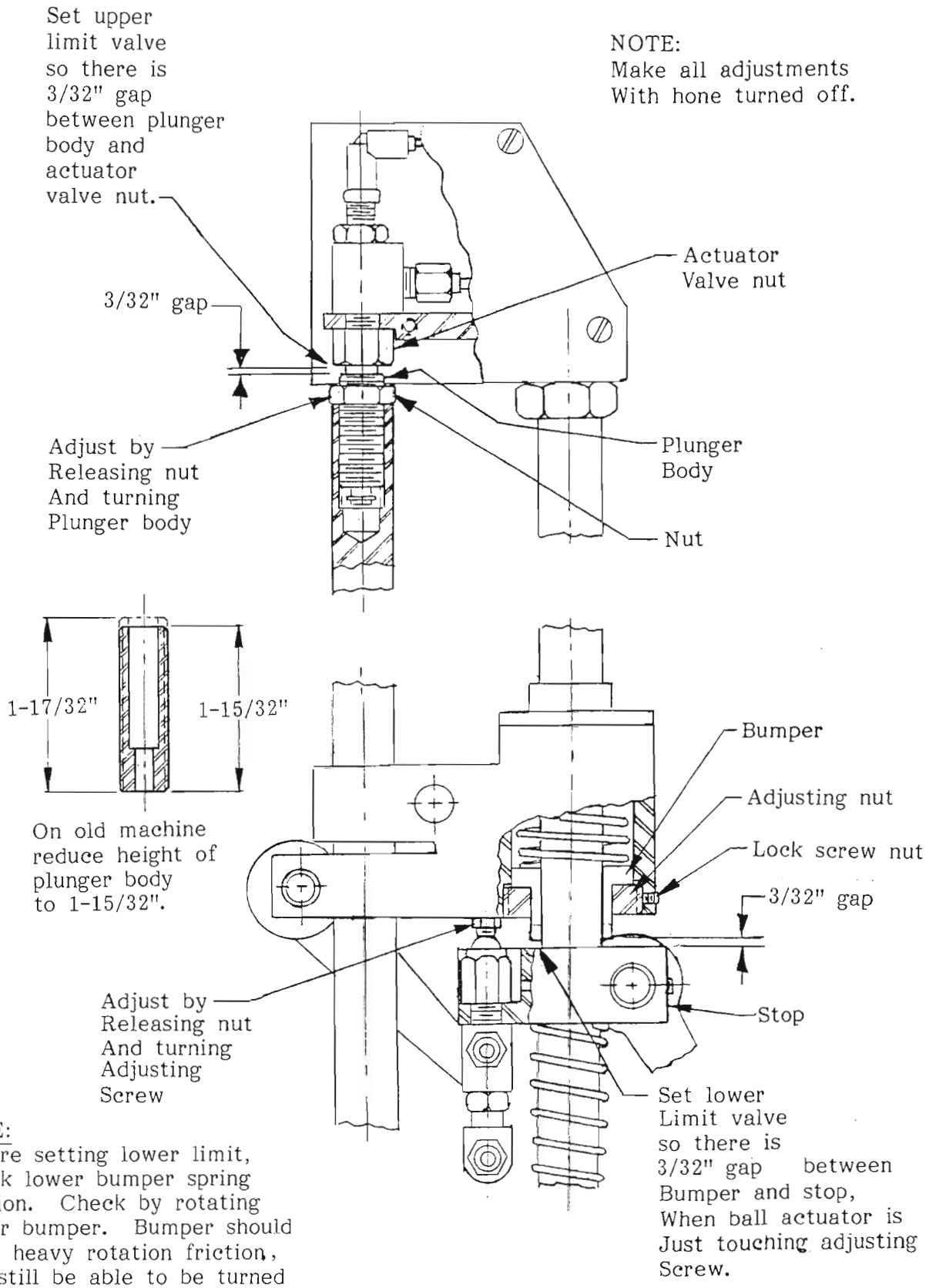
For models without short stroking.

A DWELL VALVE IS ATTACHED TO THE UP PORT OF THE STROKING VALVE. THIS DWELL VALVE IS SPRING LOADED IN THE OPEN POSITION AND IS AIR PILOTED IN THE CLOSED POSITION. A PUSH BUTTON CONTROL VALVE IS LOCATED ON THE RIGHT SIDE OF THE CARRIAGE. IT CLOSES THE DWELL VALVE WHEN PRESSED. IF PRESSED in down stroke, ram will stop at bottom of stroke. IF PRESSED in the up stroke, ram will stop immediately.

CLAMP/FLOAT SWITCH

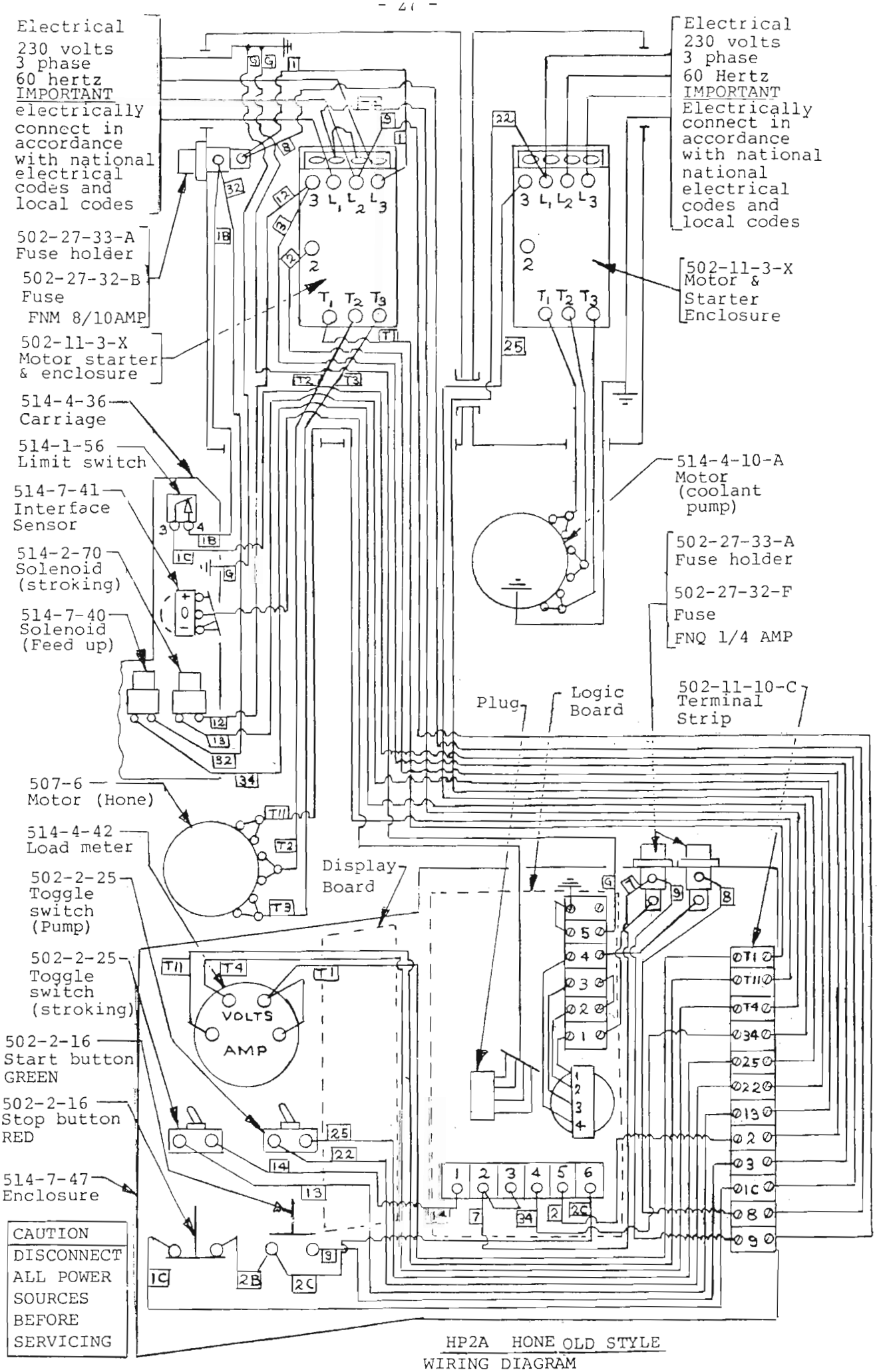
TURN CLAMP/FLOAT SWITCH TO LEFT, which allows air to flow through valve to regulator, then out two ports of the regulator. Air from one port flows through the right orifice on the bottom of the float plate. Air from the other port flows through a flow control valve then to the left side of the float plate and out the orifice on the bottom of the float plate.

TURN CLAMP SWITCH TO RIGHT, which allows air to flow through valve to two clamping cylinders. The cylinders lift two lever arms and a clamp bar which pull up on key in T-slot.

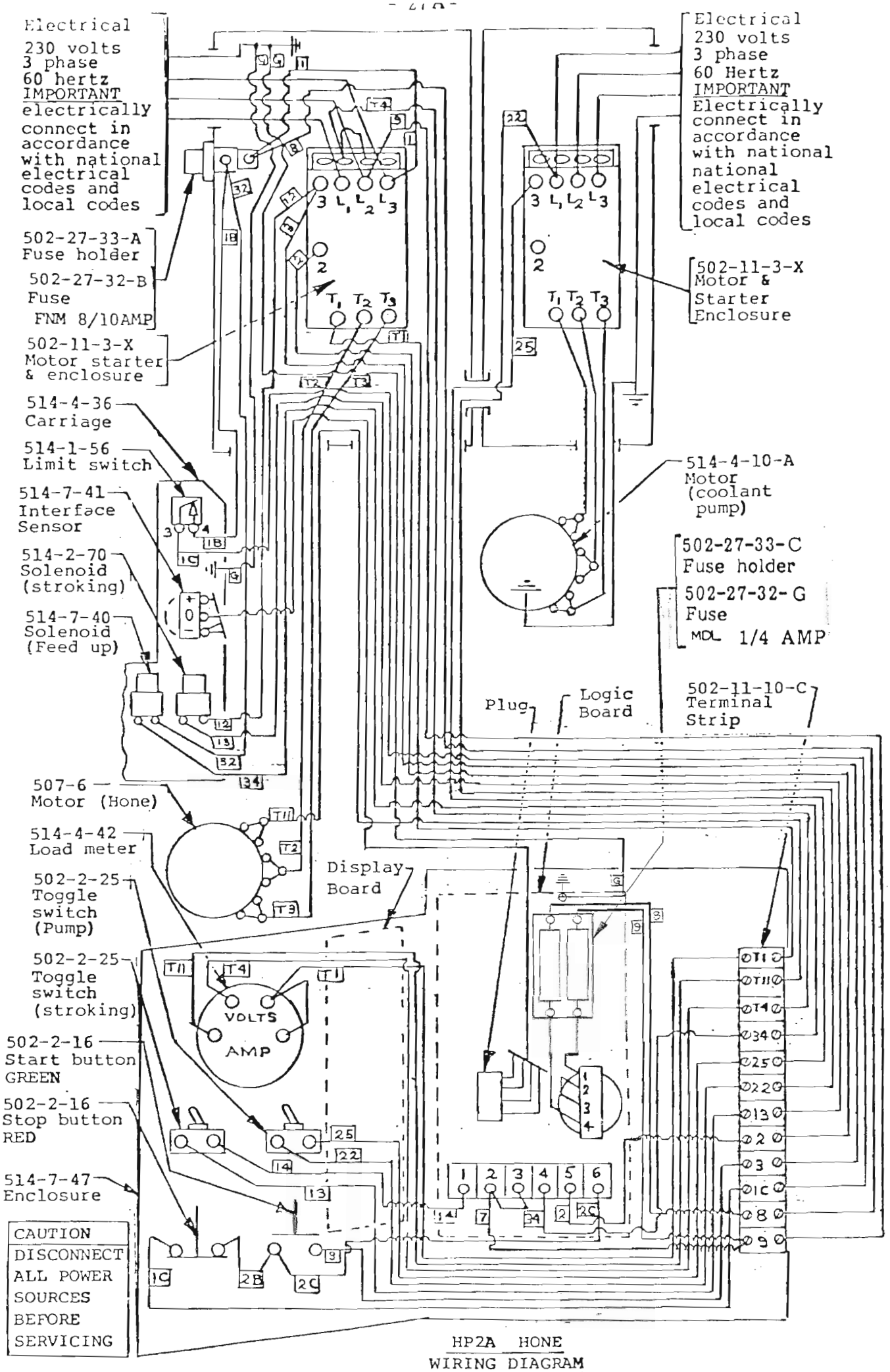


NOTE:
Before setting lower limit, check lower bumper spring tension. Check by rotating lower bumper. Bumper should have heavy rotation friction, but still be able to be turned by hand. Adjust by releasing lock screw, then turning nut.

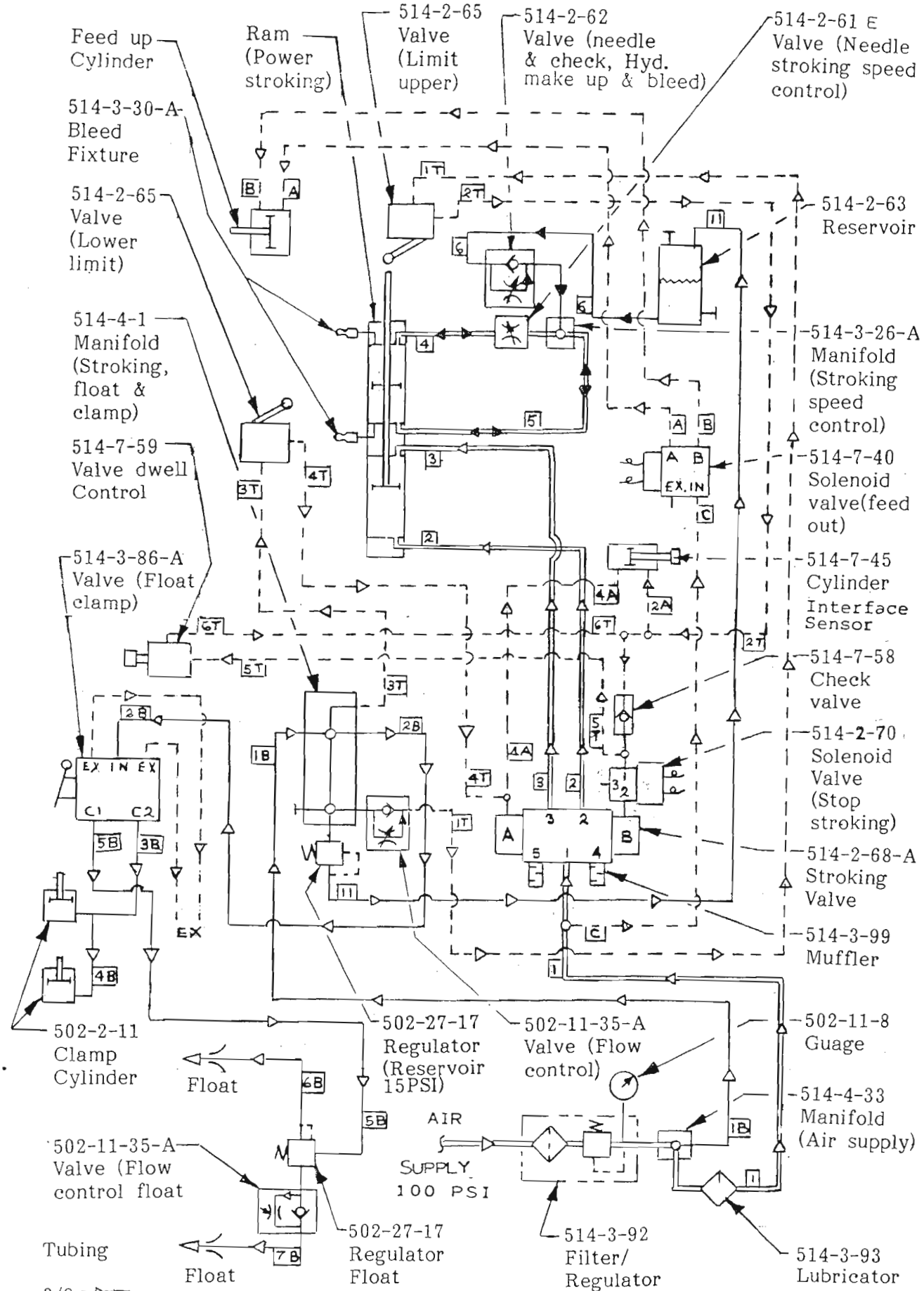
UPPER AND LOWER
LIMIT VALVES ADJUSTMENTS



