

CombohoistTM

with the exclusive **COMBOLINKSM**



**OWNERS
MANUAL**

MOUNTING AND OPERATING INSTRUCTIONS

**CRYSTEEL
MFG. INC.**

Telephone: 507-726-2728

Highway 60 East Lake Crystal, Minnesota 56055

DATE PURCHASED

BODY SERIAL NUMBER

HOIST SERIAL NUMBER

CYLINDER SERIAL NUMBER

PUMP SERIAL NUMBER

DEALER

ADDRESS

PHONE

OPERATION AND USE

1. Engage PTO from cab and adjust engine speed to fast idle.
2. If the hydraulic hose connections are correct, the hoist should raise when the hoist control lever is pulled back, hold when the lever is in the center detent, and lower when the lever is pushed forward. For the push-pull control on Models 20LSF and 30LSF, the hoist should raise when the hoist control knob is pulled all the way out, hold when the knob is centered, and lower when the knob is pushed all the way in.
3. Cycle the hoist several times to remove air from the cylinders and hydraulic lines.
4. When the hoist cylinder reaches the end of the stroke, oil will flow through the automatic bypass valve built into the piston inside the cylinder and return to the reservoir. Place the hoist control knob in the hold position and disengage the PTO.
5. It is advisable to run the PTO to 'power down', or lower, the hoist because this will act as a hydraulic lock to hold the hoist in the lowered position. It is not necessary to do this, however, because the reservoir has sufficient capacity whether or not the hoist is powered down. You will benefit from the advantages of the double acting hoist only if you power it down.
6. To make use of the hydraulic lock feature, place the hoist control knob in the center hold position after the hoist is powered down. This places the pressure on the valve, where it belongs, not on the pump.
7. DO NOT LEAVE THE PTO IN GEAR WHILE TRANSPORTING. THIS WILL CAUSE SEVERE DAMAGE TO THE HYDRAULIC PUMP AND/OR DRIVELINE.
8. The hydraulic system should be drained, flushed and refilled with proper hydraulic fluid at regular intervals. CAUTION: NEVER use hydraulic brake fluid in the hydraulic system.

SOME DO'S AND DON'T'S FOR SAFETY AND LONG SERVICE LIFE

1. Use the proper hydraulic fluid. KEEP IT CLEAN. Remember to change it regularly.
 2. Lubricate all grease fittings at regular intervals.
 3. ALWAYS carefully block up the body, using the body prop, before working under it.
 4. Do not 'race' the engine when unloading.
 5. Do not load the hoist beyond its capacity.
 6. DO NOT tamper with the hydraulic relief valve. This will void the warranty. It can cause severe damage to the hoist and cylinder.
 7. Never leave the PTO in gear while transporting. It will ruin the hydraulic pump.
 8. Check all bolts and set screws regularly. Keep them tight!
-

FOREWORD

Crysteel's Subframe Combohoist is a heavy duty underbody hoist designed and intended for use under dump bodies. The Subframe Combohoist line consists of 12 sizes that fit single, tandem and triple axle trucks. The Combohoist is a patented combination of two underbody hoist principles, the scissors and the double-arm hoist.

Crysteel's Dump Body is a heavy duty body designed with the contractor and highway department user in mind. It is constructed of high-strength, low-alloy steel throughout and has Crysteel's unique hat section crossmembers for strength and torsional rigidity. It comes in a range of sizes from 8 through 18 feet in length and from 2 through 25 cubic yards in capacity.

This manual contains information necessary for the proper installation and operation of Crysteel's Subframe Combohoist and Dump Body. Study it carefully before attempting to mount or use these products. With proper installation and maintenance, the Crysteel Dump Body and Subframe Combohoist will give many years of trouble-free service.

KEEP THIS MANUAL IN A SAFE PLACE FOR FUTURE REFERENCE

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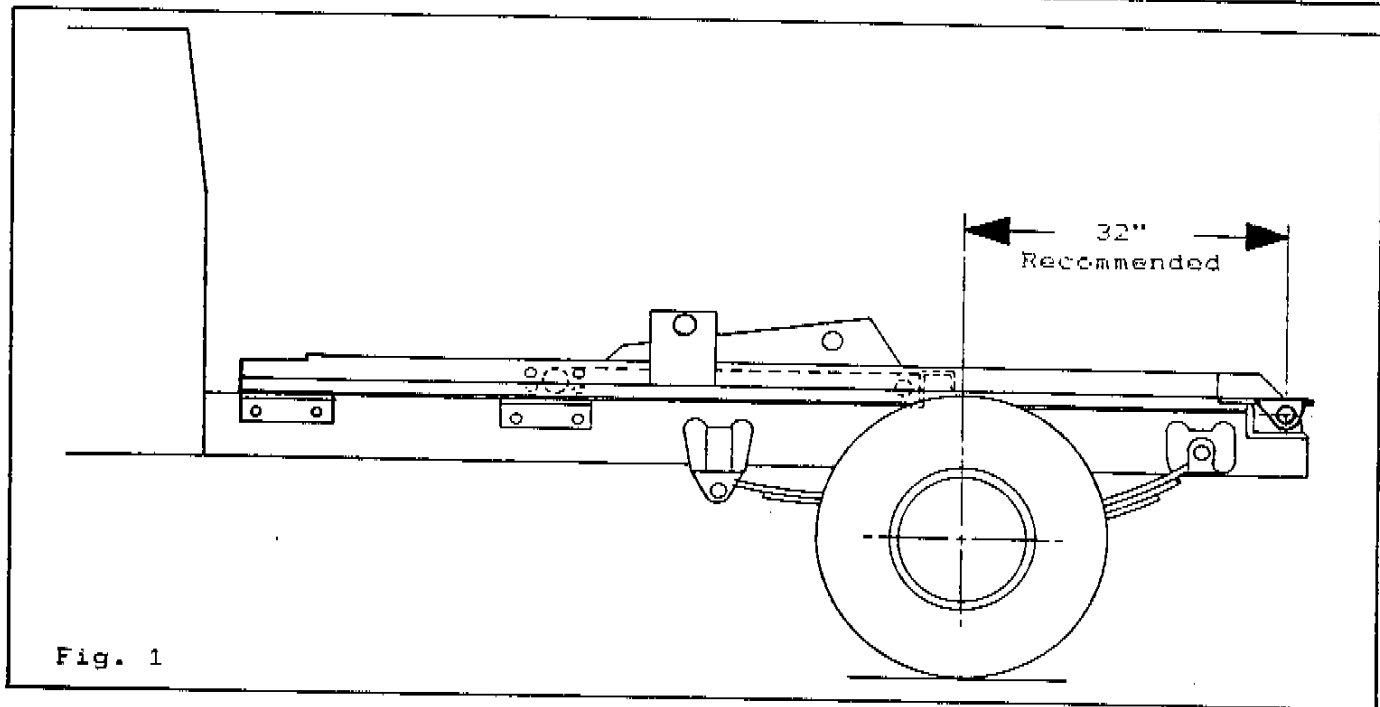


Fig. 1

LOCATE SUBFRAME - MODEL 20LSF THROUGH 70LSF

Place the hoist-subframe assembly on the truck frame. The truck frame will need to be notched around the rear hinge for proper installation. The rear hinge frame angle must be as close as possible behind the rear spring hanger. This will be approximately 32 inches behind the rear axle on single axle trucks and 42 to 45 inches behind the center of the tandem on tandem axle trucks. The rear hinge should never be more than 36 inches behind the rear axle on single axle trucks, nor more than 50 inches behind the center of the tandem on tandem axle trucks. Temporarily block up the front of the subframe so it is level with the truck frame. The distance between the subframe and the truck frame is the depth of the notch required for the rear hinge angle. Mark the rear of the truck frame for notching as shown, leaving enough of the bottom flange of the truck frame to be bent up later to box in the truck frame. Crysteel recommends that the subframe crossmember under the back end of the hoist should be supported if the unit is to be subjected to severe service. To do this a crossmember may be added to the truck frame. On the truck frame, mark the location of the flange of the hoist subframe crossmember; this will be the location of the added crossmember for supporting the subframe crossmember. Remove the hoist-subframe assembly from the truck and notch the truck frame as marked. At the location marked for the hoist subframe crossmember, install a crossmember, not supplied, in the truck frame.

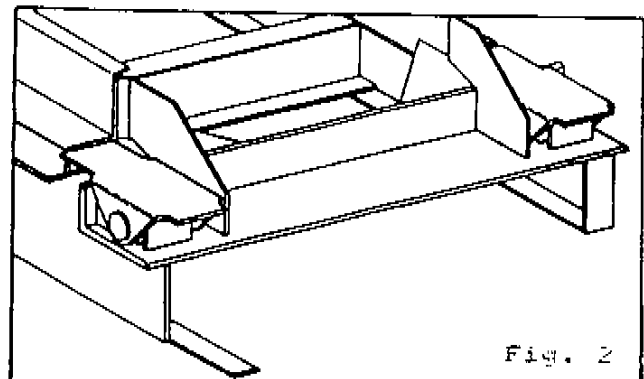


Fig. 2

Note: If the truck frame has rivets in the top flange, add spacers between the truck frame and the subframe, or countersink the rivet heads into the subframe by drilling holes in the subframe. Do not remove the rivet heads.

