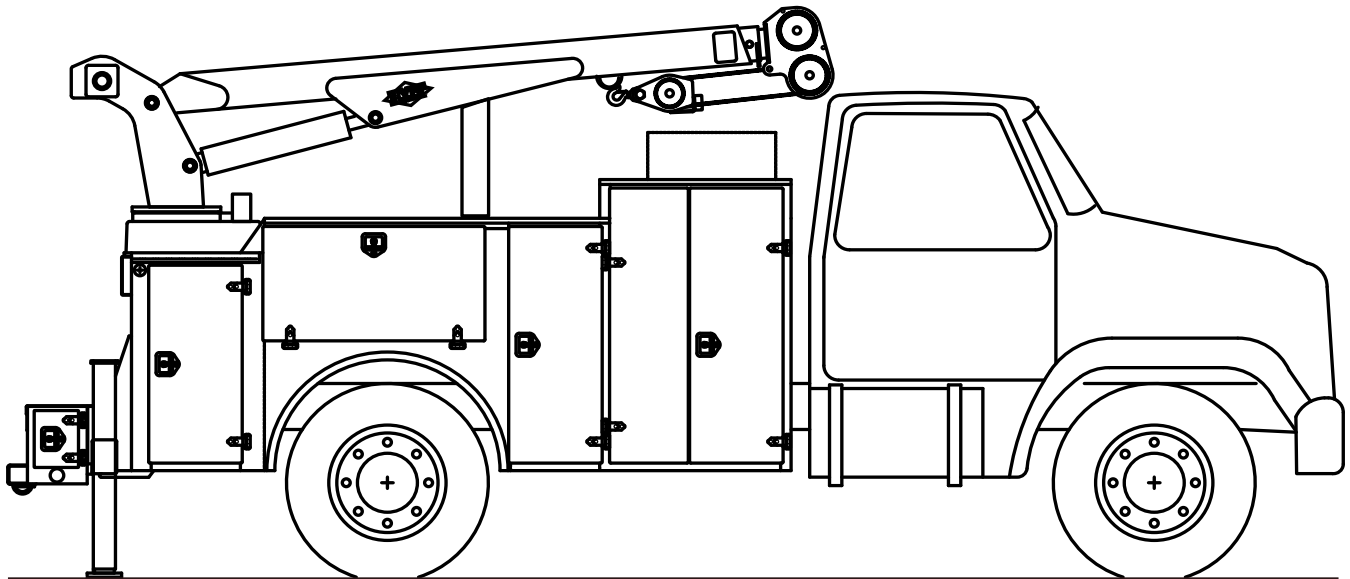




TELESCOPIC CRANE OPERATION AND SAFETY



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MANUAL PART NUMBER 99903514

Iowa Mold Tooling Co., Inc. is an Oshkosh Corporation Company.

INTRODUCTION

GENERAL

The information contained in this manual is designed to help provide you with the knowledge necessary in the safe and proper operation of your crane. This information is not intended to replace any governmental regulations, safety codes or insurance carrier requirements. Operators, maintenance and test personnel must read and understand all safety procedures applicable to the equipment in use.

WARNING

FAILURE TO READ, UNDERSTAND AND FOLLOW ANY SAFETY PROCEDURES APPLICABLE TO YOUR EQUIPMENT MAY RESULT IN EQUIPMENT DAMAGE, SERIOUS INJURY, OR DEATH.

Familiarization with this manual, government regulations, hazards, and the specific operation of your crane is a necessity. Use caution while operating and maintaining your crane, and follow all safety procedures and regulations. Common sense is essential to a safe work environment.

Modifications to your crane must be performed with IMT approved accessories, parts and optional equipment. If in doubt about the safety, compatibility, or appropriateness of any modifications, contact IMT prior to making those modifications. DO NOT alter or modify any safety device! All safety devices must be inspected, tested and maintained in proper working condition.

Decals regarding crane safety and operation are considered safety equipment. They must be maintained just as any other safety device.

Decals must be kept clean and legible to the operator, operational personnel, and bystanders as specified in the decal section of this manual. DO NOT remove, disable, or disregard any safety device attached to your crane.

OWNER RESPONSIBILITIES

The owner and/or designated employee is responsible for informing all operators, maintenance personnel, and others involved in equipment operation about the safe operation and maintenance of the crane.

If questions arise concerning safe crane operation, contact IMT or your IMT distributor for clarification.

WARNING

CHILDREN, BY-STANDERS, AND PERSONS NOT REQUIRED IN THE OPERATION OF EQUIPMENT MUST BE A MINIMUM OF 10'-0" (3.05 m) FROM THE OUTERMOST RANGE OF THE CRANE.

Much of the material contained in this manual is specific to IMT telescopic cranes. Much of the general crane safety information is directly taken from The American Society of Mechanical Engineers' (ASME) latest revisions of Mobile and Locomotive Cranes (ASME/ANSI B30.5) and Articulating Boom Cranes (ASME/ANSI B30.22) industry safety standards. More information on these publications are available from www.asme.org.

Crane operators must be familiar with OSHA 29CFR, Subpart N, Article 1926.550 and CAL-OSHA Title 8, Article 93 (California).

This volume includes information that is common to all IMT telescopic cranes. For specific information, refer to Volume 2, PARTS AND SPECIFICATIONS. Volume 2 contains information on Specifications, Crane Description, and Parts specific to your crane model. IMT recommends that Volume 1, OPERATION and SAFETY, and Volume 2, PARTS and SERVICE, be kept with the crane at all times.

Three means are used throughout this manual to gain the attention of operating and service personnel. They are NOTES, CAUTIONS and WARNINGS and are defined as follows:

NOTE

A NOTE IS USED TO EITHER CONVEY ADDITIONAL INFORMATION OR TO PROVIDE FURTHER EMPHASIS FOR A PREVIOUS POINT.

CAUTION

A CAUTION IS USED WHEN THERE IS THE STRONG POSSIBILITY OF DAMAGE TO THE EQUIPMENT OR PREMATURE EQUIPMENT FAILURE.

WARNING

A WARNING IS USED WHEN THERE IS THE POTENTIAL FOR PERSONAL INJURY OR DEATH.

It is the user's responsibility to maintain and operate this unit in a manner that will result in the safest working conditions possible.

In addition, it is the user's responsibility to be aware of existing Federal, State and Local codes and regulations governing the safe use and maintenance of this unit.

Warranty of this unit will be void on any part of the unit subjected to misuse due to overloading, abuse, lack of maintenance or unauthorized modifications. No warranty - verbal, written or implied - other than the official published IMT new machinery and equipment warranty will be valid with this unit.

NOTICE TO THE OWNER / USER

If your equipment is involved in a property damage accident, contact your IMT distributor immediately and provide them with the details of the accident and the serial number of the equipment. If an accident involves personal injury, immediately notify your distributor and IMT's Technical Support at:

**IOWA MOLD TOOLING CO., INC.
500 HWY 18 WEST, GARNER, IA 50438
641 - 923 - 3711**

REVISIONS LIST

DATE	LOCATION	DESCRIPTION OF CHANGE
-	-	-
20050301	SECTION 1 - OPERATION	UPDATED INFORMATION FOR NEW RADIO
	SECTION 5 - DECALS	UPDATED PER DECAL DESIGN CHANGES
20070215	COVER	UPDATED LOGOS WITH OSHKOSH INFO
20080110	1-13, 5-8	ECN 10653 - ADDED INSTRUCTIONS FOR SINGLE LINE DOWNHAUL WEIGHT,
20090418	2-12	ADDED WIRE ROPE LAY INFORMATION
	6-7 to 10	ADDED STABILITY TEST
20120104	THROUGHOUT	ECN 11628 - UPDATED STABILIZER WORDING, ADDED LEVEL INFORMATION, UPDATED DECALART.
20120521	CYLINDER REPAIR	REPLACED WAFER LOCK WITH STOP TUBE RING IN REPAIR INSTRUCTIONS.
20140915	LUBRICATION	ECN 12264 - MOLUB-ALLOY 882 WAS MOLUB-ALLOY 936
	5-9	ECN 12279 - REMOVED MOBIL OIL INFO FROM 70394189

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1-1: GENERAL

To operate a crane, crane operators must conform to qualifications as specified by ANSI B30.5, Chapter 5-3.

Prior to beginning work at a job site, the crane operator should understand:

Crane Safety
Crane Controls
Crane Load Limits
Operating Procedures

The operator should also have the chance to practice operating the crane prior to using the crane in a job site application.

The operator must understand emergency measure execution and be prepared to take emergency action at any time. Safe operation is the responsibility of the operator, maintenance and inspection personnel. Safety has been a major consideration in the design and manufacture of this equipment but only the operator and maintenance personnel can insure a safe work environment.

1-2: DAILY SAFETY INSPECTIONS

Using the Crane Log, IMT Manual No. 99900686, or the inspection checklist in the reference section of this manual, inspect the crane on a daily, weekly, and monthly basis.

Use the following list as a guide when you are inspecting your unit at start-up and during operation:

1. Vehicle - Check oil level, battery, lights, brakes, and tires for inflation, pressure, cuts, and loose or missing wheel lugs.
2. Safety Accessories - Check for proper function, oil levels, leaks and malfunctions.
3. Hydraulic Oil Reservoir - Check for proper oil level, above the bottom of the reservoir within the screened area. Check for leaks and blockages.
4. Weldments - Check visually for damage, especially cracks or breaks in welds.
5. Cylinders - Check for leakage and scored rods.
6. Fasteners - Check pins, sheaves, nuts and bolts for breakage, excessive wear and tightness.

8. Crane Hooks - Check for the presence of a safety catch, twists, cracks, or damage.
9. Ropes & Slings - Check for frayed edges, broken strands, kinks, flat spots, and end attachments.
10. Covers & Guards - Check for missing or improperly maintained covers and guards.
11. Remote Control - Check engine stop switch for function and corrosion.
12. Operation Placards and Safety Decals - Check for illegible or missing decals and placards. Refer to the Decal section of this manual for more information on the required decals.

Replace or repair any items as needed prior to equipment operation.

1-3: WORK SITE PREPARATION

Work site preparation is extremely important to a safe work environment. Plan lifts carefully, and watch for hazards such as powerlines, bystanders, overhead obstructions, etc.

1-3-1: ELECTRICAL HAZARDS

Always operate the crane so that no part of the crane or load enters the "DANGER ZONE", or the minimum clearance distance for a powerline.

NOTE:

THE DANGER ZONE OF A PARTICULAR POWERLINE IS BASED UPON ITS VOLTAGE. HIGH VOLTAGE LEVELS INCREASE THE DANGER ZONE. SEE FIGURE A-2.

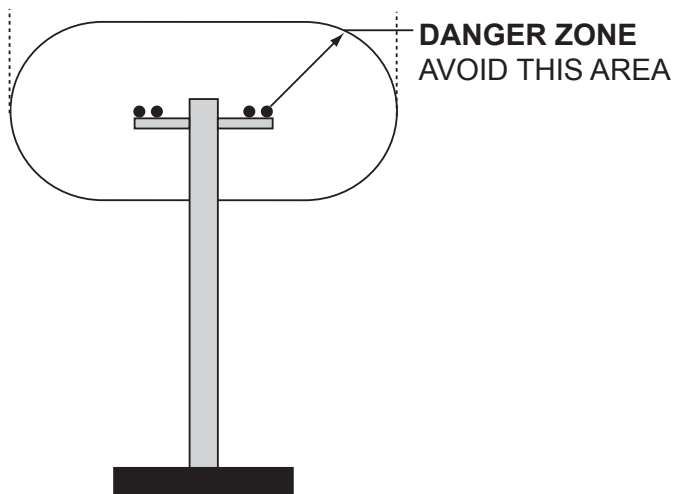


Figure A-1: Danger Zone for Cranes Operating Near Electrical Powerlines

	NORMAL VOLTAGE kV (Phase to Phase)	MINIMUM REQUIRED CLEARANCE Feet (meters)
OPERATION NEAR HIGH VOLTAGE POWERLINES	From 0 to 50	10 (3.05)
	From 50 to 200	15 (4.60)
	From 200 to 350	20 (6.10)
	From 350 to 500	25 (7.62)
	From 500 to 750	35 (10.67)
	From 750 to 1000	45 (13.72)
OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED.	From 0 to 0.75	4 (0.22)
	From 0.75 to 50	6 (0.83)
	From 50 to 345	10 (3.05)
	From 345 to 750	16 (4.87)
	From 750 to 1000	20 (8.10)

Figure A-2: Required Clearance of Cranes from Electrical Transmission Lines

For maximum safety during work near powerlines, adhere to the following guidelines:

- During windy conditions, allow additional clearance.
- Do not rely on cage-type boom guards, insulating links, or proximity warning devices for safety. Adhere to the required distances listed in Figure A-2.
- Contact the utility company before beginning work near powerlines.
- Always assume overhead lines to be energized.
- Avoid transporting a crane over uneven terrain.
- When using rope to steady a load or restrain spinning of the load, be aware that rope will also conduct electricity, especially if wet or damp.
- Reduce operating speed when in close proximity to powerlines in order to allow the operator more reaction time.

IF ELECTRICAL CONTACT OCCURS:

1. Shut off all power.
2. Break contact of any person in contact with a live conductor by using rubber hose, dry rope, or dry wood. DO NOT attempt this unless you are certain that all power is off.
3. Call 911 or the local emergency service.
4. Administer first aid.
5. Avoid the area around the crane, as high voltage travelling through a crane will charge the ground.

ELECTRICAL CONTACT FOLLOW-UP

1. Inspect and repair any equipment affected by electrical contact.
2. Replace any wire rope which has had high voltage contact.

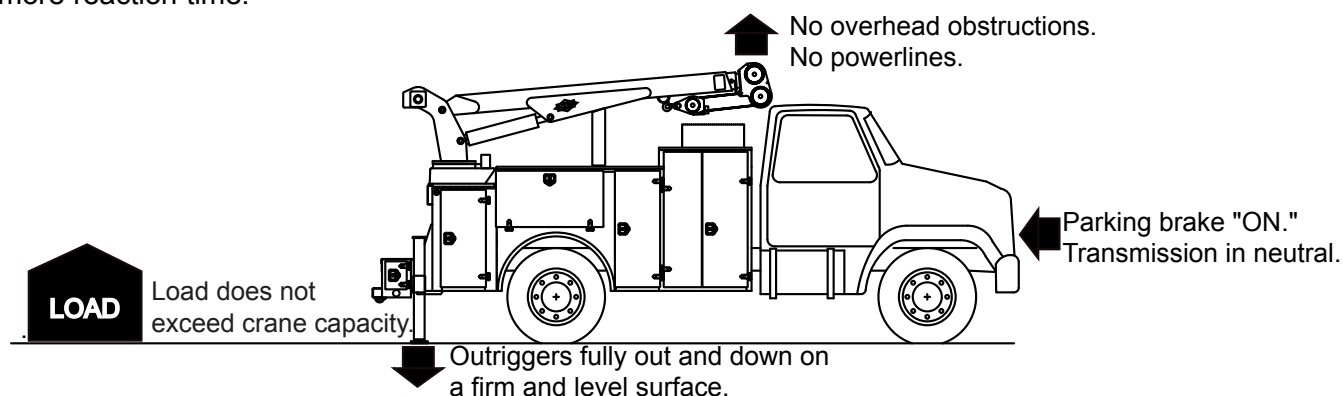


Figure A-3: Work Site Set-up

1-3-2: WORK STATION POSITIONING

Park the working unit on firm, level and dry pavement or ground close to the job. Avoid overhead obstructions.

Use wheel chocks when parking unit on a slope. If parking on a curbed roadway, turn the front wheels toward curb when parked with the truck downgrade, and away from curb with rear of truck downgrade. At the worksite, park the vehicle with the grade. When cross-grade parking is necessary, restrict the load to compensate for the increased tipping risk.

1-3-3: OUTRIGGERS**WARNING**

OUTRIGGERS CAN PINCH, STRIKE, OR CRUSH PEOPLE OR OBJECTS! MAKE SURE THERE ARE NO OBSTRUCTIONS BEFORE OPERATING OUTRIGGERS.

Although the outriggers are critical to safe and stable operation, they can be hazardous due to their close proximity to the operator and other personnel. They are the only component of the crane which normally contacts the ground. Your unit may have hydraulic outriggers, manual outriggers, or a combination of both.

Before setting up the outriggers, park the carrier vehicle over a firm and level surface for adequate outrigger support. If outriggers appear to bury themselves in a less than firm surface, move the vehicle or improve the surface using plates or blocks under the outriggers. DO NOT perform a lift until a the location is suitable. DO NOT position the outriggers near sharp drop-offs or areas of uncertain firmness.

Extend the outrigger arms fully. If hydraulic, turn on the engine and engage the PTO. The outrigger hydraulic valves are located inside the crane control cabinet. If manual, release the pin which locks the outriggers in place and fully extend them until they lock into position.

Lower the outrigger legs until full ground contact and solid stability is achieved.

Before a lift is made, be certain that the parking brake is set and the drive axle is disengaged. Use the power down outrigger function to level the vehicle side-to-side. Use a signal person if the outriggers are not in view from the operator's station when extending or lowering the outriggers.

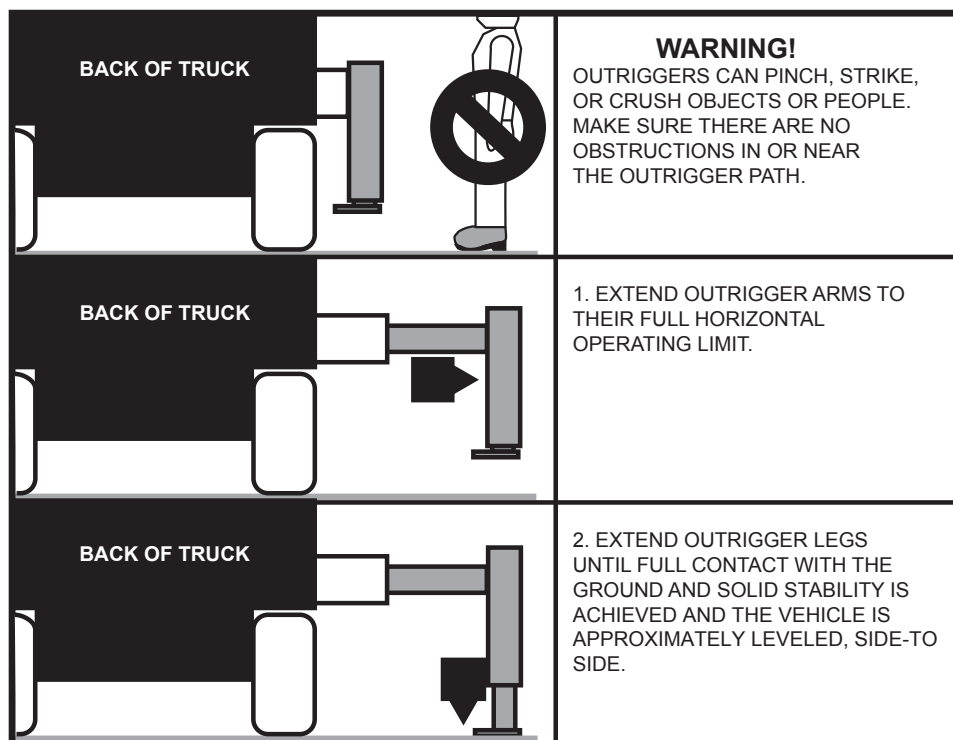


Figure A-4: Outrigger Operation

1-4: STARTING CRANE OPERATION**1-4-1: ENGAGING THE POWER TAKE-OFF (PTO) (IF APPLICABLE)****NOTE:**

FOLLOW MANUFACTURER INSTRUCTIONS TO ENGAGE THE PTO IN YOUR VEHICLE. THE INSTRUCTIONS IN THIS MANUAL MAY NOT BE ACCURATE FOR ALL PTO'S.

A. Automatic Transmission

- 1) Set the vehicle parking brake.
- 2) Turn on the vehicle engine.
- 3) Put the vehicle in "Park" or "Neutral".
- 4) Engage the PTO according to the manufacturer's instructions. With an electrical "Hot Shift" PTO, press the switch to the "ON" position. NOTE: A light will come on to show the PTO is engaged.
- 5) Warm the engine to operating temperature.
- 6) Begin crane operation.

B. Manual Transmission

- 1) Set the vehicle parking brake.
- 2) Place the transmission in "Neutral".
- 3) Make certain the PTO lever is in the "OFF" position.
- 4) Start the vehicle engine.
- 5) Fully depress the clutch.
- 6) Engage the PTO. With a cable-shift PTO, move the lever to the "ON" position. With an air shift PTO, move the valve to the "ON" position.
- 7) Release the clutch gradually.
- 8) Warm the engine to operating temperature.
- 9) Begin crane operation.

1-4-2: DISENGAGING THE PTO

- 1) Fully depress the vehicle's clutch pedal (if manual).
- 2) Disengage the PTO (OFF).
- 3) Release the clutch pedal gradually.



**Figure A-5: PTO
Danger Decal**

DANGER:

DO NOT COME IN CONTACT WITH THE PTO. DEATH OR SERIOUS INJURY MAY OCCUR.

WARNING:

DISENGAGE THE PTO PRIOR TO MOVING THE VEHICLE. FAILURE TO DO SO MAY CAUSE PUMP AND PTO DAMAGE, AND INADVERTENT OPERATION OF THE CRANE DRIVE TRAIN, WHICH COULD CAUSE AN ACCIDENT.

1-5: ROTATOR WORM GEAR BREAK-IN

Crane models 3020, 3820, 5020, 5025, 5525, 6025 and 6625 have a rotator worm gear.

BEFORE BEGINNING CRANE OPERATION WITH A NEW WORM GEAR,

the gearset must be well lubricated. Keystone Moly29 Open Gear Compound is recommended. The molybdenum disulfide grease must be liberally brushed on the gear teeth of the bearing and on the teeth of the worm before any turning of the rotator. All teeth need to be covered with grease with no exposed bare metal areas showing. The first rotations of the rotator may be rough and may have a scraping sound. This is normal. The gear and worm are merely breaking in and will smooth out with continued use. This amount of time depends on variables including moment load, cycles of use, slope of boom tilt, etc.

IMT recommends running the system 10-15 cycles with a light load, then 10-15 cycles with a medium load and finally 10-15 cycles with a heavy load.

During the break in period, small shavings of metal may appear in the grease. If this occurs, the grease with shavings should be removed from the gear and a new coat of grease is to be applied to the gear. This will improve rotation system performance for the life of the system.

1-6-5: ELECTRIC CRANES

Electric cranes have no PTO or pumps, but they do have tethered remote controls which are similar in operation to the hydraulically controlled cranes.

The telescopic remote controls operate the crane boom extensions, crane rotation, winch, engine speed, and crane and compressor power. The remote controls also have an ENGINE STOP function which is a safety feature required on all cranes with remote controls that use a PTO driven pump.

To operate the crane,

- 1) Turn on the power via the on/off switch of the tethered remote handle. Press the "Engine Start" toggle to start the vehicle engine to power the crane.
- 2) Pull back on the trigger until the power unit begins to run.
- 3) Using the decal as a guide, select the required function on the crane handle to move the crane as desired, making sure not to release tension on the trigger assembly. You must hold both the trigger and the crane function toggle switch at the same time to make the crane move.

4) When done with the function, continue to hold the trigger assembly in until all immediate movements of the crane have been completed.

5) If no further work with the crane is needed, or if all immediate movements of the crane have been completed, then release the trigger assembly to return the power unit back to a rested state.

6) Turn off power to the handset.

NOTE

EXCESSIVE OR RAPID "ON/OFF" CYCLING OF THE TRIGGER ASSEMBLY SHOULD BE AVOIDED, PARTICULARLY IF A FUNCTION IS ENGAGED. THIS WILL CAUSE PREMATURE AGING OR EXTENSIVE DAMAGE TO THE POWER UNIT COMPONENTS.

Although you should not rapidly cycle the trigger, which turns the motor on and off, you can cycle the toggle switch to control the working speed of the crane.

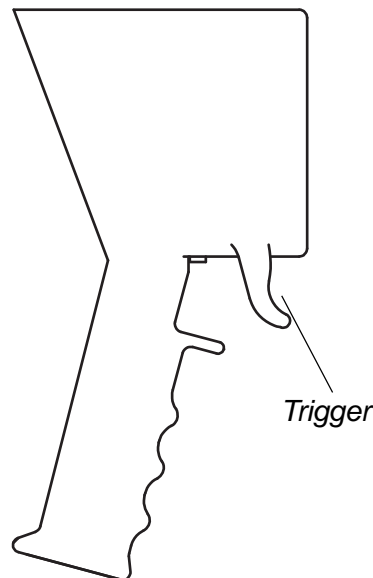
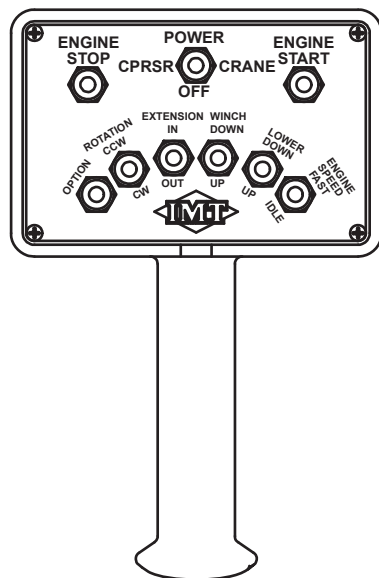


Figure A-9: Telescopic Electric Crane Remote Control

1-7: CRANE CAPACITY AND LOAD LIMITS

The IMT crane is designed to lift specific loads. These loads are defined on the capacity placard mounted near the operator's station and on the crane. Exceeding the limits presented on the capacity placard will create severe safety hazards and will shorten the life of the crane.

The operator and other concerned personnel must know the load capacity of the crane and the weight of the load being lifted!

WARNING

NEVER EXCEED THE CRANE'S RATED LOAD CAPACITIES. DOING SO WILL CAUSE STRUCTURAL DAMAGE AND DAMAGE TO WINCHES AND CABLES WHICH CAN LEAD TO SERIOUS INJURIES OR DEATH.

NOTE

LOAD LIMIT INFORMATION ON THE CAPACITY PLACARD IS FORMULATED ON 85% OF TIPPING. "TIPPING REFERS TO THE CRANE ACTUALLY TIPPING WITH ITS OPPOSITE OUTRIGGER AND TIRES HAVING BROKEN CONTACT WITH THE SURFACE.

Prior to lifting a load:

1. Determine the weight of the load.
2. Determine the weight of any load handling devices.
3. Add the weight of the load and the weight of the load handling devices. The sum will be the total weight of the load being lifted.
4. Determine the distance from the centerline of crane rotation to the centerline of the load being lifted.
5. Determine the distance from the centerline of crane rotation to the centerline of where the load is to be moved to.

6. The actual distance used should be figured as the larger of items 4 and 5 above.

7. Determine at what angle the crane will be operated (for example 30°, 45°, etc.) by referencing the angle indicator on the lower boom.

8. Make certain that 2-part line is used for any lift which requires 2-part line. (Note: The two-part line weight is noted in a box on the capacity chart.)

For more information on crane stability concepts and the hydraulic capacity placards, refer to Section 6, Reference, of this manual.