HP2A HONE OLD STYLE
WIRING DIAGRAM

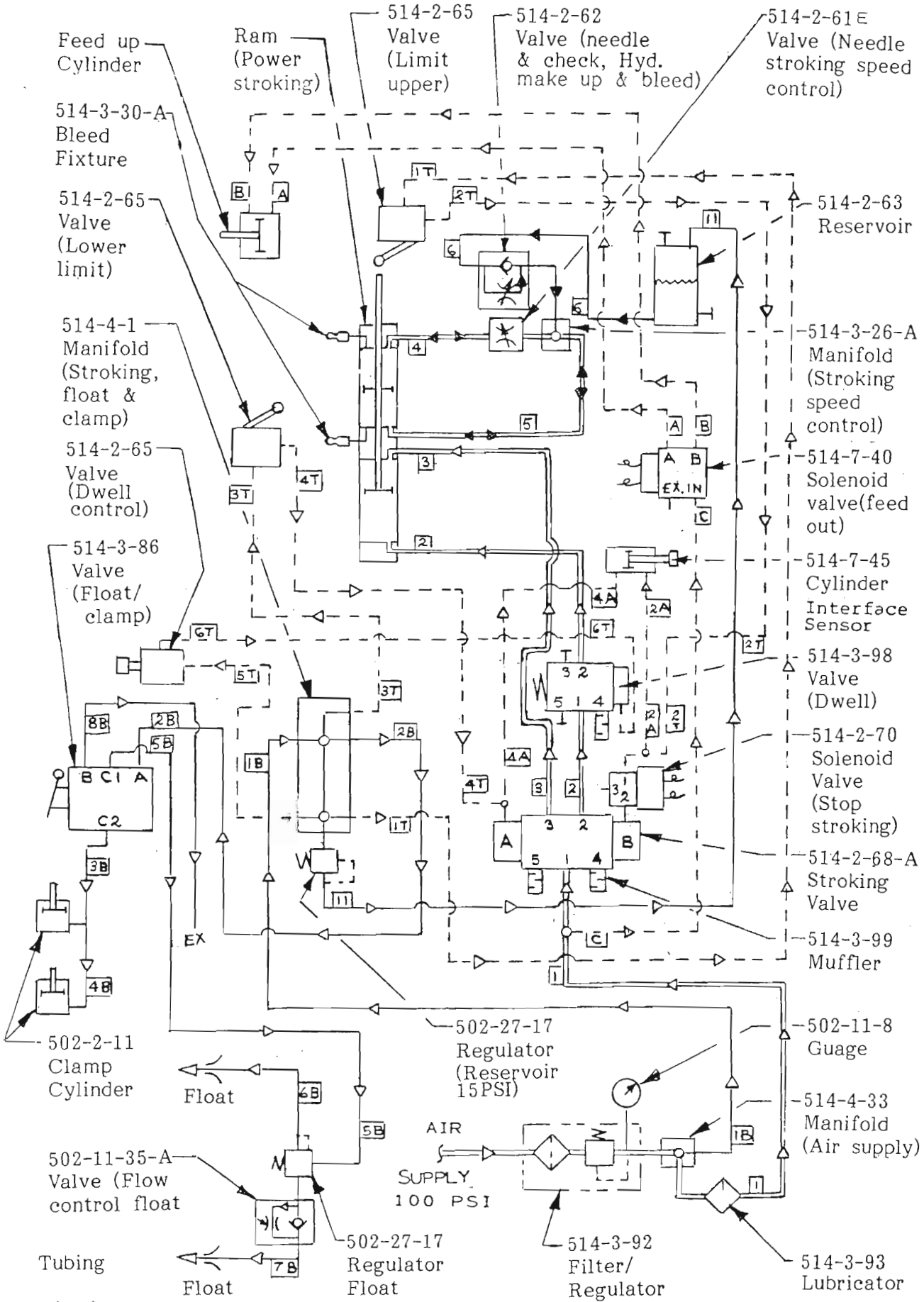


HP2A HONE
WIRING DIAGRAM

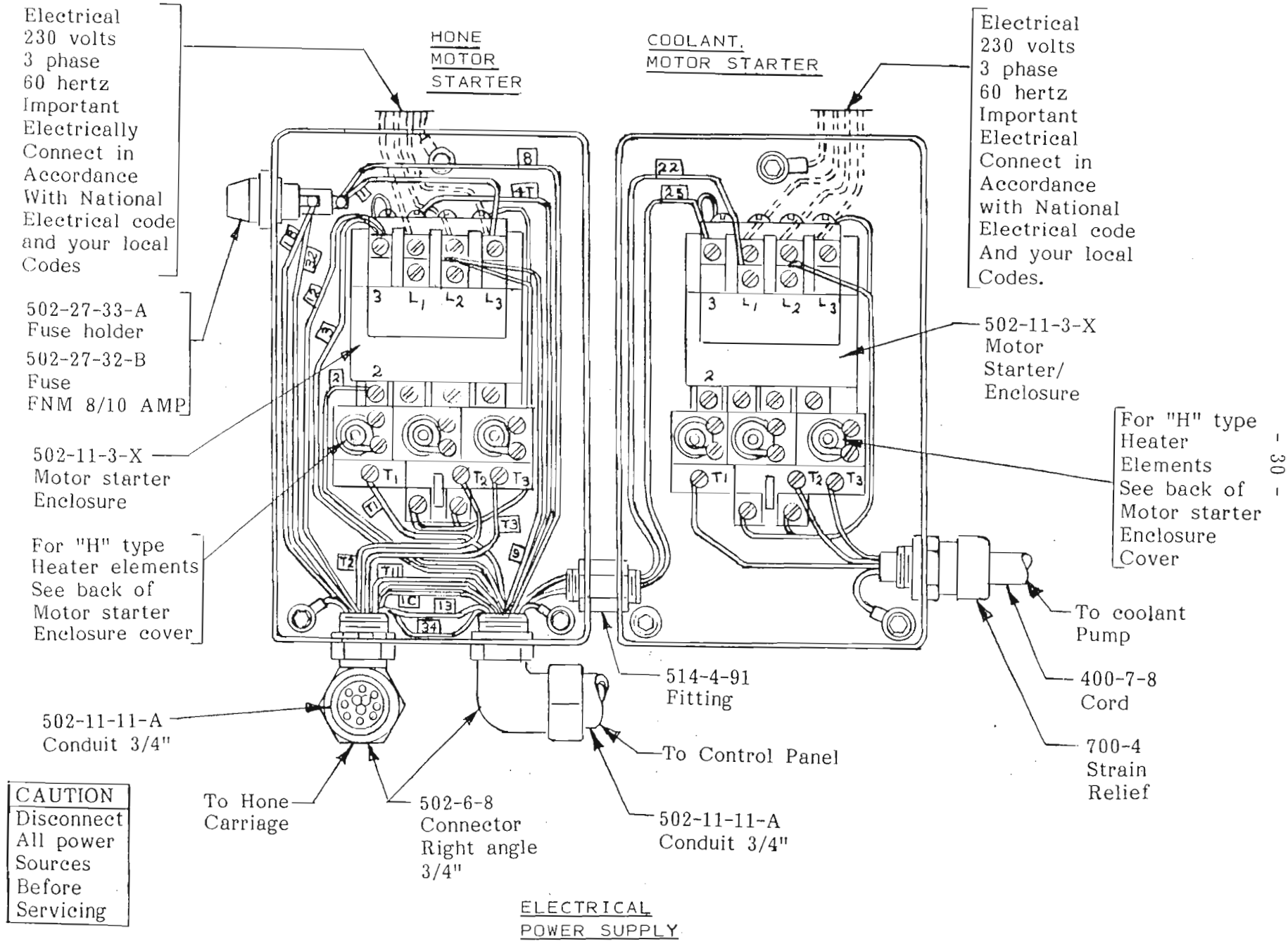


HP2A HONE

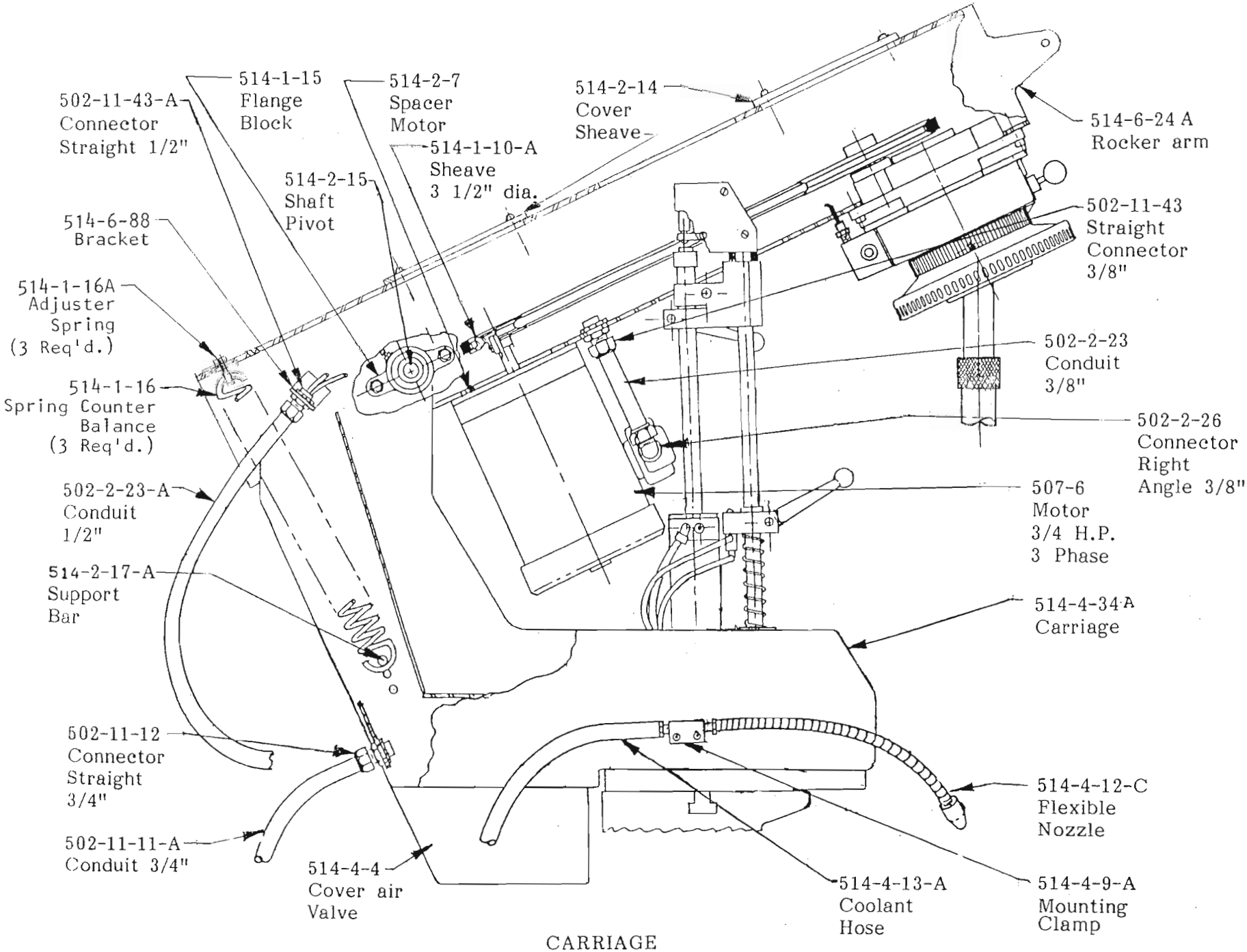
PNEUMATIC CIRCUT
W/short stroking
& Humphrey (float/
clamp valve)



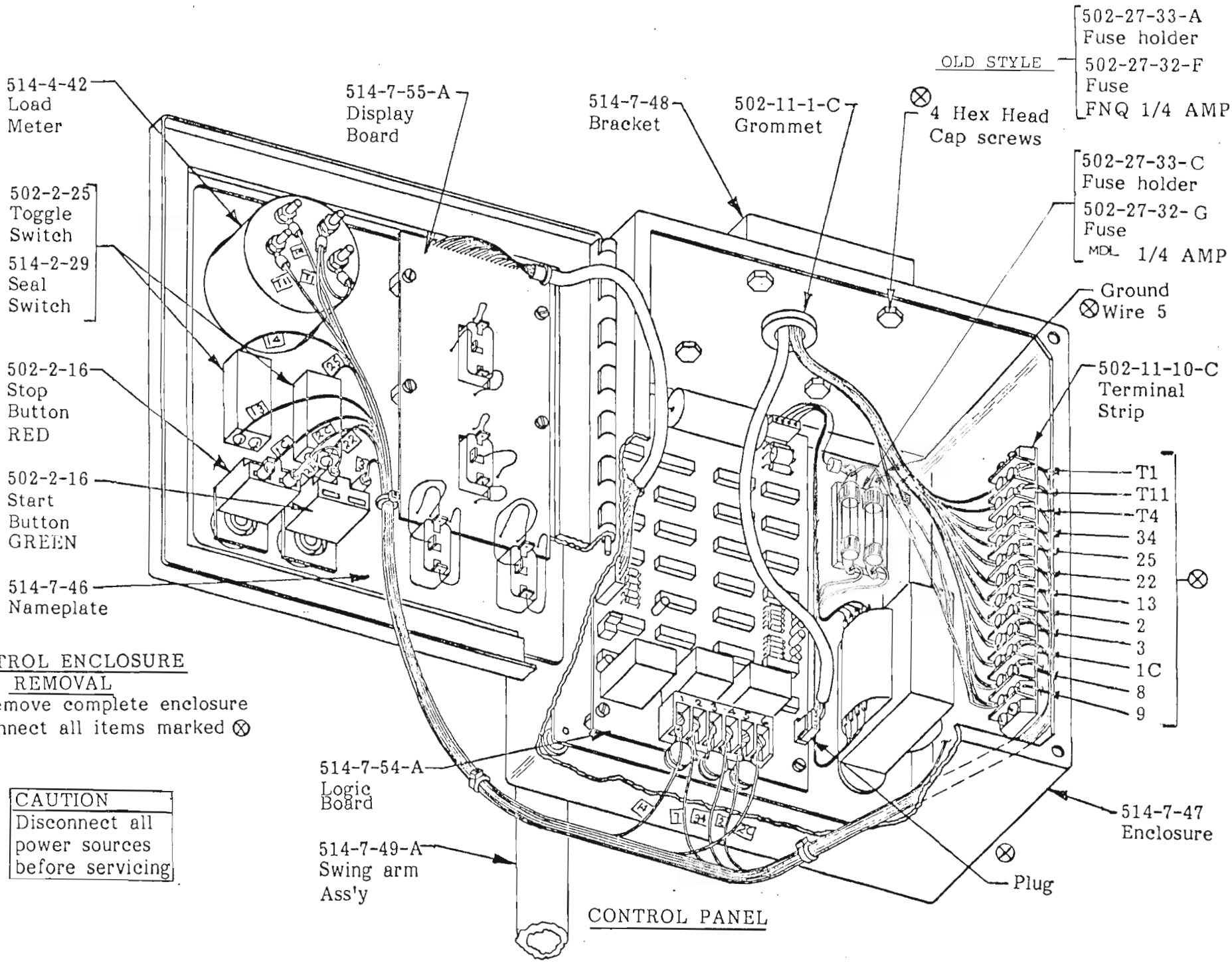
HP2A HONE
PNEUMATIC CIRCUT
W/versa (float/ clamp) valve and w/o short stroking