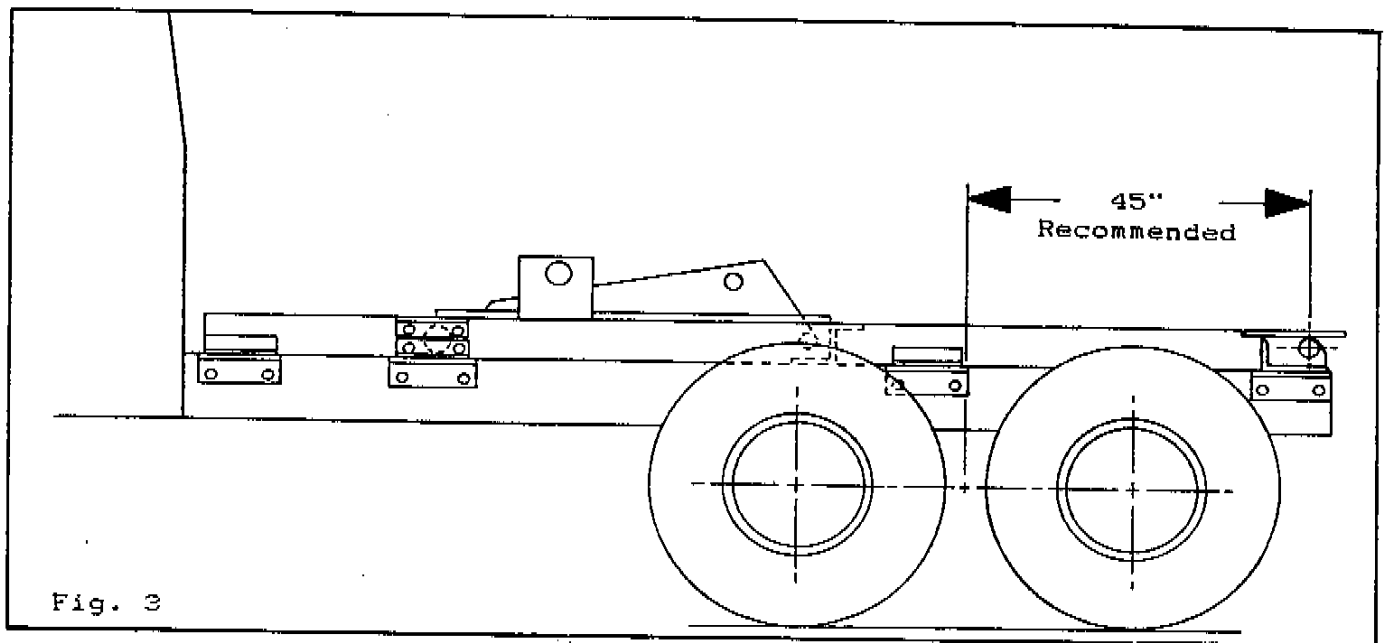


Fig. 3

LOCATE SUBFRAME - MODEL 80LSF THROUGH 120SF

Place the hoist-subframe assembly on the truck frame. The rear hinge pivot should be located 42 to 45 inches behind the center of the tandem on tandem axle trucks. The rear hinge pivot should not be located more than 50 inches behind the center of the tandem. Mark the truck frame as shown leaving enough material to box in the truck frame later. Crysteel recommends that the subframe crossmember under the back end of the hoist should be supported if the unit is to be subjected to severe service. To do this a crossmember may be added to the truck frame. On the truck frame, mark the location of the flange of the hoist subframe crossmember; this will be the location of the added crossmember for supporting the subframe crossmember. Remove the hoist-subframe assembly from the truck and cut the truck frame as marked. At the location marked for the hoist subframe crossmember, install a crossmember, not supplied, in the truck frame.

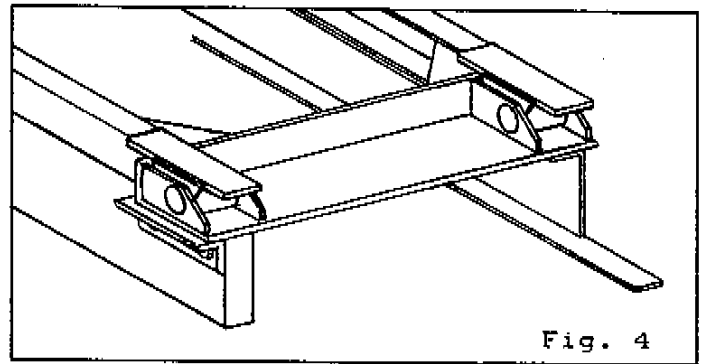


Fig. 4

SUBFRAME LENGTHS - MODEL 20LSF THROUGH 120SF

In some cases it may be necessary to shorten or lengthen the subframe to match the length of the body. The following table gives the body length that each subframe was designed to support. Subframe extensions in 2 foot lengths are available from Crysteel.

MODEL	BODY LENGTH	SUBFRAME LENGTH	MODEL	BODY LENGTH	SUBFRAME LENGTH
S50-20LSF	9 Ft	8 Ft 9 In	T40-70LSF	12 Ft	11 Ft 3 In
S50-30LSF	10 Ft	9 Ft 10 In	T50-80LSF	14 Ft	13 Ft 4 In
S55-40LSF	10 Ft	9 Ft 10 In	T45-90SF	14 Ft	13 Ft 4 In
S60-50LSF	10 Ft	9 Ft 10 In	T50-100SF	14 Ft	13 Ft 4 In
S60-60LSF	12 Ft	11 Ft 3 In	T50-110SF	16 Ft	15 Ft 4 In
			T50-120SF	18 Ft	17 Ft 4 In

ASSEMBLE HOIST AND SUBFRAME TO TRUCK - MODEL 20LSF THROUGH 70LSF

The hoist is located in the subframe to give a 50 degree dump angle.

If the hoist and subframe are separate, assemble the hoist to the subframe using 1/2 x 1 1/4 cap screws, lock washers and hex nuts. BE SURE THE HOIST MOUNTING PLATES ARE RESTING ON THE MOUNTING PLATE SUPPORT BRACKETS welded to the inside of the subframe before tightening the cap screws and nuts. The hoist mounting plates are not centered on the lower cross tube of the hoist and will raise the hoist 1 inch if they are turned upside down (See Fig. 6). The rear hinge end of the hoist may be raised to provide more room for installing the cap screws, lock washers and hex nuts.

Place the hoist and subframe assembly on the truck (See Fig. 1). Locate one pair of mounting angles under the lower cross tube of the hoist and mark the truck frame for drilling using the mounting angles as guides.

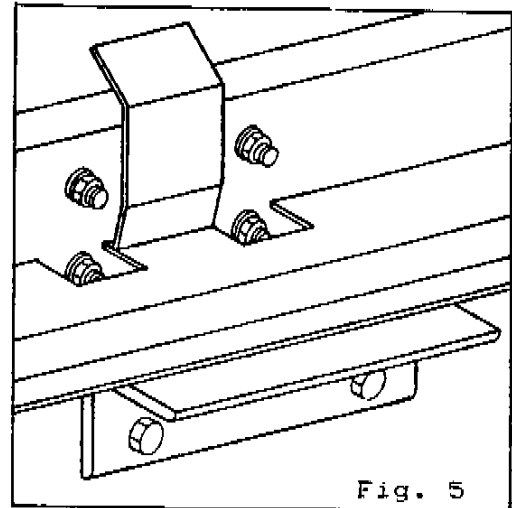


Fig. 5

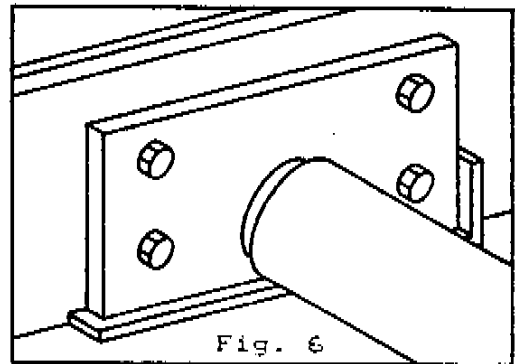


Fig. 6

ASSEMBLE HOIST AND SUBFRAME TO TRUCK - MODEL 80LSF THROUGH 120SF

The hoist is located on the subframe to give a 50 degree dump angle. Four small mounting angles (with two holes) need to be added to the hoist-subframe assembly as shown in Fig. 7. Two of these small mounting angles will be used to support the body guides which will be mounted later.

If the hoist and subframe are separate, assemble the hoist and 4 small mounting angles (with two holes) to the subframe using 5/8 x 1 3/4 cap screws, lock washers and hex nuts as shown in Fig. 7. Two of these small mounting angles will be used to support the body guides which will be mounted later.

Place the hoist and subframe assembly on the truck (See Fig. 3). Locate one pair of large mounting angles under the lower cross tube of the hoist and one pair under the rear hinge. Mark the truck frame for drilling using the mounting angles as guides.