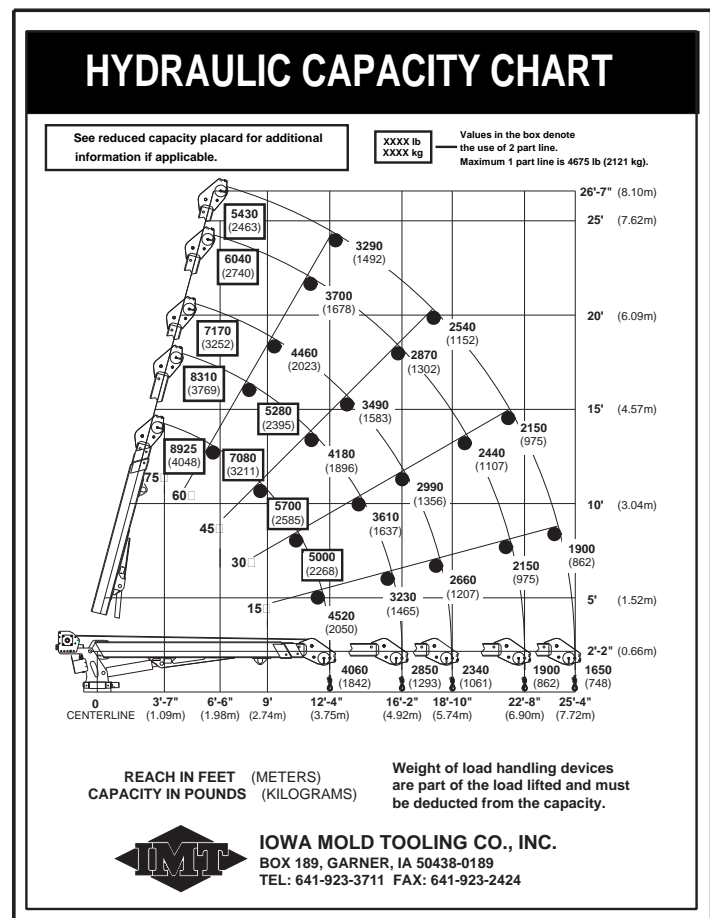


Figure A-10: Sample Telescopic Crane Hydraulic Capacity Chart

1-7-1: REDUCED CAPACITY (RCLC)

In some cases, the capacity of a crane is reduced when lifts are performed on the sides of the truck. If your vehicle cannot lift full capacities when the crane is positioned on the side of the truck, you will see a Reduced Capacity Lift Chart on your vehicle. This chart uses a green, yellow, and red color-coding system to show you the level of capacity the crane can lift when the crane is positioned in various sectors. The color-coded Reduced Capacity Lift Chart (RCLC) corresponds to a visual indicator on the base of the crane, and displays the percentage of the full hydraulic crane capacity to be lifted in each sector.

If applicable, an RCLC chart will be mounted on the inside of the panel door in place of the standard capacity chart.

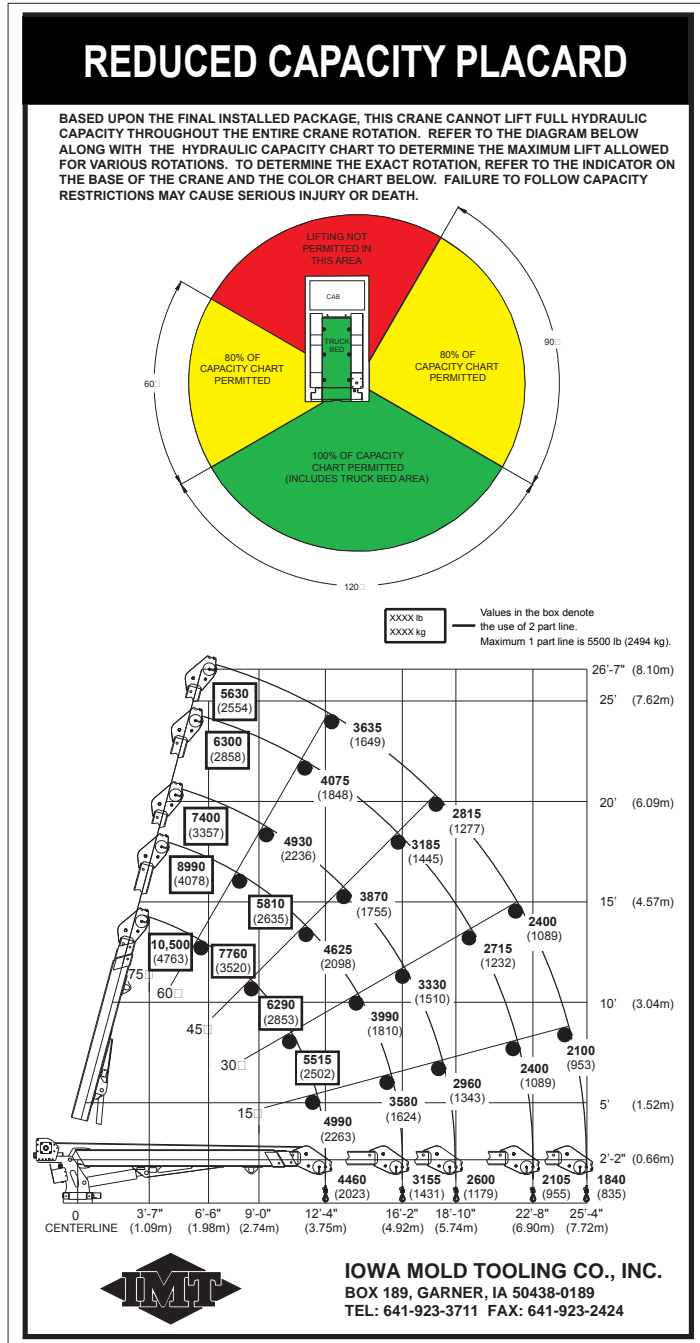


Figure A-11: Sample Reduced Capacity Placard

1-8: CRANE CAPACITY ALERT SYSTEM (ELECTRICALLY OPERATED)

IMT provides an electrically operated capacity alert system on all of its field service, telescoping, stick-boom cranes. This system is designed to prevent loads from being lifted which exceed the rated capacity of the crane.

The capacity alert system consists of a pressure switch mounted on the lift side of the lower boom cylinder which senses hydraulic pressure. It is connected electrically to the lift side of the winch, the extend side of the extension boom, and the down side of the lower boom.

If an operator attempts to lift a load which exceeds the rated capacity of the crane, the capacity alert system will be activated. When activated, it will prevent the winch from lifting, the extension boom from extending, and the lower boom from being lowered.

To resume operation of the crane when the capacity alert system is activated, the winch may be lowered or the extension boom retracted. Being able to lower the winch will give the operator the opportunity to reevaluate the load and adjust it. Retracting the extension boom will move the load closer to the centerline of rotation and within acceptable limits of load capacity.

It is important that this system be maintained in good operating condition at all times. Wiring should be checked on a regular basis for loose connections, corrosion and broken wires. The manifold should be checked for leakage from its o-ring seal. The pressure switch is available through IMT and its distributors and easily replaced.

See Figure A-12 for general electrical wiring reference and refer to your particular crane manual for specific information on parts and wiring.

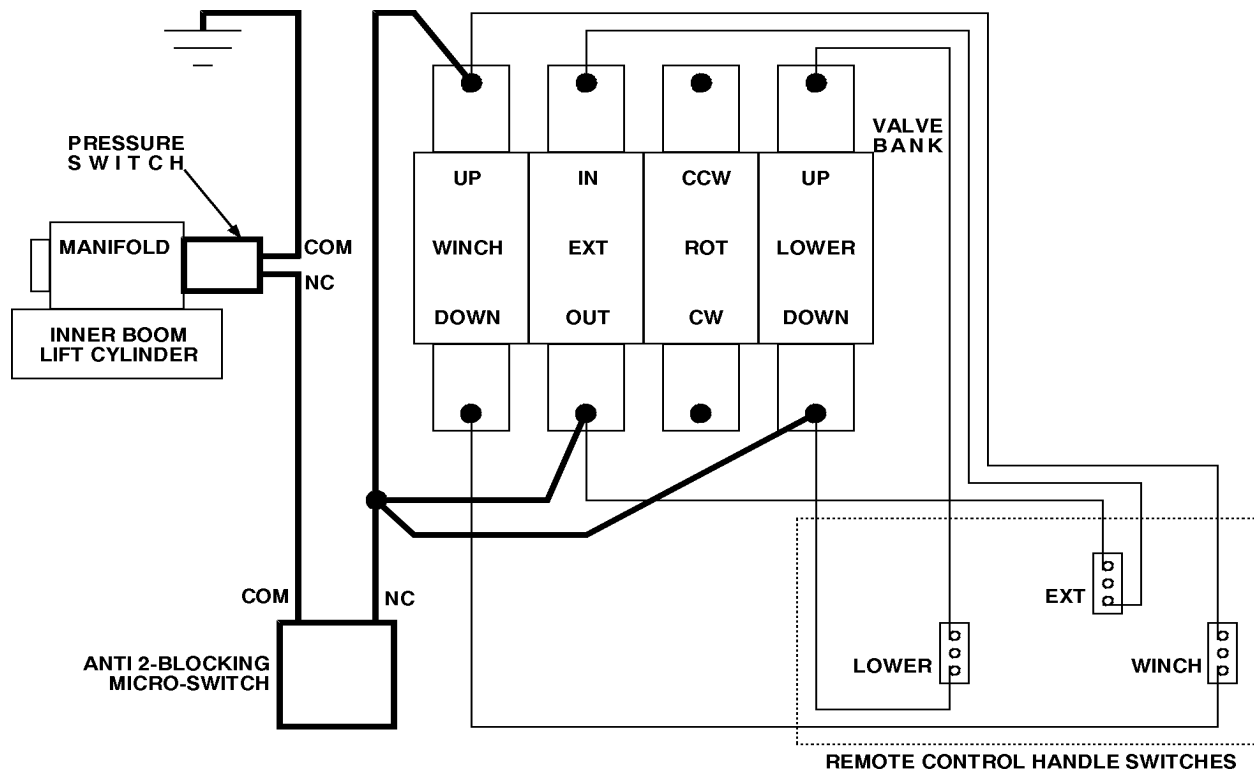


Figure A-12: General Capacity Alert System Wiring Diagram

1-9: ANTI TWO BLOCKING SYSTEM

"Two-Blocking" is the condition in which the lower load block or hook assembly comes in contact with the upper load block or boom point sheave assembly. This can cause winch cable and sheave damage.

WARNING

ANY ANTI TWO BLOCKING SYSTEM CONSISTS OF A SERIES OF MECHANICAL COMPONENTS AND CANNOT BE 100% FAILSAFE.

An anti two-blocking system can help prevent cable damage by sensing the position of the winch cable end attachments with respect to the sheave case and shutting down the functions that cause two blocking.

IMT telescopic cranes have two types of anti two-blocking systems; a rod and weight system and a switch activation mechanism.

The crane operator should check the anti two-block system daily as follows:

1. Examine flexible rod and weight / switch activation mechanism to insure free unrestricted mechanical operation
2. Examine cord for damage, cuts or breaks. Grasp cord and pull to check operation of cord reel. The cord should retract on reel when released.

3. Start vehicle, engage PTO and slowly winch the loadline up until anti two-block weight / switch activation mechanism comes in contact with the hook end of the loadline cable. At the moment the weight is fully supported, the winch up function should become non-functioning. Slowly increase truck engine speed while simultaneously actuating the winch up function. The winch should not function. If operation other than as described occurs, stop immediately and investigate. Failure to do so will risk damage to the cable or the crane.

If all is well at this point, actuate the boom extend function slowly, and gradually increase to full actuation. Once again the function should be non-existent with no tightening of the winch cable. If operation other than described occurs, stop immediately and reverse the function.

The final check involves actuating both the winch up and extend functions together and checking for proper operation of the anti two blocking circuit. Once again, start slowly and stop if it appears the cable is being tensioned.

If the anti two block function appears to be functioning normally, winch the cable down until the sensing weight swings free or the switch activation mechanism returns to the normal position.

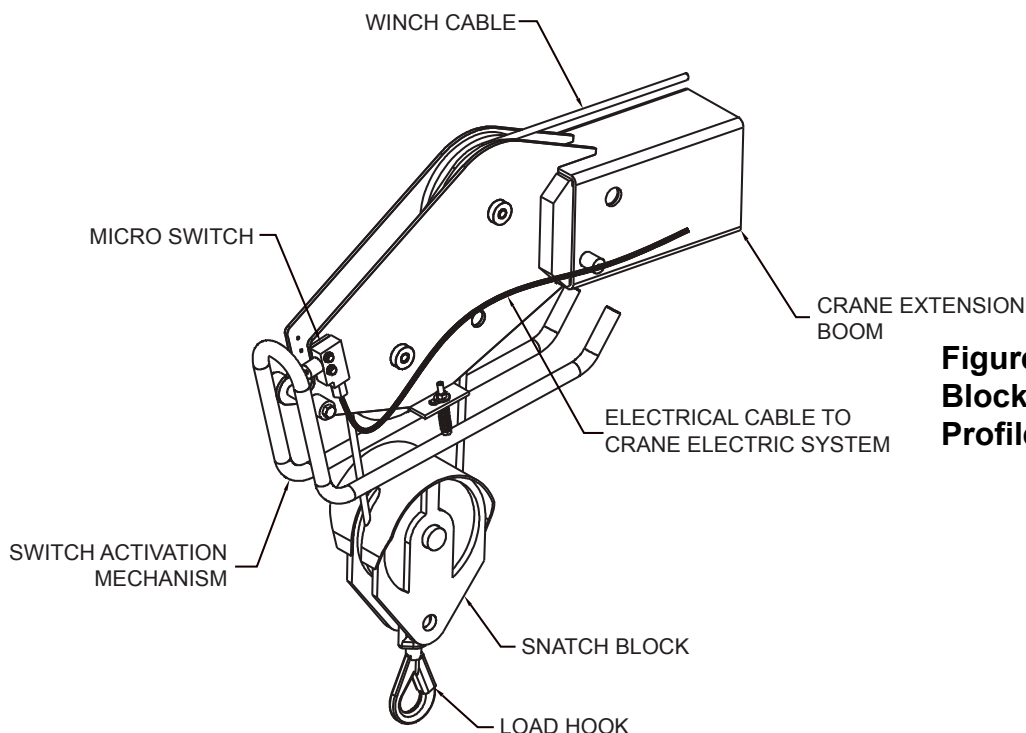


Figure A-13: Anti Two-Blocking System - Low Profile Boom Tip Cranes

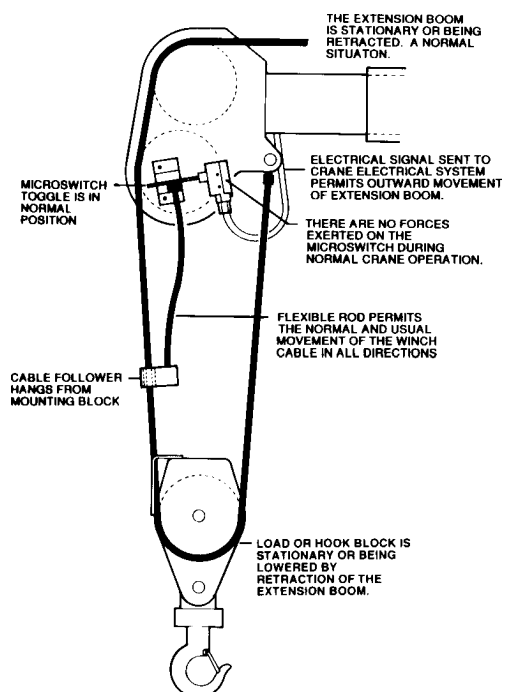


Figure A-14: Normal Work Position

NOTE:

"TWO-BLOCKING" IS THE CONDITION IN WHICH THE SNATCH BLOCK OR HOOK ASSEMBLY COMES IN CONTACT WITH THE UPPER LOAD BLOCK OR BOOM POINT SHEAVE ASSEMBLY.

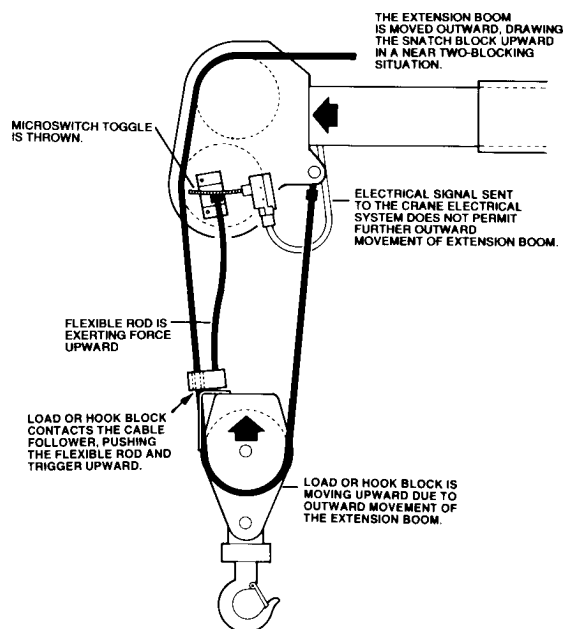


Figure A-15: Approaching Two-Blocking Situation

NOTE:

THESE ILLUSTRATIONS OF "TWO-BLOCK" CONDITIONS APPLY TO CRANES WITHOUT THE LOW PROFILE BOOM TIP. SEE FIGURE A-12 FOR THE TWO BLOCK CONFIGURATION FOR CRANES WITH LOW PROFILE BOOM TIPS.

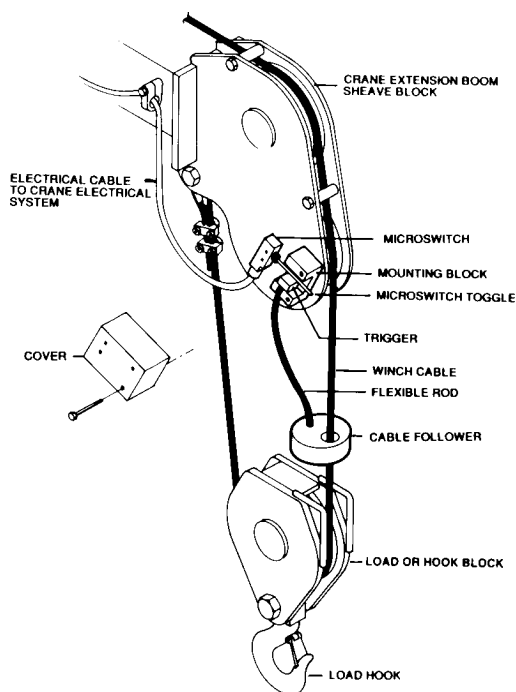


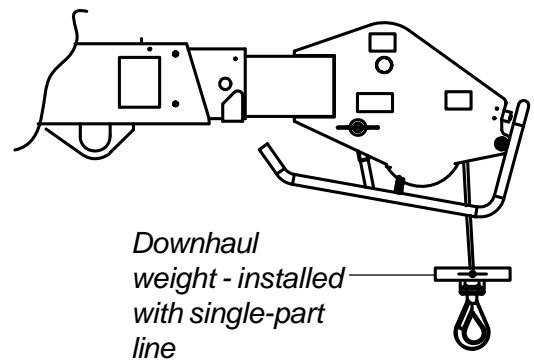
Figure A-16: Anti Two-Blocking Device Components

1-10: CHANGING FROM DOUBLE TO SINGLE-PART LINE

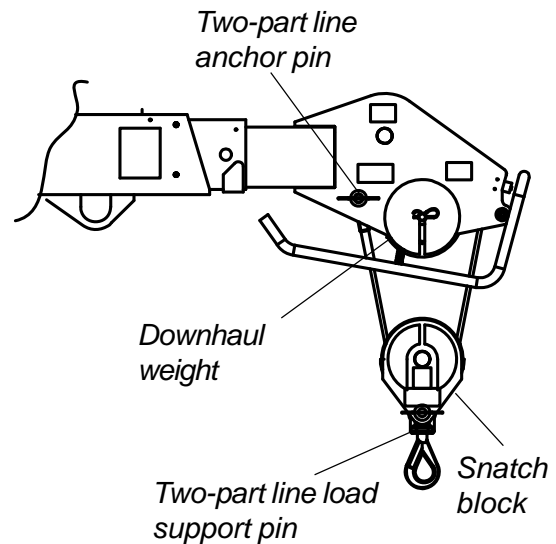
Initially, your crane is set up with two-part line. Single-part line gives you a closer load distance and faster line speed.

If you require a closer load distance or a faster line speed, first check that you have the capacity to lift your load using single part line. If you do, change the crane to one part line using the following steps:

- 1) Disconnect the pin which holds the hook/snatch block assembly in place. Set aside the pin and the snatch block.
- 2) Disconnect the double-line anchor pin.
- 3) Remove the downhaul weight from the crane boom tip.
- 4) Slide the downhaul weight onto the wire rope. Drop it into place on the hook. NOTE: Some cranes have two hooks. Use the hook rated for your load.
- 5) Lift your load. When finished, return the boom tip to two-part line, or stow the snatch block and pin.



A. Single-Part Line Configuration



B. Two-Part Line Configuration

Figure A-17: Single/Two-Part Line Diagram - Low Profile Boom Tip

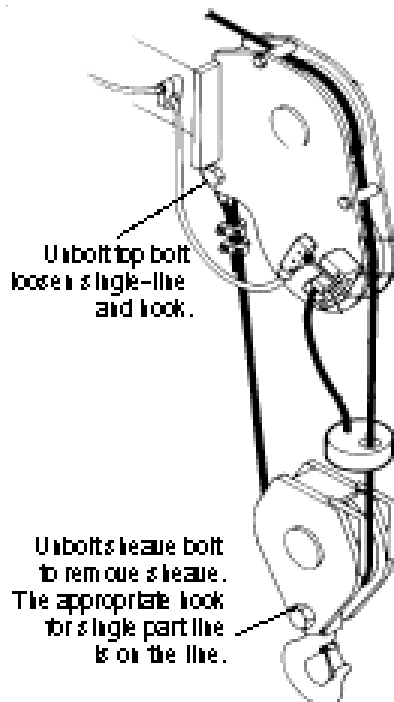


Figure A-18: Single/Two-Part Line Diagram - Traditional Boom Tip

1-11: TASK PERFORMANCE

To operate the crane:

- 1) Position the crane as close to the job as possible on a firm, dry and level surface. Avoid overhead obstructions on the work side of the unit.
- 2) Set the auxiliary (parking) brake.
- 3) Depress the clutch pedal. Engage the PTO per section 1-4-1.
- 4) Before conducting any boom operations, extend outriggers and level the crane side to side, using the power down outrigger function. Use a signal person if the outriggers are not in view from the operator's station when extending or lowering the outriggers. Provide blocks if necessary to level the unit on sloping ground or bearing pads if the outriggers tend to sink into soft terrain or hot asphalt. Some concrete or asphalt surfaces are relatively thin and cannot withstand the outrigger loading. Concrete can break through and cause instability.

WARNING

DO NOT ATTEMPT TO HANDLE A LOAD IF OUTRIGGERS ARE UNABLE TO MAKE SOLID CONTACT WITH THE GROUND. ALL OUTRIGGERS MUST BE DE-PLOYED!

- 5) Raise the inner boom.
- 6) Rotate the boom to the selected location. Lower the hook block to an adequate length to allow for extended boom length before extending any telescoping boom sections.

Firmly set the outriggers, but do not lift tires from the ground. Stability over the front (without front stabilizers) can be hampered by raising the vehicle excessively. Be very careful when operating in areas around the truck not supported by outriggers because of cushion of tires and springs. When swinging loads from areas supported by outriggers, use extreme caution due to potential sudden shifting of the support point. Always keep the load as close to the ground as possible.

1-11-1: TROUBLESHOOTING

PROBLEM	CAUSE	RESOLUTION
Vehicle tires sink into ground.	Unstable work area.	Reposition truck or use blocks.
Hydraulic outrigger controls do not function.	Crane does not have hydraulic power.	Engage the PTO to power the crane's hydraulic system.
Radio remote does not work.	Emergency stop button is pushed in.	Pull out emergency stop button.
	Remote battery is dead.	Replace with fully charged battery.
Tethered remote does not work.	"Power" toggle switch is not switched to "Crane."	Switch toggle to "Crane".
	Tether is not plugged in.	Plug tether into connection in control cabinet.
	Tethered control is broken.	Use buttons on valve bank to manually stow crane.
Crane functions including boom down, extension out, and winch up do not work.	Crane is in two-blocking condition.	Winch down to relieve the two-block condition.
	Crane is in overload condition.	Boom up, extend in, or winch down to relieve the overload condition.
Radio remote failure.	Breakage, battery failure, etc.	Use the radio remote backup.

Figure A-19: Troubleshooting Crane Operation Problems

CAUTION

DO NOT ATTEMPT TO ROTATE THE CRANE BEFORE PLACING IT IN THE DEPLOYED POSITION. DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL MAY RESULT.

1-12: CRANE SHUTDOWN

- 1) Retract the extension booms (and cable if applicable). Be sure to retract the manual extensions prior to the hydraulic extensions.
- 2) Secure the hook.
- 3) Stow the crane in its travel configuration with the boom in the boom support. Make sure the winch line is SLACK. After stowing, tighten the winch line just enough to keep the cable from contacting the boom. Excessive cable tension may cause the boom to bounce out of the rest during transit and may put damaging loads on the extension cylinder.

CAUTION

EXCESSIVE DOWNWARD PRESSURE ON THE BOOM SUPPORT MAY DAMAGE THE BOOM SUPPORT OR THE BODY.

Once the boom is in the transport position, shut off the truck engine and toggle the inner and extensions functions on the handset to relieve any trapped pressure. This will ensure the

boom does not move out of the boom rest during transit. See Figure A-18.

4. Stow the outriggers.
5. Disengage the throttle control.
6. Depress clutch pedal (if applicable) and disengage PTO.
7. Secure loose items on truck bed.
8. Release the auxiliary brake.

1-13: OPERATORS

Personnel permitted to operate a crane must have certain minimum qualifications, conform to conduct and physical requirements and possess certain abilities as defined by the Occupational Safety and Health Administration (OSHA). Other restrictions may be imposed by other local, state or federal regulations. Be aware of and follow all such regulations.

Refer to ANSI B30.5 chapter 5-3 for information on operator qualifications and operating practices.

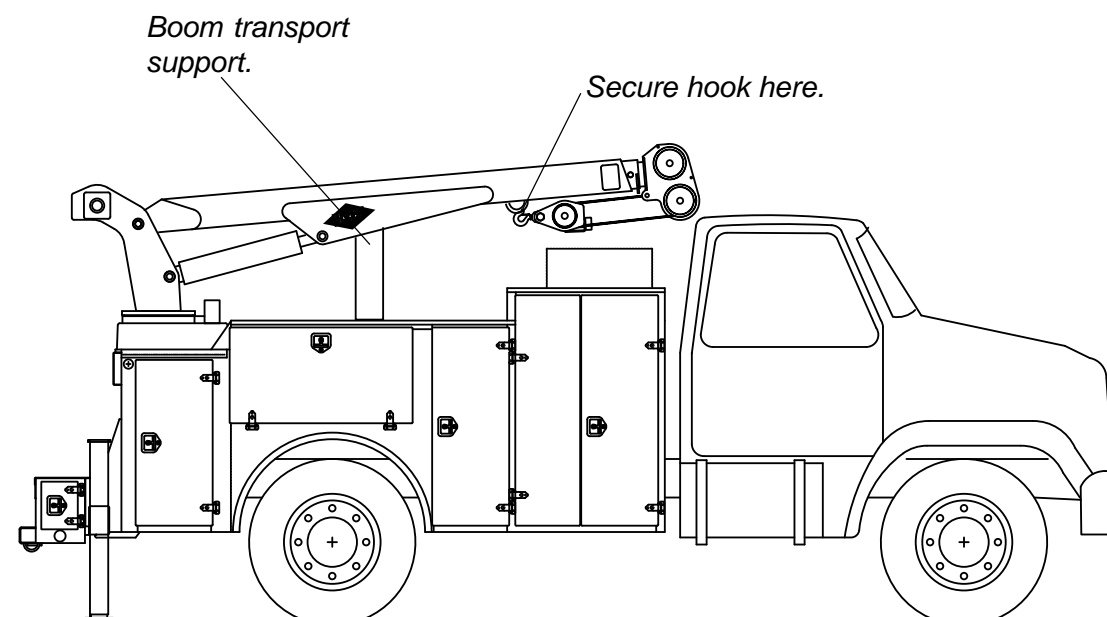


Figure A-20: Stowed Telescopic Crane

1-14: OPERATION IN ADVERSE CONDITIONS

1-14-1: DUSTY AND SANDY AREAS

Operating in dusty or sandy areas presents special problems due to the abrasive action of dust which shortens the life of parts. Make every effort to keep dust and sand out of the moving parts of the crane machinery and engine.

1. All lubricants and lubricating equipment must be kept clean. Service breathers and air cleaners frequently to remove accumulated sand and dust. Lubricate more frequently to keep a supply of clean lubricant in the moving parts. Clean all lubrication fittings thoroughly before attaching the grease gun.

2. Keep the fuel tank filler cap tight to prevent sand and dust from entering the fuel tank. Service fuel filters frequently to keep them free of sand and dust.

3. Keep the hydraulic oil reservoir caps tight to prevent sand and dust from entering the hydraulic systems. Service the hydraulic oil filters frequently to keep the system free of sand and dust.