ELECTRICAL
POWER SUPPLY
PANELS


502-11-43-A
Connector
Straight 1/2"
514-1-15
Flange
Block
514-2-7
Spacer
Motor
514-2-14
Cover
Sheave
514-6-24 A
Rocker arm
514-1-10-A
Sheave
3 1/2" dia.
514-2-15
Shaft
Pivot
514-6-88
Bracket
502-11-43
Straight
Connector
3/8"
514-1-16A
Adjuster
Spring
(3 Req'd.)
502-2-23
Conduit
3/8"
514-1-16
Spring Counter
Balance
(3 Req'd.)
502-2-26
Connector
Right
Angle 3/8"
502-2-23-A
Conduit
1/2"
507-6
Motor
3/4 H.P.
3 Phase
514-2-17-A
Support
Bar
514-4-34 A
Carriage
502-11-12
Connector
Straight
3/4"
514-4-12-C
Flexible
Nozzle
502-11-11-A
Conduit 3/4"
514-4-4
Cover air
Valve
514-4-13-A
Coolant
Hose
514-4-9-A
Mounting
Clamp

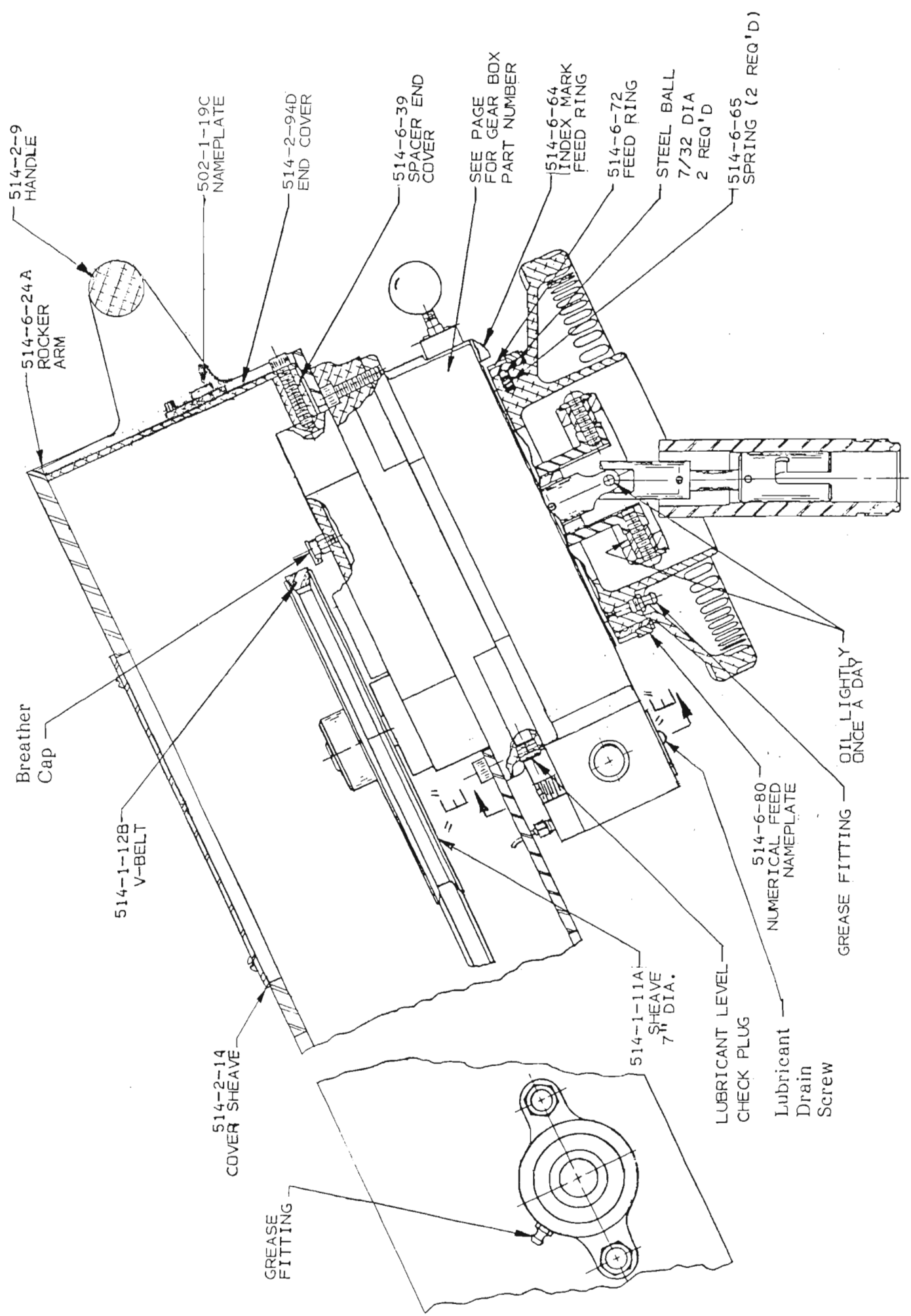
CARRIAGE

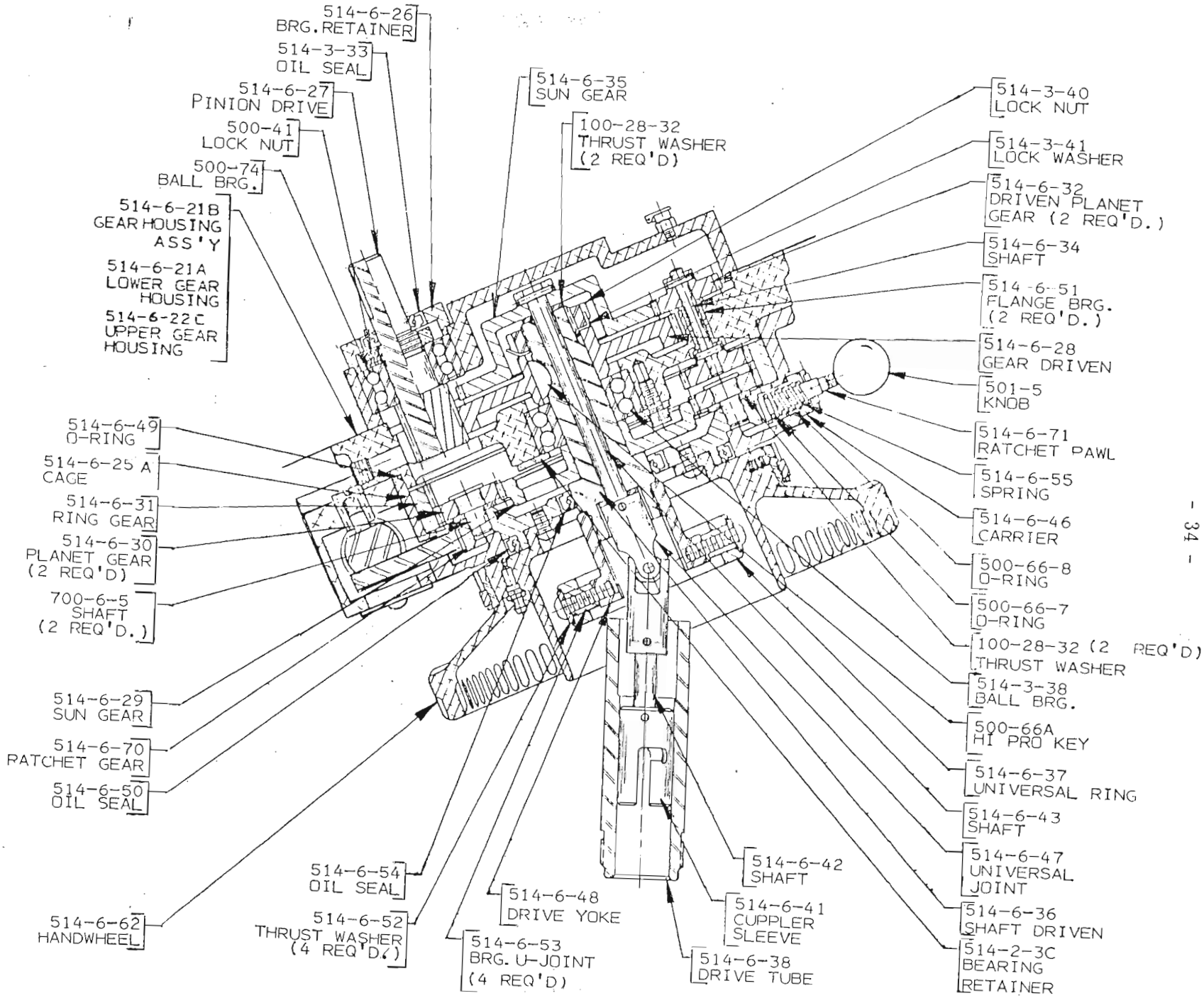


CONTROL ENCLOSURE
REMOVAL

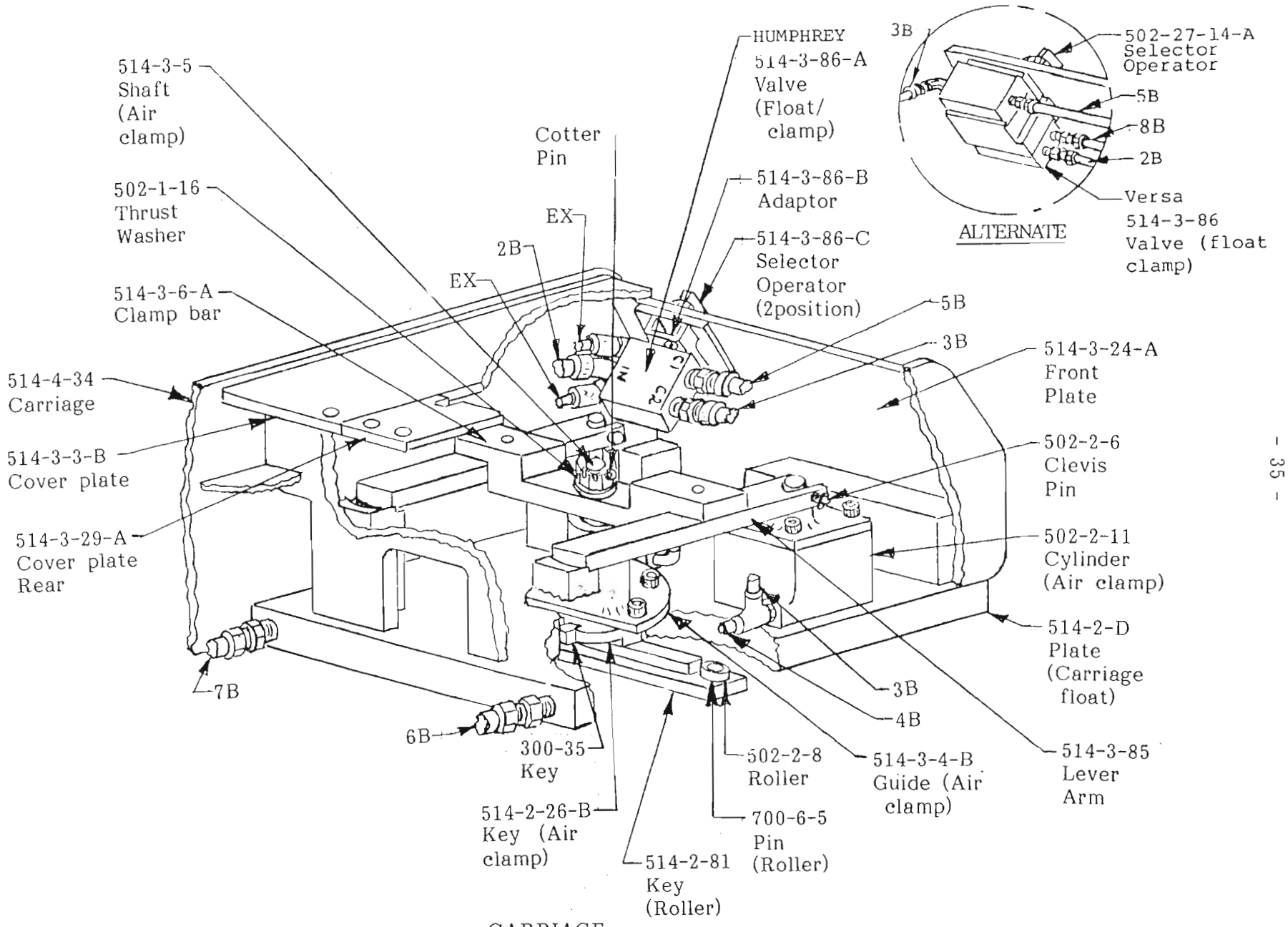
To remove complete enclosure disconnect all items marked ⊗