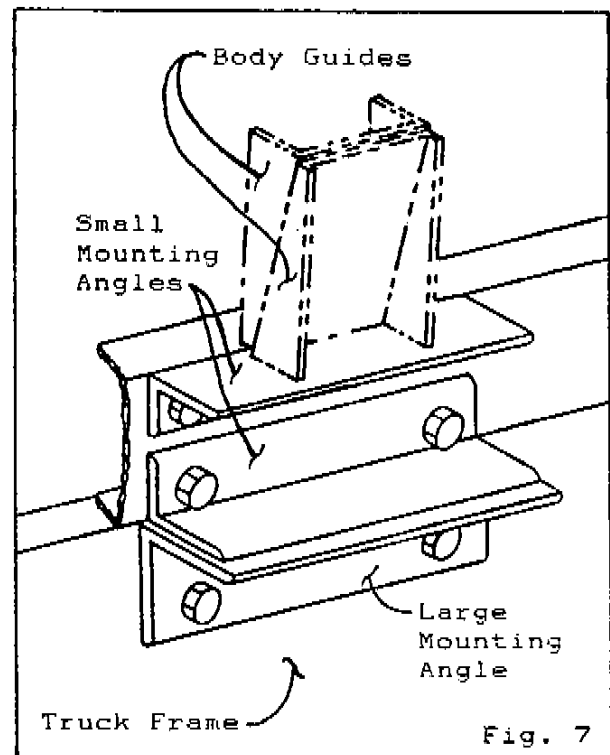
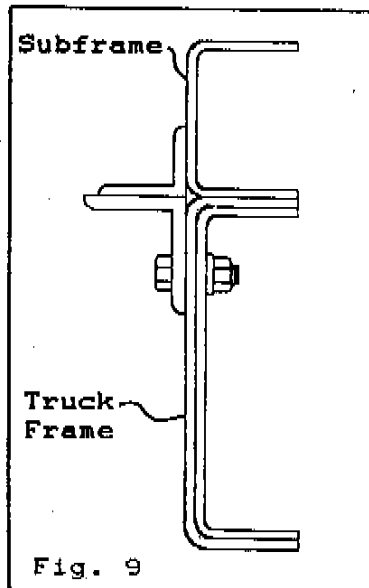


Fig. 7

CAUTION: BE CAREFUL OF BRAKELINES, WIRING, ETC. INSIDE THE TRUCK FRAME WHEN DRILLING THE TRUCK FRAME.

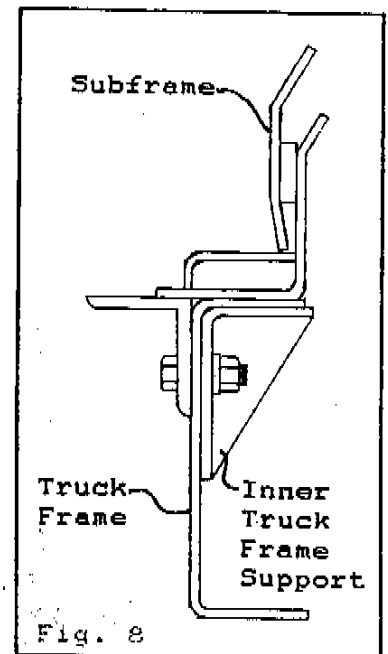
DRILL TRUCK FRAME - MODEL 20LSF THROUGH 70LSF

Clamp the inner truck frame supports to the inside of the truck frame under the lower cross tube of the hoist, as shown in Fig. 8, and drill $21/32$ inch holes in the truck frame and the inner truck frame supports using the mounting angles as guides. Bolt the mounting angles and the inner truck frame supports in place using $5/8 \times 1 \frac{3}{4}$ cap screws, lock washers and hex nuts.



DRILL TRUCK FRAME - MODEL 80LSF THROUGH 120SF

Drill $21/32$ inch holes in the truck frame using the mounting angles as guides. See Fig. 9.



WELD REAR HINGE AND SUBFRAME - MODEL 20LSF THROUGH 70LSF

Make sure subframe is correctly located, centered and square on the truck frame. Clamp the subframe in place and weld the subframe to the mounting angles. Weld the rear hinge to the truck frame. Bend the bottom flange of the truck frame up and weld all around to box in the truck frame. (See Fig. 2.) Insert spacers between the subframe crossmember and the crossmember added to the truck frame and weld in place. This will help support the hinge end of the hoist. Clamp a mounting angle to the truck frame at the front of the subframe on each side and mark the truck frame for drilling. (See Fig. 1.) Drill $17/32$ inch holes in the truck frame and bolt the mounting angles in place using $5/8 \times 1 \frac{3}{4}$ cap screws, lock washers and hex nuts. Securely weld the subframe to the mounting angles.

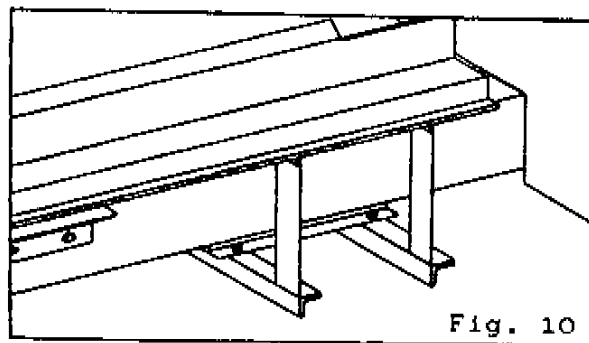
Note: If desired, the rear hinge may be welded to mounting angles instead of the truck frame. This allows the hoist and subframe to be easily removed from the truck by unbolting the mounting angles. It also eliminates any welding on the truck frame. After the subframe has been welded to the mounting angles under the lower cross tube, clamp a pair of mounting angles under the rear hinge and mark the truck frame for drilling. Drill $21/32$ inch holes using the mounting angles as a guide and bolt in place using $5/8$ cap screws, lock washers and hex nuts. Weld the rear hinge to the mounting angles. For more rear hinge support, the flat side of a 6" channel may be placed against the bottom side of the rear hinge frame angle and bolted or welded to the truck frame. If desired, the rear hinge may be bolted to this channel.

WELD REAR HINGE AND SUBFRAME - MODEL 80LSF THROUGH 120SF

Make sure subframe is correctly located, centered and square on the truck frame. Bolt the large mounting angles in place under the rear hinge and under the lower crosstube of the hoist using $5/8 \times 1\ 3/4$ cap screws, lock washers and hex nuts. Weld the small mounting angles at the lower crosstube of the hoist to the large mounting angles bolted to the frame. Weld the rear hinge to the large mounting angles. Bend the flange on the truck frame over and weld all around to box in the truck frame. (See Fig. 4.) Insert spacers between the subframe crossmember and the crossmember added to the truck frame and weld in place. This will help support the hinge end of the hoist. Clamp one small mounting angle (one with no holes) to the subframe at the front of the subframe and one mid-way between the rear hinge and the lower cross tube of the hoist (two mounting angles on each side). Clamp one large mounting angle to the truck frame under each of these small mounting angles and mark the truck frame for drilling. (See Fig. 3.) Drill $21/32$ inch holes in the truck frame (See frame drilling note on page 5) and bolt the large mounting angles in place using $5/8 \times 1\ 3/4$ cap screws, lock washers and hex nuts. Securely weld the small mounting angles to the large mounting angles and to the subframe. The hoist subframe is now attached to the truck frame at four places on each side.

MOUNT STANDARD PUMP - ALL MODELS

The pump is mounted on the same side of the truck as the PTO opening on the transmission. Determine which side of the truck frame to mount the pump. Bolt the mounting angles to the pump using $3/8 \times 1$ cap screws, flat washers, lock washers and hex nuts. Clamp the pump mounting angles to the truck frame with the pump inside the truck frame a few inches behind the cab. Check that the PTO drive shaft is long enough and does not exceed 15 degrees in angularity. Check for sufficient clearance around the pump. Reposition the pump for the best location. In some cases it may be necessary to rework the exhaust system for sufficient clearance around the pump.



NOTE: UNDER NO CIRCUMSTANCE SHOULD THE ENGINE EXHAUST BE PERMITTED TO BLOW DIRECTLY ONTO THE PUMP!

After locating the pump, drill $17/32$ inch holes through the truck frame and bolt in place using $1/2 \times 1\ 3/4$ cap screws, lock washers and hex nuts. (See the frame drilling caution note on page 5.)

INSTALL SQUARE PTO DRIVE SHAFT - MODELS 20LSF AND 30LSF

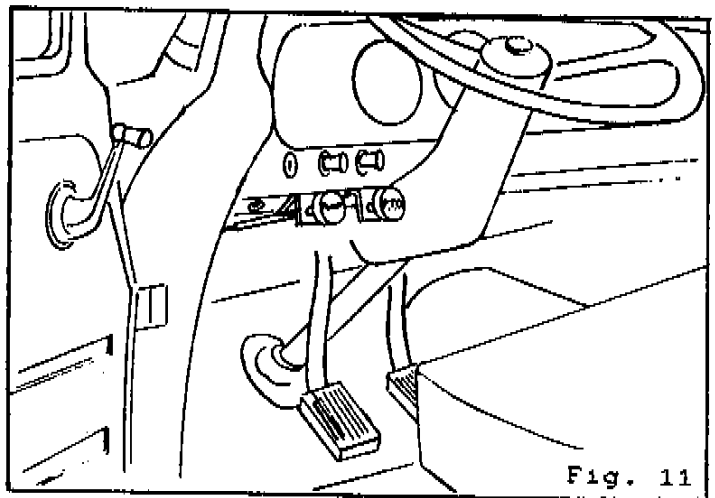
Install the long slip U-joint on the pump driveshaft and the short U-joint on the PTO driveshaft so that the inner edge of the hub of each is flush with the end of the shaft. **DO NOT TIGHTEN THE SETSCREWS!** Measure the distance from the inner edge of the hub of one U-joint to the inner edge of the hub of the other U-joint. This is the length the drive shaft needs to be. Cut the driveshaft to proper length with a hacksaw and deburr. Install the drive shaft and tighten all set screws. Retighten set screws and secure them with a safety wire.

INSTALL ROUND PTO DRIVE SHAFT - MODEL 40LSF THROUGH 120SF

Install the long slip U-joint on the pump shaft and the short U-joint on the PTO shaft so that the inner edge of the hub of each is flush with the end of the shaft. DO NOT TIGHTEN THE SETSCREWS! Measure the distance from the inner edge of the hub of one U-joint to the inner edge of the hub of the other U-joint. This is the length the finished drive shaft assembly needs to be. The short drive shaft will increase the length of the drive shaft 5 inches after the short drive shaft and the drive shaft assembly are welded together. Cut the drive shaft assembly to the proper length and deburr the inside of the tube. Insert the short drive shaft into the drive shaft assembly and ROTATE UNTIL BOTH KEYWAYS ARE IN LINE. Weld the short drive shaft and the drive shaft assembly together. Install the completed drive shaft assembly and tighten all set screws. Retighten the set screws and secure them with a safety wire.