4. Use wood blocking or mats under the outrigger pads when operating in sand. See that the carrier vehicle does not shift during operation.

5. Before performing service on the crane, such as replacing hoses, thoroughly clean hose connections and surrounding area. Failure to do so will allow sand particles into the hydraulic system which will damage the pump, holding valves, valvebank and cylinders, leading to costly repairs.

1-14-2: HIGH HUMIDITY OR SALT AIR CONDITIONS

Moisture and salt will cause deterioration of paint, cables, wiring and all exposed metallic parts. Keep parts dry and well lubricated in high humidity or salt air conditions.

1. Completely remove rust and corrosion as soon as it appears on any part of the machine.

Wash off salt water and dry all parts thoroughly. Paint the exposed surfaces immediately. Place a film of lubricant or grease on all polished or machined surfaces and other surfaces which cannot be painted.

2. Keep parts thoroughly lubricated to repel water from polished metal surfaces and to prevent the entry of water into bearings. Keep lifting cables well lubricated.

1-14-3: HIGH ALTITUDE

Operation at high altitudes presents special problems due to lower atmospheric pressure and wide temperature ranges. Consult the vehicle owner's manual regarding operating the vehicle at high altitudes.

1-14-4: COLD WEATHER

For cold weather operation with temperatures of -25°F or lower, the following procedures must be followed:

1. Start the truck and run at manufacturer's recommended idle speed for proper warm up.

2. After approximately 45 minutes of truck warm up time, engage the PTO.

3. With the PTO fully engaged and the truck engine running at idle speed, let the hydraulic system oil circulate.

CAUTION

DURING THE 45 MINUTES ALLOWED FOR WARM UP, DO NOT RACE TRUCK ENGINE AND OVER SPEED HYDRAULIC PUMPS. PUMP CAVITATION, WITH PERMANENT DAMAGE, MAY RESULT.

If at any time during oil circulation, and especially during the initial warm up time, any hydraulic pump noise such as metal grinding, or a popping noise is heard, shut down the unit immediately. Check that the hydraulic oil line

leading to the suction port on the pump is not clogged, or that the hydraulic oil itself does not have a jelling condition.

CAUTION

FOR CRANE OPERATION IN TEMPERATURES BELOW -25°F, HYDRAULIC OIL CONFORMING TO MIL-L-46167 MUST BE USED IN THE CRANE HYDRAULIC SYSTEM.

CAUTION

FOR WINCH OPERATION IN TEMPERATURES BELOW -25°F, THE LUBRICATION OIL IN A WINCH GEARBOX MUST BE CHANGED TO LUBRICATING OIL CONFORMING TO MIL-L-2105C, GRADE 75W (GO-75).

5. After the 45 minute warm up period, begin crane operation as follows:

- a. Slowly extend horizontal outrigger cylinders out approximately 6 inches and retract, extend out again approximately half way and retract, and then extend full stroke.
- b. Follow the procedure above on crane deployment, and extend cylinders.
- c. When completed, begin crane swing operation by rotating slowly approximately one eighth revolution one way, return to previous position and rotate in opposite direction. Do this several times, then rotate 90° and return.
- d. If equipped with a winch, begin winch operation by slowly opening the control valve allowing several revolutions in one direction. Then reverse the control valve and operate several revolutions in the opposite direction. Repeat several times allowing longer operation intervals.

CAUTION

VALVES SHOULD BE ENGAGED SLOWLY DURING WARM UP CYCLE TO PREVENT SUDDEN HYDRAULIC SPIKES WHICH WILL DAMAGE HYDRAULIC COMPONENTS.

NOTE

IT IS NORMAL FOR SOME OIL SEEPAGE TO OCCUR AROUND PISTON ROD SEALS DURING THE WARM UP OPERATION. SEEPAGE SHOULD CEASE WHEN HYDRAULIC SYSTEM HAS REACHED OPERATING TEMPERATURE.

1-15: HAND SIGNALS

Hand signals can be used to communicate between crane operators and assistants when the job site noise level is too high to communicate in other ways.

Signals to the operator shall be in accordance with those signals illustrated in this section, unless voice communication is utilized. Signals shall be discernible or audible at all times. No response by the operator is to be made unless the signal is clearly understood.

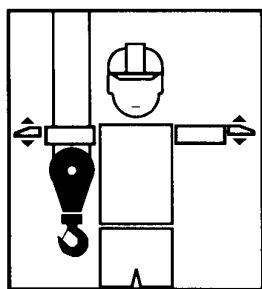
For operations not covered by the illustrated hand signals, additions to or modifications may be made. These special signals must be agreed upon by the operator and signal person before the crane is operated.

If verbal instructions are required rather than hand signals, all crane motions must be stopped before doing so.

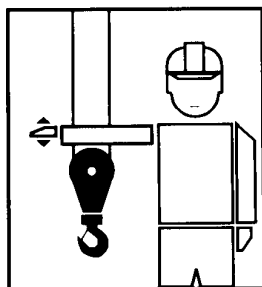
Figure A-19 includes an illustration of the hand signal, the operation associated with the signal, and a description of the signal. The operator and signal person must review these signals and agree to their use before implementation.

For complete hand signal information, refer to the following publication of The American Society of Mechanical Engineers:
Mobile and Locomotive Cranes
(ASME/ANSI B30.5)

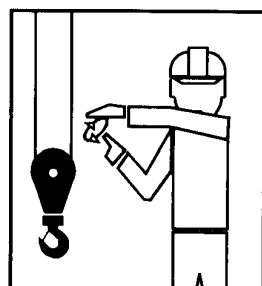
The hand signals presented by The American Society of Mechanical Engineers have been accepted by the Occupational Safety and Health Administration (OSHA).



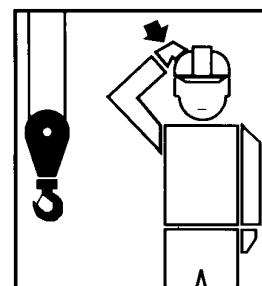
EMERGENCY STOP - Both arms extended, palms down, move arms back and forth horizontally.



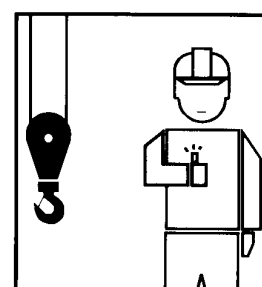
STOP - Arm extended, palm down, move arm back and forth horizontally.



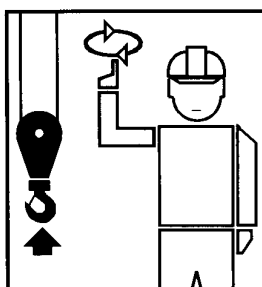
MOVE SLOWLY - One hand gives any motion signal; place other hand motionless in front of that hand. (Hoist slowly shown).



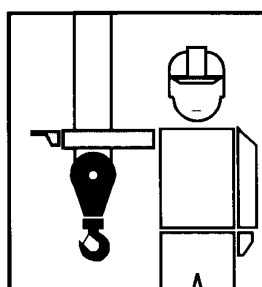
USE MAIN HOIST - Tap fist on head; then use regular signals.



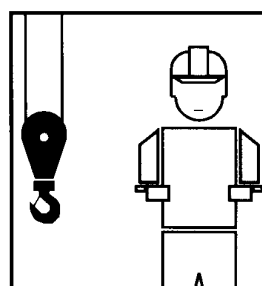
EXTEND BOOM - (Telescoping Booms). One Hand Signal. One fist in front of chest with thumb tapping chest.



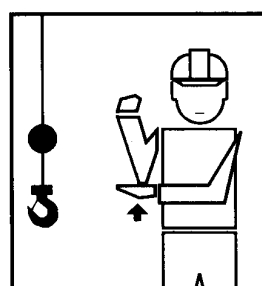
HOIST - With forearm vertical, forefinger pointing up, move hand in small horizontal circles.



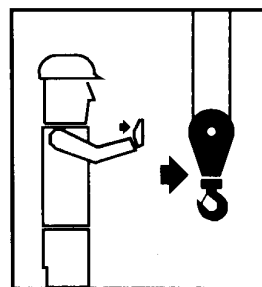
SWING - Arm extended, point with finger in direction of boom swing.



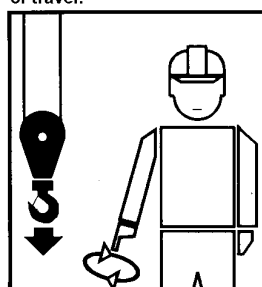
EXTEND BOOM - (Telescoping Booms). Both fists in front of body with thumbs pointing outward.



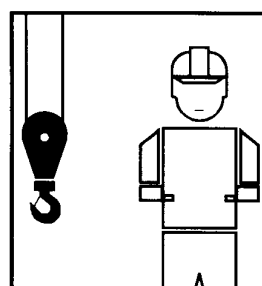
USE WHIPLINE (Auxiliary Hoist)- Tap elbow with one hand; then use regular signals.



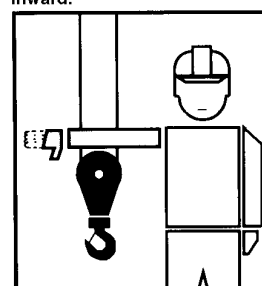
TRAVEL - Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



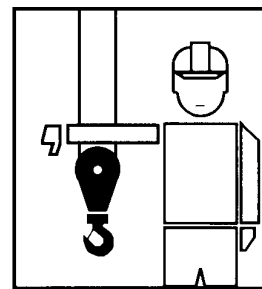
LOWER - With arm extended downward, forefinger pointing down, move hand in small horizontal circle.



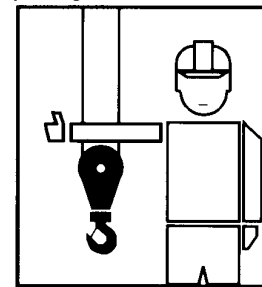
RETRACT BOOM - (telescoping Booms). Both fists in front of body with thumbs pointing inward.



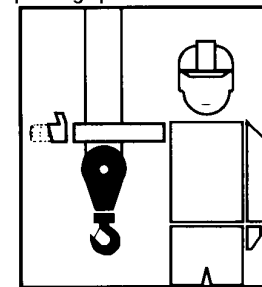
LOWER BOOM-RAISE LOAD - Arm extended, thumb pointing down, flex fingers in and out until desired movement is completed.



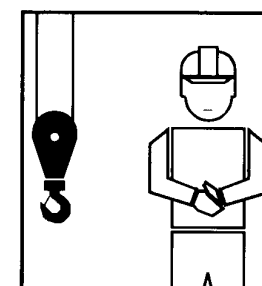
LOWER BOOM - With arm extended, fingers closed, thumb pointing downward.



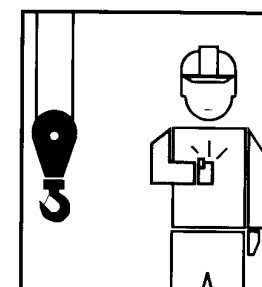
RAISE BOOM - With arm extended, fingers closed, thumb pointing upward.



RAISE BOOM-LOWER LOAD - Arm extended, thumb pointing up flex fingers in and out until desired movement is completed.



DOG EVERYTHING - Clasp hands in front of body.



RETRACT BOOM - (Telescoping Booms). One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

Figure A-21: Hand Signals

IMPORTANT! NOTES FOR SAFE OPERATION**ANTI-TWO BLOCK:**

IMT telescoping cranes using a winch are equipped with an anti-two blocking device, but mechanical devices cannot be substituted for good operator judgement. It is the operator's responsibility to avoid two-blocking and not to rely on the device alone.

EXTENSION SEQUENCE:

Always extend the hydraulic extensions first, followed by the manual extensions. When retracting, retract the manual extensions prior to the hydraulic extensions.

CRANE OPERATION

- Make certain the carrier vehicle's transmission is in neutral and the parking brake is on before engaging the PTO.
- Stand clear of all moving outriggers.
- Know the position of the booms at all times while operating the crane.
- Eliminate swing by positioning the boom tip directly over the center of the load before lifting.
- Never drag a load!
- Check the safety of the load by first lifting the load barely off the ground.
- Keep lifts as close to the ground as possible.
- Stop all crane operation at a signal from anyone.
- When rotating the crane load from that supported by outriggers to that supported by the carrier vehicle's suspension, take precautions to do so smoothly as a carrier vehicles springs and tires will respond differently.
- Position the crane in its stowed position when not in use.

OVERLOAD PROTECTION SYSTEM:

IMT cranes are equipped with an overload protection system. In an overload condition, no function will operate which results in an increase in operating radius. However, the same function may be operated in the opposite direction if it results in decreased operating radius. Be aware that the overload protection system is not sensitive to vehicle stability -- it is still possible to cause vehicle instability. The operator cannot substitute the overload protection system for good judgement. Refer to the capacity chart before attempting to lift a load.

WINCH:

Never use the winch to drag a load into position before lifting. This may sideload the crane or stress the wire rope beyond safe limits. Equipment damage may result.

When using a winch, always keep the tip of the extension boom as close to the load as practical. This will prevent the load from swinging out of control when using the rotation (swing) function. To dampen excessive swing of the load, rotate the crane in the direction of the swing. Failure to comply may result in an injury or equipment damage. DO NOT permit personnel to ride the boom, loadline, hook or load, as this action may cause DEATH or serious injury.

Use only specified wire rope for lifting. Retain at least three full wraps of wire rope on the winch drum at all times.

WIRE ROPE:

Before extending the boom, always pay out the wire rope. Failure to do so may result in over-stressing the wire rope and causing a "two block" condition.

FIRE PRECAUTIONS**FIRE PRECAUTIONS**

To avoid fires,

1. Use safety-type portable gasoline containers equipped with an automatic closing cap and flame arrester.
2. DO NOT refuel while the vehicle engine is running.
3. DO NOT smoke in a refueling area.
4. Install in the vehicle cab a portable fire extinguisher with a basic minimum extinguisher rating of 10 BC.
5. Operating and maintenance personnel must be familiar with the operation of the fire extinguisher.

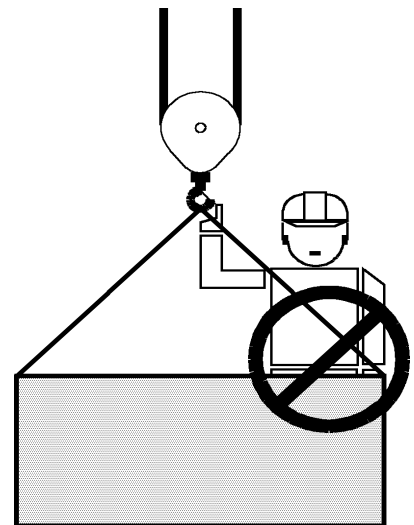


Figure A-22: DO NOT Ride Load, Hook, or Boom

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2-1: GENERAL

To obtain reliable and satisfactory service, IMT telescopic cranes require a consistent preventive maintenance schedule. Take necessary safety precautions during maintenance procedures to avoid equipment damage and personal injury. Follow the maintenance schedule included with this manual for best results.

1. Maintenance should only be performed by authorized service personnel.
2. Disengage the PTO before any service or repair is performed.
3. DO NOT disconnect any hydraulic components or hoses while there is pressure in those components.
4. Stand clear of high pressure hydraulic fluid leaks. Hot hydraulic fluid will cause serious injury, burns and possibly DEATH.
5. Keep the crane clean and free from built-up grease, oil and dirt to prevent slippery conditions and as an aid in the inspection of the crane.
6. Perform all checks before each period of use.
7. Replace parts with factory approved parts, only.
8. Repair or have repaired any components found to be inadequate, immediately.

2-2: MAINTENANCE SCHEDULE

Detailed steps on numerous maintenance procedures are described in the following pages. Use the following chart to help you determine the time schedule of the maintenance requirements.

WEEKLY

- Lubricate:
 - Pinion gear
 - Worm caps & bearings
 - Drive gear
 - Winch sheave
 - Wire rope sheaves
 - Turntable-bearing
 - Cylinder pins
 - Boom hinge pins
 - Hook (Model 7025 only)

MONTHLY

- Lubricate:
 - Worm gear bearings
 - PTO
 - Winch shaft and/or outboard bearing
- Inspect wire rope

AFTER THE FIRST 50 HOURS OF USE

- Change hydraulic filter

QUARTERLY

- Detailed inspection (Refer to IMT Crane Log and Telescopic Crane Operation Manual, Section 2-10)
- Check for hydraulic oil deterioration

EVERY 200 HOURS

- Change hydraulic filter

EVERY 6 MONTHS or 800 HOURS

- Inspect remote control
- Purge hydraulic system & replace hydraulic oil & filter

EVERY 2 YEARS

- Inspect pins

2-3: LUBRICATION

Different lubricants are required for different sections of your crane. Contact your lubricant supplier for specific product information.

Follow the grease and lubricant specifications and intervals listed in this manual for best results.

APPLICATION POINT	LUBRICATION PRODUCT	APPLICATION MEANS	INTERVAL
Pinion & Drive Gear Turntable Bearing - (rotate while greasing) Winch Sheave Cylinder Pins Boom Hinge Pins Hook	Shell Alvania 2EP or Shell Retinax "A" or Mobilith AW2 or Equivalent	Hand Grease Gun or Pneumatic Pressure Gun	Weekly
Rotation Worm Gear	Molub-Alloy 882 Heavy or Equivalent	Brush On	Weekly
PTO Winch Sump	Mobilube HD 80W90, 85W140 or Equivalent	Fill to Check Plug	Monthly

Figure B-2: Lubrication Product & Schedule

2-4: LUBRICATION POINTS

Crane grease zerks must be greased on a weekly basis during normal operating conditions. Under severe operating conditions the zerks must be greased more frequently. Each grease zerk is marked with a decal, "Grease Weekly", as shown in Figure B-3.

Crane worm gear teeth and bearing teeth must be lubricated weekly with Molub-Alloy 882 Heavy or equivalent.

See Figure B-2 for the lubrication product schedule. Apply products with a grease gun or brush as directed.

See Figures B-3 through B-6 for grease zerk locations by crane model, and for crane component names.



Figure B-3: Grease Weekly Decal

NOTE

COMPONENTS ON CRANE DIAGRAM ARE IDENTIFIED BY NAME; GREASE ZERKS ARE IDENTIFIED BY NUMBER.

Figure B-4: Components & Grease Zerk Locations - Models 1015 & 2020

1. Worm Gear
2. Turntable Bearing - Grease Extension
3. Lower Cylinder - Base End
4. Lower Cylinder - Rod End
5. Mast/Lower Boom Hinge Pin
6. Sheave Pin
7. Snatch Block

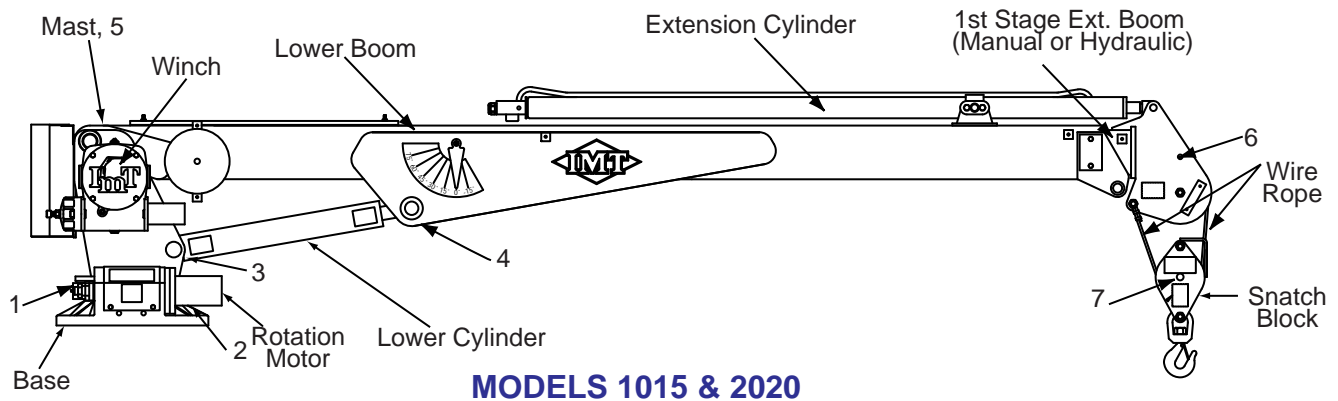


Figure B-5: Component & Grease Zerk Locations - Models 3020, 3820 & 5020

1. Gear Rotator Grease Extension (Rotate crane while greasing)
2. Lower Cylinder Base
3. Lower Cylinder Rod
4. Mast/Lower Boom Hinge Pin
5. Upper Sheave Pin
6. Lower Sheave Pin
7. Snatch Block Sheave Pin
8. Worm Drive Bearings (3 pumps, then rotate fully) (Model 5020 only)
9. Winch Outboard Bearings
10. Worm Gear Bearing Zerks (2)

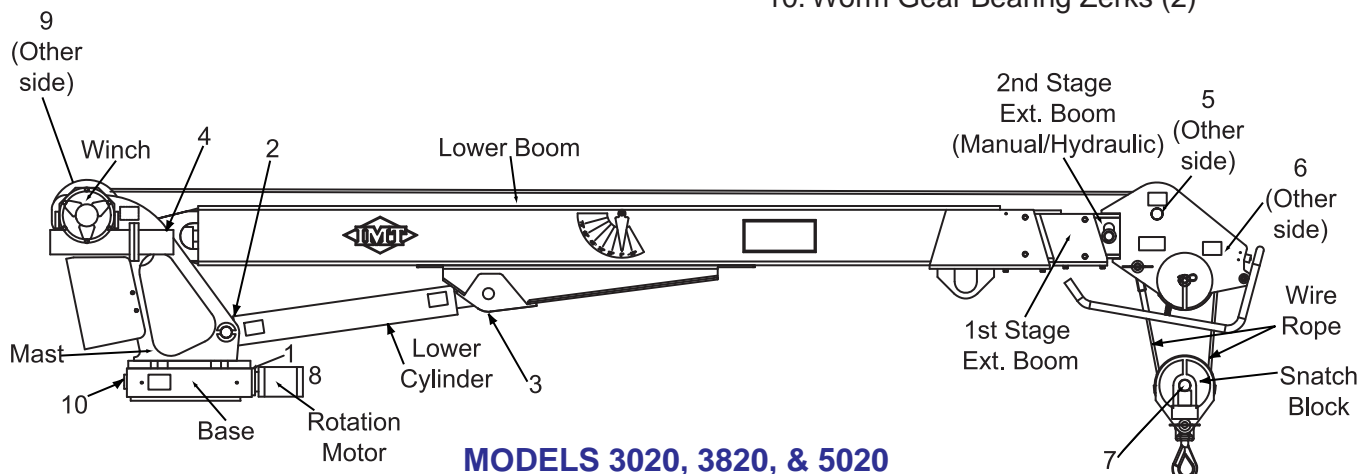


Figure B-6: Component & Grease Zerk Locations - Models 5525, 6025, 6625

1. Turntable Bearing Grease Extension (Rotate crane while greasing)
2. Worm Gear (Forward)
3. Worm Gear (Rear)
4. Lower Cylinder Base
5. Mast/Lower Boom Hinge Pin
6. Lower Cylinder Rod
7. Upper Sheave Pin
8. Lower Sheave Pin
9. Snatch Block Pin
10. Winch Bearing

NOTE

COMPONENTS ON CRANE DIAGRAM ARE IDENTIFIED BY NAME; GREASE ZERKS ARE IDENTIFIED BY NUMBER.

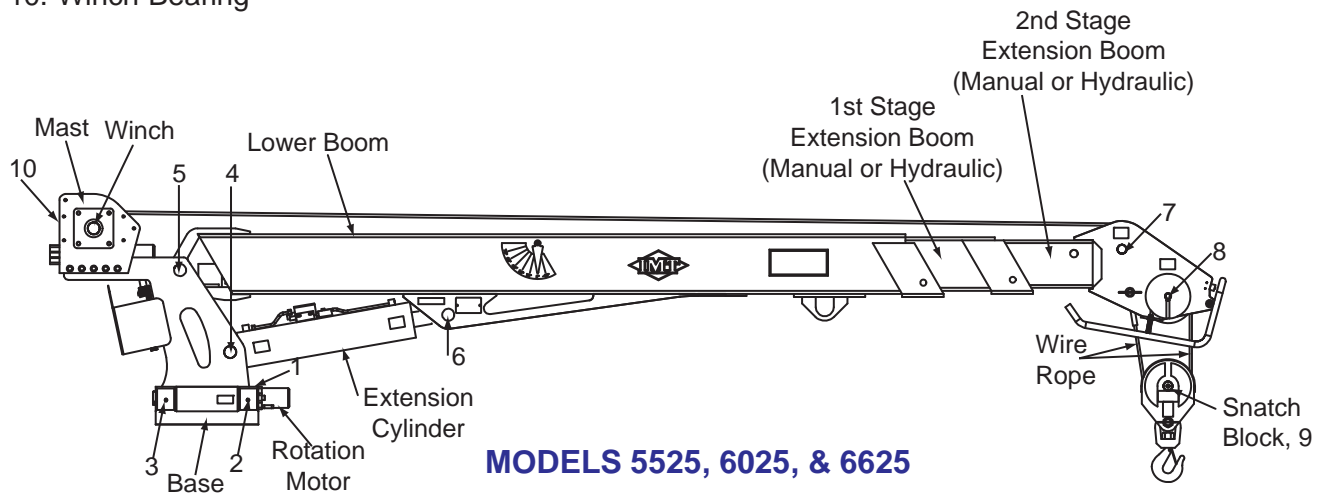
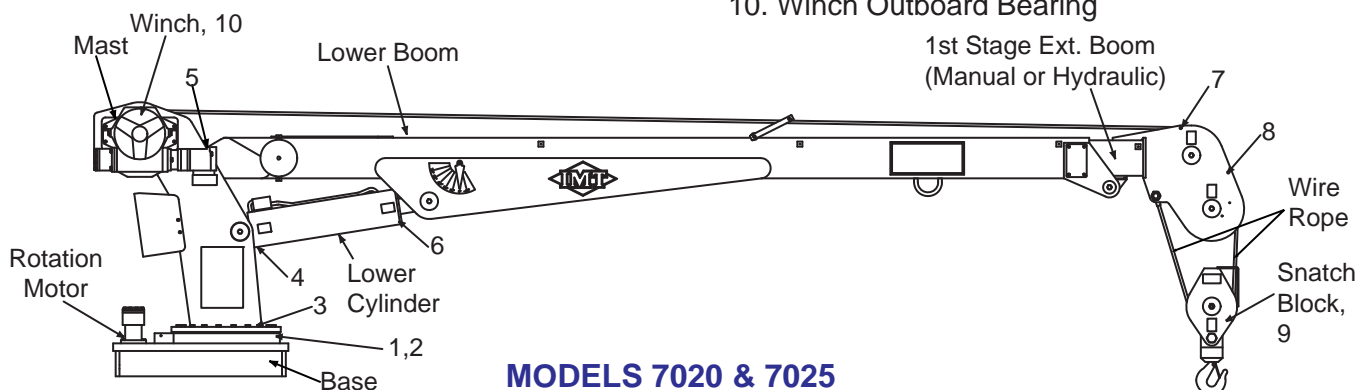


Figure B-7: Component & Grease Zerk Locations - Models 7020 & 7025

1. Drive Gear
2. Turntable Bearing Grease Extension (Rotate crane while greasing)
3. Pinion Gear
4. Lower Cylinder - Base End
5. Mast/Lower Boom Hinge Pin
6. Lower Cylinder - Rod End
7. Upper Sheave Pin
8. Lower Sheave Pin
9. Snatch Block Pin
10. Winch Outboard Bearing



2-5: HYDRAULIC SYSTEM

2-5-1: HYDRAULIC OIL SPECIFICATIONS

The hydraulic oil is the power transmission medium, system lubricant, and coolant. Under normal operation conditions, the hydraulic oil must meet the following specifications:

- High quality, antiwear hydraulic oil which meets ISO VG 32.
- Viscosity specifications for hydraulic oil:

SAE Designation	Temperature Range
5W-20	-10 to 180°F (-23 to 82°C)
10W	+10 to 180°F (-12 to 82°C)
10W-30	+10 to 210°F (-12 to 99°C)

Figure B-8: SAE Designation for Hydraulic Oil

- Viscosity characteristics including:
 1. 80 to 180 SSU optimum at system operating pressure.
 2. 60 SSU minimum at system operating temperature.
 3. 7500 SSU maximum at starting temperature.
 4. 90 Viscosity Index (VI) minimum.
- Additives including anti-foam inhibitors, anti-oxidant inhibitors, rust resistance, and anti-wear must be part of the oil.