CAUTION
Disconnect all power sources before servicing

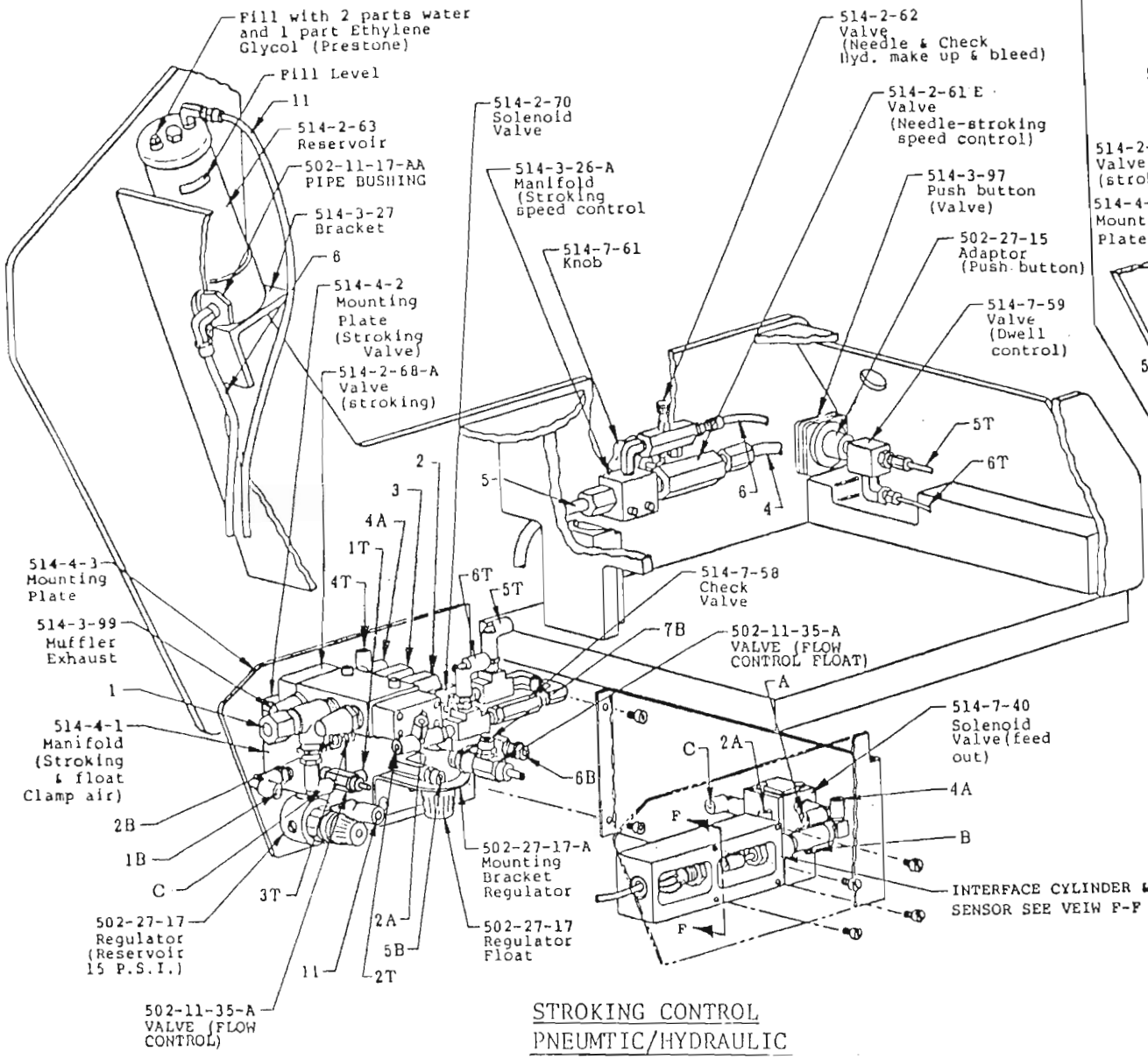

514-2-9
HANDLE
502-1-19C
NAMEPLATE
514-2-94D
END COVER
514-6-39
SPACER END
COVER
SEE PAGE
FOR GEAR BOX
PART NUMBER
514-6-64
INDEX MARK
FEED RING
514-6-72
FEED RING
STEEL BALL
7/32 DIA
2 REQ'D
514-6-65
SPRING (2 REQ'D)
514-6-24A
ROCKER
ARM
Breather
Cap
514-1-12B
V-BELT
514-2-14
COVER SHEAVE
514-1-11A
SHEAVE
7" DIA.
LUBRICANT LEVEL
CHECK PLUG
Lubricant
Drain
Screw
514-6-80
NUMERICAL FEED
NAMEPLATE
GREASE FITTING
OIL LIGHTLY
ONCE A DAY
GREASE
FITTING


514-6-26
BRG. RETAINER
514-3-33
OIL SEAL
514-6-27
PINION DRIVE
500-41
LOCK NUT
500-74
BALL BRG.
514-6-21B
GEAR HOUSING
ASS'Y
514-6-21A
LOWER GEAR
HOUSING
514-6-22C
UPPER GEAR
HOUSING
514-6-35
SUN GEAR
100-28-32
THRUST WASHER
(2 REQ'D)
514-3-40
LOCK NUT
514-3-41
LOCK WASHER
514-6-32
DRIVEN PLANET
GEAR (2 REQ'D.)
514-6-34
SHAFT
514-6-51
FLANGE BRG.
(2 REQ'D.)
514-6-28
GEAR DRIVEN
501-5
KNOB
514-6-71
RATCHET PAWL
514-6-55
SPRING
514-6-46
CARRIER
500-66-8
O-RING
500-66-7
O-RING
100-28-32 (2 REQ'D)
THRUST WASHER
514-3-38
BALL BRG.
500-66A
HI PRO KEY
514-6-37
UNIVERSAL RING
514-6-43
SHAFT
514-6-47
UNIVERSAL
JOINT
514-6-36
SHAFT DRIVEN
514-2-3C
BEARING
RETAINER
514-6-49
O-RING
514-6-25 A
CAGE
514-6-31
RING GEAR
514-6-30
PLANET GEAR
(2 REQ'D)
700-6-5
SHAFT
(2 REQ'D.)
514-6-29
SUN GEAR
514-6-70
RATCHET GEAR
514-6-50
OIL SEAL
514-6-62
HANDWHEEL
514-6-54
OIL SEAL
514-6-52
THRUST WASHER
(4 REQ'D.)
514-6-48
DRIVE YOKE
514-6-53
BRG. U-JOINT
(4 REQ'D)
514-6-42
SHAFT
514-6-41
CUPPLER
SLEEVE
514-6-38
DRIVE TUBE

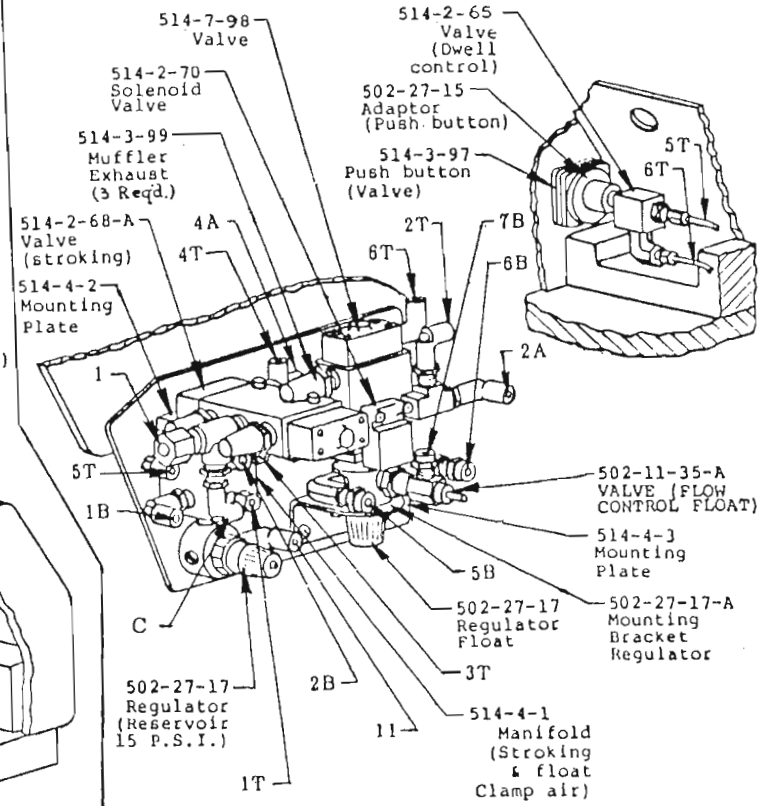
GEAR BOX



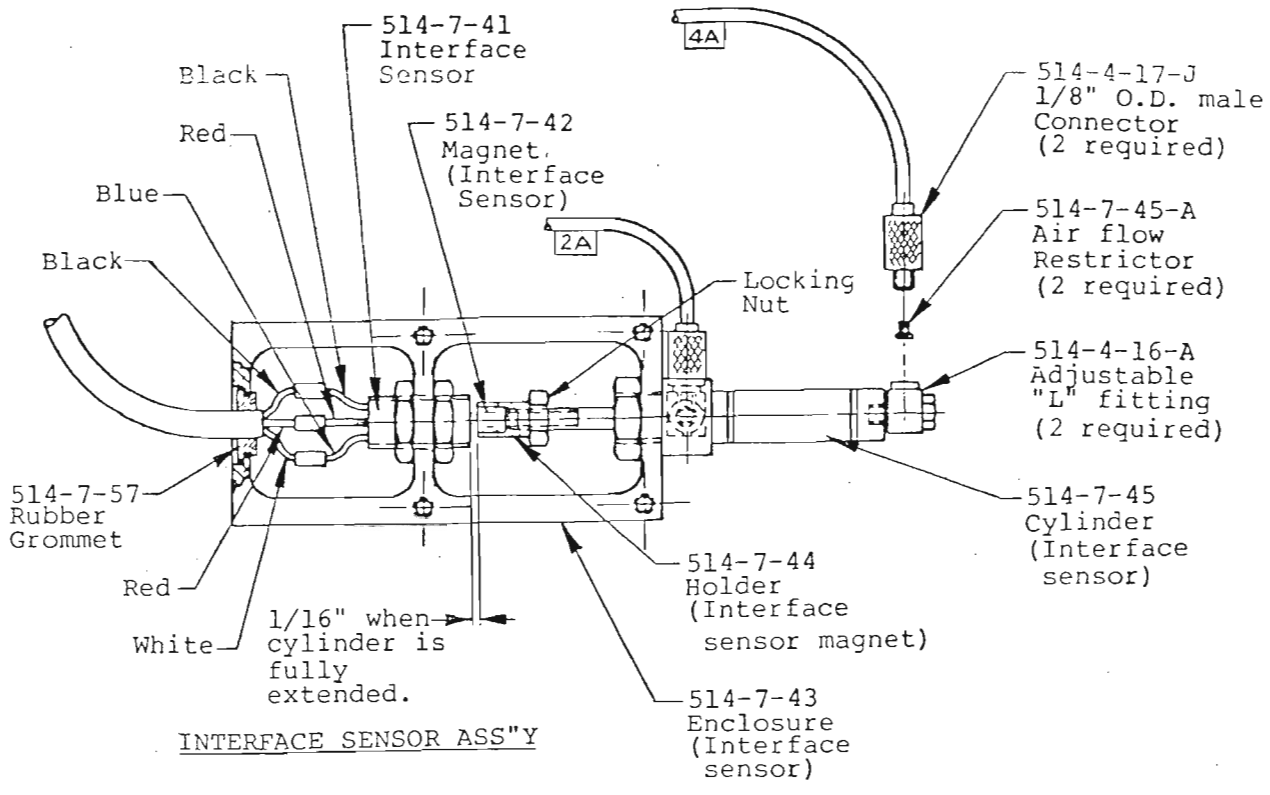
CARRIAGE
FLOAT/CLAMP



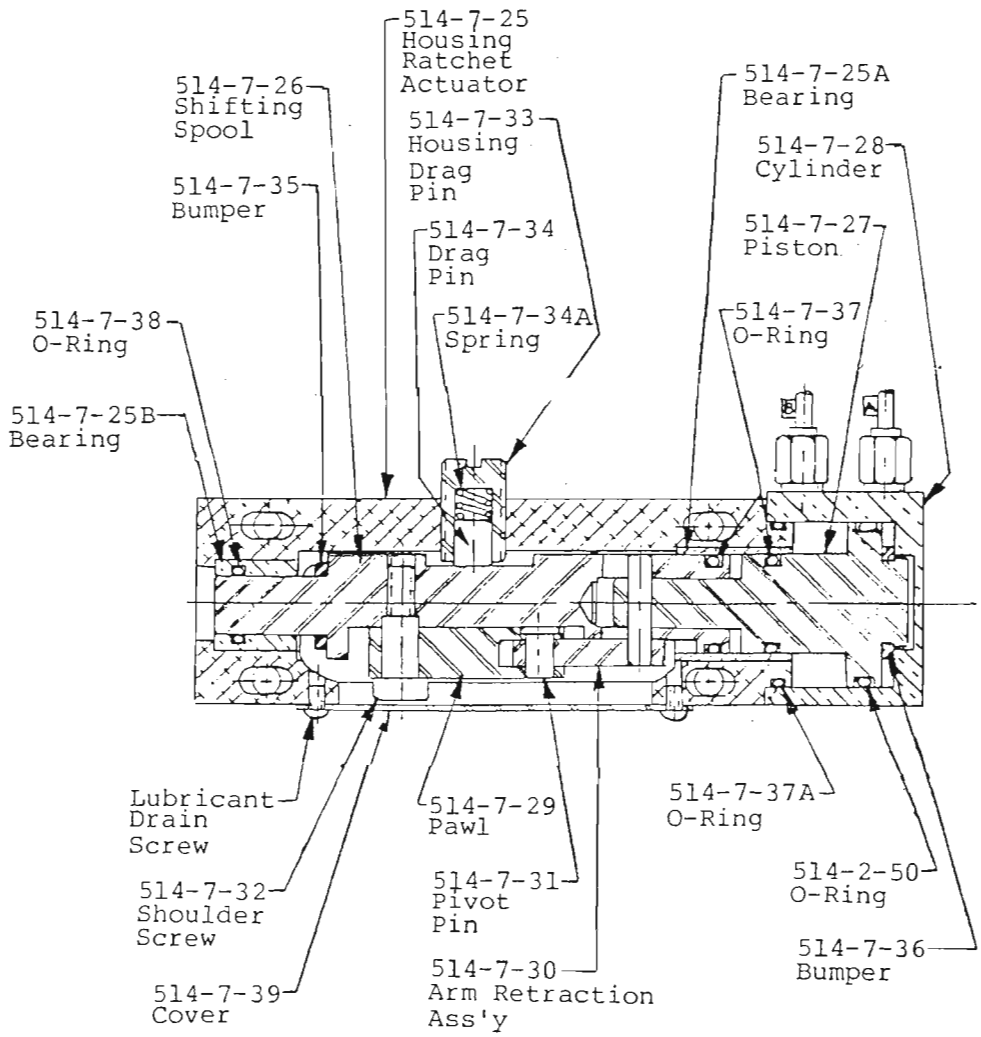
STROKING CONTROL
PNEUMTIC/HYDRAULIC
(WITH BOTTOM SHORT STROKING)