INSTALL CONTROL CABLES - MODELS 20LSF AND 30LSF

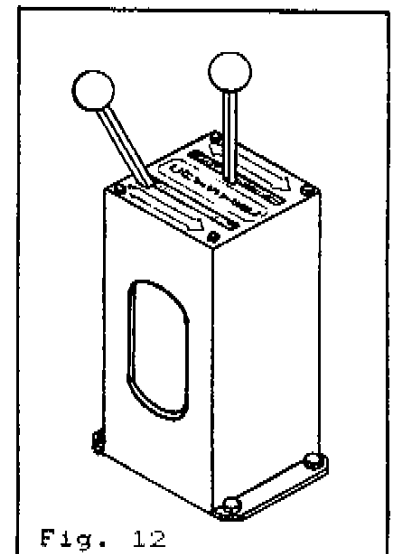
Remove the control wire from the control cable housing and oil the inside of the cable housing and reassemble. Attach the control mounting angle at a convenient location under the dash using $1/4 \times 3/4$ cap screws, lock washers and hex nuts. Insert control cable through a hole in the firewall, attach control knob end of the control cable to the control mounting angle and attach other end to the valve control lever on the pump using the parts supplied. Check for proper operation and adjust if necessary. Be sure there are no sharp bends in the control cable. Keep the control cable away from hot exhaust pipes. Install the valve safety cover to prevent accidents and to protect the valve from damage.



INSTALL CONTROL PEDESTAL - MODEL 40LSF THROUGH 120SF

The hoist controls in the truck cab are a quadrant lever type, pedestal mounted with detents for safety. The PTO control lever has a detent in the disengaged position and the hydraulic valve control lever has a detent in the "hold" position.

Place the pedestal in a convenient location next to the drivers seat. (Check below the floor for obstructions and cable routing before drilling.) Mark the floor using the pedestal as a template, and drill $1/4$ inch holes for the mounting screws and $3/8$ inch holes for the control cables. Mount the pedestal using $5/16 \times 3/4$ self-tapping screws. Remove the control wire from the control cable housing and oil the inside of the cable housing and reassemble. Insert the control cables through the floor and connect them to the control levers. Mount the control lever assembly to the control pedestal



using #10 x 3/8 self-tapping screws. Attach the other end of the cables to the PTO and the valve control lever. Check for proper operation and adjust if necessary. Be sure there are no sharp bends in the cables. Keep the control cable away from hot exhaust pipes. Install the valve safety cover to prevent accidents and to protect the valve from damage.

OPTIONAL GEAR PUMP MOUNTING - MODEL 20LSF THROUGH 120SF

Crysteel offers two gear pumps for use with the Comboloist Models 20LSF through 120SF. A direct mount pump for mounting directly onto the PTO and a remote mount pump that can be either PTO or crankshaft driven. These pumps come with a reservoir and valve assembly and a return line filter. The filter must be used to assure long service life for the pump. Replace the 10 micron filter at regular intervals.

The direct mount pump has an SAE "B" 4-bolt flange and a 13 tooth splined shaft that can be bolted directly to a PTO with an SAE "B" flange. The reservoir and valve assembly can be mounted in a convenient location. The reservoir mounting brackets are shipped loose so the reservoir can be located for the best mounting. Weld the mounting brackets to the reservoir and clamp the reservoir in place so holes can be drilled for mounting the reservoir. Drill 17/32 inch holes and bolt in place using 1/2 x 1-3/4 cap screws, lock washers and hex nuts. (See the frame drilling note on page 5.)

Connect a 1-1/2 or 2 inch I.D. suction hose between the pump and the suction port on the reservoir. Connect a 1/2 or 3/4 inch I.D. pressure hose between the pump and the pressure port on the reservoir (near the fill tube). For Models 20LSF through 80LSF this hose must have a minimum pressure rating of 3250 PSI. For Models 90SF through 120SF this hose must have a minimum pressure rating of 5000 PSI. Suction and pressure hoses are not supplied by Crysteel.

The filter is installed in a line between the filter port on the side of the valve and the return line port on the reservoir (near the valve). The filter can be supported by pipe fittings (not supplied) as shown, or it can be mounted where it is most convenient. Install a tee in one section of the line for the safety drain line hose from the safety valve. Hoses and fittings are not supplied by Crysteel.

The control valve is machined to accept the Morse sealed control cable. The Morse adapter kit for the Gresen valve connects the control cable to the valve. Crysteel does not supply the cable or adapter kit. They are available from the local hydraulics supply house.

The remote mount gear pump has an SAE "B" 2 bolt flange and a 1 inch round, keyed shaft. This pump can be mounted behind the cab and driven from the PTO or it can be mounted in front of the engine and driven from the crankshaft. Brackets are included for mounting the pump behind the cab. Bolt the pump to the "L" bracket using 1/2 x 1-3/4 cap screws, lock washers and hex nuts. Holes will need to be drilled in the pump mounting angles to mount the "L" bracket. Follow the instructions on page 6 for mounting the standard pump and follow the instructions on page 7 for mounting the round driveshaft.

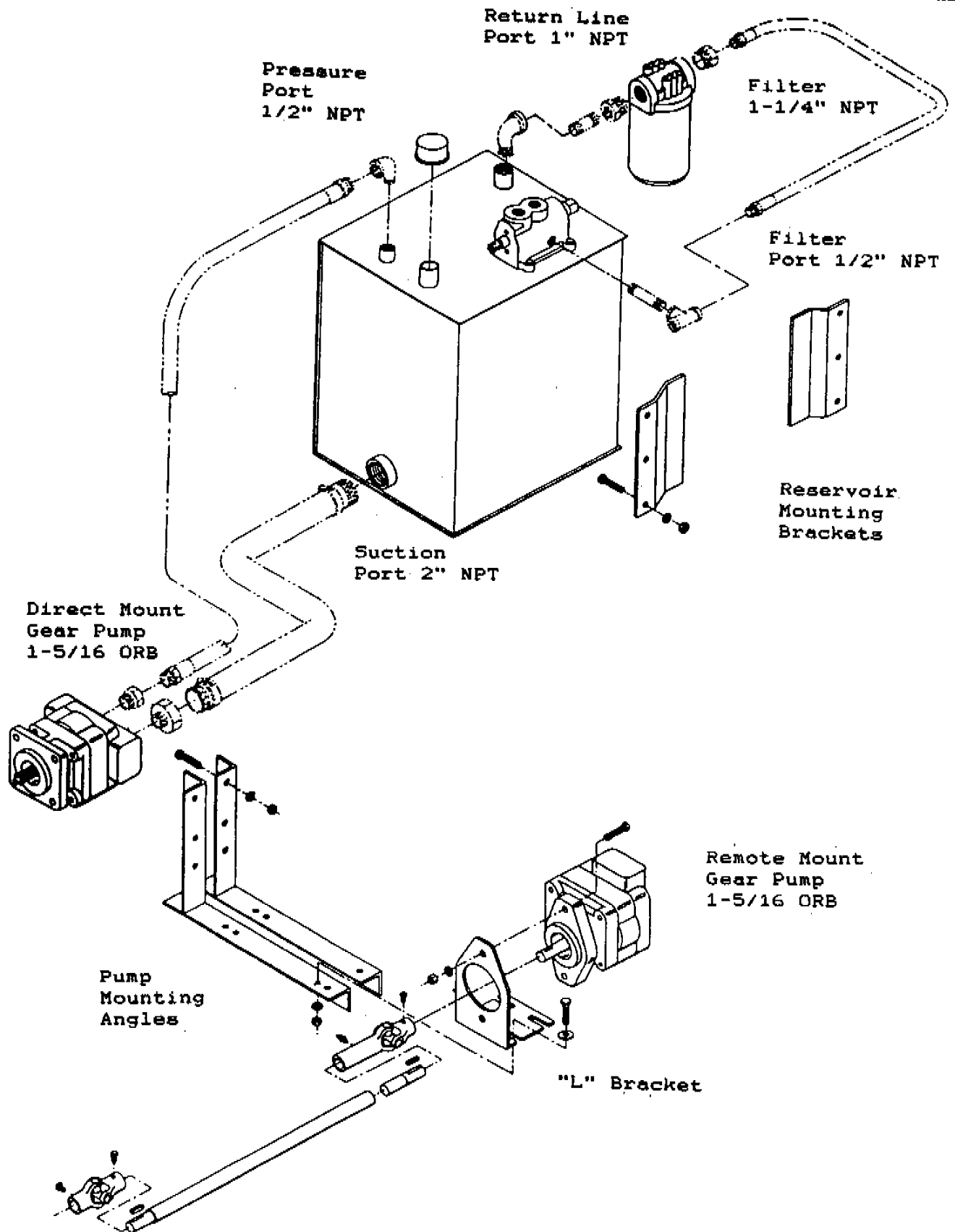


Fig. 13

CENTRAL HYDRAULIC SYSTEMS

Crysteel's COMBOHOIST is ideally suited for use with a wide variety of hydraulic pumps (gear, vane or piston pumps with multiple valve banks) in central hydraulic systems controlling snowplows, wings, sanders and hydraulic tools. Because of the low volume displacement of the COMBOHOIST hydraulic cylinders, it is especially well matched to closed center load sensing hydraulics using variable displacement piston pumps. This efficient combination can save up to 20 horsepower (with matching fuel savings) on a typical highway department truck equipped with hoist, sand spreader and snowplow.