When the crane leaves the factory, it is filled with an ISO VG32, low pour, anti-wear hydraulic oil.

2-5-2: LOW TEMPERATURE HYDRAULIC OIL SPECIFICATIONS

In conditions below -25°F, use gear oil which meets MIL-L-2105C Grade 75W (GO-75).


Fluids which contain halogenated hydrocarbons, nitro hydrocarbons, and phosphate ester hydraulic fluids may not be compatible with hydraulic system seals and wear bands.

2-5-3: HYDRAULIC FLUID LEVEL

Check the hydraulic oil level daily using the following procedure:

1. Remove the hydraulic oil reservoir cap.
2. Visually check the oil level. Oil should be visible in the fill screen area above the bottom of the reservoir.
3. If the hydraulic oil is low, fill until the oil is visible in the screen area.

Iowa Mold Tooling Co., Inc.
Garner, Iowa, USA
1-641-923-3711



70394189

**HYDRAULIC OIL RESERVOIR
FILL RECOMMENDATION**

HYDRAULIC OIL	AMBIENT TEMPERATURE RANGE	
	°F	°C
Mobil DTE® 13M	0° to 90°	-18° to 32°
Mobil DTE® 11M	Below 0°	Below -18°
Mobil DTE® 25	Above 90°	Above 32°

For Arctic conditions, consult your oil supplier.

For Mobil Product information:
1-800-662-4525

AMBIENT TEMPERATURE RANGE	0-90°	BELOW 0°	ABOVE 90°
Minimum Pour Point, °F	-40°	-40°	-10°
Maximum Viscosity, SSU @ 0°F	5000	1500	—
Minimum Viscosity, SSU @ 100°F	140-195	80-90	200-335
Minimum Viscosity, SSU @ 210°F	48	39	49
Minimum Viscosity Index	139	139	95
ISO VG Grade	32	15	46
Mobil Oils (Reference)	DTE 13M	DTE 11M	DTE 25

Figure B-9: Hydraulic Fluid Specifications

2-5-4: HYDRAULIC FLUID DETERIORATION

NOTE:

DO NOT USE ENGINE OIL AS AN ALTERNATIVE FOR HYDRAULIC FLUID. AUTOMATIC TRANSMISSION FLUID CAN BE SUBSTITUTED FOR HYDRAULIC FLUID IN LOW-TEMPERATURE, LOW-PRESSURE HYDRAULIC APPLICATIONS.

Every 3 months, sample your hydraulic oil for deterioration. Viscosity over 10% and a Total Acid Number (TAN) over 3.0 are indications that the oil has oxidized and should be replaced.

2-5-5: CHANGING HYDRAULIC OIL

Replace the oil in the hydraulic reservoir after 800 hours of operation or every 6 months, whichever occurs first.

Purging the system requires a new oil supply sufficient to completely fill the reservoir, lines, cylinders, etc., and an extra quantity for loss during this procedure. To minimize oil loss during this process, operate the truck engine at low RPM.

Two operators are required during the purging operation: one to operate the crane controls and the other to regulate pump output (engine speed).

CAUTION

DO NOT ALLOW THE RESERVOIR OIL LEVEL TO DROP BELOW 1/3 CAPACITY DURING THIS OPERATION.

1. Locate the truck in an area with solid footing and space to accommodate the full operating range of the crane.
2. Stabilize the crane with the stabilizers. Move the crane to 90° on either side of the truck. Extend the lower and extension cylinders.
3. Disengage the PTO, drain the hydraulic oil reservoir, remove the suction line filter and drain all hoses. **Disconnect the pressure hose from the pump, drain and reassemble.** Replace the suction line filter element (Section 2-5-8) and reassemble the system.

NOTE

DISPOSE OF WASTE OIL IN A RESPONSIBLE MANNER, FOLLOWING ANY FEDERAL, STATE OR LOCAL REGULATIONS.

4. Remove the reservoir return line. Direct the flow into a sump or waste container. Plug the drain port on the reservoir and fill with new oil.

NOTE

READ AND FOLLOW THE FOLLOWING INSTRUCTIONS WITHOUT INTERRUPTION OR STOP THE ENGINE AT THE END OF EACH STEP. IF THIS IS NOT DONE, EXCESS OIL WILL BE DISCHARGED THROUGH THE DISCONNECTED VALVE BANK RETURN HOSE.

5. Start the truck engine and engage the PTO per instructions in the Operation section. Rotate the crane 90°, retract the extension boom and lower the lower boom to the lowest position.
6. Return the crane to its stowed position as marked on the rotation system. Raise the stabilizers. Shut off the engine.
7. All components of the system are now purged. Replace the return line filter cartridge and reinstall the return line on the reservoir.
8. Check hydraulic oil level. Top off if necessary.

2-5-6: PURGING AIR FROM THE HYDRAULIC SYSTEM

Air trapped in the hydraulic cylinder will cause an erratic "bumpy" motion. To expel the air:

1. Hold the control open for a few seconds after the function has "bottomed out".
2. Move the function in the opposite direction. Again, hold the control open a few seconds after the function has "bottomed out".
3. Attempt to operate the crane in the normal manner to determine if the air has been purged.

2-5-7: HYDRAULIC PRESSURE RELIEF

The hydraulic system relief valve is provided to prevent the user from placing too much strain on the hydraulic components. The system relief pressure is preset and sealed at the factory, and it must not be tampered with. If you suspect the system relief pressure of malfunctioning, see your IMT dealer for testing and replacement.

WARNING

SETTING THE PRESSURE RELIEF HIGHER THAN THAT SPECIFIED FOR YOUR MODEL CRANE IS UNSAFE. DO NOT ATTEMPT. EXCESSIVE RELIEF PRESSURE WILL DAMAGE THE EQUIPMENT AND CAN RESULT IN SERIOUS INJURY OR DEATH. ONLY AN AUTHORIZED IMT REPRESENTATIVE MAY ADJUST THE RELIEF PRESSURE AND RESEAL THE RELIEF VALVE. A BROKEN SEAL ON THE RELIEF VALVE WILL VOID THE WARRANTY.

2-5-8: HYDRAULIC CYLINDER HOLDING CAPABILITIES

The hydraulic cylinders have holding valves that prevent sudden movement of the cylinder rods in the event of a hydraulic hose or other hydraulic component failure. The valve is non-adjustable and failure is unlikely.

Check the hydraulic cylinder using the following steps:

1. With a full rated load, extend the cylinder in question and kill the engine.
2. Operate the control valve to retract the cylinder. To check the main cylinder, set the boom horizontally with the maximum load. To check the extension boom cylinder, set the crane at maximum articulation (angle).

If the cylinder “creeps”, replace the holding valve. If the cylinder does not “creep”, the valve is serviceable.

2-5-9: HYDRAULIC FILTER REPLACE- MENT

The hydraulic oil filters remove contaminating particles. To avoid residue accumulation in the reservoir and to protect hydraulic system components, the filter must be changed after 50 hours of new-unit operation and every 200 hours thereafter.

Check the vacuum gauge reading on the suction line filter for a reading greater than 8” of mercury.

If the gauge reads higher than 8”, it could damage the pump due to cavitation. In addition, the filter elements should be replaced 50 hours after the repair of a major hydraulic component.

To change filter cartridges:

1. Kill the engine.

NOTE

WHEN CHANGING THE SUCTION LINE FILTER, ALWAYS CLOSE THE GATE VALVE AT THE RESERVOIR FIRST.

2. Replace the cartridge with a new one ensuring proper rubber seal seating and tightening as much as possible with both hands. Hand tighten only.

3. **Open the gate valve**, engage the PTO, and test for leaks.

2-5-10: HYDRAULIC SYSTEM TROUBLE-SHOOTING

Problems with hydraulic oil viscosity can lead to systems that do not function properly.

Hydraulic oil that is too light causes:

1. Excessive leakage.
2. Lower volumetric efficiency of the pump.
3. Increased component wear.
4. Loss of system pressure.
5. Lack of positive hydraulic control.
6. Lowered overall efficiency.

Hydraulic oil that is too heavy causes:

1. System pressure increase.
2. Increased system temperature.
3. Sluggish system operation.
4. Low mechanical efficiency.
5. Higher power consumption.

In either case, the hydraulic oil must be replaced for the system to function properly.

NOTES:

- Keep system operating temperatures below 130°F, using oil coolers or heat exchangers. Keep the system full to avoid sloshing and overheating.
- Use 10-micron filters or better.
- Change fluid as specified.
- Inspect oil regularly, and use lab testing to determine oil quality.
- Replace hydraulic components before they contaminate the system.

2-6: WIRE ROPE & HOOK MAINTENANCE

2-6-1: WIRE ROPE INSPECTION

OSHA requires regular inspections and permanent, signed record-keeping on wire rope inspections. These inspections help the crane operator determine whether the rope can be safely used. Inspection criteria, including number and location of broken wires, wear and elongation, have been established by OSHA, ANSI, ASME and similar organizations.

WIRE ROPE INSPECTION

1. **INSPECTOR** - The wire rope inspector must keep written reports of the rope condition on file at the work site and must have the authority to order wire rope replacements and keep unsafe wire rope from being used.
2. **PERIODS OF INSPECTION** - Set up inspection periods for each material hoist wire rope. Determine inspection frequency by considering environment, degree of hazard to materials, frequency of operation and the frequency with which the wire rope is subjected to its capacity limits. **Inspect at least every 30 days.**
3. **METHODS OF INSPECTION** - To inspect, unwind the working length of the wire rope from the hoist drum. Thoroughly inspect the rope sections that pass over sheaves, drums or contact saddles or which make opposing turns. Inspect the rope close to the end attachments. **DO NOT** open the rope for inspection.

4. **USED WIRE ROPE** - Thoroughly inspect used wire rope prior to installation.
5. **IDLE EQUIPMENT** - Inspect wire rope on idle equipment prior to operation.

Wire Rope Daily Inspection:

Inspect for kinking (sharp bends), crushing, unstranding, birdcaging, core protrusion, rope diameter loss, rope strand unevenness, general corrosion, broken or cut strands, heat damage, and integrity of end attachments.

Wire Rope Monthly Inspection:

Each month, inspect the entire length of the rope, the wire rope eye, and the sheaves, drums and other apparatus with which the rope makes contact.

When a wire rope has been removed from service because it is no longer suitable for use, it must not be re-used on another application. Every wire rope user should be aware of the fact that each type of fitting attached to a wire rope has a specific efficiency rating which can reduce the working load of the rope assembly or rope system, and this must be given due consideration in determining the capacity of a wire rope system.

2-6-2: WIRE ROPE LUBRICATION

Wire rope used on IMT cranes does not have continuous lubrication replenishment. Use open gear lubricant to protect the wire rope on your crane. The areas of rope which experience the most wear are located over sheaves or are otherwise hidden, and these areas require the most rope lubrication.

Lubricate the wire rope using ChainMate (TM) Chain and Wire Rope lubricant or equivalent. To lubricate the rope:

1. Clean dirt, dust, and foreign matter from the rope.
2. Apply ChainMate lubricant or equivalent, penetrating the strands of the rope. Apply according to the lubricant specifications.
3. Apply lubricant heavily to portions which encounter bending such as at the sheave and winch.

2-6-3: WIRE ROPE MAINTENANCE

If the daily wire rope inspection shows a problem with the wire rope, the rope must be repaired or replaced. Use only original wire rope from IMT. Failure to do so may cause problems with the anti-two block system and the downhaul weights.

2-6-4: WIRE ROPE REPLACEMENT

Replace wire rope when any of the following conditions exist.

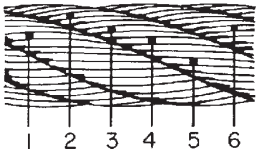
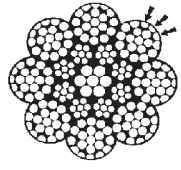
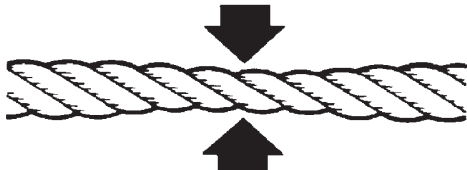
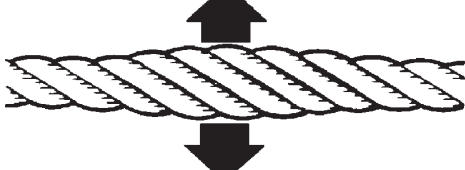
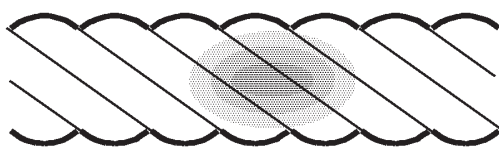
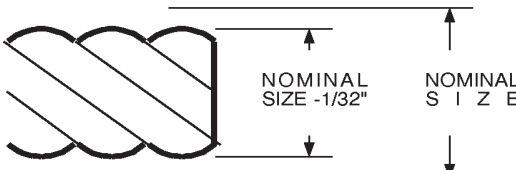

1. When there are either 3 broken wires in one strand or a total of six broken wires in all strands in any one rope lay.	
2. When flat spots on the outer wires appear and those outside wires are less than 2/3 the thickness of the unworn outer wire.	
3. When there is a decrease of diameter indicating a core failure.	
4. When kinking, crushing, birdcaging or other distortion occurs.	
5. When there is noticeable heat damage (discoloration) of the rope by any means.	
6. When the diameter is reduced from nominal size by 1/32" or more.	
7. If a broken wire protrudes or loops out from the core of the rope.	

Figure B-10: When to Replace Wire Rope

2-6-5: WIRE ROPE SLINGS

Rated load (rated capacity) of a wire rope sling is based on the nominal, or catalog, strength of the wire rope used in the sling, and factors which affect the overall strength of the sling. These factors include attachment or splicing efficiency, the number of parts of rope in the sling, type of hitch (straight, choker, basket), diameter around which the body of the sling is bent, and the diameter of hook over which the eye of the sling is rigged.

Rated load of a sling is different for each of the three basic methods of rigging. These rated loads are available from your wire rope sling supplier and may be indicated on a tag attached to the sling at the time it is fabricated.

WARNING

A HAND-TUCKED EYE SPLICE CAN UNLAY (UNRAVEL) AND FAIL IF THE SLING IS ALLOWED TO ROTATE DURING USE.

Never shock load a sling. You cannot estimate the actual force applied by shock loading. The rated load of a wire rope sling can easily be exceeded by a sudden application of force, and damage can occur to the sling. The sudden release of a load can also damage a sling.

Protect the wire rope body against damage using corner protectors, blocks or padding. Sharp bends that distort the sling body damage the wire rope and reduce its strength.

Any angle other than vertical at which a sling is rigged increases the loading on the sling.

Visually inspect slings before each lift or usage to determine if it is capable of safely making the intended lift. Inspect wire rope slings in the same manner as wire rope.

When a sling is found to be deficient, the eyes must be cut, or other end attachments or fittings removed to prevent further use, and the sling body discarded.

A sling eye should never be used over a hook or pin with a body diameter larger than the natural width of the eye. Never force an eye onto a hook. The eye should always be used on a hook or pin with at least the diameter of the rope.

BASIC HITCHES

VERTICAL or straight attachment, is simply the using of a sling to connect a lifting hook to the load. Full rated load of the sling may be used, but never exceeded. A tagline should be used on such a lift to prevent rotation which can damage the sling. A sling with a hand-tucked splice can unlay and fail if the sling is allowed to rotate.

CHOKER hitches reduce lifting capability of a sling, since this method of rigging affects the ability of the wire rope components to adjust during the lift, places angular loading on the body of the sling, and creates a small diameter bend in the sling body at the choke point.

BASKET hitches distribute a load equally between the two legs of a sling, within limitations imposed by the angles at which legs are rigged to the load.

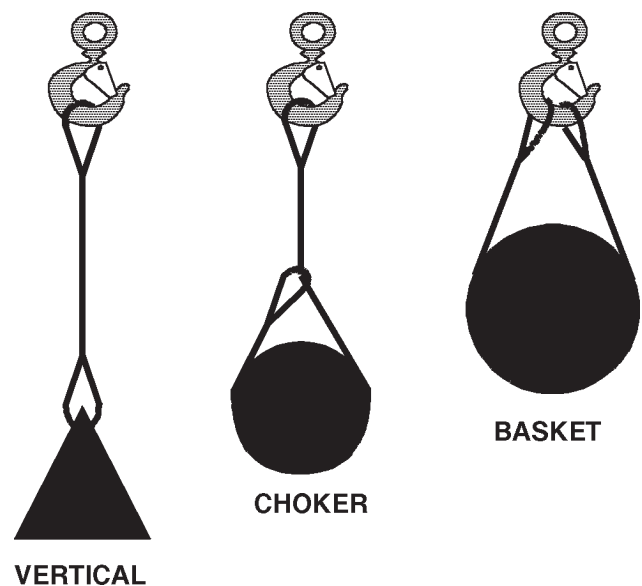


Figure B-11: Basic Hitches

SLING LOADING

Sling angle (angle of loading) is the angle measured between a horizontal line and the sling leg or body. This important angle can have a dramatic effect on the rated load of the sling. When this angle decreases, the load on each leg increases. This principle applies whether one sling is used with legs at an angle in a basket hitch, or for multi-leg bridle slings. Horizontal sling angles of less than 30° shall not be used. See Figure B-12.

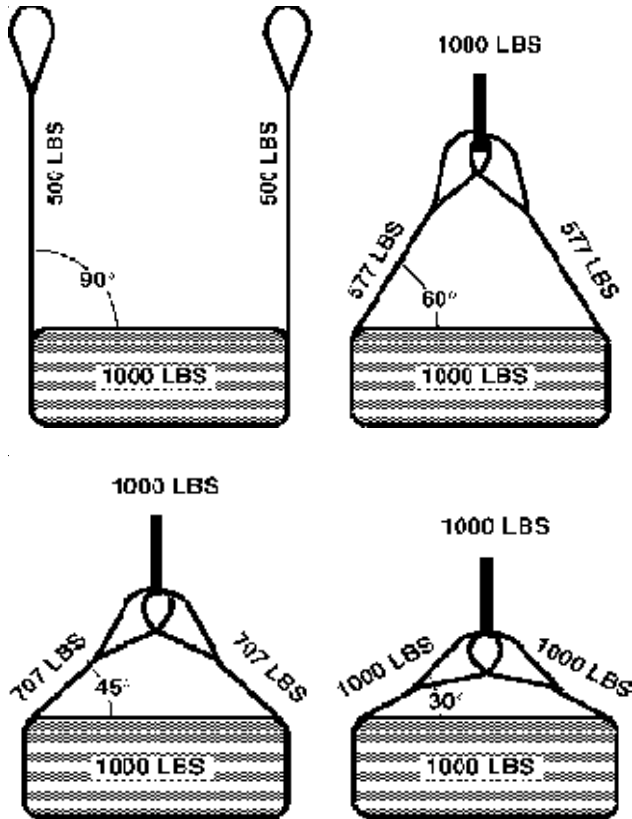


Figure B-12: Load at Various Sling Angles

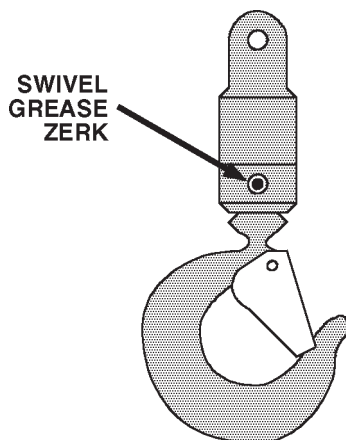
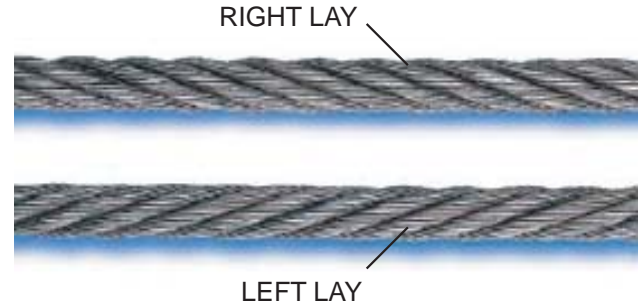


Figure B-14: Swivel Hook Grease Zerk

2.6-6: WIRE ROPE LAY

Wire rope "lay" indicates the directions strands lay in the rope - right or left. When you look down a rope, strands of a right lay rope go away from you to the right, like a right hand screw thread. Left lay is the opposite, and corresponds to a left hand screw thread.



You must choose the correct lay for your winch drum to avoid winch spooling problems and rope which does not lay correctly. Use the following graphics to help in selecting the correct wire rope based on the direction of drum winding.

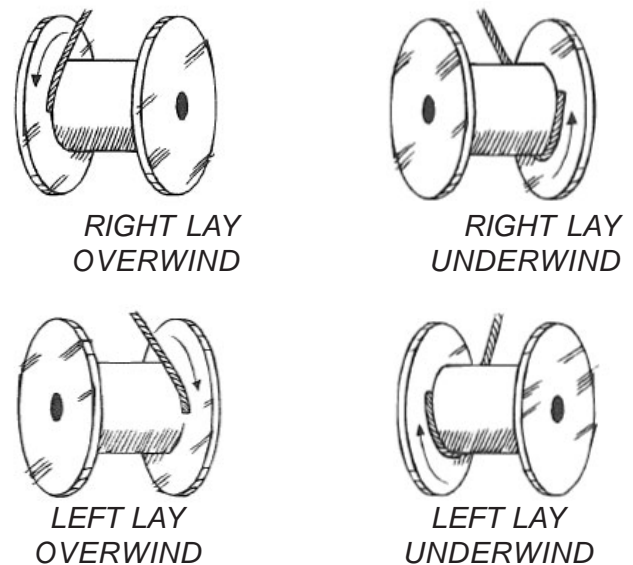


Figure B-13: Wire Rope Lay & Winding

2.6-7: HOOK & LATCH MAINTENANCE

Swivel hooks with grease zerks must be lubricated on a weekly basis. Some hooks have a grease zerk for this purpose. If the hook on your crane does not have a grease zerk, you do not need to lubricate the hook. See Figure B-14.

If a crane latch becomes inoperative due to wear or deformation, it must be repaired prior to being returned to service.

2-7: PERIODIC VEHICLE INSPECTION

Maintaining the carrier vehicle in safe operating condition is essential for safety. The vehicle should be inspected in accordance with the vehicle manufacturer's recommendations. Consult the documentation which accompanied your vehicle.

2-8: PERIODIC CRANE INSPECTION

The Crane Inspection Checklist, included in the Reference Section (6), is designed to assist you in maintaining the crane in safe operating condition. Become familiar with the checklist prior to operating the crane, and inspect to the instructions shown on the checklist.

ANSI/ASME B30.5A required that written, dated, and signed inspection reports and records must be maintained monthly on critical items including the brakes, crane hooks, wire rope, hydraulic cylinders, and hydraulic pressure relief valves.

NOTE

A CRANE LOG BOOK, PART NO. 99900686, IS AVAILABLE FROM IMT. THE CRANE LOG PROVIDES A CONVENIENT AND PRECISE INSPECTION RECORDING METHOD.

2-9: ADDITIONAL INSPECTIONS

Every three months, and more frequently when the equipment is subject to heavy useage, perform the following inspections in addition to those specified in the Crane Inspection Checklist in the Reference Section.

LOWER AND EXTENSION BOOMS

1. Check structural defects evidenced in weld cracks, dents or bends.
2. Check slide pads for wear.
3. Check lower and extension cylinder pins for proper installation. Check hinge pin bushings for excessive wear.

BOOM & MAST ASSEMBLY

1. Check control valvebank and all other fittings for oil leaks and tightness.

2. Check all bolts and retainer plates on pin assemblies for proper installation.

3. Check torque on all unit mounting bolts. See Figure B-14 for mounting bolt torques on each crane model.

<u>MODEL</u>	<u>MOUNTING BOLT TORQUE</u>
1015	200 FT-LB
2020	200 FT-LB
3020	680 FT-LB
3820	680 FT-LB
5020	680 FT-LB
5525	680 FT-LB
6020	680 FT-LB
6025	680 FT-LB
6625	680 FT-LB
7020	200 FT-LB
7025	200 FT-LB

Figure B-15: Mounting Bolt Torques

4. Check for loose bolts, fatigue cracks or corroded structural members.

BASE ASSEMBLY

1. Check base casting housing for cracks.
2. Check for proper rotation function by making several start-stop operations. Maximum allowable free-play at mast front should be 1/8" to 3/16".
3. Check for proper gear mesh in turntable gear-bearing. Check motor and gearmounting bolts for tightness.

HYDRAULIC SYSTEM

1. CYLINDERS
 - A. Check rods for damage such as scarring, nicks, dents and rust on out-of-service units.
 - B. Check for leaks at weld joints and rod seals. Check for drift indicating leakage around piston rings or defective holding valves.
 - C. Check cylinder case for dents.

2. HYDRAULIC PUMP

- A. Check for leaks at shaft seal.
- B. Check for drop in operating speed.
- C. Check hydraulic oil for excessive heating.
- D. Check bolts and fasteners for tightness. Note any unusual vibration or noise.

3. PTO AND PUMP

- A. Inspect for proper transmission gear to PTO engagement.
- B. When supplied, inspect driveline U-joints for securing cap tightness and adequate lubrication.
- C. Check mounting bolts on pump and PTO for tightness.

2-10: TETHERED REMOTE CONTROL INSPECTION

The tethered remote controls are subject to corrosion. They must be checked at least twice yearly and more often if operated in severe, wet conditions. To check for corrosion:

- 1. Remove the cover of the control handle and inspect for a lack of luster. Metal should appear bright and untarnished.
- 2. Spray the inside of the control handle with ignition sealer.
- 3. Check for broken or corroded ground wires, normally attached to the chassis frame with a self tapping screw. If faulty or extremely corroded, clean thoroughly and replace using new hardware.

WARNING

FAILURE TO COMPLY WITH THESE INSTRUCTIONS MAY RESULT IN A CONTROL FAILING TO RETURN TO NEUTRAL AND MAY CAUSE SERIOUS INJURY, DEATH OR EQUIPMENT DAMAGE.

2-11: CORROSION CONTROL

IMT treats metal to metal surfaces and hardware on new cranes with Cortex VCI-389, a chemical for rust prevention. Surfaces sprayed with Cortex VCI-389 will have a slight yellow or cream color. The discoloration can be removed with a degreaser or citrus cleaner.

Cortex VCI-389 prevents rust for about one year from application. It can be reapplied after crane disassembly or cleaning for continued rust prevention.

In addition, to ensure the life and appearance of the crane, which includes booms, hydraulic hoses, rotation bearings and rotation gearing, the crane must be thoroughly washed and lubricated after performing job functions in harsh environments, such as dirt, sand, salt water spray, etc. If this maintenance step is neglected, you run the risk of shortening the life of the crane through corrosion and abrasion. After a thorough washing, refer to Figure B-2, Lubrication Products & Schedule, for proper maintenance as scheduled.

2-12: LONG TERM STORAGE

When a crane is put into long term storage, it should be stored within a controlled environment. To prolong the life of hydraulic system seals, o-rings, hoses, filters and pumps, the crane must be operated and maintained on a regular basis. If this maintenance is neglected, hydraulic system components will dry out which will require extensive repair and expense. IMT recommends the crane be operated, with all functions cycled fully as in normal operation, at least every three months. The climate in which the crane is stored may dictate more frequent operation to prevent component deterioration.

All wire rope which has been idled for a period of a month or more, due to shutdown or storage of a machine, shall be given a thorough inspection before it is placed into service. This inspection should cover all types of deterioration.

2-13: CHEMICAL SAFETY

Many chemicals are available for cleaning and lubricating your equipment. Prior to opening or using any chemical for cleaning, lubrication, or other procedure, **READ THE LABEL**.

Labels on chemical containers list important information on health, safety, and the product itself. This information can save you from serious injury or even DEATH. Some of this information may be the scientific or common name of the chemical, which is useful when describing poisoning conditions to a poison control center or doctor. The label also describes chemical properties such as flammability, combustibility, explosiveness, or corrosiveness. This information can save your life.