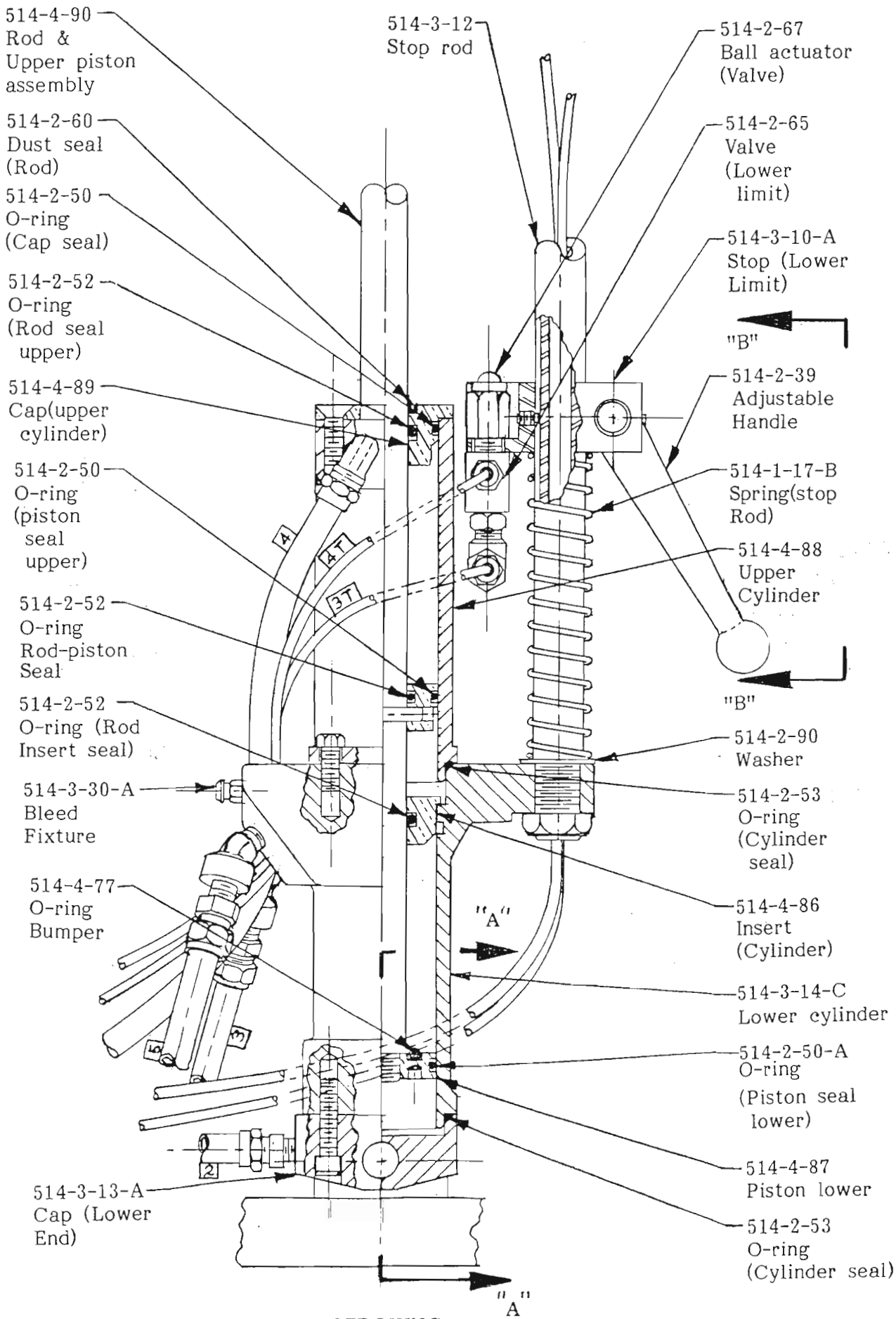
STROKING CONTROL
PNEUMTIC/HYDRAULIC
(WITHOUT BOTTOM SHORT STROKING)



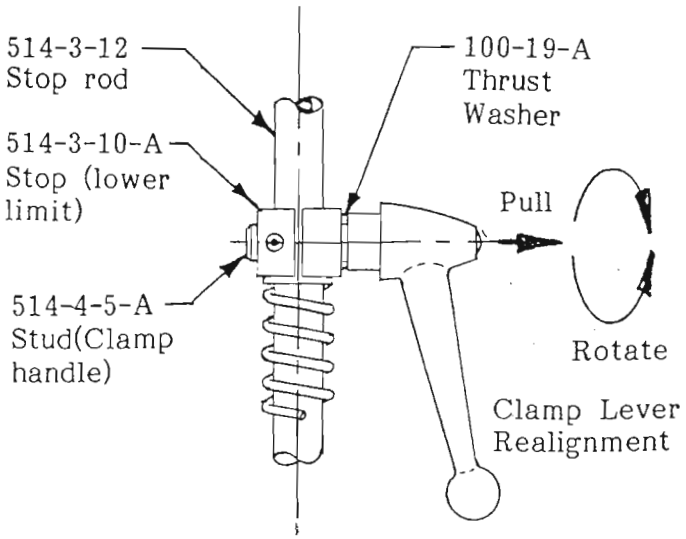
INTERFACE SENSOR ASS"Y



RATCHET ACTUATOR
ASSEMBLY
SECTION (E-E)



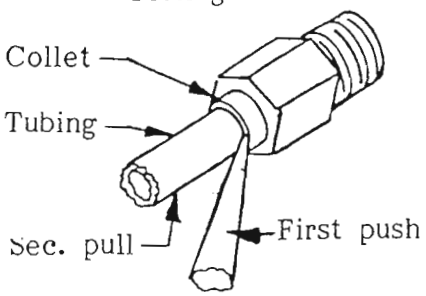
STROKING CYLINDER



LOWER TRAVEL
LIMIT STOP
LEVER

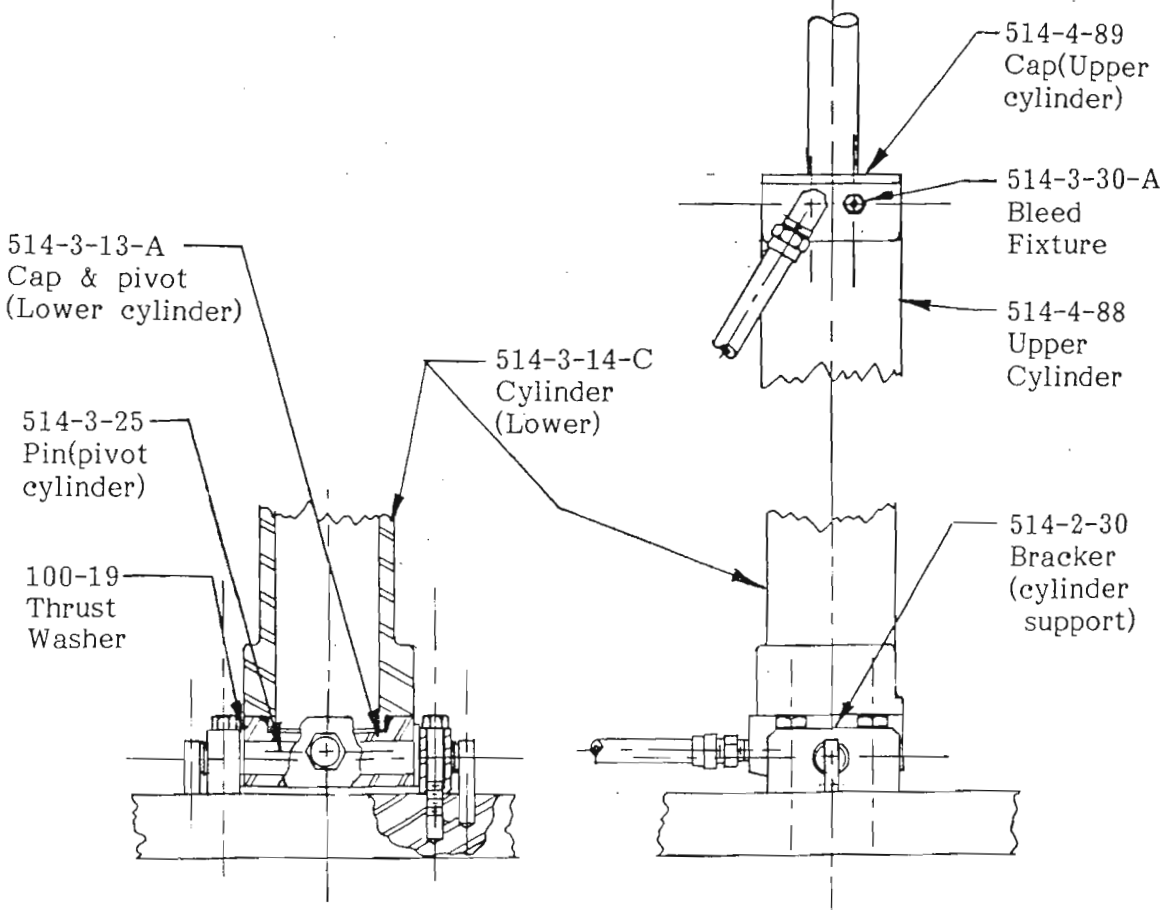
VIEW "B" - "B"

Use a nylon ll
Tubing with legris
Fitting

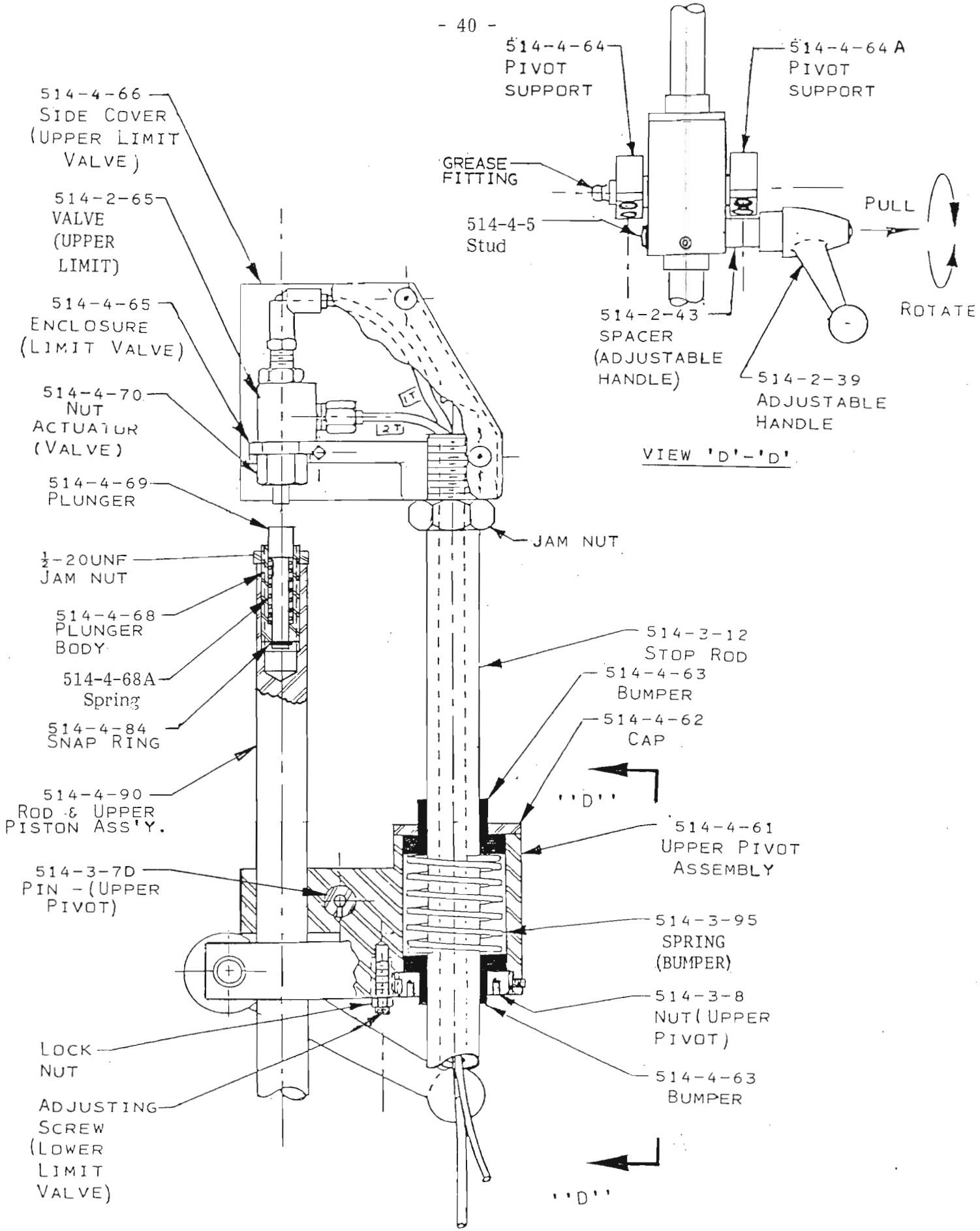


LEGRIS
TUBE
FITTINGS

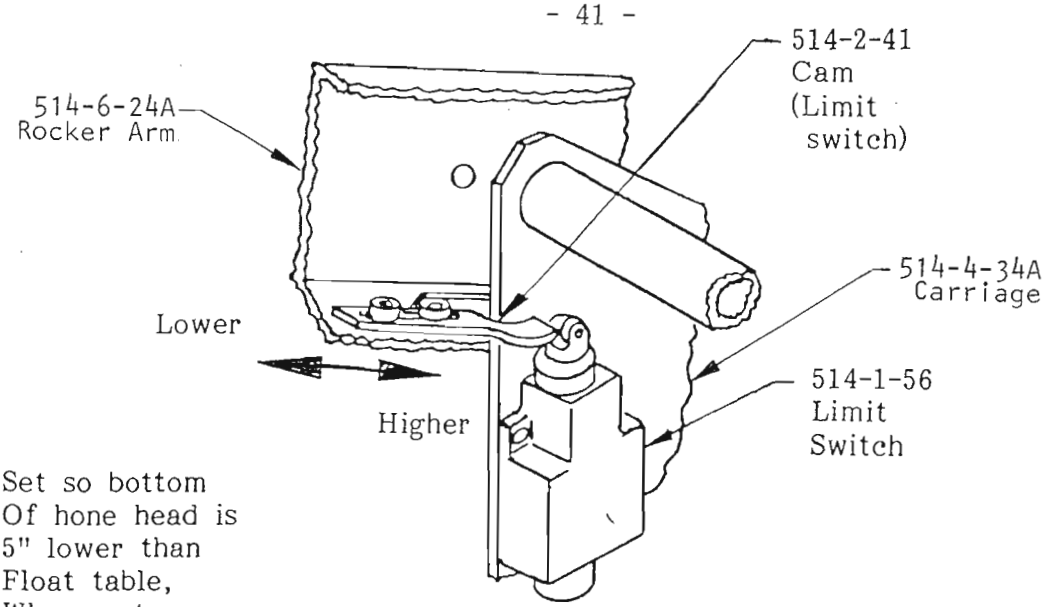
To Disconnect
Tubing from legris fitting-push collet with a screwdriver then pull tubing.
To connect tubing to Legris fittings just push tubing into fitting.
NOTE-tubing must be all the way in to seal tubing.
First past a gripping ridge then thru an O-ring.