OPTIONAL ELECTRIC PUMP MOUNTING - MODEL 20LSF THROUGH 60LSF

For trucks with automatic transmissions, Crysteel offers a 12 volt electric pump. Use the following instructions for mounting the optional electric pump.

1. Assemble the electric pump to the mounting angles using 3/8 x 7/8 cap screws, flat washers, lock washers and hex nuts.
2. Mount the pump just ahead of the hoist inside the truck frame using 1/2 x 1- 3/4 cap screws, lock washers and hex nuts. See the frame drilling note above.
3. Install control cable as described on page 7.
4. Mount the push-button switch just above the control cable so both the cable and the push-button switch can be operated with one hand.
5. The Monarch electric pump will begin pumping oil when the small terminal on the solenoid is grounded. Connect one terminal of the push-button switch to vehicle ground, and the other terminal on the switch to the small terminal on the solenoid. Connect the large terminal on the solenoid to the positive terminal on the battery using a No. 0 Gauge or heavier battery cable.
6. IMPORTANT - On all electric pump installations, install a heavy duty ground cable from the truck battery directly to the truck frame. The light-weight cable normally used grounding the engine to the frame is not heavy enough. The recommended battery cable size is No. 0. Never, under any circumstance, use cable lighter than No. 1.
7. The port on the reservoir side of the valve should be connected to the HI port on the safety valve. The other valve port should be connected to the LO port on the safety valve.

INSTALL HYDRAULIC SAFETY VALVE AND HOSES

Read these instructions and study the diagrams below for a complete understanding of the hoist hydraulic system hose connections. Follow the diagrams exactly when installing the hoses and safety valve.

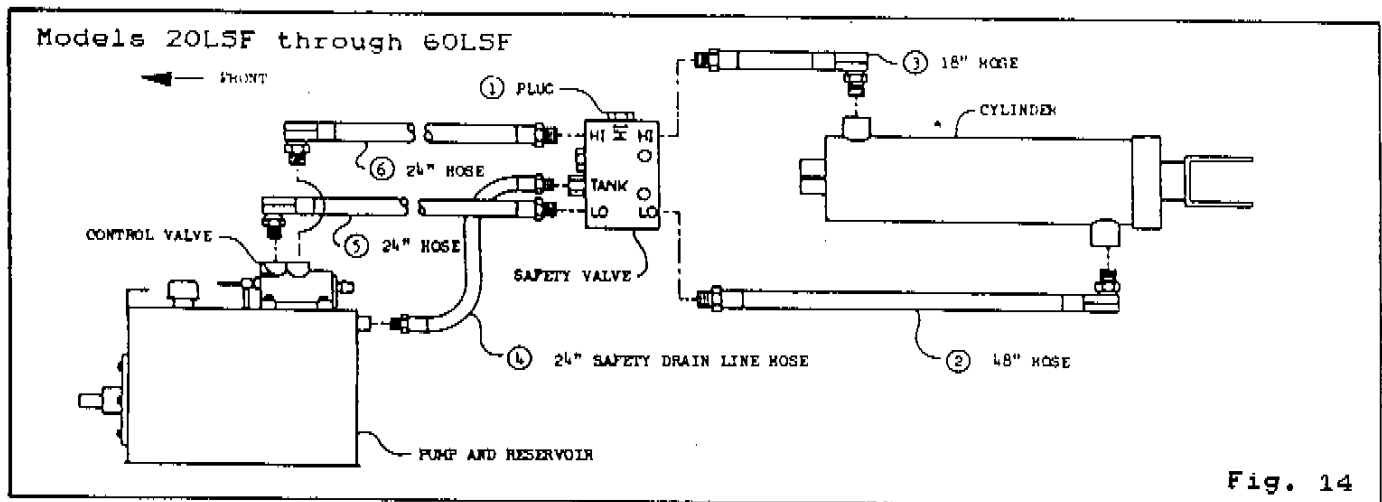
The safety valve is a component of the Combohoist hydraulic system that is installed between the hoist and the control valve to protect the hoist from accidental overloads. The ports on the safety valve are labeled "HI" for high pressure, "LO" for low pressure, and "TANK" for a drain line to the reservoir.

The Combohoist uses high pressure (3250 or 5000 PSI depending on hoist model) to raise the body and low pressure (1800 PSI) to lower the body. On the Williams control valve, the port farther from the control lever is the high pressure port used to raise the body, the port nearer to the control lever is the low pressure port used to lower the body. The high pressure hoses use different fittings than the low pressure hoses to prevent the hoses from being connected incorrectly.

!!! IMPORTANT !!! THE SAFETY VALVE MUST BE INSTALLED EXACTLY AS SHOWN FOR THE CRYSTEEL WARRANTY TO BE HONORED. Failure to install or failure to install the safety valve correctly voids the warranty. This applies regardless of the type, manufacture or source of the pump, control valve or reservoir used with the hoist.

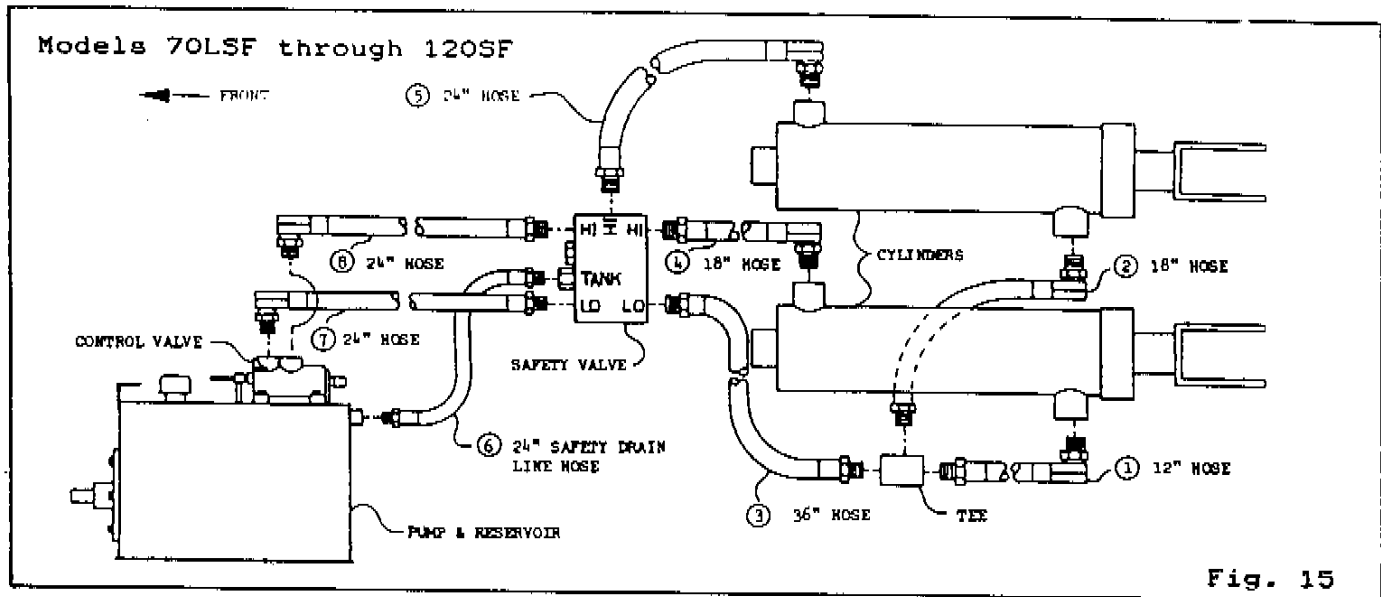
Hose extension kits are available from Crysteel. The hose extensions should be installed between the safety valve and the control valve.

After the safety valve and hoses have been installed, use the safety valve mounting bracket to mount the safety valve to the hoist subframe or the truck frame at a convenient location. Be sure there is enough slack in the hoses between the safety valve and the hoist for proper hoist operation. DO NOT WELD on the safety valve! This may cause the safety valve to leak.



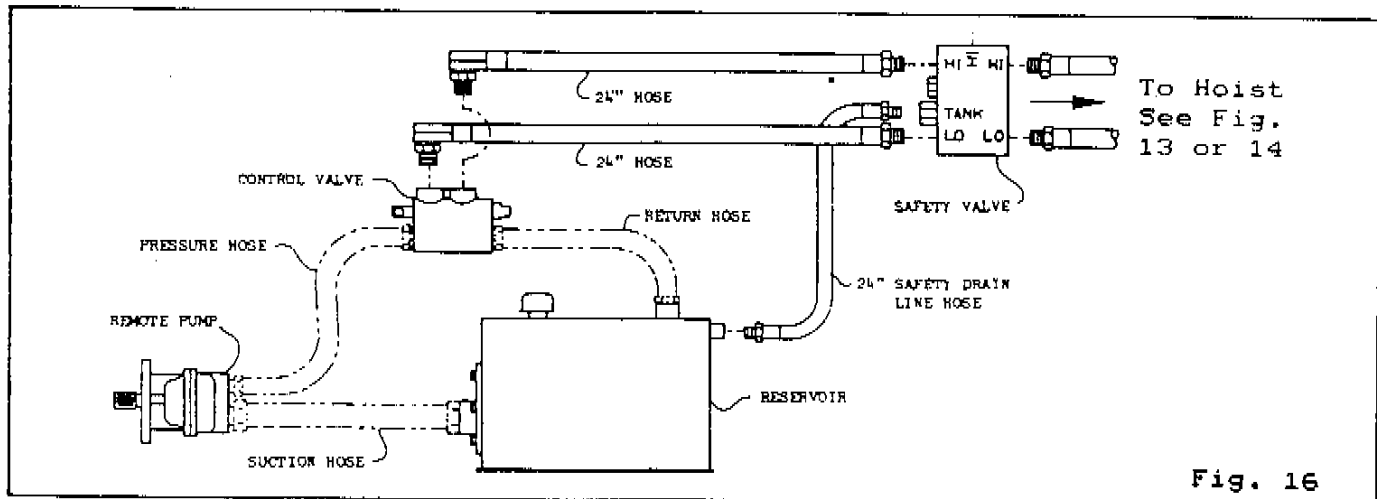
Connect the hoses as follows for single cylinder hoists:

1. Use plug from cylinder base port to plug middle HI port on safety valve.
2. 48" 3/4-16 ORB from rod end port of cylinder to LO port on safety valve.
3. 18" 7/8-14 ORB from base end port of cylinder to HI port on safety valve.
4. 24" 3/8 NPT from TANK port on safety valve to Safety Drain Line port on reservoir.
5. 24" 3/4-16 ORB from LO port on safety valve to front port on control valve.
6. 24" 7/8-14 ORB from HI port on safety valve to rear port on control valve.