The label also provides advisories in how the product is to be used, such as, "Use only in a well-ventilated area", "Keep away from heat", or "Avoid contact with skin". Always follow these and other warnings and instructions, and refer to the container for first aid instructions.

These warnings and advisories may also be posted in the area where chemicals are stored or used.

Chemicals and their containers have specific handling, storage, and disposal requirements. If these aren't noted on the container, acquire the information from the chemical distributor or responsible governmental agency.

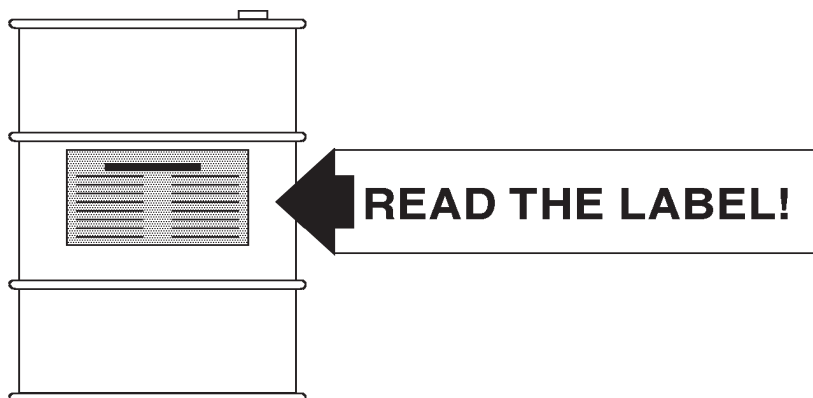


Figure B-16: Chemical Container Labels

2-14: EXCESSIVE LOAD LIMIT SYSTEM (ELLS) TEST PROCEDURE

Use this procedure to test the Excessive Load Limit System (ELLS) used on the IMT Telescoping Crane models. Following this test procedure will ensure the system is currently operable and will not allow the crane to be excessively overloaded.

The purpose of the ELLS is to prohibit the excessive overloading of the crane. It does this by disarming the functions that make it possible for the operator to apply greater than allowable stress to the crane structure and components. The functions which are involved in the ELLS may vary for each crane model (Refer to TABLE 1 for which functions are shut down by the ELLS on each crane).

The load rating of the crane is determined by the pressure induced in the lower boom cylinder. The ELLS senses the pressure in the base end of the lower boom cylinder with a normally closed pressure switch located on the valve block on the top of the cylinder. When the pressure in the base end of the cylinder exceeds the setting of the pressure switch for that particular crane, the pressure switch opens and breaks the ground connection for the solenoids that shift the valve spool on the appropriate functions. Once the ground connection is disengaged, the solenoids that shift the valve spools for the appropriate functions can not be activated using the remote control handle. Only those functions that will not increase the load moment of the crane structure and components will be operable (i.e.- winch down, extension in, lower boom up, rotation). The operator is able to use "WINCH DOWN" to set the weight down to relieve the crane and "EXTENSION IN" to bring the load in for a shorter load radius. Either of these two functions will decrease the load moment of the crane structure and components, thus decreasing the pressure in the main cylinder.

ITEMS REQUIRED TO TEST THE CRANE ELLS (SEE PHOTOS NEXT PAGE)**PRESSURE GAGE ASSEMBLY (GAGE & PIPE-JIC ADAPTER)**

-5000 PSI LIQUID FILLED PRESSURE GAGE W/ 1/4" PIPE THRD	QTY 1
-1/4 PIPE-#6 JIC ADAPTER (ref) PARKER PART# 0203-4-6	QTY 1

16" HOSE ASSEMBLY (3/8" OR 1/4" HOSE W/ #6 FEM. JIC FITTINGS & T-FITTING)

-TEE FITTING (ref) PARKER PART# 653T-6-6	QTY 1
-#6 FJIC FITTING (ref) PARKER PART# 10643-66	QTY 2
-3/8" SAE 100R16 HOSE (ref) PARKER PART# 431-6	QTY 16"

4" HOSE ASSEMBLY (3/8" OR 1/4" HOSE W/ #6 FEM. JIC FITTINGS)

-#6 FJIC FITTING (ref) PARKER PART# 10643-66	QTY 2
-3/8" SAE 100R16 HOSE (ref) PARKER PART# 10643-66	QTY 4"

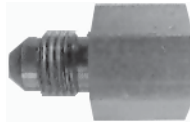
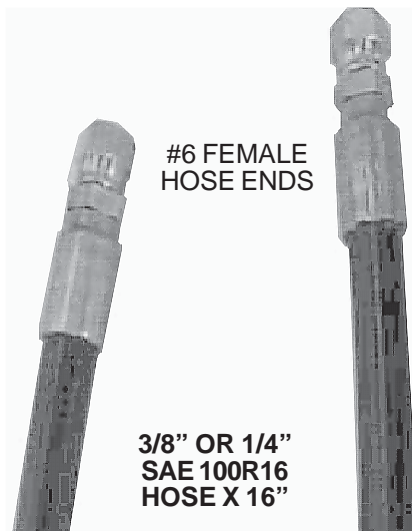
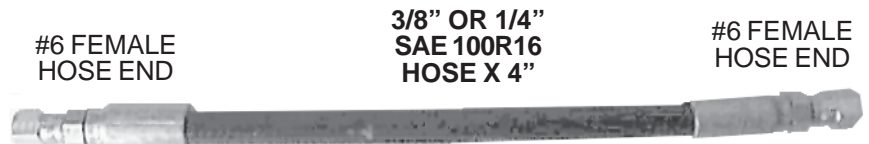
#6 STR-#6 MALE JIC FITTING (ref) PARKER PART# 0503-6-6	QTY 2
---	-------

#6
MALE
STRAIGHT
THREAD#6
MALE
JIC#6
MALE
STRAIGHT
THREAD#6
MALE
JIC

TEE

#6
MALE
JIC

ADAPTER

1/4"
FEMALE
PIPE
THREAD**5000 PSI
LIQUID FILLED
PRESSURE GAUGE**#6 FEMALE
HOSE ENDS3/8" OR 1/4"
SAE 100R16
HOSE X 16"#6 FEMALE
HOSE END3/8" OR 1/4"
SAE 100R16
HOSE X 4"#6 FEMALE
HOSE END

TEST PROCEDURE

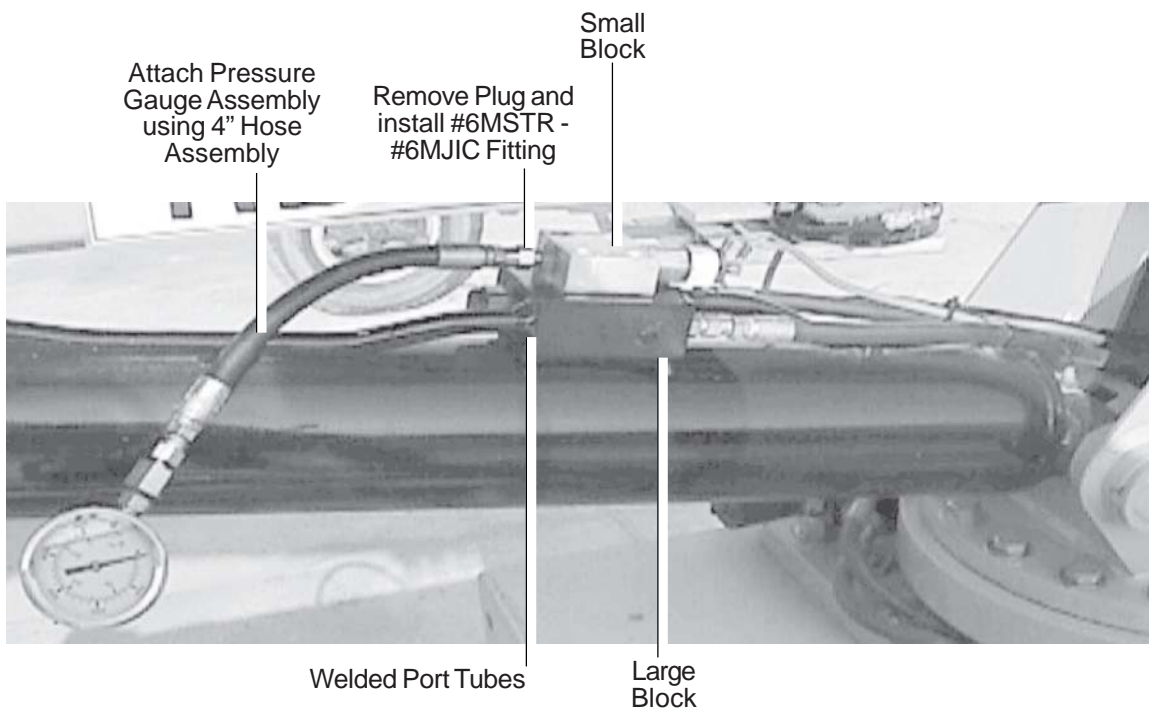
A. Position Crane Boom

1. Back the truck up to an immovable object to which the crane hook can be securely fastened. The boom tip must be directly over the immovable object when the crane is rotated to the rear of the truck, with the extension extended one foot.
2. Engage the parking brake and PTO.
3. Properly position all stabilizers.
4. Rotate crane so it is pointing directly off the rear of the truck. (Most stable position)
5. Extend extension boom one foot.
6. Check to assure that the boom tip is positioned directly over the immovable object to which the crane hook can be securely attached.
7. Lower the lower boom until the lower boom cylinder is fully retracted and bottoms out.
8. After the boom is bottomed out, hold the "LOWER BOOM DOWN" function for two seconds to make sure cylinder is bottomed out.
9. Disengage PTO and turn off the engine in the truck.
10. Turn the truck ignition back on after the engine is stopped. **BE AWARE OF TRAPPED PRESSURE BEHIND THE PLUG IN THIS STEP!! PRESSURIZED OIL MAY CAUSE SERIOUS INJURY!!**
11. Trigger the function for the main boom up and down a few times to relieve trapped pressure in cylinder.

B. Attach Pressure Gauge (Procedure used depends on cylinder block used on crane.)

- Use Procedure 1 for cranes featuring a large valve block with a smaller block attached and the port tubes welded directly to the valve block and cylinder.
- Use Procedure 2 for cranes with only one valve block and the port tubes are removable by use of fittings on the valve block and on the cylinder.

1. **Procedure 1** (Large valve block with smaller block attached – port tubes welded)
 - a. BE AWARE OF TRAPPED PRESSURE BEHIND THE PLUG IN THIS STEP!! PRESSURIZED OIL MAY CAUSE SERIOUS INJURY!! Slowly remove #6 hex plug on the end of the smaller block on the lower boom cylinder.
 - b. Install #6 MJIC fitting into the port that the plug was removed from.
 - c. Attach 5000 PSI liquid-filled pressure gage assembly using 4" hose assembly.
 - d. Be sure to tighten all fittings securely.

PRESSURE GAGE ASSEMBLY & 4" HOSE ASSEMBLY

2. Procedure 2 (Large valve block only – port tubes removable)

- a. Remove bolts that attach the valve block to the cylinder
- b. **BE AWARE OF TRAPPED PRESSURE BEHIND THE PLUG IN THIS STEP!!**
PRESSURIZED OIL MAY CAUSE SERIOUS INJURY!! Turn off fitting connecting port tube to base end of cylinder (end closest to crane base).
- c. Turn off fitting connecting port tube to valve block.
- d. Carefully remove port tube that runs from the valve block on the lower boom cylinder to the base end of the lower boom cylinder, being sure not to damage fittings.
- e. Remove fitting from valve block.
- f. Install 16" hose assembly with T-fitting (refer below) between block on lower boom cylinder and base end of lower boom cylinder.
- g. Attach pressure gage assembly to T-fitting using 4" hose assembly (refer to figure below).
- h. Be sure to tighten all fittings securely.

16" HOSE ASSEMBLY WITH T-FITTING & 4" HOSE ASSEMBLY

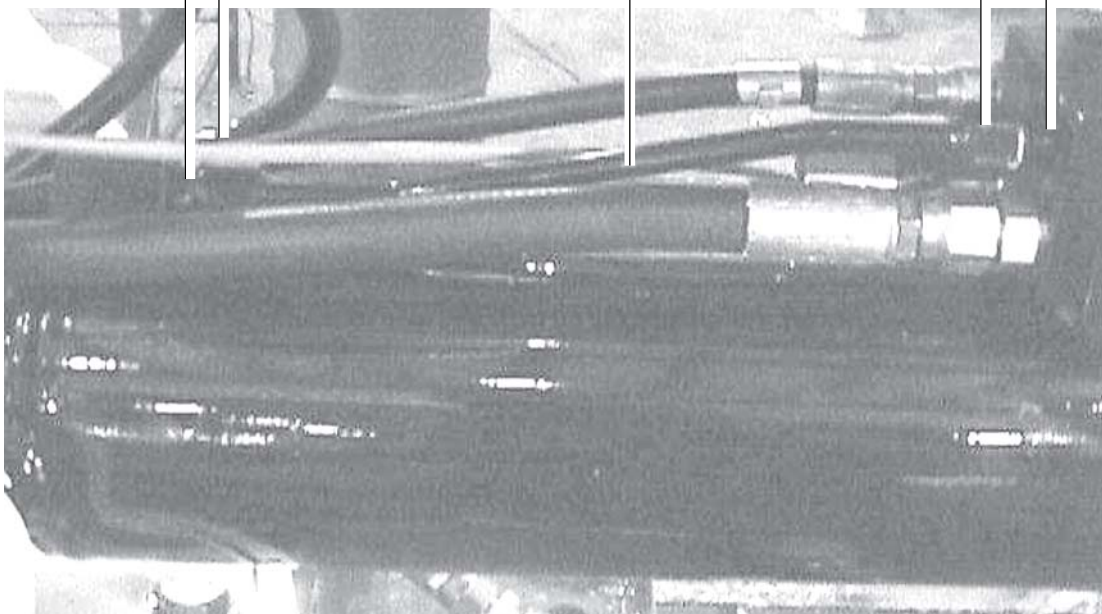
Fitting connecting Port Tube to
Base End of Cylinder

Remove
Fitting

Remove
Port Tube

Fitting connecting Port Tube to Valve
Block

Remove
Fitting on
Valve Block



C. Test System

1. Start truck engine.
2. Raise boom up until boom cylinder is fully extended, then lower boom until cylinder is fully retracted to remove air that may have been introduced while installing the gage.
3. Raise boom to 15 degrees above horizontal and securely fasten crane hook to immovable object using a double line attachment.
4. Use the winch up function to take slack out of cable.
5. Refer to Figure B-16 for maximum pressure at which ELLS system should shut down appropriate functions for the particular crane model being tested.
6. While monitoring the pressure gage, use the winch up function to slowly apply down force on end of boom. If the pressure on the gage exceeds the maximum pressure for that particular crane and the ELLS has not shut down the appropriate functions, the ELLS is not working. Do not go any higher.
7. If the system is operating properly, the function should stop working before the gage reaches maximum pressure.
8. While the pressure gage still reads the pressure at which the ELLS shut down the appropriate functions, test the other functions that should be shut down by the ELLS (Figure B-16).
9. If the appropriate functions are not operational, the ELLS system is working
10. If any of the functions in Figure B-16 are still operational, the ELLS system is not working.
11. Refer to the ELLS trouble-shooting procedure (Section 2-15) for instructions to determine the problem with the ELLS.

Figure B-17: Functions Shut Down by ELLS

IMT CRANE MODEL	FUNCTIONS SHUT DOWN BY ELLS			MAX. TEST GAGE PRESSURE ALLOWED
	WINCH UP	EXTENSION OUT	LOWER DOWN	
1015	X	X	X	3000
2020	X	X	X	3000
3020	X	X	X	3300
3820	X	X	X	3500
5020	X	X	X	3500
5525	X	X	X	3300
6020	X	X	X	3500
6025	X	X	X	3300
6625	X	X	X	3300
7020	X	X	X	3200
7025	X	X	X	3200
8025	X	X	X	3200

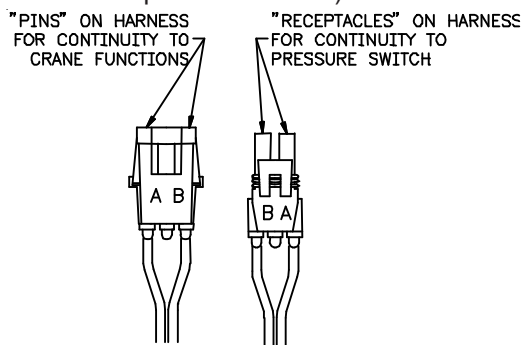
2-15: ELLS TROUBLESHOOTING PROCEDURE

Each function (winch up, winch down, extension in, etc.) is actuated by a solenoid that shifts the valve spool to perform the particular function. The solenoids are located on the valve bank. Each solenoid has two wires protruding with a connector on the end that is plugged into a connector on the wire harness for the crane. There are two wires, one wire is black (ground) and the other wire is colored. The "ground receptacle" is the receptacle that the black wire connects to.

A. Find which solenoid actuates which function

-When a solenoid is actuated, it becomes magnetic. By using a piece of steel to find which solenoid is magnetic, (steel ruler, paper clip, etc.) the solenoids can be matched with which function it controls. It will not be a real strong magnetic pull, but will be detectable with a small piece of metal.

1. Be sure the truck ignition is on, the parking brake is engaged, and power is "on" to the crane. The PTO does not need to be engaged.
2. Activate "LOWER UP" on the remote control handle and use the piece of steel to find which solenoid is magnetic (being actuated).
3. When the correct solenoid is found, unplug the connector protruding from the solenoid.
4. Activate "WINCH UP" on the remote control handle and use the piece of steel to find which solenoid is magnetic (being actuated).
5. When the correct solenoid is found, unplug the connector protruding from the solenoid.
6. Unplug the connector protruding from the pressure switch (Some models may have wire terminals instead of a connection. Detach the wires from the pressure switch.)



7. Using a multi-meter, check continuity (setting on multi-meter that "beeps" if two wires are connected) between the ground receptacle on the connector that plugs into the connector on the "LOWER UP" solenoid and the ground receptacle on the connector that plugs into the connector on the "WINCH UP" solenoid. They should not be continuous. If they are, the harness is the problem, which needs to be either repaired or replaced.
8. Reconnect the pressure switch.
9. Repeat steps 4-8 for each of the functions shut down by the ELLS. Instead of using "WINCH UP", use the appropriate function and find the controlling solenoid and check for continuity with ground receptacle on the connector that plugs into the connector on the "LOWER UP" solenoid.
10. Activate "WINCH UP" on the remote control handle and use the piece of steel to find which solenoid is magnetic (being actuated).
11. When the correct solenoid is found, unplug the connector protruding from the solenoid.
12. Unplug the connector protruding from the pressure switch (Some models may have wire terminals instead of a connection. In this case, detach the wires and use the ground wire that attaches to the pressure switch for the next step.)
13. Using a multi-meter, check continuity between the ground receptacle on the connector that plugs into connector on the pressure switch and the ground receptacle on the connector that plugs into the connector on the "WINCH UP" solenoid. They should be continuous. If they are not, there is a problem with the harness, which either needs to be repaired or replaced.
14. Reconnect the pressure switch.
15. Repeat steps 10-14 for each of the functions shut down by the ELLS. Instead of using "WINCH UP", use the appropriate function and find the corresponding solenoid. Each one should be continuous with the ground receptacle on the connector that plugs into the connector on the pressure switch.
16. If there is no problem found with the harness, the pressure switch is the problem and it will need to be replaced.

2-16: WINCH TROUBLESHOOTING

POSSIBLE CAUSE	PROBABLE CURE
WINCH WON'T LIFT HEAVY LOADS.	
TOO MUCH LOAD.	RIG TO REDUCE LOADING ON WINCH.
LOW OR NO GEARBOX OIL.	CHECK OIL LEVEL. ADD PROPER OIL IF NECESSARY.
MOTOR INLET PRESSURE IS LESS THAN SPECIFICATIONS WITH LOAD STALLED.	TEST HYDRAULIC PUMP. CHECK MAIN RELIEF - MODEL 1015 - 2250 PSI MODEL 2020 - 2350 PSI MODELS 3020, 3820, 5020, 5525, 6025, 6625 - 3000 PSI MODEL 7020/7025 - 2500 PSI
BRAKE SHOULD ENGAGE IN PAYOUT DIRECTION ONLY.	RUN WINCH WITH NO LOAD IN BOTH DIRECTIONS. SYSTEM PRESSURE SHOULD BE SLIGHTLY HIGHER IN PAYOUT DIRECTION.
CHECK FLOW TO WINCH MOTOR WITH WINCH UNDER LOAD.	TEST PUMP IF NOT TO SPECIFICATION.
CHECK END PLAY IN WORM.	IF GREATER THAN 0.030", INSPECT WORM BEARINGS FOR WEAR. REPLACE IF NECESSARY.
WINCH WON'T HOLD LOAD.	
BRAKE MAY NEED ADJUSTMENT.	TURN ADJUSTING SCREW CLOCKWISE 1/4 TURN AT A TIME. RE-TEST WINCH.
BRAKE DISCS MAY BE WORN.	INSPECT. REPLACE IF NECESSARY. RETEST.
CAM CLUTCH IN BRAKE MAY BE INSTALLED INCORRECTLY.	REVERSE CLUTCH. RETEST.
JOURNAL ON WORM WHERE CAM CLUTCH RUNS MAY BE GALLED OR WORN.	INSPECT. REPLACE WORM IF NECESSARY.
WINCH RUNS TOO SLOWLY.	
SYSTEM MAY HAVE LOW FLOW.	INSTALL FLOW METER IN SYSTEM. TEST UNDER LOAD. IF FLOW IS BELOW SPECIFICATIONS, INSPECT PUMP.
MOTOR WORN OUT.	REPLACE MOTOR.
WINCH WILL NOT RUN UNDER LOAD. (RELIEF VALVE OPENS W/O WINCH TURNING.)	
MOTOR SEIZED UP.	REMOVE MOTOR FROM WINCH. TEST IF OPERABLE. IF NOT, REPLACE MOTOR.
WORM AND GEAR SET DAMAGED.	REPAIR GEARBOX.

SECTION 3: REPAIR

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3-1: GENERAL

The information supplied in this section of the manual is designed to help you service and repair of your IMT telescopic crane. Information on inspection, lubrication and general maintenance information can be found in the previous sections of this manual. Before attempting to perform any service work, the machine must be shut down as outlined in the Operation Section.

3-2: REPAIR PRECAUTIONS

Maintaining your crane regularly keeps the crane operating safely.

Prior to starting repairs on your telescopic crane:

1. Park the crane in an area where other equipment is not operating and where there is no through traffic.
2. Set the carrier vehicle's parking brake. Use wheel chocks to prevent vehicle movement.
3. Position the crane in its stowed position if possible, or with the boom supported to prevent boom collapse during maintenance.
4. Place all controls in the "OFF" position and disable any means of starting the carrier vehicle or powering the crane.
5. Disconnect the PTO.
6. Secure sheaves and/or load blocks so they will not swing or fall during maintenance.
7. Relieve the hydraulic oil pressure from all circuits before disconnecting any hydraulic fittings or components.
8. Replace any parts with only factory approved replacements.

Prior to putting your telescopic crane back into service:

1. Replace all shrouds, guards and safety devices removed during maintenance.
2. Remove all trapped air in the hydraulic system to prevent erratic operation.
3. Clean grease and oil from controls.
4. Make certain all decals are present and legible.

5. DO NOT return to the worksite until all repairs are proven to be in proper working condition.

3-3: SYSTEMATIC REPAIR PROCEDURE

- 1) Begin repairs by studying the hydraulic schematics and systematically approaching the problem.
 - Locate the source of the problem.
 - List possible causes.
 - Devise checks.
 - Conduct checks in a logical order to determine cause.
 - Consider the remaining service life of components against the cost of parts and labor needed to replace them.
 - Make the necessary repair(s).
 - Re-check to be sure nothing has been overlooked.
 - Functionally test the new part.
- 2) If you cannot determine or correct the problem, contact your local distributor or the IMT Technical Service Department. Have your parts manual, model number, and serial number on hand when you call. This information is usually located on the serial number placard posted on the crane mast or lower boom.

NOTE

SAFETY IS THE MOST IMPORTANT CONSIDERATION WHEN WORKING AROUND CRANES. STAY CLEAR OF MOVING PARTS, UNDERSTAND THE JOB, AND USE COMMON SENSE.

CAUTION

ALWAYS LABEL WIRES, CABLES & HOSES WHEN DISASSEMBLING.

3-4: CLEANLINESS

Keep dirt out of working parts to preserve the life of the crane. Enclosed compartments, seals, and filters have been provided to keep the air supply, fuel, and lubricants clean. Maintain these enclosures.

When any hydraulic oil, fuel, or lubricating oil lines are disconnected, clean the adjacent areas as well as the connection point. Once disconnected, cap, plug, or tape each line to prevent foreign material entry.

Clean and inspect all parts, and cover them once clean. Be sure all passages and holes are open. Install clean parts and leave new parts packaged until assembly.

3-5: HYDRAULIC SYSTEM

The hydraulic system must be clean. Contaminants in the hydraulic system affect operation and can cause component damage. When working on the hydraulic system:

NEVER

- Allow foreign material including dirt, metal particles, or water to enter the hydraulic system. Cap all connections. If you find evidence of foreign particles, flush the system and replace filters.

ALWAYS

- Relieve hydraulic pressure.
- Inspect all seals during assembly and disassembly. IMT recommends installing new seals after hydraulic system repairs.
- Position hoses so they don't rub on the crane or other hoses. Maintain natural hose curvature.
- Clean hydraulic components prior to assembly, using an appropriate solvent and following manufacturer precautions. Disassemble and assemble components on a clean surface.
- Cycle all controls after repair to eliminate trapped air and alleviate erratic movement.
- Check for hydraulic leaks after repair. A high-pressure leak is hazardous and must be repaired prior to putting the unit back in service.

WARNING

USE CLEANING SOLVENTS ONLY IN A WELL-VENTILATED AREA WITH FIRE EXTINGUISHERS READILY AVAILABLE.

3-6: FASTENERS & TORQUE VALUES

BOLTS: Use bolts of the correct length so the bolt does not bottom out and enough threads are engaged.

Torque values correspond to the bolts, studs, and nuts used. Use hardened washers when torquing nuts or bolts.

Identification of fastener grades is necessary. When marked as a high grade bolt (grade 5, 8, etc.) the mechanic must be aware he is working with a highly stressed component, and the fastener should be torqued accordingly.



GRADE 5



GRADE 8

HEX HEAD CAP SCREW IDENTIFICATION

Figure C-1: Fastener Grade Identification

WARNING

USE OF FASTENERS OTHER THAN THE GRADE SPECIFIED CAN CAUSE PERSONAL INJURY OR EQUIPMENT FAILURE. IF A MOUNTING BOLT IS REMOVED, **ALWAYS** REPLACE IT WITH A NEW BOLT OF THE SAME GRADE.

When the maximum recommended torque value has been exceeded, replace the fastener.

NOTE

TEMPERATURE VARIATION, VIBRATION, AND METAL ELASTICITY CAN RESULT IN THE GRADUAL REDUCTION OF BOLT TORQUE. RE-TORQUE BOLTS AS OUTLINED IN THE INSPECTION PROCEDURES.

3-7: CRANE BASE REMOVAL AND REPLACEMENT

- 1) Mark and remove the hydraulic hoses connected to the base. Be sure to cap the hoses to prevent contamination.
- 2) Use a hoist or two slings to support the entire crane.
- 3) Remove and discard the bolts which mount the crane base to the body. Upon reassembly, replace with new bolts which are properly torqued.
- 4) Using the hoist or slings, lift the crane up. Remove the base for service or replacement.

3-8: WORM DRIVE WINCH

Worm drive winches on IMT telescopic cranes are equipped with three plugs. The plug on the top of the winch is used to fill the winch with oil. The plug at the bottom is used to drain oil, if needed. The plug on the side is used as a gauge to determine if there is enough oil in the winch.

Each telescopic crane requires a specific amount of oil in the winch.

Use 85W140 oil or equivalent in the winches, unless otherwise directed. Fill winch with oil per the following chart.