SECTION "A" - "A"

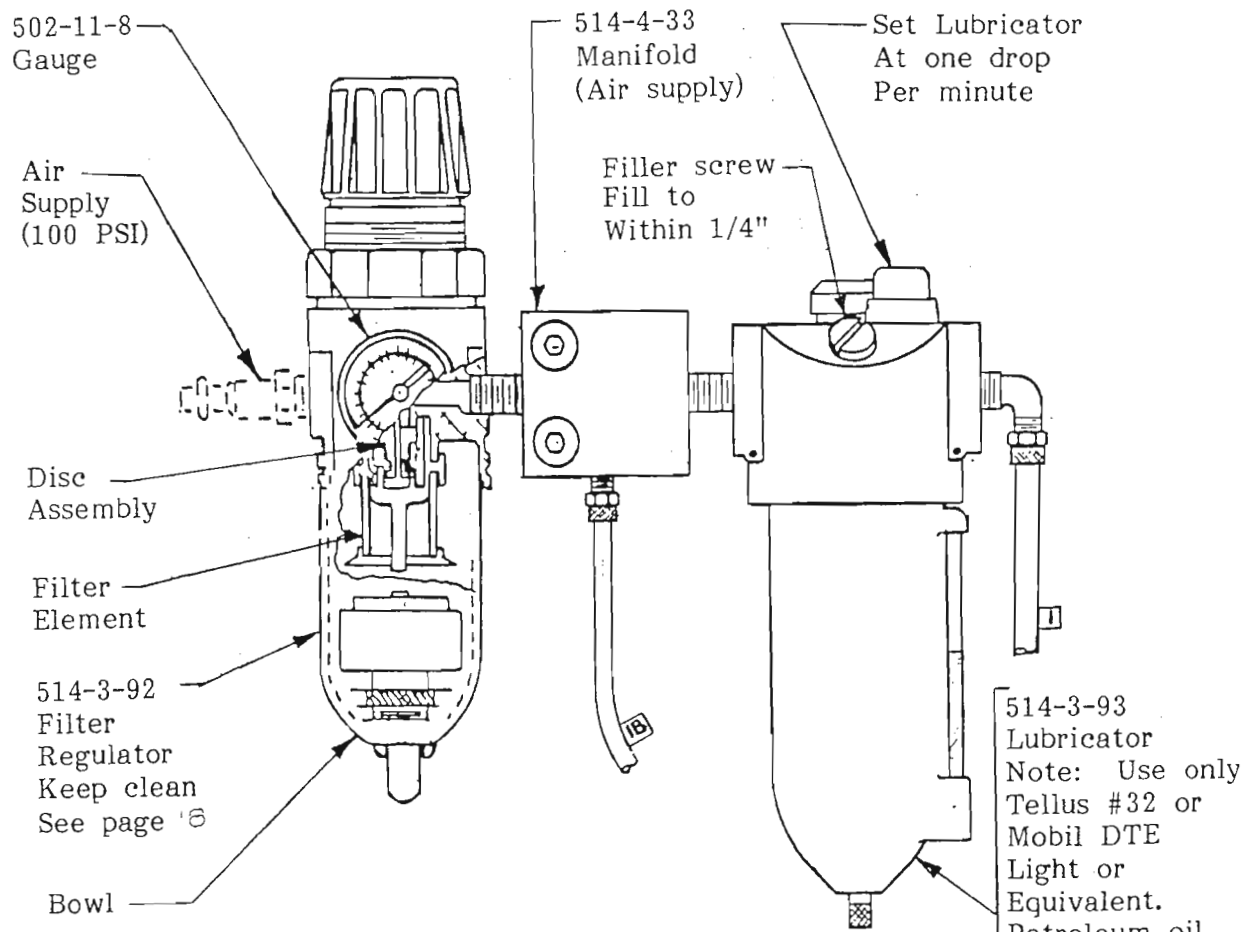


UPPER LIMIT VALVE & UPPER PIVOT
STROKING CYLINDER

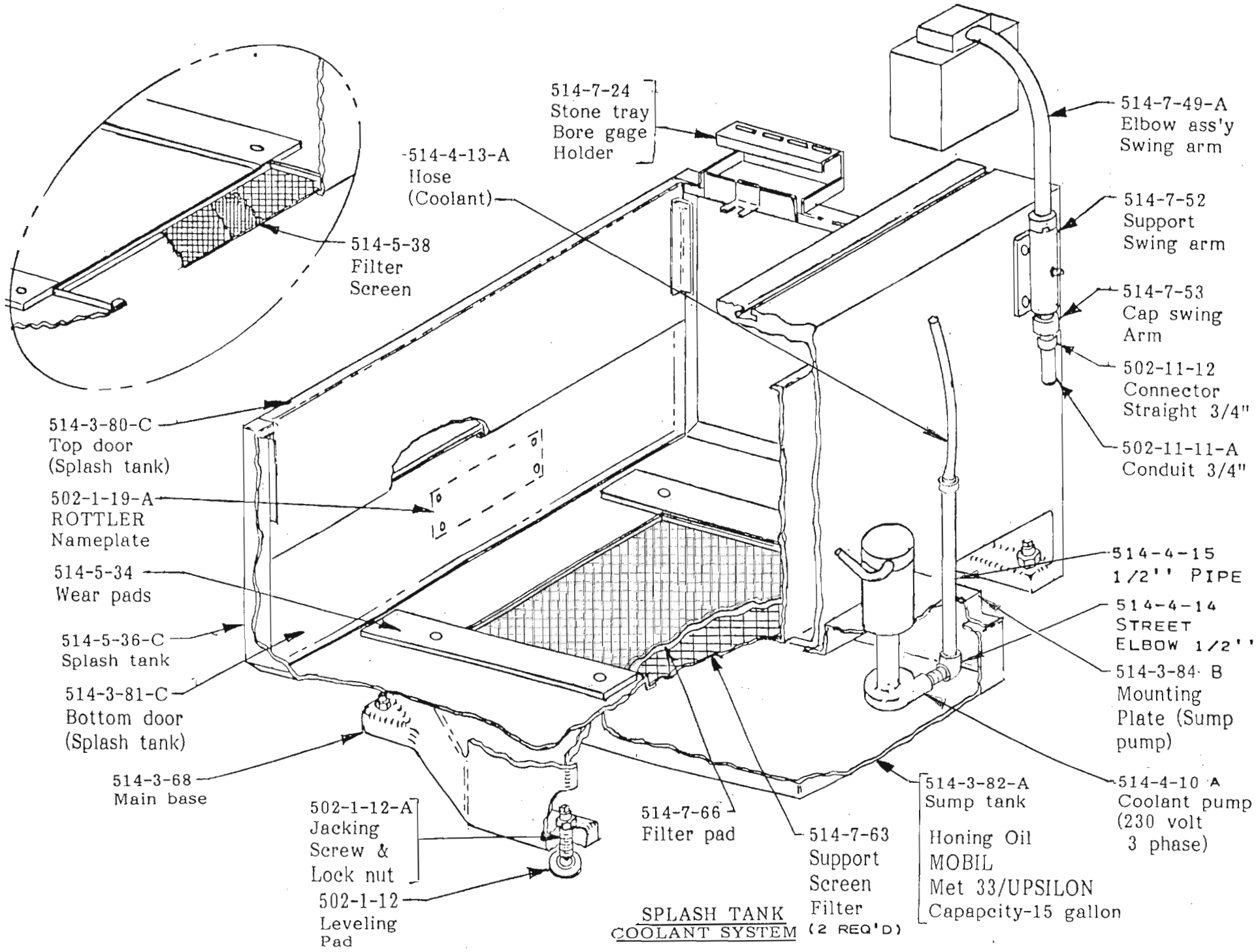


Set so bottom
Of hone head is
5" lower than
Float table,
When motor
Cuts off.

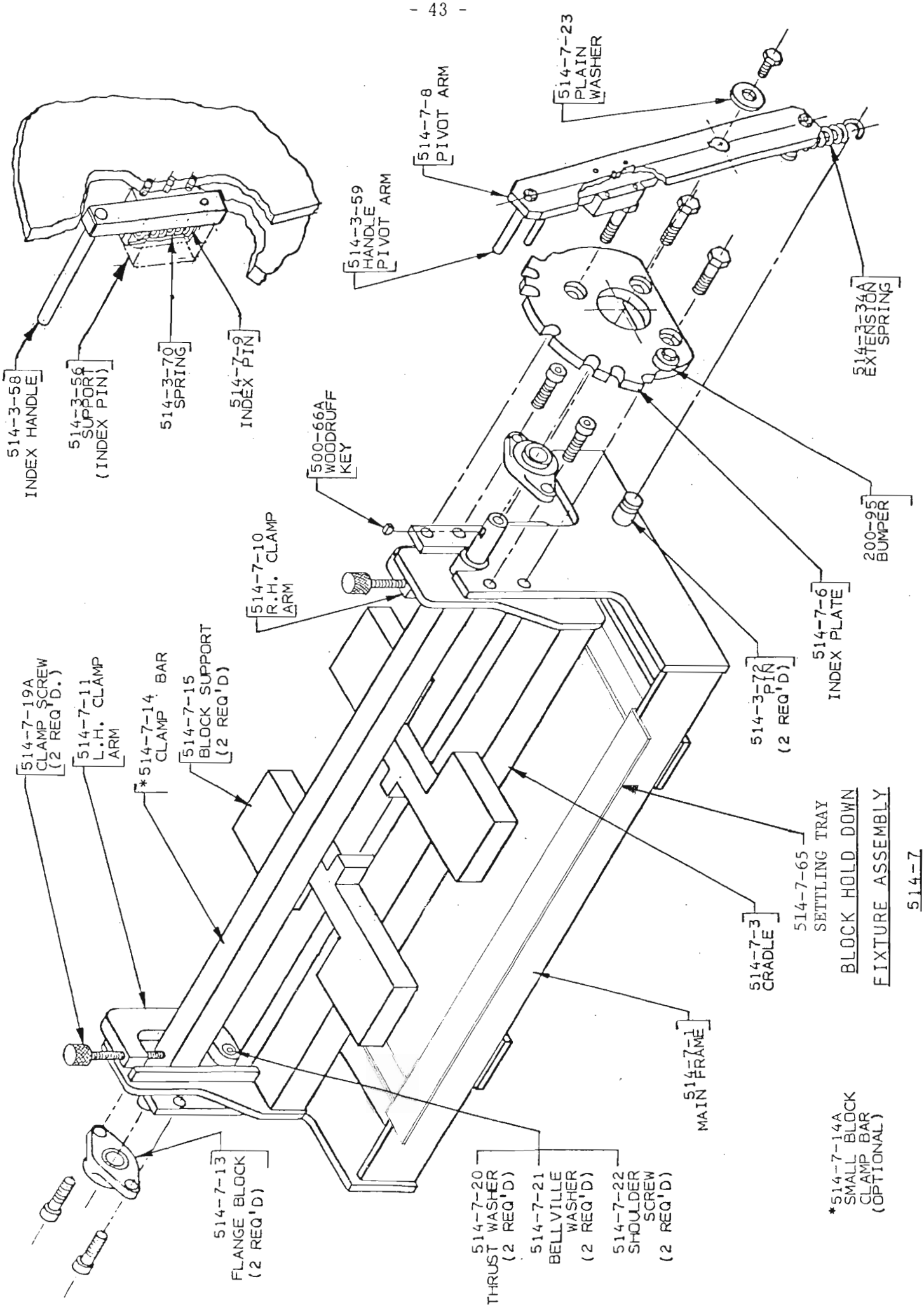
MOTOR CUT OUT
SAFETY SWITCH
ADJUSTMENT



PNEUMATIC
POWER SUPPLY



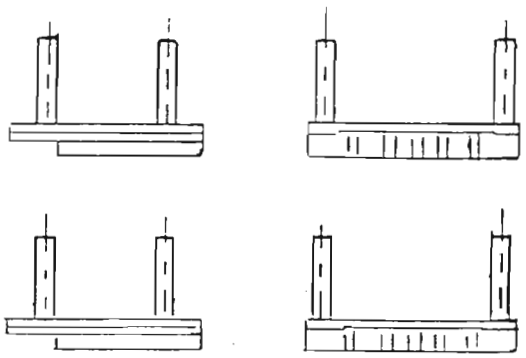
SPLASH TANK
COOLANT SYSTEM



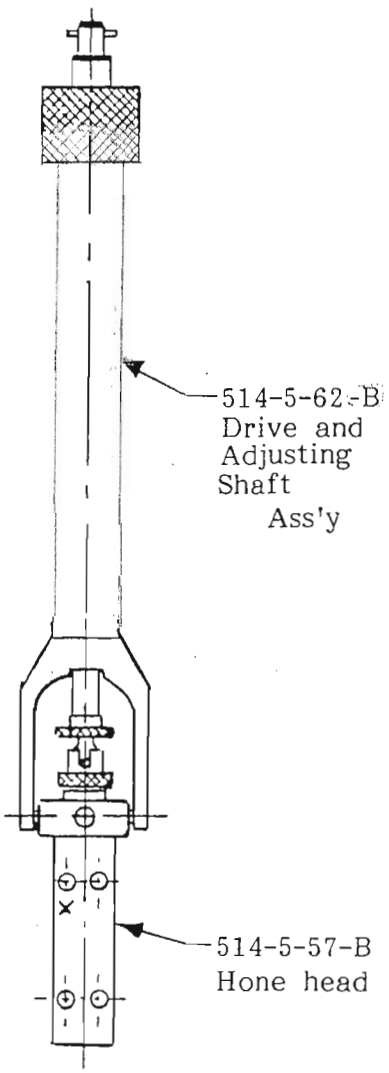
BLOCK HOLD DOWN

FIXTURE ASSEMBLY

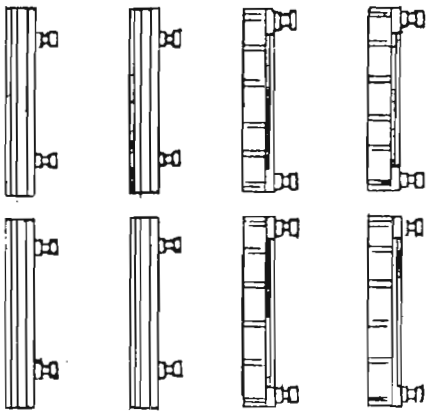
514-7



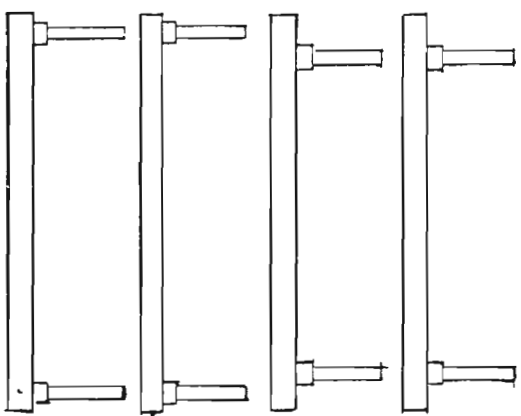
STONE SET 3" OVERALL LENGTH		
STANDARD		
GRIT	DIAMETER	PART #
180 SN200	2.7/4.1	514-5-53-E
180 SN201	3.5/5.7	514-5-53-C
OPTIONAL		
GRIT	DIAMETER	PART #
80 SN100	2.7/4.1	514-5-52-C
80 SN101	3.5/5.7	514-5-52-A
220 SN300	2.7/4.1	514-5-54-C
220 SN301	3.5/5.7	514-5-54-A