Connect the hoses as follows for twin cylinder hoists:

1. 12" 3/4-16 ORB from rod end port of cylinder on same side of truck as pump to one end of tee.
2. 18" 3/4-16 ORB from rod end port of other cylinder to middle port on tee.
3. 36" 3/4-16 ORB from tee to LO port on safety valve.
4. 18" 7/8-14 ORB from base end port of cylinder on same side of truck as pump to HI port on safety valve.
5. 24" 7/8-14 ORB from base end port of other cylinder to middle HI port on end of safety valve.
6. 24" 3/8 NPT from TANK port on safety valve to Safety Drain Line port on reservoir.
7. 24" 3/4-16 ORB from LO port on safety valve to front port on control valve.
8. 24" 7/8-14 ORB from HI port on safety valve to rear port on control valve.



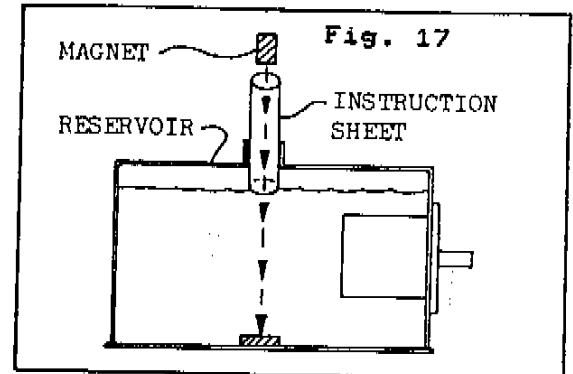
When the Williams pump, reservoir and valve assembly normally supplied with hoist is not used, extra care must be taken when installing the safety valve and hoses. The hoses between the hoist and the safety valve are the same as shown for the single and twin cylinder hoists shown in Figs. 14 and 15. Refer to Fig. 16 for hose connections between the safety valve, the control valve, the pump, and the reservoir. Crysteel recommends that the hoses be connected to the control valve so the body raises when the control knob or lever is pulled and lowers when the control knob or lever is pushed.

INSTALL MAGNET IN RESERVOIR

A magnet has been included with this hoist to extend the life of its hydraulic system. The magnet should be placed in the reservoir to attract the metal filings that result from normal wear of the hydraulic components.

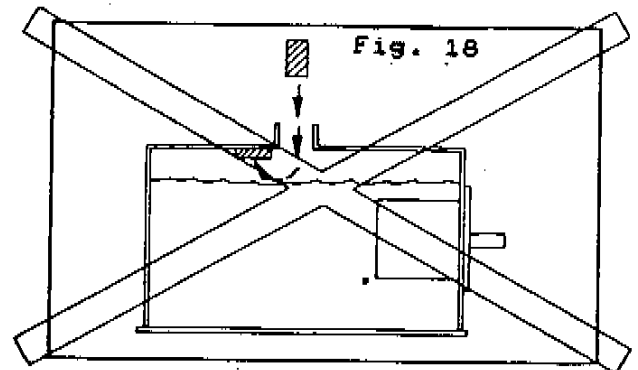
RIGHT

To install the magnet into the reservoir, roll this instruction sheet into a tube. Slip the paper tube into the fill hole on the reservoir and drop the magnet into the reservoir through the paper tube



WRONG

If the paper tube method is not used, the magnet may attach itself to the top of the reservoir where it would be useless.



ADD HYDRAULIC OIL

Use a quality hydraulic fluid of 150 SSU @ 100 degrees F which contains corrosion and oxidation inhibitors and a foam depressant. This is approximately the equivalent of SAE 10W or lighter weight oil, or use Type A automatic transmission oil for improved performance in cold weather. See the following table for the amount of oil needed for each hoist. DO NOT OVERFILL THE RESERVOIR!

Hoist Model	Reservoir Size	Oil Required	Hoist Model	Reservoir Size	Oil Required
S50-20LSF	15 Quart	9 Quarts	T50-70LSF	27 Quart	20 Quarts
S50-30LSF	15 Quart	10 Quarts	T50-80LSF	27 Quart	24 Quarts
S55-40LSF	21 Quart	14 Quarts	T45-90SF	27 Quart	20 Quarts
S60-50LSF	21 Quart	16 Quarts	T50-100SF	27 Quart	24 Quarts
S60-60LSF	21 Quart	18 Quarts	T50-110SF	40 Quart	30 Quarts
			T50-120SF	40 Quart	32 Quarts

KEEP THE OIL CLEAN! USE CLEAN CONTAINERS, FUNNELS AND OTHER EQUIPMENT!

With normal use and working conditions the hydraulic oil should be changed annually. The breather cap should be cleaned every time the hydraulic oil is changed. With heavy use or very dusty working conditions the hydraulic oil should be changed more often.

POWER HOIST DOWN - ALL MODELS

Before mounting the body, the hoist must be completely closed to make certain the hoist gives full lift height and performance. Rotate upper crosstube and Combo-link assembly so the linkage is straight up and down and the body lift plates do not touch the subframe. Start the truck engine, engage the PTO and power down the hoist to "bottom-out" the hydraulic cylinder and the hoist frame. Place the hoist valve control in the "hold" position. NOW ROTATE THE COMBO-LINK TOWARD THE REAR OF THE TRUCK so the body lift plates rest flat on the subframe. Both the hoist frame and the hydraulic cylinder are now completely closed.

!!! IMPORTANT !!!

It is EXTREMELY IMPORTANT that the Combahoist with subframe be installed with the Combo-link angled toward the rear of the truck as shown in Fig. 19.

The Combo-link provides the extra leverage that the hoist needs to start the load. If it is not installed correctly, the hoist will act only as a scissors hoist with much less capacity. The result will be extreme overloading of the hoist structure and the possibility of severe damage to the hoist and/or the truck.

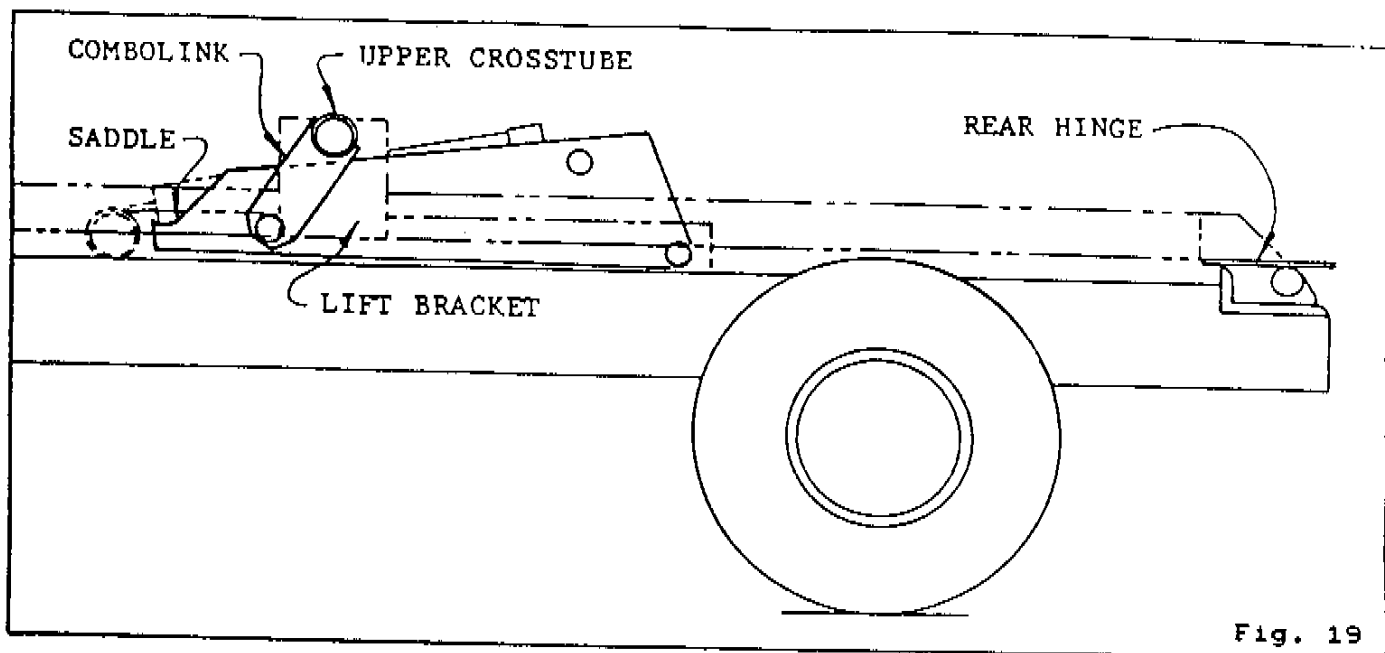
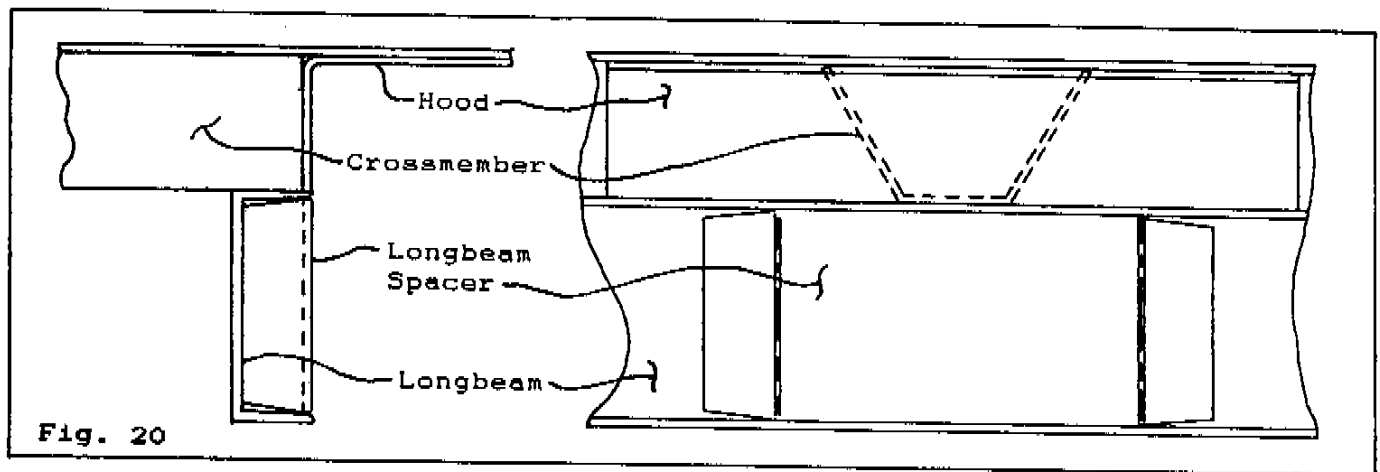