Figure C-2: Winch Plugs

Crane Model	Volume of Oil in Winch
1015	1/3 quart
2020, 3820, 5020	1/2 quart
5525, 6020	1 quart
7020, 7025	2 quarts

3-8-1: REMOVING THE WORM DRIVE WINCH

To remove and replace the winch,

1. Unhook and remove the wire rope.
2. Unbolt the four bolts which hold the winch in place.
3. Unbolt the pillow block on the opposite side of the winch.
4. Remove the winch.

Reverse the procedure to install a new winch.

If the winch vibrates on reassembly, use a spacer on the winch motor side for a tighter fit.

3-8-2: PLANETARY WINCH (MODELS 6025 AND 6625)

The planetary winch (used on crane models 6025 and 6625) includes both a gearbox and a disc brake. A complete winch manual is included with the parts manual for the 6025 and 6625 crane. Check the oil in the planetary winch every 500 hours, and change the oil completely every 1000 hours. Use SAE 90 EP gear lube in the gearbox and automatic transmission fluid in the brake section.

3-9: CRANE ROTATION SYSTEM

IMT telescopic cranes have two types of rotation systems; an integral base and worm drive system and a turntable system. Use the following chart and the parts manual to determine which type of rotation system is applicable for your telescopic crane.

Crane Model	Rotation System
1007, 1015, 2020	IMT base & worm drive
3020, 3820, 5020, 5525, 6025, 6625	Integral base & worm drive
7020, 7025	Spur gear drive train rotation

3-9-1: REMOVING THE CRANE ROTATION SYSTEM

1. Retract extension booms, and support both the crane and mast fully.
2. Lower the boom so that the boom tip is as low as possible.
3. Cinch two slings or a hoist on opposite sides of the boom center of gravity. Hook slings on hoist and raise hoist to tension the slings.
4. Identify, mark, and remove hose connection between the crane base and boom. Cap or plug all open hydraulic fittings.
5. With boom fully supported, remove and discard bolts which secure mast to rotation system. Upon reassembly, replace bolts with new, properly-torqued bolts.
6. Remove rotation system from mounting system.

3-9-2: SETTING BACKLASH - IMT BASE & WORM DRIVE (1007, 1015, 2020)

NOTE

BACKLASH IS DEFINED AS THE SHORTEST DISTANCE BETWEEN NON-DRIVING TOOTH SURFACES OF ADJACENT TEETH IN MATING GEARS. BACKLASH IS MEASURED AT THE HIGH SPOT ON THE TURNTABLE BEARING (USUALLY INDICATED BY YELLOW OR LIGHT BLUE PAINT), USING A THICKNESS OR FEELER GAUGE AT OR NEAR THE PITCH DIAMETER AND TANGENT TO THE GEAR TEETH.

Telescopic crane models 1007, 1015, and 2020 have a common gear and rotation system. To set the backlash on these models,

1. Bolt the worm gear in place.
2. Position the high spot on the bearing next to the center of the worm gear. (The high spot on the bearing is marked by the manufacturer with paint.)
3. Screw a bolt into the threaded hole nearest the high tooth. Screw additional bolts into threaded holes at 90° from the high tooth.
4. Check for clearance between gears using a feeler gauge. Clearance should be between .005 and .012". Rotate the gear completely to verify that the assembly does not bind.

5. Install and tighten remaining bolts in the correct sequence with the correct torque, using the torque chart and the torque sequence in the General Reference section of this manual.

3-9-3: WORM END PLAY & BACKLASH - INTEGRAL BASE & WORM DRIVE (3020, 3820, 5020, 5525, 6025, 6625)

Crane models 3020, 3820, 5020, 5525, 6025, 6625 have an integral base and worm drive rotation system.

To set both Worm End Play and Backlash, you must locate the high tooth on the gear. Usually this spot is marked by the manufacturer with light blue paint. If you cannot find the paint mark, identify the high tooth using a dial indicator with a magnetic base and a round steel pin which is large enough to contact the bearing near the pitch line of the bearing tooth. Set the indicator base on the face of the bearing race that does not have teeth. Place the pin between two of the teeth. Set the indicator probe on the pin and adjust the dial to zero. Rotate the bearing, checking every third tooth until you find the highest indicator reading. Check three teeth in both directions in this area to determine the highest tooth. The amount of run-out varies depending on the diameter of the bearing. Once you find the high tooth, mark it for future reference.

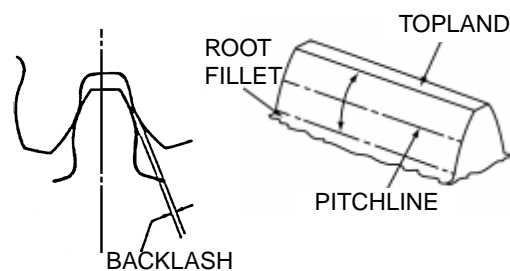


Figure C-3: Bearing Tooth Contact Point

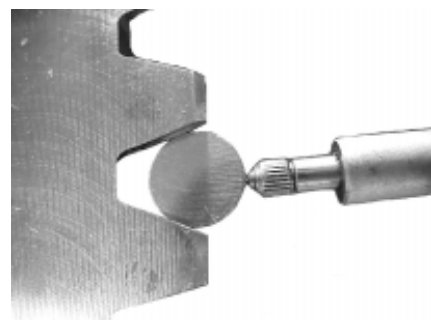


Figure C-4: Pin and Indicator Tip

To set the worm end play:

1. Locate the high tooth on the gear. (The high spot on the bearing is marked by the manufacturer with paint.)
2. Screw a bolt into the threaded hole nearest the high tooth. Screw additional bolts into threaded holes at 90° from the high tooth.
3. Mount a magnetic base with an indicator attached on top of the worm housing and at the opposite end from where the motor is mounted.
4. Adjust the indicator to read from the end of the worm shaft. Set the indicator to "0".
5. Using two of the bolts as handles, rotate the outer race back and forth. Read the total indicator movement. The measurement is the end play of the worm. The specification for end play is +0.000/-0.004. If your end play does not meet the specification, remove the bearing retainer and add or remove shims from the unit. Repeat the measurement process until the end play meets the specification.

To set the gear bearing backlash:

1. Locate the high tooth on the gear. (The high spot on the bearing is marked by the manufacturer with paint.)
2. Rotate the bearing until the high tooth is engaged with the worm. Loosen the three bearing retaining allen head capscrews just enough to be able to move the bearing toward or away from the worm. Screw a bolt into the threaded hole in the bearing nearest the worm.
3. Set the magnetic indicator base on the worm housing with the indicator probe against the bolt, and set the indicator dial at zero.
4. Move the bearing back and forth. Watch the indicator dial, and adjust the bearing in or out of the worm until the total indicator movement is 0.005". NOTE: Deduct any end play in the worm from the indicator reading.
5. Rotate the bearing 180°. Recheck the backlash. Total backlash should be 0.005" to 0.012".

6. After setting the backlash, torque the bearing retaining allen head capscrews which watching the indicator dial so that the correct backlash setting is maintained.

**Figure C-5: Dial Indicator Set-up****3-9-4: TURNABLE GEAR REMOVAL & REPLACEMENT (7020 & 7025)**

Model 7020 and 7025 cranes are equipped with a turntable gear. You can remove and replace the entire gear assembly using a hoist. If a hoist is not available, some boom disassembly will be necessary.

1. Retract extension booms.
2. Operate LOWER and EXTENSION boom control levers to position outer boom vertically with the boom point as low as possible.
3. Place two fabric slings around the boom. Cinch on opposite sides of the boom center of gravity. Hook slings on hoist and raise hoist to tension the slings.
4. Identify, mark and remove hose connections between the crane base and boom. Cap or plug all open hydraulic fittings.
5. With base, mast, and boom fully supported, remove bolts which secure mast to turntable gear.

CAUTION

**DO NOT LIFT CRANE TOO QUICKLY.
HOSE DAMAGE MAY OCCUR.**

7. Turntable gear bearing is now exposed. Remove cap screws that secure turntable gear to crane base.
8. Remove turntable gear from crane base.

9. Thoroughly clean the top of the crane base and bottom of the new turntable gear bearing. The mating surfaces must be clean and dry - no oil or grease.
10. Install the new gear bearing, with ball loading plug located next to pinion gear (See Figure C-6), using new bolts, hardened flat washers and Loctite 262 or an equivalent thread lock on bolt threads. Torque all cap screws per Torque Data Charts in the general reference section.
11. Reverse procedure for reassembly. Use new cap screws and hardened washers when attaching mast to turntable gear. Torque cap screws per Torque Data Charts in the general reference section.
12. Start the unit and slowly cycle all of the controls to evacuate air trapped in the hydraulic system. Simultaneously check for leaks.
13. After air has been purged from the system, check the reservoir oil level and top off oil if necessary.
14. Lift the full rated load and swing it completely around in both directions. Actuate the controls very slowly and keep the load as close to the ground as possible. Set the load down and move the crane to the stored position.
15. Recheck the gear bearing bolt torque of all gear bearing mounting bolts.

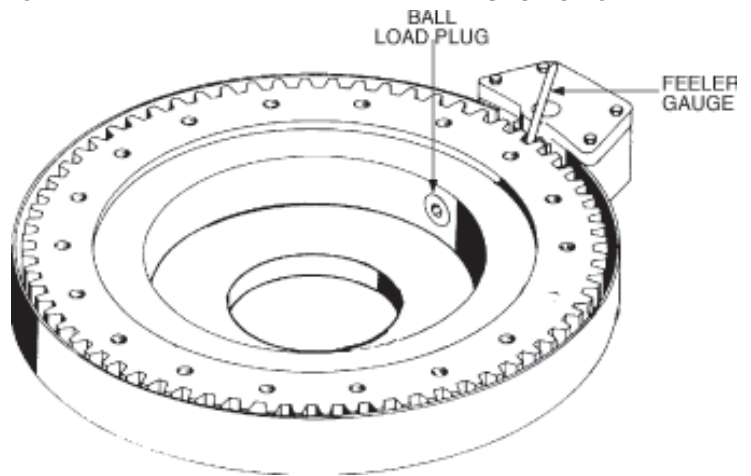


Figure C-6: Turntable Gear Bearing Installation

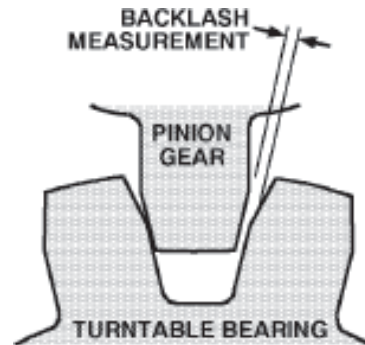


Figure C-7: Turntable Gear Bearing Backlash Measurement

WARNING

AFTER REMOVAL, REPLACE ALL GEAR BEARING MOUNTING BOLTS WITH IDENTICAL, NEW BOLTS. FAILURE TO REPLACE GEAR BEARING BOLTS MAY RESULT IN BOLT FAILURE DUE TO METAL FATIGUE AND COULD CAUSE A SERIOUS INJURY OR DEATH.

BEFORE TORQUING, SEE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE IN THE REFERENCE SECTION.

CHECK ALL BOLTS AFTER SWINGING THE FULL RATED LOAD. APPLYING THE FULL LOAD AGAINST ALL OF THE BOLTS WILL TEST BOLT TORQUES.

NOTE

FOR PROPER OPERATION OF THE CRANE, THE HIGH SPOT ON THE TURNTABLE GEAR MUST BE MATCHED TO THE PINION GEAR. THE HIGH SPOT ON THE TURNTABLE GEAR IS NORMALLY MARKED WITH YELLOW OR LIGHT BLUE PAINT. REMOVE PAINT AND CHECK GEAR BACKLASH WITH A FEELER GAUGE. CLEARANCE BETWEEN PINION GEAR AND TURNTABLE GEAR BEARING TEETH WILL USUALLY BE LISTED ON THE BASE ASSEMBLY DRAWING IN THE PARTS SECTION OF YOUR SPECIFIC CRANE MANUAL. SHIFT THE TURNTABLE GEAR AROUND TO ADJUST THE BACKLASH. SEE FIGURE C-7 FOR BACKLASH INFORMATION.

3-9-5: PINION, DRIVE GEAR BUSHING REMOVAL & REPLACEMENT (7020, 7025)

Models 7020 and 7025 are equipped with a pinion and drive gear bushing, located in the crane base.

NOTE

POWER MAY BE SUPPLIED BY A SIMPLE HAND PUMP OR BY AN AIR-OVER-HYDRAULIC INTENSIFIER PUMP.

To remove the pinion gear and bushings:

1. Rotate the crane mast until the notch on the mast base plate is positioned over the pinion gear.
2. Remove the pinion gear cover.
3. Locate and remove the retaining ring on the bottom of the pinion gear under the base.
4. Lift the pinion gear up and out of the intermediate gear. Slide the intermediate gear out of the way.
5. Install the bushing removal tool (IMT part number 92091200) as shown in Figure C-8.
6. Apply power to pull the bushings up and out of the base.
7. To install the bushings, assemble the tool as shown in Figure C-9. The flat side of the ring bushing set and top bushing fits against

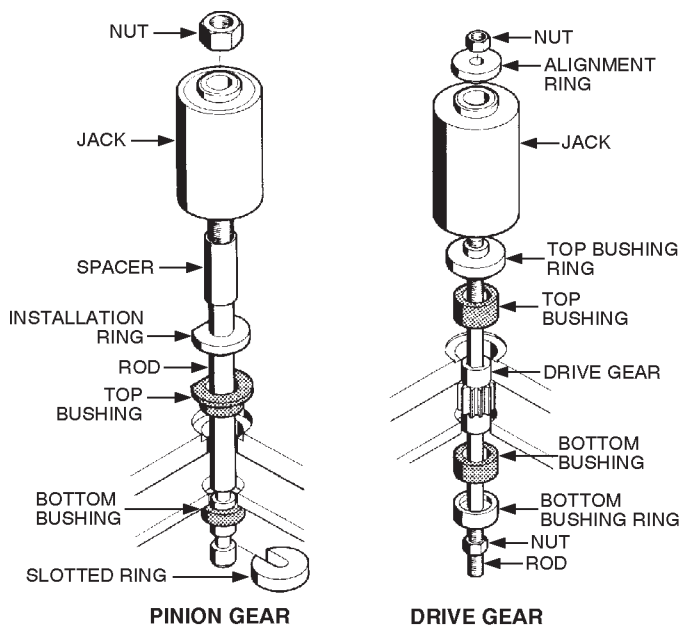


Figure C-8: Bushing Removal

the gear bearing. A spacer is installed and then the hydraulic jack.

8. Apply power to press the bushing into place.
9. Install the pinion gear and intermediate gear. Install the retaining ring on the bottom of the pinion gear. Pack the cavity around the pinion gear with grease and then install the pinion gear cover.
10. Lubricate the pinion through the grease zerk.

To remove the drive gear bushing:

1. Disconnect the hydraulic hoses and remove the rotation motor.
2. Remove the grease plate on the bottom of the drive gear.
3. Install the bushing removal tool as shown in Figure C-8. Apply power to pull the bushing and gear upward.
4. Reassemble the tool as shown in Figure C-9 and press the gear and bushings into place.
5. Install the grease plate and rotation motor. Lubricate the drive gear.
6. Connect the hydraulic hoses to the motor.
7. Start the engine, engage the PTO and test actuate the rotation motor. Check for leaks.
8. Rotate the crane at least five times in both directions to purge the air trapped in the rotation motor.

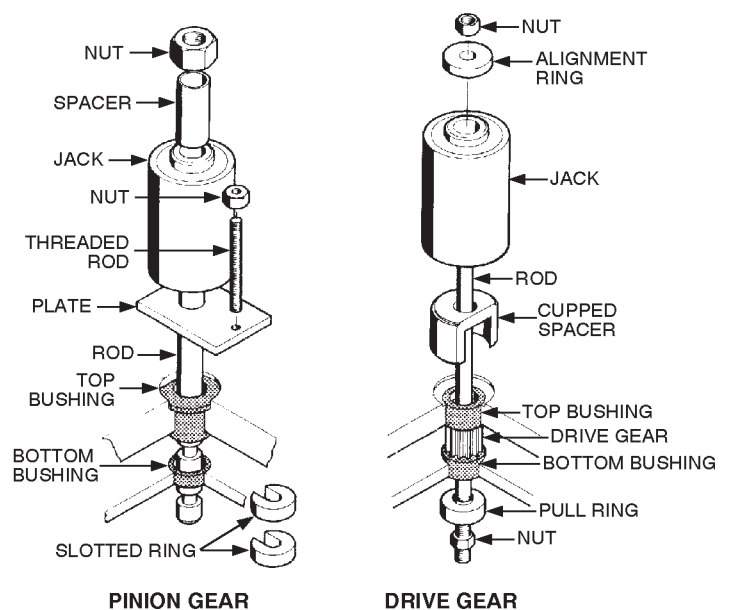


Figure C-9: Bushing Installation

3-9-6: ROTATION MOTOR AND C'BAL VALVE REMOVAL AND REPLACEMENT (7020, 7025)

1. Shut down hydraulic system to ensure there is no pressure in the system.
2. Remove the two input/output hoses connected to the counterbalance valve.
3. Remove the four counterbalance valve mounting bolts, being careful to cover parts with clean rags to prevent contamination.
4. Remove the two hydraulic motor mounting cap screws and carefully remove the motor.
5. Installation is the reverse of the steps above. Be sure the mounting bolts for all three items are torqued to the correct specification.

3-10: WEAR PADS

Telescopic cranes booms extend and retract on synthetic wear pads. The pads are either dropped in place in a cavity or screwed in place.

Replace wear pads when:

- The pads wear such that boom sections rub on each other, resulting in metal scraping and/or paint removal.

Wear pads can be located:

- On the bottom and sides of the front of the lower boom assembly.
- On the top of the extension boom assembly
- Around the pin which holds the main cylinder in place.

Refer to the parts manual for specific wear pad locations and styles for your telescopic crane.

To replace boom assembly wear pads:

1. Position the lower boom in a horizontal position at a comfortable working height.
2. Extend the required extension boom section sufficiently to allow access to wear pads. Remove and replace. **NOTE:** In some crane models, you may have to completely remove the extension boom to access the side wear pads. In other cases, you can lift the end of the boom with a hoist, or use ground pressure to SLIGHTLY raise the

boom to gain access to the wear pads.

3. To access the wear pads at the bottom of the lower boom assembly, completely pull out the extension boom section(s).
4. Remove the cap screws which hold the pads in place. Remove and replace the wear pads.
5. There may be round wear pads on the sides of extension end of the lower boom. (Models 5525, 6025, and 6625). Install the drop-in wear pad on the bottom of the boom, then install the round wear pads, then install the extensions.
6. Slide in new pad and replace retaining cap screws. Relieve hoist pressure on boom.

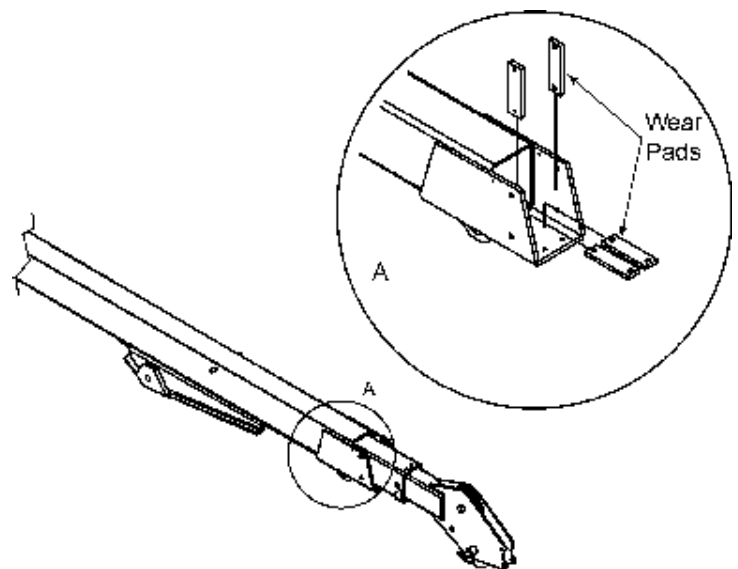


Figure C-10: Wear Pad Example

3-11: PINS

Pins are frequently used as structural components on telescopic cranes. Critical structural pins which require inspection and repair include:

- Pin which secures the lower boom assembly to the mast
- Pin which secures the main cylinder base end to the mast
- Pin which secures the main cylinder rod end to the lower boom assembly
- Pin which secures the extension boom assembly to the boom tip.

See Figure C-11 for the pins which secure the lower boom to the mast, the cylinder base to the mast, and the cylinder rod to the lower boom.



Pins

Figure C-11: Pin Locations

Every two years, disassemble the crane and inspect the critical structural pins (noted above) for damage.

To remove the pins:

1. Support crane assemblies using a hoist or two slings.
2. Remove pin.
3. Check for signs of wear. The pin should be shiny with no galling or pitting in the contact areas. Minor blemishes (see chart) can be dressed and the pins can be reused. Pins with cracks which extend into the pin cross section must be replaced.
4. Reinstall pins. Use anti-seize to aid installation. Grease as needed.

Pin Defect

Maximum Tolerance

Nick, gouge, or scratch	Up to 1/8" diameter
Circular scratch around the pin	Up to 1/16" wide or deep
Lengthwise scratch	Up to 1/32" wide or deep

Pins with defects up to the maximum tolerance can be repaired. To repair, dress the edges of the flaw with a file so no metal protrudes above the circular surface of the pin.

Pins with defects larger than those listed, or with large cracks extending into the pin cross section, must be replaced.

3-12: BEARINGS & BUSHINGS

3-12-1: BEARING TYPES

Roller bearings are used on sheaves in the 1007, 1015 and 2020 cranes.

Bushings, which are bearings without moving parts, are used on the cylinders and booms of some crane models. See chart for bushing locations.

BUSHING LOCATIONS

MODEL	MAST	CYLINDER	BOOMS
1015	No	No	No
2020	No	Yes	Yes
3020	No	Yes	No
3820	No	Yes	No
5020	No	Yes	No
5525	No	Yes	Yes
6025	No	Yes	Yes
6625	No	Yes	Yes
7020	No	Yes	Yes
7025	No	Yes	Yes

3-12-2: BEARING INSPECTION & RE-PLACEMENT

To inspect bushings and bearings,

1. Degrease bearing.
2. Inspect the inside coating of the bearing. No tears and breaks in the coating are acceptable.
3. Inspect the metallic body of the bearing. No change in the bearing dimensions are permitted.

4. Replace the bearing if needed. Otherwise, lightly grease and reassemble.

To replace bearings:

1. Start the bearing in its respective hole by rotating the bearing while applying pressure. Align the grease zerk hole with the bearing hole (if applicable). Once started, drive the bearing to its full counterbored depth by tapping with a rubber mallet. Use a mallet with a head larger than the bearing so the bearing isn't damaged.
2. If the bearing is loose, tighten the bearing by centerpunching the bore diameter in about 50 places around the 2" deep bored area.
3. After installing bearings, and before assembling the machine, insert the pins through both bearings in each end of the lift cylinders, and through the boom pivot bearings, to ensure alignment and fit are correct. Pins should slide freely through the leading hole and start in the opposite hole. If the pin binds, do not force it. Remove the pin, clean the hole, and reinsert.

Inspect bushings and bearings as needed, and replace any damaged or worn bushings. Lubricate with EP grease upon replacement.

3-13: VALVEBANK

3-13-1: VALVEBANK COMPONENTS

This section describes the operating characteristics of the main control valvebank used telescopic cranes and provides troubleshooting information.

ELECTRICAL-AMP DRIVER POWER LED

The Power LED illuminates red while power is being applied to the valve amplifier. If the LED is not illuminated, no power is being applied to the valve amplifier.

If the Power LED does not function as described, inspect input wiring and repair or replace as necessary. When input power is applied, the LED should illuminate.

PMW% LED

The PMW% LED indicates the condition of the output current flowing to the proportional valve. The LED will change colors from red to yellow to green. The change of colors indicates the variance of current flowing to the proportional valve. Red indicates minimum current and green indicates maximum current. This represents the flow condition going from low flow (red) to maximum flow (green), thus varying the speed of crane functions.

If the LED stays red when the speed control trigger is activated, a dead short is present in the circuit. This could be the result of a wiring problem, shorted out proportional coil, etc. Inspect the wiring and replace the proportional coil if required.

MIN POTENTIOMETER

The *MIN* adjustment potentiometer is used to set the minimum amount of movement of an individual function at the valvebank when the corresponding function switch at the handset is depressed. To adjust, set engine at high speed control setting. Depress the "Rotation" function switch at the handset. Adjust the *MIN* potentiometer at the AMP driver card clockwise until crane begins to rotate or counterclockwise until motion begins to stop. No other electrical adjustments are required to properly operate the crane.

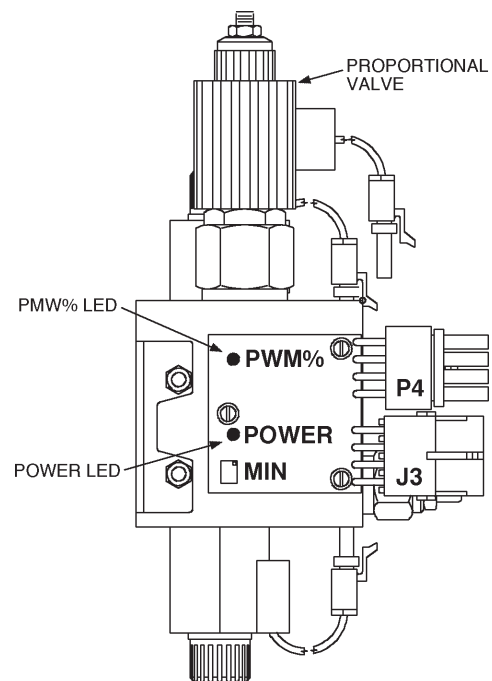


Figure C-12: Valve Functions

HYDRAULICS-VALVEBANK RELIEF VALVE

The relief valve limits the maximum system pressure. Pressure limits the amount of torque or force an actuator will see. This pressure is preset to 3000 psi at 10 gpm. If the relief valve should fail, it would likely stick open. This would prevent system pressure from developing and cause a lack of torque/force at the actuator. The relief valve can be changed easily by screwing it out and replacing with a new one.

PROPORTIONAL VALVE

The proportional valve varies the oil flow to the individual crane functions. Doing so dictates the speed of the crane functions. As the electrical current (0.2 to 2.2 Amps) increases to the valve, by using the trigger on the control handle, more oil is ported downstream to the crane function. If the valve coil burns out, the operator would be unable to vary the flow to the crane functions. If the valve spool becomes stuck, the operator would be unable to vary the downstream flow. If speed control is the problem, it is likely an indication of a proportional valve problem. It is necessary to verify that current is flowing to the coil correctly, and that it is not an electrical problem. The proportional valve can also be operated manually for test purposes. The valve stem can be screwed in manually to port oil downstream. Doing so will manually position the valve spool and hold it in the manually commanded position.

DIRECTIONAL VALVES

The directional valves (4) control the direction of the crane functions. When one of the solenoids is energized, it shifts the valve spool. This allows oil to flow out one of the valve ports. If a function does not work, a directional valve may be to blame. These valves have a standard manual override. You may manually shift the valve by pushing the pin, located in the middle of the solenoid.

CAUTION

MANUALLY OVERRIDING A DIRECTIONAL VALVE WILL PORT OIL IMMEDIATELY TO THE VALVE FUNCTION. THIS WILL CAUSE A SUDDEN MOVEMENT OF THE ACTUATOR. OPERATORS AND MAINTENANCE PERSONNEL MUST KEEP THE WORK AREA CLEAR OF OTHER PERSONNEL WHEN OVERRIDING A DIRECTIONAL VALVE.

If the valve shifts using manual overrides, the problem is of an electrical nature. Valve coils are interchangeable and may be changed by removing the coil nut. This allows maintenance personnel to isolate individual coil failures. If the valve cannot be actuated manually or electrically, it is necessary to replace the section.