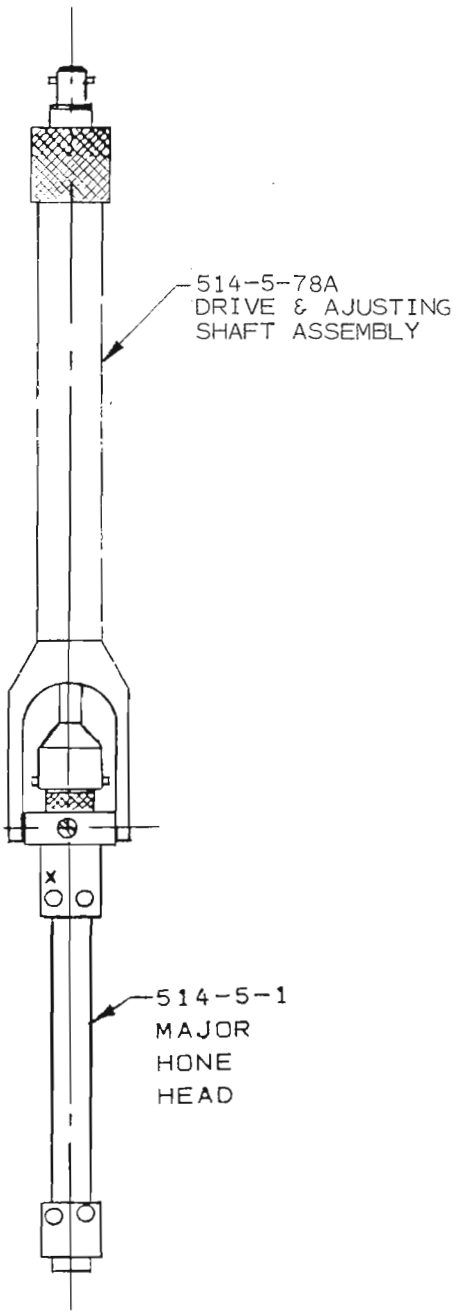
STANDARD
HONE HEAD ASSEMBLY
HP2
2.7 TO 5.7
514-5-61-A



STONE SET FOR CARRIER 514-5-2	
GRIT	PART NO.
120 PT4/4/F2F	514-5-4
180 PT4/4/F3F	514-5-5



514-5-2
CARRIER
FOR STONE
PT4/4

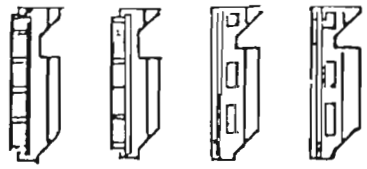


514-5-78A
DRIVE & AJUSTING
SHAFT ASSEMBLY

514-5-1
MAJOR
HONE
HEAD

(Optional)

MAJOR
H-P 2 HONE HEAD ASS'Y.
4.62 TO 7.00 DIA.
514-5-79



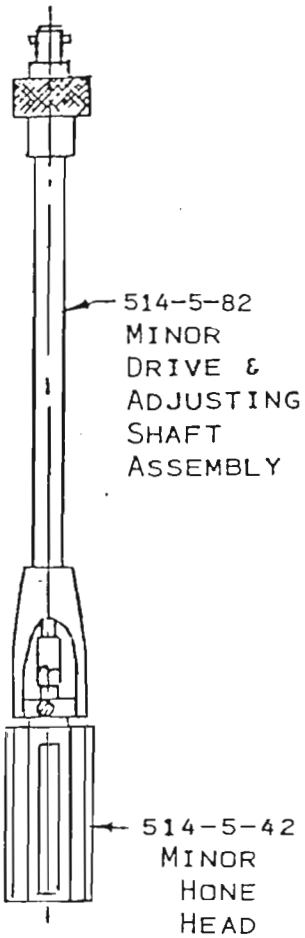
MINOR STONE SET 1.50 TO 1.75 DIA.	
GRIT	PART NO.
120 28F2F	514-5-43
180 28F3F	514-5-44

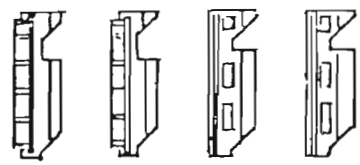
MINOR STONE SET 1.75 TO 2.00 DIA.	
GRIT	PART NO.
120 29F2F	514-5-45
180 29F3F	514-5-46

(Optional)

MINOR
HONE HEAD ASSEMBLY
1.50 TO 2.00 DIA.
514-5-83

HP2





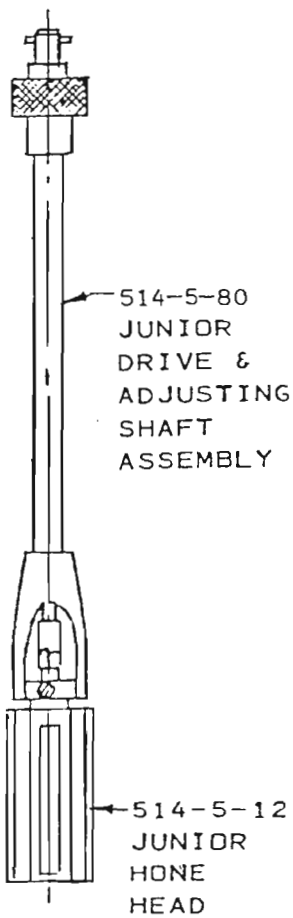
JUNIOR STONE SET 2.00 TO 2.20 DIA.	
GRIT	PART NO.
120 TF2F	514-5-14
180 TF3F	514-5-17

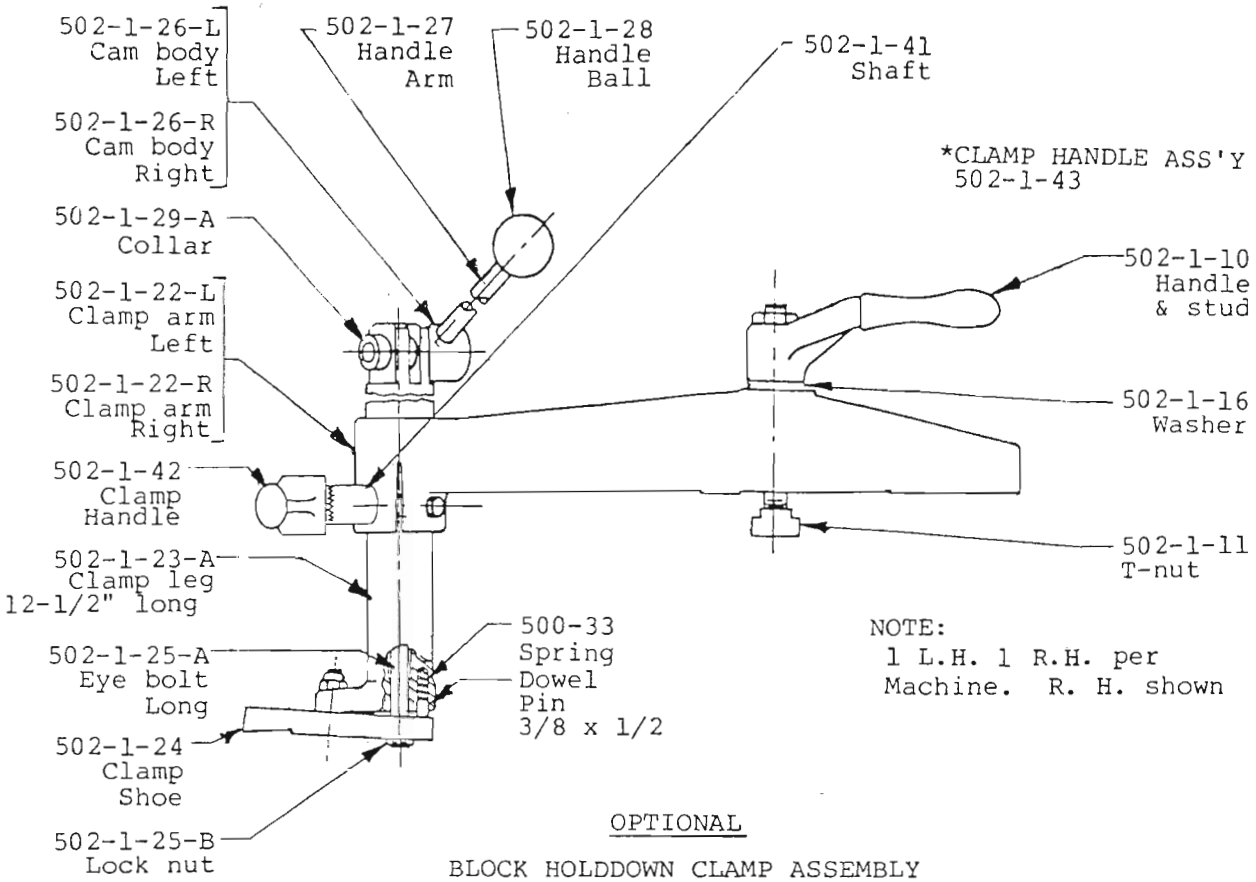
JUNIOR STONE SET 2.20 TO 2.40 DIA.	
GRIT	PART NO.
120 UF2F	514-5-15
180 UF3F	514-5-18

JUNIOR STONE SET 2.40 TO 2.68 DIA.	
GRIT	PART NO.
120 VF2F	514-5-16
180 VF3F	514-5-19

(Optional)