Fig. 19



ASSEMBLY BODY AND INSTALL ON TRUCK

On Crysteel dump bodies the inside of each longbeam is boxed in with a spacer to provide a flat surface for welding the hoist lift plates to the body. Crossmembers are spaced and notched to provide clearance for the hoist. The longbeam spacers are located to give a 5 to 6 inch overhang on bodies used with hoist models 20LSF through 50LSF and a 12 inch overhang on bodies used with hoist models 60LSF through 120SF.

Note: If an overhang other than noted above is desired, longbeams may need to be boxed in and crossmembers may need to be notched for hoist clearance. Any notched crossmembers must be reinforced to provide adequate floor support.

On other bodies, the inside of the longbeams must be boxed in to provide a flat surface for welding the hoist lift plates to the body. Some crossmembers may need to be notched to provide clearance for the hoist. Any notched crossmembers must be reinforced to provide adequate floor support. Box in the longbeams and notch the crossmembers where necessary after carefully measuring the hoist.

Assemble the tailgate to the body using the tailgate hinge pins and fasteners. Assemble the tailgate latch control lever using 1/2 x 1 cap screws and lock washers. Check for proper operation and adjust if necessary. It is recommended that the body be painted before it is mounted on the truck. Place the body on the truck allowing 3 inches of clearance between the truck cab and the body. Securely weld the longbeams to the rear hinge plates. Securely weld the hoist lift plates to the longbeam spacers and crossmember hood.

DO NOT WORK UNDER A RAISED BODY UNLESS THE BODY IS SECURELY BLOCKED OR PROPPED IN THE RAISED POSITION!

INSTALL BODY GUIDES - MODEL 80LSF THROUGH 120SF

The four body guides are all the same. The body guides will be located above the lower cross tube of the hoist where mounting angles were bolted to the subframe earlier. (See Fig. 7.) Securely weld one body guide to each longbeam with the wide end of the body guide up and centered over the mounting angles. Securely weld the remaining two body guides to the mounting angles with the wide end of the body guide down and tight against the body guides welded to the longbeams. Be sure there is NO SIDE PLAY between the body guides when the dump body is in the lowered position.

INSTALL CLEARANCE LIGHTS AND REFLECTORS

Install the clearance lights and connect the wiring using the connectors supplied. Mount the amber reflectors near the front of the sides. Mount the red reflectors near the rear of the sides and on the tailgate. Slip the rubber hand grip over the end of the latch control lever.

AIR OPERATED TAILGATE LATCH CONTROL (FIELD INSTALLATIONS)

An air cylinder kit is available for operating the tailgate latch instead of the lever normally supplied. The double-acting air cylinder is solenoid operated for ease of installation and service. For tailgates up to 48 inches in height, a 2 1/2 inch diameter cylinder is used; for tailgates over 48 inches, a 3 1/2 inch diameter cylinder is used. The 3 1/2 inch cylinder mounts directly into the brackets. The 2 1/2 inch cylinder requires an extension (supplied) to be bolted to the cylinder bracket on the body. Instructions are provided with the kit for installation of the mounting brackets and air cylinder. Refer to the instruction sheet included with the air cylinder for air line and electrical connections.

INSTALL GREASE ZERKS AND LUBRICATE HOIST AND BODY

PROPER LUBRICATION IS EXTREMELY IMPORTANT!!

Install grease zerks on the hoist and lubricate the body and hoist in the following locations:

HOIST

A. Upper Crosstube	2 fittings
B. Combolink Pivots	2 fittings (already installed)
C. Cylinder Crosshead	1 fitting per cylinder
D. Center Hinge Pivot	1 fitting
E. Lower Crosstube	2 fittings
F. Cylinder Base Pivot	1 fitting
G. Rear Hinge	2 fittings
H. U-Joints	2 fittings (already installed)

BODY

I. Latch Lever Pivot	1 fitting
J. Tailgate Latch Pivot	2 fittings
K. Tailgate Hinge Bracket	2 fittings
L. Body Prop	1 fitting per prop

Lubricate all fittings at regular intervals, at least every 150 cycles or every 2 months. There are extremely high forces on the bearing surfaces within the hoist frame, especially the main center hinge and the cylinder crosshead. It pays to be generous in lubricating the hoist to insure proper operation and long life.

ONE OF THE MOST COMMON REASONS FOR HOIST PROBLEMS IS FAILURE BY THE OPERATOR TO LUBRICATE THE HOIST.

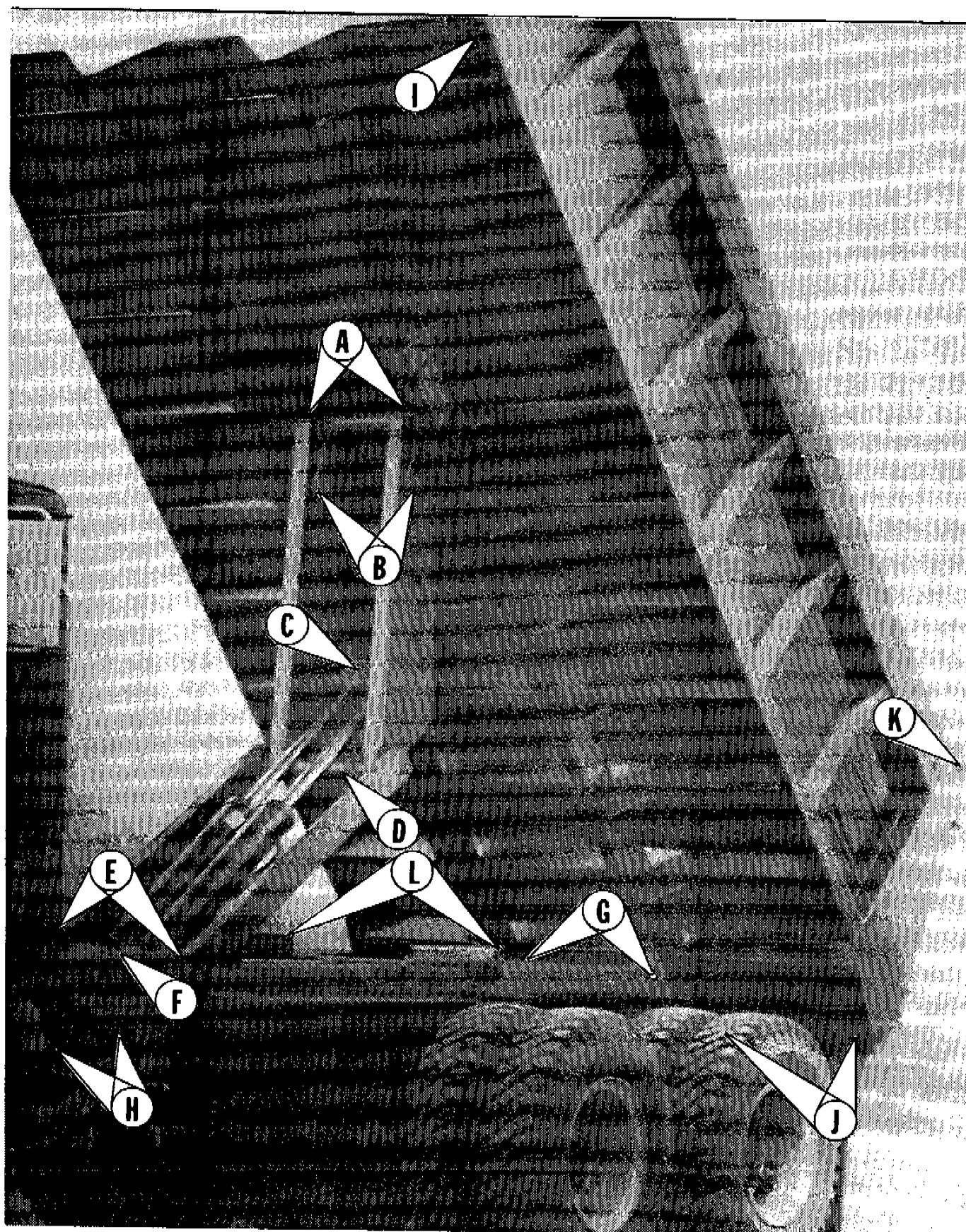


Fig. 21

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INSTALL BODY PROP

The body prop is designed and intended to support an EMPTY truck body in the raised position. Using the body prop permits service work to be performed safely beneath a raised body. One body prop is included with single cylinder hoists and it is to be mounted on the driver's side of the truck. Two body props (one pair) are included with twin cylinder hoists. Be sure to install each prop on the correct side of the truck as explained below.