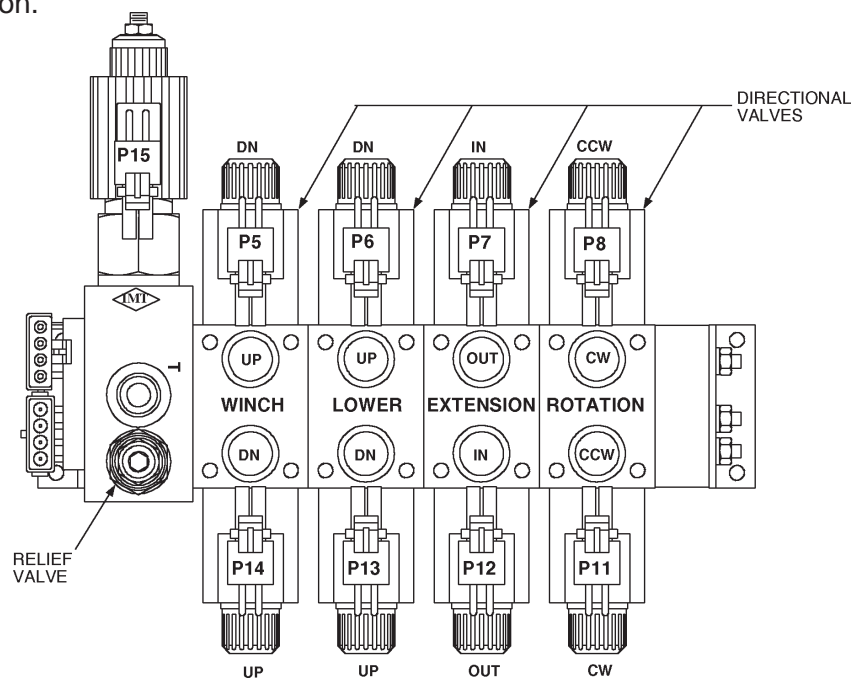


Figure C-13: Valvebank Functions and Features

3-13-2: VALVEBANK TROUBLESHOOTING

1. Determine which functions are not working, and locate the valves that control these functions.

2. Check valve functions including:

Questionable Operation of Coil - Remove the coil at the top of the valve, then remove the coil at the bottom of the valve.

Foreign Material - Foreign material can interfere with the electromagnetic field. This could include any corrosion on the inside of the coil and the stem the coil rests on.

Check indicator lights on valve driver.

Check voltage to coil under load. Is there sufficient voltage to operate the coil?

Check if solenoid is magnetized.

Switch the hose from a know working function to a non-working function. If valve begins to work, failure is not due to the valve bank.

3. Clean coils, stem, and replace coil.

3-13-3: SINGLE VALVE REPLACEMENT

Prior to replacing a single valve or a complete valvebank, make sure you have a clean, flat working surface.

To replace a single valve, loosen the bolts at each end of the valvebank and remove the pins which hold the valve in place. Slide out the valve which has failed, and slide in the new valve. Re-torque bolts to 80 in-lb.

NOTE

VALVEBANK TORQUE IS MEASURED IN INCH-POUNDS, NOT FOOT-POUNDS!

When ordering replacement valve sections, check the end caps on the valvebank. There are different replacement valves for valvebanks with blue or silver end caps. Contact IMT technical support for more information.

3-13-4: VALVEBANK REMOVAL AND REPLACEMENT

To remove and replace the valvebank:

1. Identify and mark all hoses and position points and the control valve. Remove hoses from the valve. Cap or plug all open hydraulic fittings.
2. If needed, use a sling to lift the valvebank. Hook the sling on a hoist. Raise the hoist to tension the sling. Remove hardware securing valve to crane base, and position valve on a firm work support.
3. Reverse the procedure for re-assembly. DO NOT induce any distortion in the valve body when mounting. Use shims under mounting pads if necessary to prevent distortion. Torque threaded fasteners per Torque Data Charts. Observe hose identification when reconnecting hoses to valve.
4. Start the crane. With no load, slowly cycle all cylinders out and in to purge air from the system.
5. After the air has been purged, check the reservoir oil level. Top off if necessary.



Figure C-14: Valvebank End Caps

DANGER

SUPPORT THE CRANE BASE, MAST, AND BOOMS PRIOR TO REMOVING ANY CYLINDERS! FAILURE TO SUPPORT THE CRANE FULLY CAN CAUSE PERSONAL INJURY AND EQUIPMENT DAMAGE.

3-14: LOWER CYLINDER REMOVAL & REPLACEMENT

Replace the lower cylinder if it leaks or is bent or damaged. To replace the cylinder:

1. Operate lower boom control levers to position the lower boom as low as possible. Support the boom using a hoist or two slings, and make sure the mast and base are fully supported.
2. Identify and remove hose connections. Cap or plug all open hydraulic fittings, and disconnect anti-two block wires.
3. Position a fabric sling of adequate capacity around lower cylinder and cinch sling near rod end such that sling will lift cylinder in vertical position. Hook sling on hoist and raise hoist to tension the sling.
4. Remove and discard retaining bolt from rod end of cylinder.
5. Remove and discard retaining bolt and keeper plate from piston end of cylinder. With aid of a heavy sledge hammer and pin driving tool, drive piston end pin from mast. Position cylinder on a firm work support.
6. Reverse procedure for reassembly. Reinstall pins using anti-sieze for ease of assembly. Torque new threaded fasteners per Torque Data Charts in the general reference section.
7. Start the crane and slowly cycle lower boom hoist cylinder out and in with no load to purge air from the system.
8. After the air has been purged from the system, check the reservoir oil level. Top off if necessary.

3-15: EXTERNAL EXTENSION CYLINDER-REMOVAL AND REPLACEMENT

Models 1015, and 2020 telescopic cranes have external extension cylinders. See Figure C-14 for identification. To remove and replace a telescopic crane cylinder:

1. Position the crane with the lower and extension booms horizontal. Support the base, mast and boom.
2. Disconnect and cap the extension cylinder hydraulic hoses. Plug the hose ports.
3. Remove and discard bolts securing the wear pad retainer plates. Remove the plates and wear pads.
4. Remove the retaining ring, bushing, and pin which secure the rod end of the cylinder to the boom.
5. Using a sling or hoist, lift the external extension cylinder and remove.

To install an external extension cylinder:

1. Using fabric slings and hoist, position the cylinder atop the extension boom. The extension boom may have to be moved manually to align the rod of the cylinder with the ears of the extension boom. Once aligned, insert and secure pin.
2. Install the side plates securing the cylinder to the outer boom. Torque fasteners per Torque Data Chart.

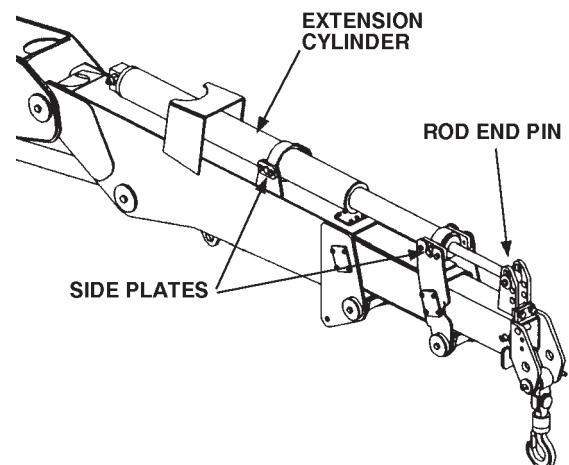


Figure C-14: External Extension Cylinder

3-16: INTERNAL CYLINDER REMOVAL AND REPLACEMENT

All telescopic crane models have internal extension and/or main cylinders. To remove and replace an internal cylinder,

1. Prior to beginning work on any crane cylinders, completely support the base, mast and booms.
2. Position the crane with the inner and extension booms in a horizontal position.
3. Retract the extension booms completely.
4. Disconnect and cap the extension cylinder hydraulic hoses. Plug the hose ports.
5. Remove the cable from the sheaves at the end of the boom tip.
6. Unfasten and move anti-two block wires on the extension boom only.
7. Refer to the parts book to determine which pins and fasteners secure the cylinders on your crane.

In all cases, you must remove the extension cylinder and extension boom at the same time.

On crane models 3820 and 5020, there is a pin which connects the mast to the lower boom. To remove the extension cylinder, slide this pin out just until the extension cylinder is free, but **DO NOT REMOVE IT COMPLETELY!** By keeping the pin in place, the lower boom will remain connected to the base.

Models including the 1015 and 2020 do not have pins securing the cylinders, and you must remove bolts or fasteners.

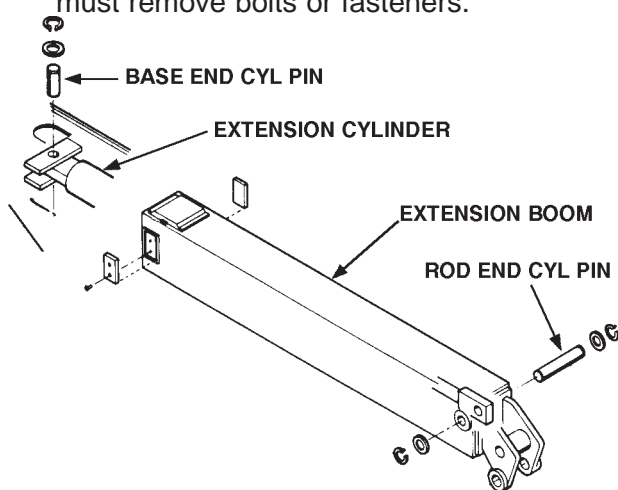


Figure C-15: Internal Extension Cylinder

8. Remove the cylinder.

Reverse this procedure to replace the cylinder. See section 3A: Cylinder Repair for information on how to repair the cylinder.

3-17: LOWER BOOM REMOVAL AND REPLACEMENT

1. Lower the lower boom completely. Support the base, mast and boom prior to disassembly.
2. Identify and disconnect hydraulic hoses. Cap or plug all open hydraulic fittings.
3. Disconnect rod ends of inner boom hoist cylinders. Position a block for cylinders to rest against. Be careful not to pinch or pull hydraulic hoses.
4. Position 2 fabric slings of adequate capacity around lower boom and cinch slings on opposite sides of center of gravity. Hook slings on hoist and raise hoist to tension the sling.
5. Remove cap screw and retainer from inner boom pivot pin. With aid of a heavy sledge hammer and pin driving tool, remove the inner boom and lay down on a firm work support.

3-18: WIRE ROPE REMOVAL/REPLACEMENT

The maintenance section of this manual describes inspection criteria for wire rope. If the wire rope is damaged, bent, or worn as defined in Section 2-6, replace it using the following steps:

1. Run out all wire rope from the winch, and stretch it out straight. Disconnect the rope from the cable guide on the side of the lower boom.
2. Remove the clamp which secures the rope to the boom tip. Pull the pin to release the cable.
3. Unhook the wire rope from the winch spool by removing the set screw or cable wedge anchor.
4. Remove the wire rope.

SECTION 3A. CYLINDER REPAIR

TOOLS REQUIRED 2

3A-1. CYLINDER DISASSEMBLY 2

FIGURE C1-1. TYPICAL CYLINDER AND SEAL KIT COMPONENTS 4

FIGURE C1-2. SEAL INSTALLATION GUIDELINES 5

3A-2. CYLINDER ASSEMBLY 6

APPENDIX: PISTON & HEAD SPANNER WRENCH ATTACHMENT PART NUMBERS 8

TOOLS REQUIRED

Use the following tools in the disassembly and repair of IMT cylinders:

PLASTIC AWL

FOR SEAL REMOVAL AND REPLACEMENT.

PLASTIC/RUBBER HAMMER

USED TO REMOVE STOP TUBE RING FROM ROD.

SPANNER WRENCH ATTACHMENT

ATTACH TO A STANDARD TORQUE WRENCH TO TORQUE OR REMOVE CYLINDER HEADS AND PISTONS. SEE CHART AT END OF SECTION TO SELECT ATTACHMENT FOR YOUR PARTICULAR CRANE.

O-RING / ROD SEAL INSTALLATION TOOL

USED TO INSTALL / REMOVE O-RINGS & SEALS. MEASURE ROD DIA. TO SELECT CORRECT TOOL.

IMT PART #	ROD DIA.
79075110	0.75 - 1.5 "
79075111	1.5 - 2.0"
79075112	2.0 - 3.0"

WARNING

REPLACE ALL SEALS WHENEVER THE CYLINDER IS DISASSEMBLED. FAILURE TO DO SO CAN CAUSE DEATH, SERIOUS INJURY OR EQUIPMENT DAMAGE. REFER TO CRANE PARTS MANUAL FOR CYLINDER SEAL KIT PART NUMBERS.

WARNING

FLAMMABLE CLEANING SOLVENTS POSE FIRE AND HEALTH HAZARDS. READ AND OBEY THE INSTRUCTIONS ACCOMPANYING ANY SOLVENTS. KEEP A SUITABLE FIRE EXTINGUISHER PRESENT WHENEVER USING FLAMMABLE SOLVENTS. USE SOLVENTS IN A WELL VENTILATED AREA. IGNORING THESE WARNINGS WILL CAUSE SERIOUS INJURY OR DEATH. IMT RECOMMENDS USING AN ALKALINE CLEANER.

WARNING

DO NOT USE COMPRESSED AIR TO ASSIST IN WITHDRAWING THE PISTON/ROD ASSEMBLY. COMPRESSED AIR MAY PROPEL THE PISTON/ROD ASSEMBLY OUT OF THE CYLINDER AND MAY CAUSE SERIOUS INJURY OR DEATH.

CAUTION

WHEN SOLVENT IS USED TO CLEAN THE INTERNAL CYLINDER COMPONENTS, ALL TRACES OF SOLVENT MUST BE REMOVED. ANY RESIDUE WILL DAMAGE THE SEALS.

3A-1. CYLINDER DISASSEMBLY

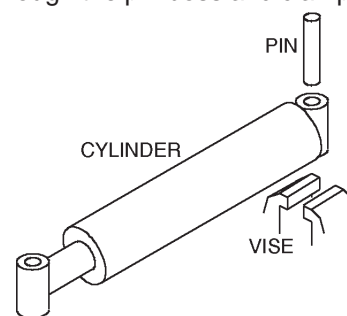
These instructions apply to inner, outer, extension and stabilizer cylinders.

1. Thoroughly wash the exterior of the cylinder case. Blow dry with compressed air. Avoid lodging chunks of material in oil passages.

NOTE

AFTER THE CASE HAS BEEN WASHED, PROCEED WITH DISASSEMBLY IN A CLEAN ENVIRONMENT WHICH IS FREE OF DUST AND DIRT.

2. Place the cylinder on a flat surface near a vise. Slip a pin through the pin boss and clamp the pin in a vise.

**WARNING**

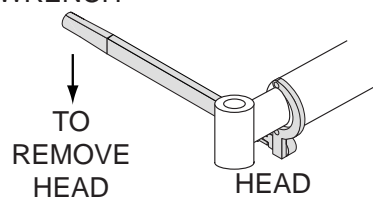
RELEASE PRESSURE ON THE CYLINDER. FOR CYLINDERS WITH HOLDING VALVES, SLOWLY UNSCREW VALVES UNTIL PRESSURE IS RELIEVED, THEN REMOVE VALVE. FOR CYLINDERS WITHOUT HOLDING VALVES, SLOWLY REMOVE PLUGS OR CAPS.

CAUTION

CLAMP ONLY THE PIN. DO NOT CLAMP THE CYLINDER IN A VISE. DOING SO WILL DAMAGE THE CYLINDER.

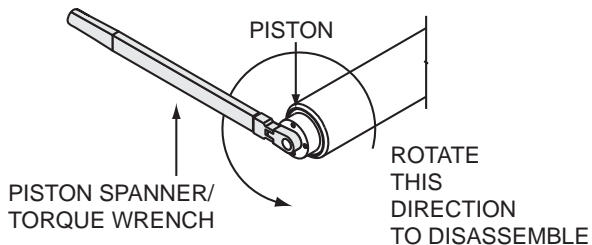
3. Using a spanner wrench, unscrew the head. Withdraw the head from the cylinder case. Pull the rod and piston assembly from the cylinder case using an up-and-down or side-to-side motion. Set the cylinder case to one side.

SPANNER
WRENCH

**CAUTION:**

DO NOT USE A PIPE WRENCH TO TIGHTEN OR LOOSEN THE HEADS. IT WILL DEFORM THE METAL, DAMAGE THE MATING SURFACES, AND PREVENT PROPER TORQUE MEASUREMENT.

4. Secure the rod pin boss with a pin clamped in the vise. Unscrew the piston using the spanner wrench. Carefully inspect the piston and rod threads for any damage or wear. Replace the part if damaged threads are present.

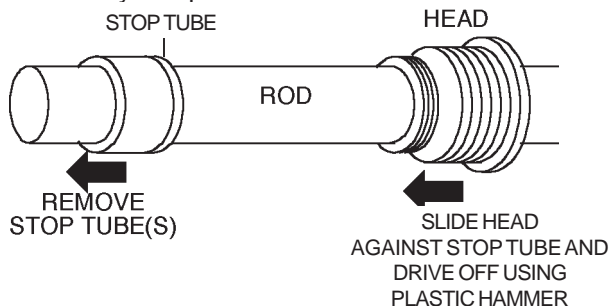
**CAUTION**

DO NOT CLAMP THE ROD IN THE VISE. DAMAGE TO THE ROD WILL RESULT.

CAUTION:

DO NOT USE A PIPE WRENCH TO TIGHTEN OR LOOSEN THE HEADS. IT WILL DEFORM THE METAL, DAMAGE THE MATING SURFACES, AND PREVENT PROPER TORQUE MEASUREMENT.

5. Remove the stop tube(s) from the rod. Slide the head down the rod until it makes solid contact against the stop tube ring/wafer lock. Drive the stop tube ring/wafer lock from the rod using a plastic hammer against the top of the head. Use only enough force to move the stop tube ring/wafer lock while distributing the blows around the head rather than in only one place.



6. Remove the head from the rod.

7. Inspect the cylinder interior and the rod for dents, nicks, scratches, cracks, or other defects which require repair or replacement.

WARNING

REPLACE CRACKED OR DENTED RODS OR CYLINDER CASES!! FAILURE TO DO SO MAY RESULT SERIOUS INJURY, DEATH, OR EQUIPMENT DAMAGE.

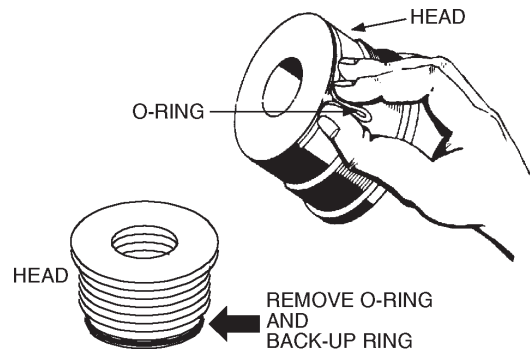
CAUTION

ANY PROTRUSION **WILL** DAMAGE NEW SEALS.

NOTE

FURTHER WORK SHOULD BE PERFORMED IN A WARM ENVIRONMENT OF 70°F OR MORE. THE SEALS WILL BE MORE FLEXIBLE AND EASIER TO MANIPULATE.

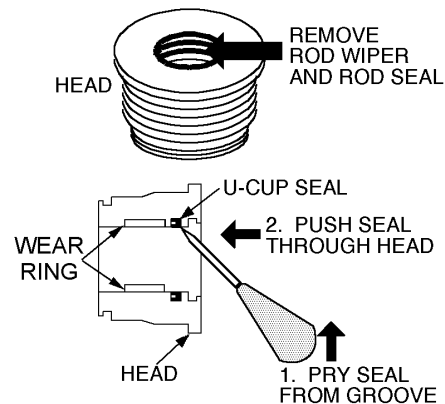
8. Work a slack section into the head seal static o-ring and remove it from its groove. Lift the static back-up ring from the groove using a plastic awl.



9. Position the head on the work surface with the rod wiper at the top.

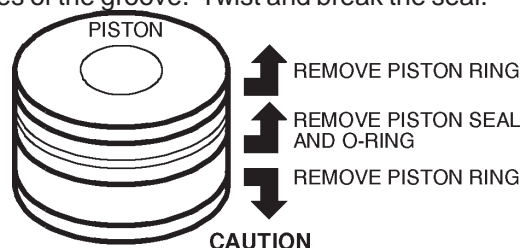
10. Slide the tip of the plastic awl under the rod wiper and remove the rod wiper from the head.

11. Puncture the rod seal using a plastic awl. Pry it out of the groove and push through the head. Remove the rod wear ring(s) using the awl to pry it from the groove and push it through the head.



12. Spread the piston rings/ wear rings and slip them over the lands and off the end of the piston nearest the wear ring.

13. Carefully lift the dynamic piston seal out of its groove using a thin blade. Take care not to nick the edges of the groove. Twist and break the seal.



CAUTION

DAMAGING THE EDGES OF THE GROOVE WILL CAUSE PREMATURE SEAL FAILURE.

14. Remove the companion o-ring and nylon insert using the plastic awl.

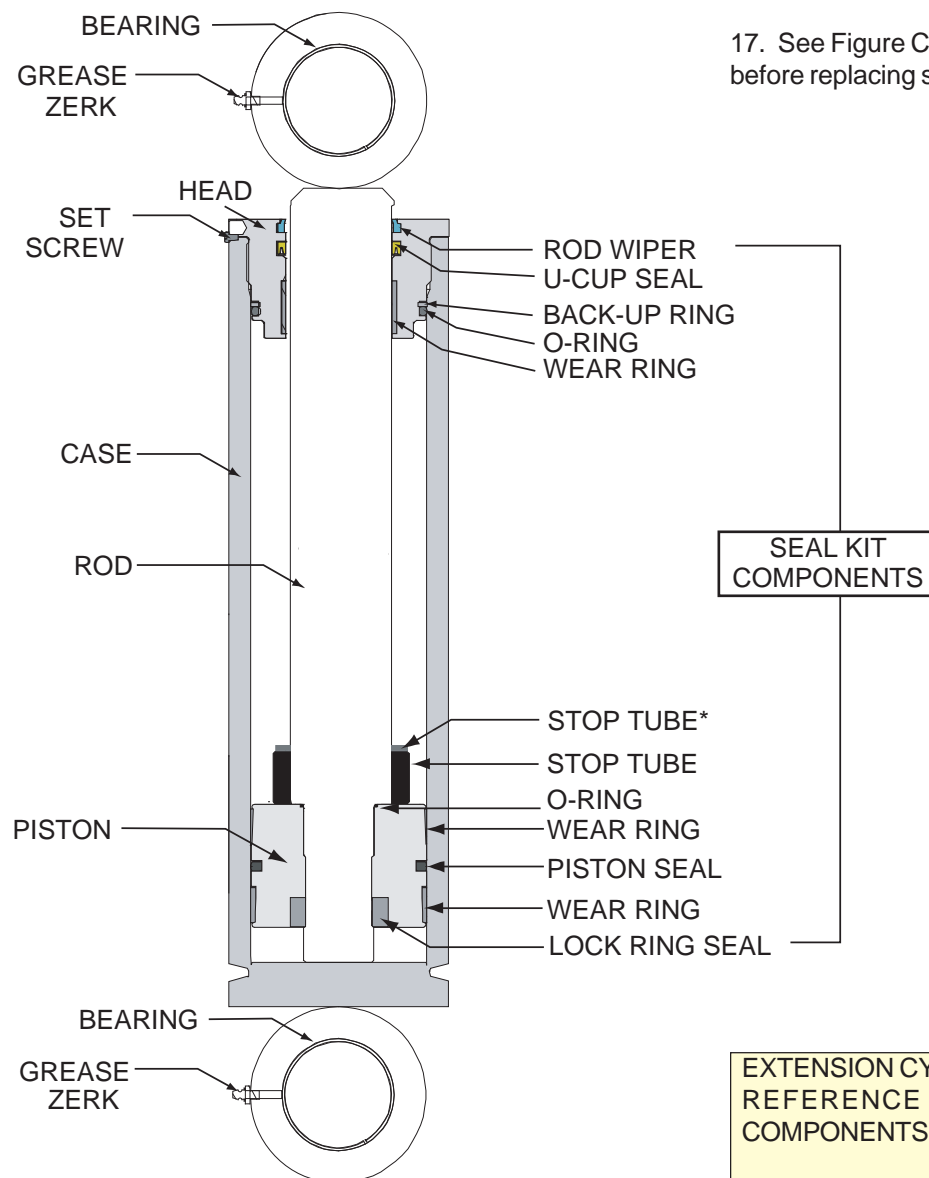
15. Attempt to dress any nicks or gouges that may have occurred during disassembly using fine grade emery cloth.

WARNING

REPLACE CRACKED OR DENTED RODS OR CYLINDER CASES!! DO NOT ATTEMPT REPAIRS.

16. Clean all cylinder components before reassembly.

17. See Figure C1-2, Seal Installation Guidelines before replacing seals.

**NOTE:**

EXTENSION CYLINDER COMPONENTS DIFFER - REFERENCE EXTENSION CYLINDER COMPONENTS DRAWING IN THIS SECTION.

* STOP TUBE REPLACED WAFER LOCK RING IN MANY CYLINDERS. USE STOP TUBE INSTEAD OF WAFER LOCK WHEN RESEALING CYLINDER.

FIGURE C1-1. TYPICAL CYLINDER AND SEAL KIT COMPONENTS

SEAL INSTALLATION GUIDELINES

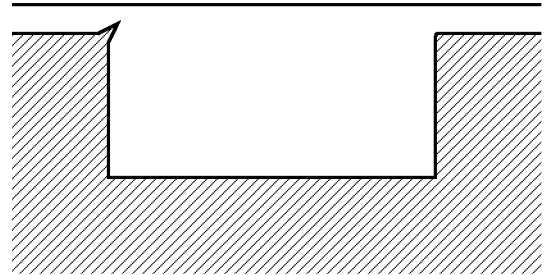
CAUTION

REPLACE ALL SEALS IN THE SEAL KIT. DOING SO WILL REDUCE EXPENSIVE DOWNTIME IN THE NEAR FUTURE.

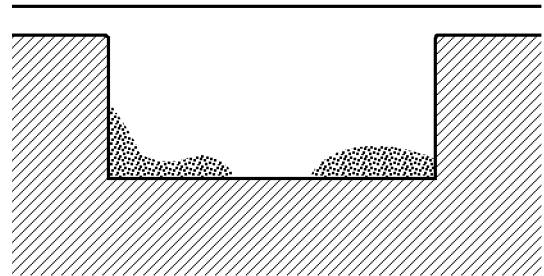
To provide maximum sealing capabilities of cylinder seals, proper installation is required. Improper or careless installation accounts for the failure of seals as much as does wear. The education and training of repair personnel should be a part of any maintenance program.

The installation of seals will vary depending on variations in seal design and whether it slips into an end groove or must snap into a recessed cavity. Whichever variety is to be installed, the following installation guidelines apply:

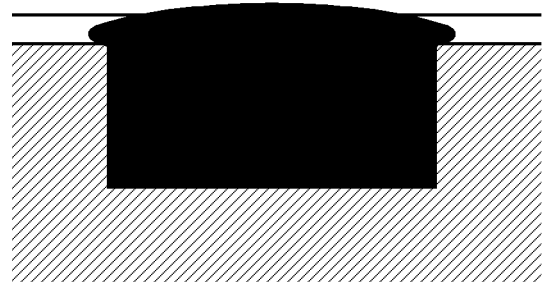
1. Clean the entire sealing device and all surfaces it traverses to its groove of all foreign material. The cleaning method should include a solvent degreasing of the seal, cylinder component and any tools used for installation. After degreasing, all components are to be wiped thoroughly with a clean, lint-free cloth.
2. Lubricate both the seal and its installation path prior to assembly. The lubricant must be selected for compatibility with the seal material and system working fluid. Do not use old or dirty oil which will contain metal particles and other foreign matter. Preferably, use a non-fibrous grease such as Lubriplate.
3. Any nicks or cuts at the seal lip interface or on the groove diameter are potential leak paths when the system is fully pressurized. It is extremely important that all sharp corners which the seal might encounter during installation be dressed. Deburr and polish any area or edge deemed the slightest bit rough or sharp.
4. Make certain all seals and components are replaced. All required seals should be checked-off as installed. The omission of one seal can render the cylinder ineffective.
5. The use of common sense, cleanliness and careful installation is extremely important and can make the difference between a properly working cylinder and one which will require additional maintenance.