JUNIOR
H-P 2 HONE
HEAD ASSEMBLY
2.00 TO 2.68 DIA.
514-5-81

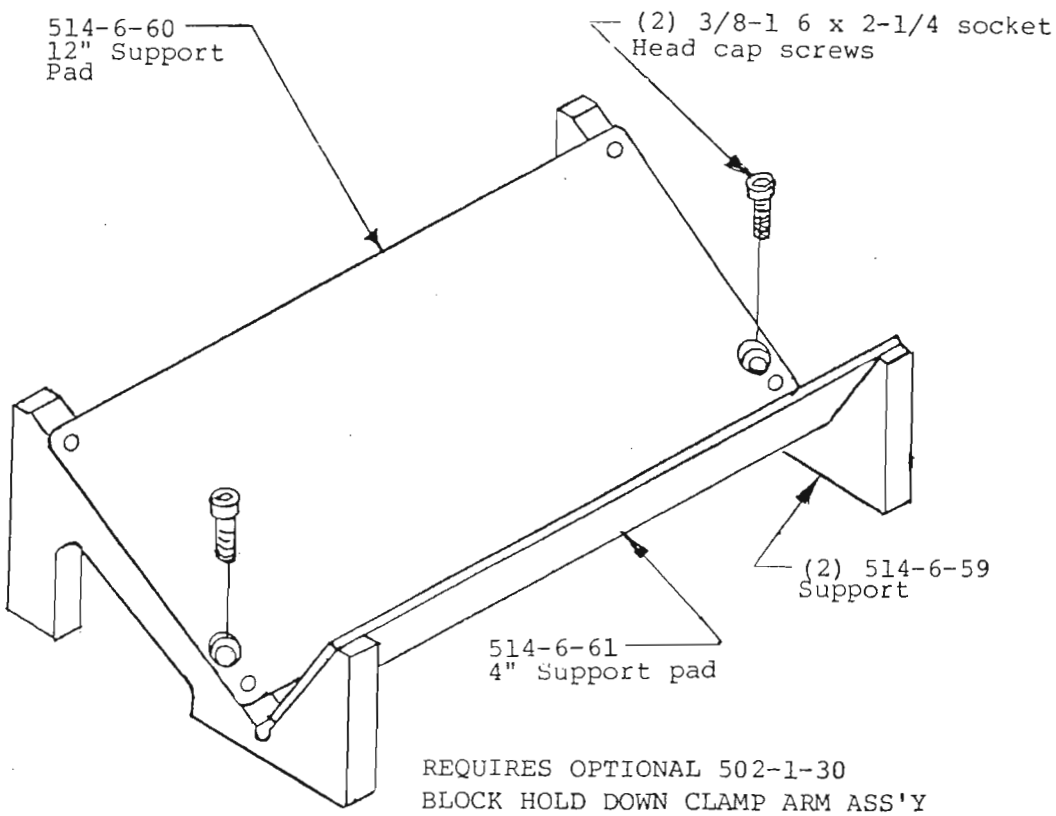




OPTIONAL

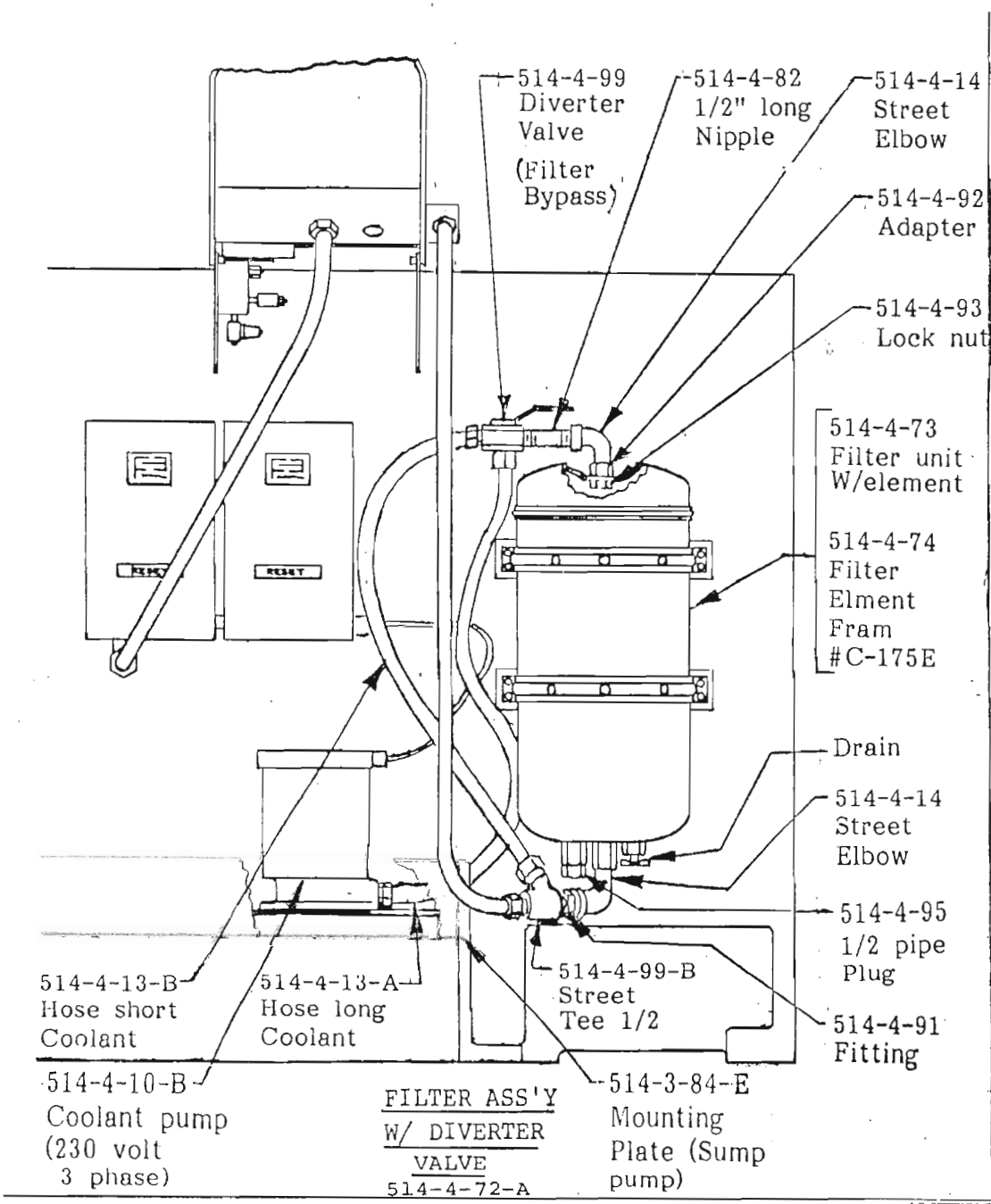
BLOCK HOLDDOWN CLAMP ASSEMBLY

502-1-30

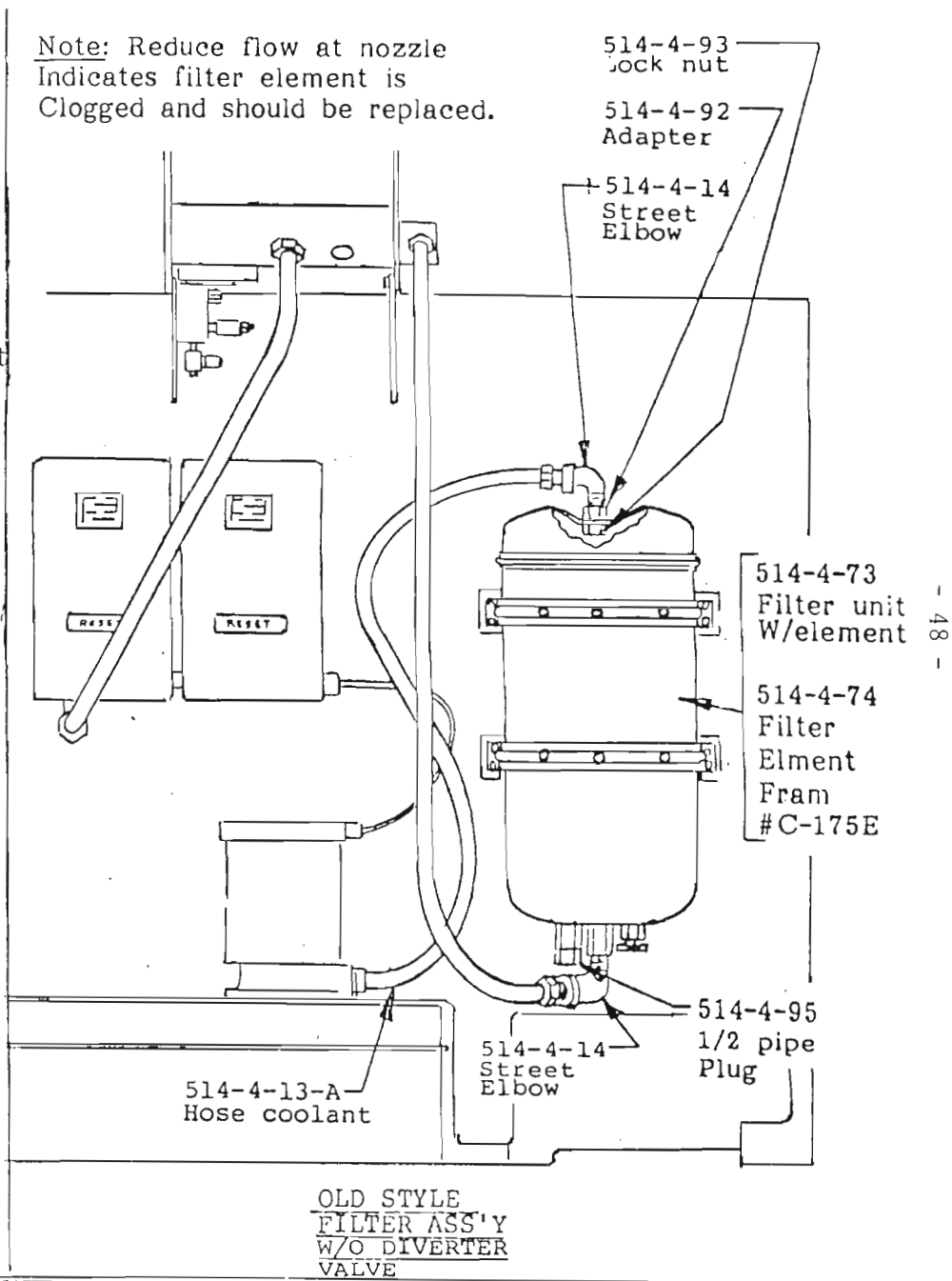


(OPTIONAL)

V-71 FIXTURE ASS'Y
HP HONE
514-6-58



FILTER ASS'Y
W/ DIVERTER
VALVE
514-4-72-A



OLD STYLE
FILTER ASS'Y
W/O DIVERTER
VALVE

ALTERNATE
FILTER ASS"Y

MOBIL OIL CORPORATION MATERIAL SAFETY DATA BULLETIN

********** I. PRODUCT IDENTIFICATION **********

MOBILMET UPSILON

SUPPLIER:
MOBIL OIL CORP.

HEALTH EMERGENCY TELEPHONE:
(212) 883-4411

CHEMICAL NAMES AND SYNONYMS:
PET. HYDROCARBONS AND ADDITIVES

TRANSPORT EMERGENCY TELEPHONE
(800) 424-9300 (CHEMTREC)

USE OR DESCRIPTION:
CUTTING FLUID

********** II. TYPICAL CHEMICAL AND PHYSICAL PROPERTIES **********

APPEARANCE: ASTM 5.0 LIQUID ODOR: MILD PH: NA
VISCOSITY AT 100 F, SUS: 62.0 AT 40 C, CS: 10.2
VISCOSITY AT 210 F, SUS: 35.1 AT 100 C, CS: 2.7
FLASH POINT F(C): >325(163) (ASTM D-92)
MELTING POINT F(C): NA POUR POINT F(C): 30(-1)
BOILING POINT F(C): > 600(316)
RELATIVE DENSITY, 15/4 C: 0.849 SOLUBILITY IN WATER: NEGLIGIBLE
VAPOR PRESSURE-MM HG 20C: < .1

NA=NOT APPLICABLE NE:NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER INFORMATION, CONTACT YOUR LOCAL MARKETING OFFICE.

********** III. INGREDIENTS **********

	WT PCT (APPROX)	EXPOSURE MG/M3	LIMITS PPM	SOURCES (AND NOTES)
HAZARDOUS INGREDIENTS:				
NONE				
OTHER INGREDIENTS:				
REFINED MINERAL OILS	>95			
ADDITIVES AND/OR OTHER INGREDS.	< 5			

KEY TO SOURCES: A=ACGIH-TLV, A*=SUGGESTED-TLV, M=MOBIL, O=OSHA
NOTE: LIMITS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

********** IV. HEALTH HAZARD DATA **********

THRESHOLD LIMIT VALUE: 5.00 MG/M3 SUGGESTED FOR OIL MIST
EFFECTS OF OVEREXPOSURE: PROLONGED REPEATED SKIN CONTACT WITH LOW VISCOSITY OILS MAY LEAD TO IRRITATION CAUSED BY DISSOLVING OF THE NATURAL OILS FROM THE SKIN. SLIGHT SKIN IRRITATION.

********** V. EMERGENCY AND FIRST AID PROCEDURES **********

EYE CONTACT: FLUSH WITH WATER.
SKIN CONTACT: WASH CONTACT AREAS WITH SOAP AND WATER.
INHALATION: NOT EXPECTED TO BE A PROBLEM.
INGESTION: DO NOT INDUCE VOMITING. ADMINISTER VEGETABLE OIL. GET MEDICAL ASSISTANCE. (NOTE TO PHYSICIAN: MATERIAL IF ASPIRATED INTO THE LUNGS MAY CAUSE CHEMICAL PNEUMONITIS. TREAT APPROPRIATELY)

********** VI. FIRE AND EXPLOSION HAZARD DATA **********
FLASH POINT F(C): > 325 (163) (ASTM D-92)
FLAMMABLE LIMITS. LEL: .6 UEL: 7.0
EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG.
SPECIAL FIRE FIGHTING PROCEDURES: FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS.
UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE
NFPA HAZARD ID: HEALTH: 0, FLAMMABILITY: 1, REACTIVITY: 0

********** VII. REACTIVITY DATA **********
STABILITY (THERMAL, LIGHT, ETC.): STABLE
CONDITIONS TO AVOID: EXTREME HEAT
INCOMPATIBILITY (MATERIALS TO AVOID): STRONG OXIDIZERS
HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE.
HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

********** VIII. SPILL OR LEAK PROCEDURE **********
ENVIRONMENTAL IMPACT: REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802.
PROCEDURES IF MATERIAL IS RELEASED OR SPILLED: ADSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.
WASTE MANAGEMENT: PRODUCT IS SUITABLE FOR BURNING IN AN ENCLOSED, CONTROLLED BURNER FOR FUEL VALUE OR DISPOSAL BY SUPERVISED INCINERATION. SUCH BURNING MAY BE LIMITED PURSUANT TO THE RESOURCE CONSERVATION AND RECOVERY ACT. IN ADDITION, THE PRODUCT IS SUITABLE FOR PROCESSING BY AN APPROVED RECYCLING FACILITY OR CAN BE DISPOSED OF AT ANY GOVERNMENT APPROVED WASTE DISPOSAL FACILITY. USE OF THESE METHODS IS SUBJECT TO USER COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS AND CONSIDERATION OF PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

********** IX. SPECIAL PROTECTION INFORMATION **********
EYE PROTECTION: NO SPECIAL EQUIPMENT REQUIRED.
SKIN PROTECTION: IF PROLONGED OR REPEATED SKIN CONTACT IS LIKELY, OIL IMPERVIOUS GLOVES SHOULD BE WORN. GOOD PERSONAL HYGIENE PRACTICES SHOULD ALWAYS BE FOLLOWED.
RESPIRATORY PROTECTION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.
VENTILATION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

********** X. SPECIAL PRECAUTIONS **********
STORAGE: SEE APPENDIX FOR PRECAUTIONARY LABEL. CL-402

********** XI. TOXICOLOGICAL DATA **********

---ACUTE---

ORAL TOXICITY (RATS): LD50: > 5 G/KG SLIGHTLY TOXIC(ESTIMATED) --- BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

DERMAL TOXICITY (RABBITS): LD50: > 2 G/KG SLIGHTLY TOXIC(ESTIMATED) -- BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

INHALATION TOXICITY (RATS): LC50: >5 MG/L FOR 4 HRS. 0/10 RATS DIED AT THIS DOSAGE LEVEL. PRACTICALLY NONTOXIC

EYE IRRITATION (RABBITS): CAUSED NO SIGNIFICANT IRRITATION TO RABBITS. EYE IRRITATION SCORES: 2.3 AT 1 HOUR, 0.1 AT 24 HOURS, 0 AT 7 DAYS.

SKIN IRRITATION (RABBITS): SLIGHTLY IRRITATING TO RABBITS. PRIMARY IRRITATION SCORE: 1.6/8

---OTHER DATA---

*****THIS MIXTURE OR A SIMILAR MIXTURE DID NOT RESULT IN ANY FATALITIES TO RATS AT CONCENTRATIONS (SEE INHALATION TOXICITY ABOVE) SUBSTANTIALLY HIGHER THAN THE 5 MG/M3 TLV SUGGESTED FOR OIL MISTS.

********** XII. REGULATORY INFORMATION **********

TSCA INVENTORY STATUS: ALL COMPONENTS REGISTERED.

D.O.T. SHIPPING NAME: NOT APPLICABLE

D.O.T. HAZARD CLASS: NOT APPLICABLE

US OSHA HAZARD COMMUNICATION STANDARD: PRODUCT ASSESSED IN ACCORDANCE WITH OSHA CFR 1910.1200 AND DETERMINED TO BE HAZARDOUS.

RCRA INFORMATION: THE UNUSED PRODUCT, IN OUR OPINION, IS NOT SPECIFICALLY LISTED BY THE EPA AS A HAZARDOUS WASTE (40 CFR, PART 261D); DOES NOT EXHIBIT THE HAZARDOUS CHARACTERISTICS OF IGNITABILITY, CORROSIVITY, OR REACTIVITY, AND IS NOT FORMULATED WITH THE METALS CITED IN THE EP TOXICITY TEST. HOWEVER, USED PRODUCT MAY BE REGULATED.

THE FOLLOWING PRODUCT INGREDIENTS ARE CITED ON THE LISTS BELOW:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
(OIL MIST)		2,10,11

--- KEY TO LIST CITATIONS ---

1 = OSHA Z, 2 = ACGIH, 3 = IARC, 4 = NTP, 5 = NCI,
6 = EPA CARC, 7 = NFPA 49, 8 = NFPA 325M, 9 = DOT HMT, 10 = CA RTK,
11 = IL RTK, 12 = MA RTK, 13 = MN RTK, 14 = NJ RTK, 15 = MI 293,
16 = FL RTK, 17 = PA RTK.

****

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

****

PREPARED BY: MOBIL OIL CORPORATION
ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPARTMENT, PRINCETON, NJ
FOR FURTHER INFORMATION, CONTACT:
MOBIL OIL CORPORATION, PRODUCT FORMULATION AND QUALITY CONTROL
3225 GALLOWS ROAD, FAIRFAX, VA 22037 (703) 849-3265

********** APPENDIX **********

FOR MOBIL USE ONLY: (FILL NO: MTJ354*M201) MHC: 1* 1* 0 0 1 PPEC: A
US86-089 APPROVE REVISED: 04/18/86

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PRECAUTIONARY LABEL TEXT FOR PACKAGED PRODUCTS:

CONTAINS LOW VISCOSITY OIL

CAUTION

MAY CAUSE SKIN IRRITATION ON PROLONGED,
REPEATED SKIN CONTACT.

AVOID PROLONGED OR REPEATED CONTACT THAT
COULD DEFAT THE SKIN.
WASH SKIN CONTACT AREAS WITH SOAP AND WATER.

LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
AVOID WEARING OF CLOTHING SOAKED WITH FLUID.
AVOID PROLONGED INHALATION OF MISTS OR VAPORS.

WHEN USE CONDITIONS ARE LIKELY TO RESULT IN
EXCESSIVE MISTING (GREATER THEN 5 MG/M3),
PROVIDE ADEQUATE LOCAL VENTILATION OR
RESPIRATORY PROTECTION.

FOR INDUSTRIAL USE ONLY
NOT INTENDED OR SUITABLE FOR USE
IN OR AROUND A HOUSEHOLD OR DWELLING.

ATTENTION

EMPTY CONTAINERS MAY CONTAIN PRODUCT RESIDUE, INCLUDING FLAMMABLE OR EXPLOSIVE VAPORS. DO NOT CUT, PUNCTURE OR WELD ON OR NEAR CONTAINER. ALL LABEL WARNINGS AND PRECAUTIONS MUST BE OBSERVED UNTIL THE CONTAINER HAS BEEN THOROUGHLY CLEANED OR DESTROYED.

REFER TO PRODUCT MATERIAL SAFETY DATA BULLETIN
FOR FURTHER SAFETY AND HANDLING INFORMATION.

MOBIL OIL CORPORATION, NEW YORK, N.Y. 10017 CL-402(1/86)

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D.O.T. SHIPPING NAME: NOT APPLICABLE
D.O.T. HAZARD CLASS: NOT APPLICABLE