1. Raise the body to the desired height and brace it securely before beginning installation. The raised body must be several inches lower than full height for the body prop to work correctly.
2. Assemble a prop arm to a prop pivot mount with a 1/4 x 3 roll pin. Position the prop pivot mount against the outside of the truck frame just behind the rear axle with the saddle end of the prop arm toward the front of the truck and resting on top of a spring hanger (See illustration). On Models T50-80LSF through T50-120SF the prop pivot mount can be mounted on the hoist subframe instead of the truck frame. A support (not supplied) for the saddle end of the prop arm will then need to be made and mounted. Using the prop pivot mount as a guide, mark location of holes on the truck frame or hoist subframe and drill 17/32 inch holes. Assemble the prop pivot mount to the frame using 1/2 x 1-3/4 cap screws, lockwashers and hex nuts.
3. Raise the prop arm to a free standing position by allowing the prop arm to rest against the rear flange of the prop pivot mount. Place the longbeam bracket in the prop arm saddle. Position the longbeam bracket against the UPPER outside of the body longbeam in order TO ALLOW ROOM FOR CLEARANCE when the body is in the lowered position. Securely weld the longbeam bracket to the longbeam.
4. When mounting two body props, repeat steps 1 through 3 for the other side. Use the body prop already mounted to assure that both body props hold the body at the same height. The left and right body props should both pivot toward the front of the truck in the storage position.
5. To operate the body prop raise the body to the desired height, shut off all power, raise the prop arm to a free standing position. Lower the body slowly until the longbeam bracket contacts the prop arm saddle. DO NOT POWER HOIST DOWN!
6. To place the body prop in the storage position, raise the body to clear the body prop saddle, lower the body prop to the storage position and lower the body.

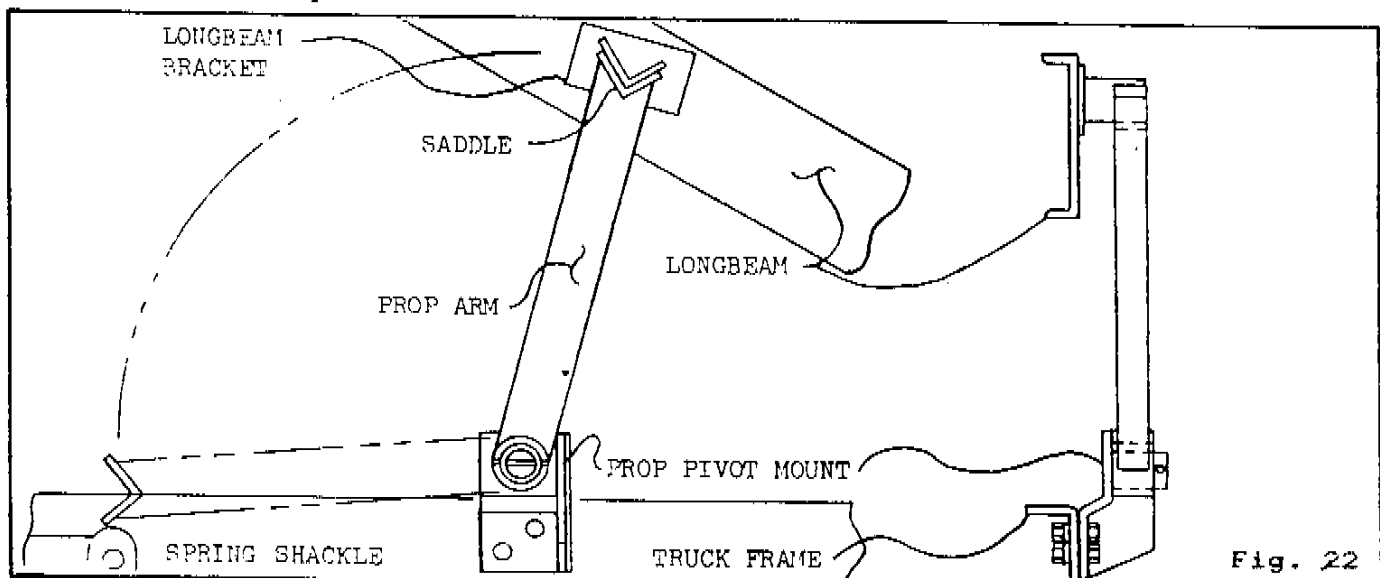


Fig. 22

Subframe Model Specifications

MODEL NUMBER	S40-10LSF	S50-20LSF	S50-30LSF	S55-40LSF	S60-50LSF	S60-60LSF	T50-70LSF	T50-80LSF	T45-90SF	T50-100SF	T50-110SF	T50-120SF
Performance Class	20	30	40	50	50	60	70	80	90	100	110	120
Double-Acting (Power down)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of Cylinders	one	one	one	one	one	one	two	two	two	two	two	two
Cylinder bore and stroke (in.)	4x18	5x18	5x21 $\frac{1}{8}$	5 $\frac{1}{2}$ x21 $\frac{1}{8}$	6x21 $\frac{1}{8}$	6x25 $\frac{1}{4}$	5x25 $\frac{1}{4}$	5x28 $\frac{7}{8}$	4 $\frac{1}{2}$ x28 $\frac{7}{8}$	5x28 $\frac{7}{8}$	5x32 $\frac{1}{2}$	5x36 $\frac{1}{8}$
Chromed cyl. shaft dia. (in.)	1 $\frac{3}{4}$	2	2	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$
Operating pressure (PSI)	3500	3250	3250	3250	3250	3250	3250	3250	5000	5000	5000	5000
Std. piston pump and G.P.M.	4P-4	4P-4	4P-4	8P-8	8P-8	8P-8	8P-8	8P-8	8P-10	8P-10	8P-10	8P-10
Reservoir size (quarts)	7	15	15	21	21	21	27	27	27	27	40	40
Opt. extra hydraulic valves (any number, any pressure)	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Opt. 12v. Elec. pump (3500 PSI)	yes	yes	yes	yes	yes	yes	no	no	no	no	no	no
Recommended C.A. (inches)	60-84	60-84	60-84	72-84	72-102	84-126	84-138	84-150				
Recommended C.T. (inches)							84-126	96-138	96-144	96-156	120-180	126-204
Recommended Body Length (feet)	8-10	8-10	8-10	8-10	9-12	11-14	11-15	12-16	12-17	12-18	14-20	16-22
Mounting Height (inches)	10	10	11	12	12	13	13	15	15	15	16	17
Mounting distance (inches)	71	71	84	84	84	98	98	112	112	112	125	138
Approx. weight (lbs)	575	660	735	800	875	1060	1220	1435	1505	1585	1710	1925

Combohoist load capacity in tons.

MODEL NUMBER	PERFORMANCE CLASS	8	9	10	11	12	BODY LENGTH IN FEET						17	18	19	20	22
S40-10LSF	20	10.5	9.0	7.9													
S50-20LSF	30	13.8	11.8	10.3													
S50-30LSF	40	16.1	13.8	12.1													
S55-40LSF	50	20.4	17.5	15.3													
S60-50LSF	50		21.6	18.9	16.8	15.1											
S60-60LSF	60				20.7	18.6	16.9	15.5									
T50-70LSF	70				26.5	23.8	21.6	19.8	18.3								
T50-80LSF	80					30.1	27.4	25.1	23.2	21.5							
T45-90SF	90					34.1	31.0	28.5	26.3	24.4	22.8						
T50-100SF	100					42.2	38.3	35.1	32.4	30.1	28.1	26.3					
T50-110SF	110						39.8	36.7	34.1	31.8	29.8	28.1	26.5				
T50-120SF	120							37.4	34.9	32.8	30.8	29.1	28.2				

To convert tons to approximate cubic yards of sand, divide tons by 1.5

SPECIALLY DESIGNED — WITH QUALITY IN MIND

WARRANTY

Crysteel Manufacturing, Inc., warrants its products for a period of one year from date of purchase.

The warranty provides that our products must perform satisfactorily or we will repair, replace, or refund the purchase price at the option of the purchaser. Hydraulic pumps, valves, hoses, and other purchased parts are covered by the warranties of their respective manufacturers.

Any parts returned to Crysteel Manufacturing, Inc. shall be shipped prepaid, and will be returned F.O.B. Lake Crystal, Minnesota.

We will not assume responsibility for shipping, labor, or travel expenses.

The warranty is void if the product has been obviously abused, or subjected to other than normal usage.

We reserve the right to make improvements without notice or obligation regarding models previously sold.



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