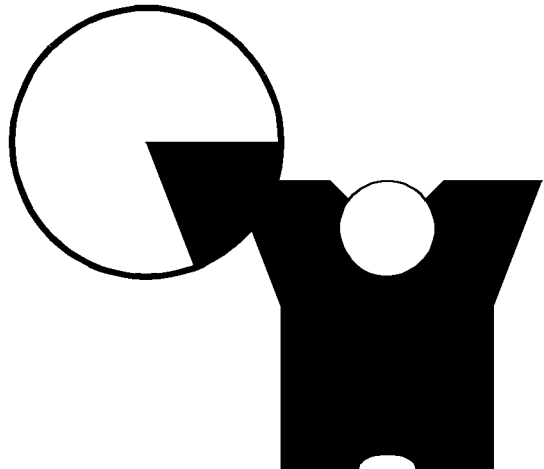
DEBURR AND DRESS ANY SHARP EDGES BEFORE INSTALLING A SEAL.



CHECK SEAL CAVITY FOR THE PRESENCE OF DIRT, METAL CHIPS, OR SCRATCHES. THOROUGHLY CLEAN.



DO NOT USE A SEAL WHICH FITS IMPROPERLY.



INSPECT LIP FOR CLEAN, CONTINUOUS SHARP EDGE.

FIGURE C1-2. SEAL INSTALLATION GUIDELINES

3A-2. CYLINDER ASSEMBLY**NOTE**

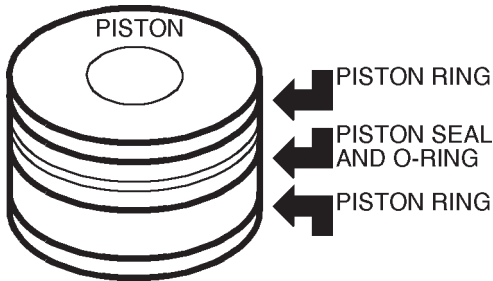
BEFORE ASSEMBLY OF CYLINDER, FAMILIARIZE YOURSELF WITH FIGURE C1-2, SEAL INSTALLATION GUIDELINES.

1. Install the piston seal. Make certain it is free of twists.

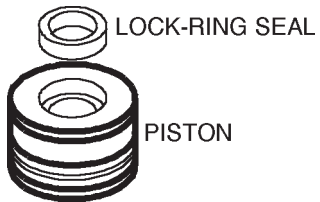
CAUTION

WORK THE PISTON SEAL CAREFULLY INTO POSITION FROM THE TOP OF THE PISTON USING THE ASSEMBLY GROOVE. DO NOT ATTEMPT DOING SO FROM THE BOTTOM OF THE PISTON. YOU MAY SCRATCH IT AND RENDER IT USELESS.

2. Slide the piston wear rings over the lands and allow them to snap into position in the grooves.

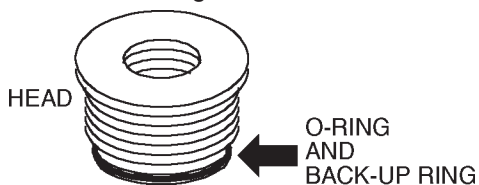


3. Carefully press the lock-ring seal into position.

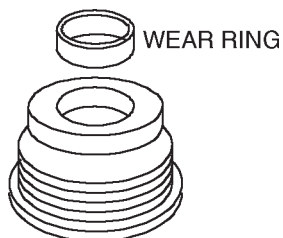
**CAUTION**

ALWAYS USE A NEW LOCK RING SEAL. A USED OR DAMAGED LOCK RING SEAL MAY PERMIT THE PISTON TO BACK OFF.

4. Install the static back-up and o-ring on the head. Make certain the o-ring is not twisted.



5. Position the head with the rod wiper pocket "down" and insert the rod wear ring into its groove.



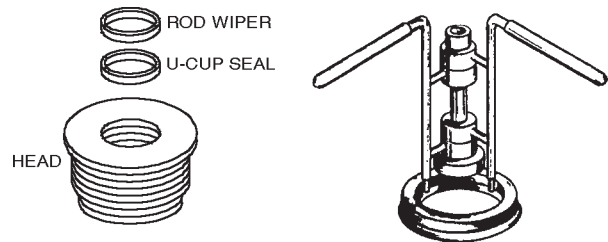
3A-6

SECTION 3A: CYLINDER REPAIR

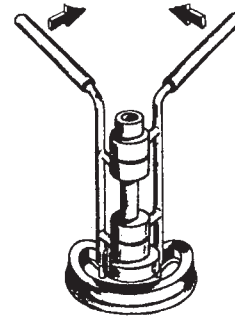
6. Position the head with the rod wiper pocket "up".
7. Using the Rod Seal Installation Tool, install Rod seal as follows:

- A. Place rod seal on flat surface with seal lip down.

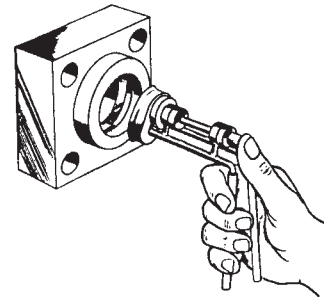
- B. Open tool so that center pin is outside the seal O.D. and the handle pins are inside the I.D.



- C. Rotate handles to deform seal.



- D. Install seal in groove from external end of bore.



- E. Release pressure and remove tool.

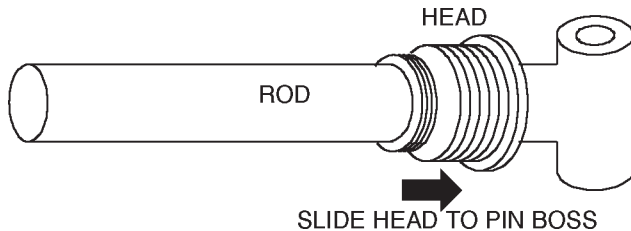
- F. With finger pressure, snap remaining part of seal into groove.

8. Install the rod wiper in the same manner as the rod seal.

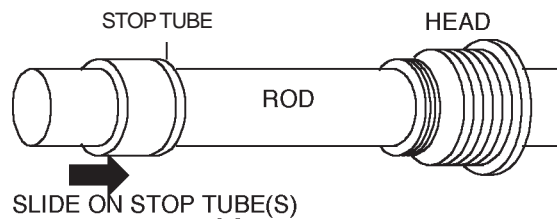
9. Install the wear rings by overlapping the ends to reduce the diameter so they will slide into position.

10. Lubricate the inside diameter of the head with a nonfibrous grease such as Lubriplate.

11. Carefully slide the head onto the rod. Make certain that the rod wiper does not catch on the rod when it is first started. Slide the head all of the way onto the rod and up to the pin boss.



12. Slide the stop tube ring and stop tubes onto the rod.



13. Lubricate the entire threaded area of the rod and inside of the piston with non-fibrous grease.

14. Secure the rod in a vise using a pin as was done during disassembly. Screw the piston onto the rod by hand. You should be able to get the piston almost all the way onto the rod before using the spanner wrench.

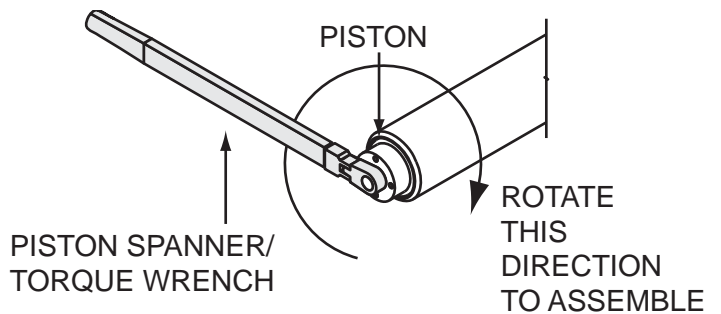
CAUTION

MAKE SURE THAT THE LOCK RING SEAL STAYS IN POSITION. IF IT DOES NOT, LEAKS MAY OCCUR OR THE PISTON MAY BACK OFF, RESULTING IN POOR PERFORMANCE AND POSSIBLE SEPARATION OF THE CYLINDER ASSEMBLY.

15. Using a spanner wrench attachment on a torque wrench, torque the piston onto the rod per the piston torque chart.

PISTON TORQUE CHART

THREAD DIAMETER	TORQUE REQ'MENT
1/2" ID	30- 40 ft-lb
3/4" ID	100-130 ft-lb
7/8" ID	150-180 ft-lb
1-1/16" ID	300-330 ft-lb
1-1/4" ID	500-530 ft-lb
> 1-1/4" ID	710-740 ft-lb



16. Generously lubricate the outside diameter of the head and piston with the non-fibrous grease. Also lubricate the threads and beveled area of the top of the cylinder case.

17. With a side-to-side or up-and-down motion, work the piston into the cylinder past the threads and beveled area at the top of the cylinder case. Avoid allowing the seals to rub across the threads. This will cut them.

18. Slide the piston into the cylinder. With a rotating motion, work the piston seal and the wear rings past the threads and hand tighten the cylinder head.

19. Secure the cylinder and torque the head per the Head Torque Chart. Use a spanner attachment on a torque wrench to measure the torque.

HEAD TORQUE CHART

THREAD DIAMETER	TORQUE REQ'MENT
2" OD	200-220 ft-lb
2-1/4" OD	225-245 ft-lb
2-1/2" OD	250-270 ft-lb
3" OD	300-320 ft-lb
3-1/4" OD	325-345 ft-lb
3-1/2" OD	350-370 ft-lb
3-3/4" OD	375-395 ft-lb
4" OD	400-420 ft-lb
4-1/4" OD	425-445 ft-lb
4-1/2" OD	450-470 ft-lb
4-3/4" OD	475-495 ft-lb
5" OD	500-520 ft-lb

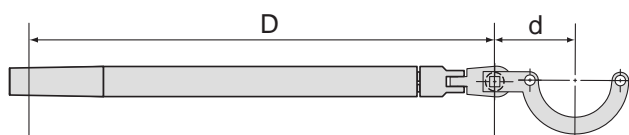
SPANNER
WRENCH

↑
TO
TIGHTEN

HEAD

NOTE:

CONNECT THE SPANNER WRENCH ATTACHMENT TO THE TORQUE WRENCH AT 90° TO READ THE TORQUE DIRECTLY FROM THE TORQUE WRENCH. IF YOU CONNECT THE ATTACHMENT AT 180° IN A STRAIGHT LINE, YOU MUST CONVERT THE TORQUE. DO NOT CONNECT THE TORQUE WRENCH AT AN ANGLE OTHER THAN 90° OR 180°.



TORQUE CONVERSION FORMULA:

$$\text{ACTUAL TORQUE} = \frac{\text{INDICATED TORQUE}}{\left(1 + \frac{d}{D}\right)}$$

EXAMPLE:

D = Torque wrench handle length

d = 1/2 of pin separation distance + distance from torque wrench mounting hole to first pin hole

Indicated Torque = Torque reading on torque wrench

If D = 18, d = 3, and the Indicated Torque is 360 ft-lb, calculate the Actual Torque using the conversion.

$$1 + d/D = 1 + 3/18 = 1.167$$

$$\text{Actual Torque} = 360 / 1.167 = 308 \text{ ft-lb}$$

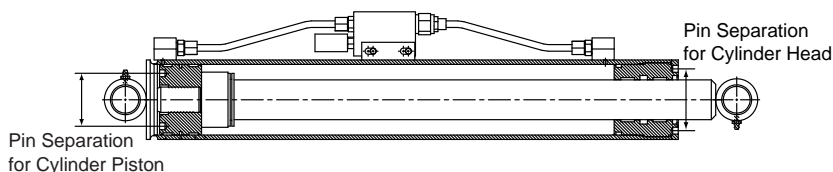
20. Install the holding valves and their o-rings. The o-rings must be in good condition and properly positioned.

APPENDIX: PISTON & HEAD SPANNER WRENCH ATTACHMENT PART NUMBERS

Use the pin separation distance on the cylinder head or piston to determine the spanner wrench attachment required to torque the head or piston to the correct torque value.

NOTE:

YOU MUST ATTACH THE SPANNER ATTACHMENT TO A STANDARD TORQUE WRENCH.



Piston Pin Separation Distance	Spanner Attachment Part #
--------------------------------	---------------------------

1.25"	60125327
1.56"	60125326
2.00" w/ 1/4" holes	60125325
2.00" w/ 3/8" holes	60125323
2.63"	60125322
3.00"	60125321
3.50"	60125320
4.05"	60125319
4.88"	60125318
5.81"	60125317

Head Pin Separation Distance	Spanner Attachment Part #
------------------------------	---------------------------

2.00"	51718092
2.12"	51718093
2.44"	51718094
2.50"	51718095
2.63"	51718096
2.94"	51718097
3.00"	51718098
3.12"	51718099
3.25"	51718100
3.50"	51718101
4.00"	51718102
4.12"	51718103
4.25"	51718104
4.50"	51718105
4.88"	51718106
5.00"	51718107
5.38"	51718108
5.81"	51718109
7.00"	51718110
7.94"	51718111

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4-1: GENERAL

Use the information in this section to prepare the truck chassis for installation of an IMT frame-mounted hydraulic crane. It contains information regarding PTO and pump installation, and frame reinforcement.

These instructions are intended only as a guide. IMT cannot cover every make, model and year of truck manufactured worldwide, so these instructions will provide only general information and should be used as a guide only.

For more specific information, the following IMT manuals provide detailed information on subjects which pertain to this section. Also, see your specific crane manual for information specific to your model of crane.

MINIMUM CHASSIS SPECIFICATIONS

For mounting of IMT Truck mounted cranes
Domestic Version - 99900765

Metric Version - 99900764

Instructions and calculations for determining suitable truck frame strength. Also minimum chassis specifications for most IMT cranes.

HYDRAULIC PUMP SELECTION GUIDE

99900698

An aid in the selection of hydraulic pumps for use with cranes and compressors.

4-2: CHASSIS PREPARATION

Prior to installing the crane, follow these steps:

1. Inspect the carrier vehicle to be certain it complies with the minimum chassis specifications for your crane model.
2. Clear obstructions from the portion of the chassis frame where the crane body will rest. Check that you have adequate mounting space. Space will be available for gas tanks, etc. after the crane is installed.
3. Install the PTO according to the PTO manufacturer's instructions (paragraph 4-3-1).

4. Install the pump (paragraph 4-3-2 or 4-3-3). Make sure that the pump rotates in the proper direction and tighten the pump mounting bolts.
5. Install the suction-line filter below the top of the truck frame and within 48" (121.9cm) of the pump. Locate it so the vacuum gauge can be read and the filter easily serviced.
6. Spray paint all unpainted surfaces.

4-2-1: FRAME STRENGTH

To prevent overstressing the truck frame by loads imposed on it by a crane (and its load), you must select the proper truck frame. You may also have to reinforce the frame. Check the model-specific information at the end of this section for the RBM (Resistance to Bending Moment) required of a frame for your crane model.

4-3: PTO AND PUMP

4-3-1: PTO INSTALLATION

A Power Take Off (PTO) must be properly matched to the vehicle's transmission as well as the requirements of the crane. In order to properly select a PTO the following information will be needed.

1. Make and model of transmission in the carrier vehicle.
2. Power requirements of the crane being driven.
3. Necessary PTO speed.
4. Direction in which the PTO must turn.
5. PTO torque required.

If possible, use a hydraulic pump directly mounted to the PTO. This will eliminate an auxiliary driveshaft and is easier to install by eliminating driveline angle and phasing errors. It is also quieter and should require less maintenance since driveline lubrication will not be necessary.

99903514:TELESCOPIC CRANE: 20030115
PTO manufacturers provide specific installation instructions with their products. Their instructions should be followed when installing the PTO. The following steps are provided as an introduction to the installation.

NOTE

IT MAY BE NECESSARY TO REMOVE AND MODIFY EXHAUST COMPONENTS TO PROVIDE SPACE FOR PTO CLEARANCE.

1. Chock the wheels of the vehicle.
2. Secure any part attached to or on the vehicle which could move or pose a hazard.
3. Run the engine and transmission in a well ventilated area. Listen for noises which indicate any engine/transmission problems. The engine and transmission should be in good operating condition before the installation of the PTO.
4. Become familiar with the PTO manufacturer's installation instructions, warnings, and precautions.
5. After the engine and transmission have cooled, drain the transmission fluid. Check the fluid for signs of damage such as metal chips, etc.
6. With the vehicle engine "Off", visually inspect the transmission for gear damage or foreign particles lodged between gear teeth.
7. Remove the PTO from its shipping container. Inspect for foreign objects which may have lodged in the PTO cavity.
8. Mount the PTO per manufacturer's instructions.
- 9. Check backlash per manufacturer's instructions.**
10. Refill the transmission with manufacturer's recommended lubricant to the proper level.

4-3

SECTION 4: INSTALLATION

11. Install the shifter cable to suit conditions. Always allow a slight overshift on lever or knob to make certain PTO is fully engaged.

CAUTION

AVOID SHARP BENDS IN THE SHIFTER CABLE. ALL BENDS SHOULD HAVE A MINIMUM 6" RADIUS. TIGHTER BENDS CAUSE DIFFICULT OPERATION OF THE SHIFTER CABLE.

12. Make sure the vehicle has all safety and operation decals.
13. Start the engine, engage the PTO and allow to run for 5 to 10 minutes. Check for leaks, unusual noise and proper operation.
14. Check PTO mounting bolts for proper torque as specified by manufacturer.

4-3-2: PUMP INSTALLATION

Install the pump as follows:

1. Check pump rotation and bolt the pump to the PTO. Torque the mounting bolts per Torque Data Chart.
2. Install adapters in the pump inlet and outlet. Use a thread sealer and adequately tighten fittings to prevent leakage. These will vary in size dependent on pump and hose fitting size required.
3. If the pump is mounted directly to the PTO and the weight of the pump exceeds 40 lbs (18 kgs), install a bracket to support the rear of the pump. Make sure the bracket supports the pump from the transmission, not the chassis frame.

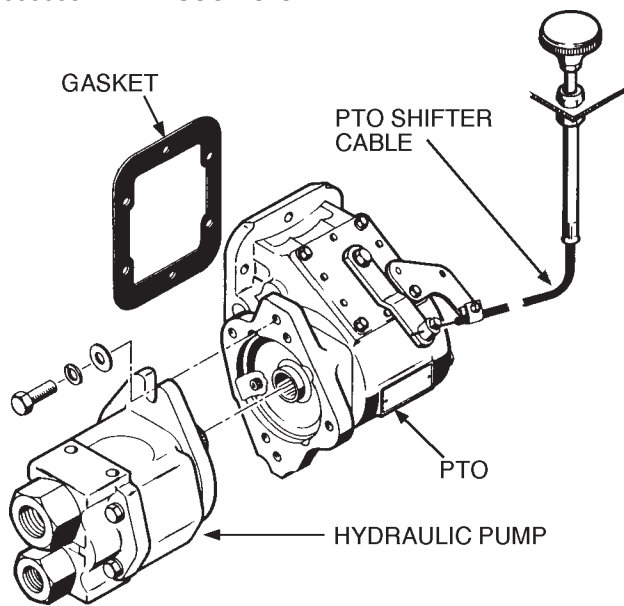


Figure D-3: PTO/Pump Installation



4-3-3: DRIVELINE APPLICATION

When you cannot directly mount the pump/PTO is not feasible, you may use an auxiliary driveshaft. To select the auxiliary driveshaft for your installation, consider the following:

1. The driveshaft must be able to transmit the necessary torque and RPM required. Applications operating at less than 1200 RPM may use a driveshaft constructed of solid bar stock. More demanding applications will require tubular shafts.
2. Avoid auxiliary driveshaft breakage and personal injury by not exceeding the critical speed of the selected driveshaft. Critical speed is calculated using operating RPM, shaft material and diameter, and installed centerline to centerline length. Consult the driveshaft manufacturer's instructions for specific information.

Normally, if calculations indicate a problem, the use of multiple shafts and support bearings is recommended.

3. The careful installation of a driveshaft with concern for recommended driveline angles will minimize vibration and provide trouble-free operation.
4. The driveshaft must be capable of absorbing any shock loads which may develop.
5. The driveshaft must be capable of varying its length during installation and while transmitting torque. This is referred to as "slip movement".
6. NEVER exceed the torque, length, angularity and RPM limits specified by the manufacturer.
7. Only trained personnel using driveshaft assembly equipment should fabricate a driveshaft.
8. Balance tubular driveshafts.

WARNING

DRIVESHAFTS ARE DANGEROUS!
PLACE DRIVESHAFT IN AN UNEX-
POSED OR SHIELDED POSITION TO
HELP PREVENT ACCIDENTAL EN-
TANGLEMENT. FABRICATION OF A
SHIELD OR FENCE TO ISOLATE RO-
TATING DRIVESHAFTS WILL HELP
PREVENT PERSONAL INJURY OR
DEATH.

1. Install the PTO per manufacturer's instructions.
2. Loosely bolt the pump mounting bracket to the adjustable bracket.
3. Bolt the adjustable bracket to the truck frame at a point not exceeding 48" (121.9cm) from PTO and where it will not produce a joint angle greater than that recommended by the manufacturer.

WARNING

The installer of the driveline must inspect the final position of the driveline to determine whether its location provides sufficient protection to an operator, or other personnel, from hazards associated with a rotating driveline. If protection is insufficient, the installation of a guard is required. If you are unsure of methods to guard a rotating driveline, call Iowa Mold Tooling Co., Inc. for instructions. Failure to do so may result in serious injury or death.



4. Check pump rotation and install pump, pumpend yoke and PTO end yoke.
5. If a setscrew protrudes above end yoke hub, replace it with a recessed allen-head set screw.

WARNING

A PROTRUDING SET SCREW OR
OTHER HARDWARE IS HAZARDOUS
TO PERSONNEL. WHEN THE
DRIVESHAFT IS SPINNING, IT PRO-
VIDES A HOOK TO SNAG CLOTHING,
SKIN AND HAIR, RESULTING IN PER-
SONAL INJURY OR DEATH.

6. Size, cut and weld the driveline per manufacturer's instructions.
7. Install driveline and lock set screws, torquing all fasteners as recommended.
8. Lubricate driveshaft per manufacturer's recommendations.

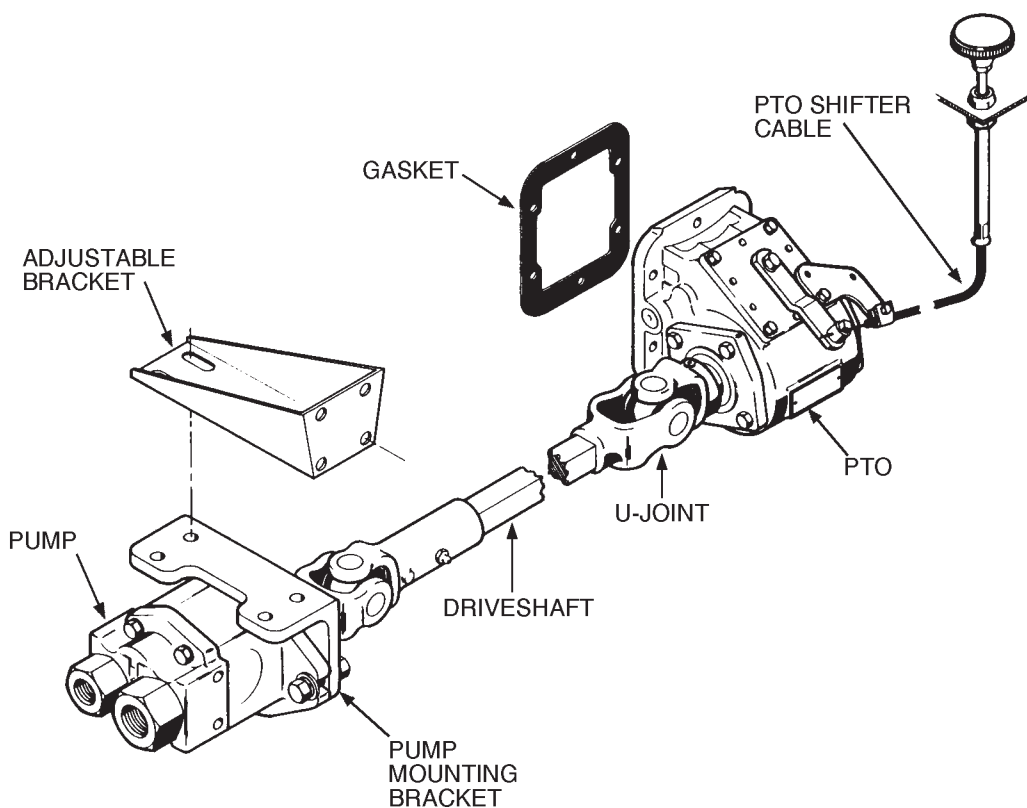


Figure D-4: Driveline Application

4-4: ENGINE SPEED REGULATION

The delivery rate of the hydraulic pump determine the operating speed of the crane. In order for the crane to function at speeds stated in the Crane Specifications, the pump must operate at the speed required for the proper delivery rate (required pump speed). To determine the required pump speed, you must know the rated capacity of the pump, the pump speed required for the rated capacity, and the required delivery rate for the proper crane performance.

To determine the engine RPM necessary for required pump speed, the required pump speed is divided by the engine to PTO ratio. (The PTO ratio is generally specified as a percentage of engine speed.)

If you don't know the engine to PTO ratio, or the pump capacity, contact your dealer or IMT. To find the engine to PTO ratio, you must know the PTO and transmission model numbers as well as the make, model, and year of the truck. To find the proper pump capacity, you must know the pump make and model. Once you've obtained this information, record it below.

PUMP CAPACITY	ENGINE TO PTO RATIO

Efficient operation of your crane is dependent upon proper pump speed. When operation is too slow, check the pump speed when diagnosing the cause. A tachometer with accurate calibration may be used to check engine speed.

C	=	Rated Pump Capacity
D	=	Delivery Rate Required for Proper Pump Performance
RPM	=	Pump Speed Required for Rated Pump Capacity
D		
—	X	RPM = REQUIRED PUMP SPEED
C		
EXAMPLE:		
(D) 9 GPM		1384 RPM
(C) 13 GPM	X 2000 RPM =	(REQUIRED PUMP SPEED)

Figure D-5: Formula- Required Pump Speed

Required Pump Speed	=	Required Engine Speed (RPM)
PTO Ratio (%)		
EXAMPLE:		
(Required Pump Speed)		
1385	=	1980 RPM
.70		
(PTO Ratio of 70%)		

Figure D-6: Formula- Engine RPM

4.5 MODEL SPECIFIC CRANE & HYDRAULIC INSTALLATION GUIDES

4.5.1 GENERAL

This section is intended to serve as a general guide in the installation of a specific model of IMT crane. Since each installation is considered unique, certain components, such as the power unit's battery cable must be cut to the proper length.

4.5.2 CHASSIS INFORMATION

Your crane is designed for use with an IMT body installed on a vehicle meeting minimum chassis requirements including a specific body style, wheelbase dimension, cab-to-axle dimension, frame section modulus, RBM*, axle ratings, and gross vehicle ratings. A chart with this information is included in crane installation section.

* (RBM is a figure of relative strength of a specific frame which is made of a specific grade of steel. RBM is calculated by the multiplication of Frame Section Modulus (in³) by Frame Yield Strength.)

If this crane is being installed on any body other than an IMT mechanic body, check with IMT to determine the suitability of that body.

WARNING

THE USE OF THIS CRANE ON A BODY NOT CAPABLE OF HANDLING THE LOADS IMPOSED ON IT BY THE CRANE, MAY RESULT IN SERIOUS INJURY OR DEATH.

4.6 MODEL 1015 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional Cab
WHEELBASE	137" - 161"
CAB TO AXLE	60" - 84"
FRAME SECTION MODULUS	5.91 in ³
RBM	212,760 in-lb (based on 36,000 psi yield frame mat'l)
FRONT AXLE RATING	4000 lb
REAR AXLE RATING	7500 lb

CRANE INSTALLATION

The crane requires a mounting space of at least 14-1/2" wide by 17" long. If necessary, the truck body can be reinforced to give sufficient strength to support the crane in its operating condition. Locate and drill the four 13/16" holes (see Mounting Hole Layout drawing). Use a pilot drill first and then the 13/16" drill. Cut the 4" diameter hole with a saw after starting with a drill. Deburr all holes. Lift the crane into position on the body. Use a lifting device capable of supporting the crane - 650 lbs (295 kg).

Install the bolts, lockwashers, flat washers and nuts to secure the crane to the chassis (see Crane Installation drawing). Torque the bolts to 200 ft. lbs. (27.66 kg-m).

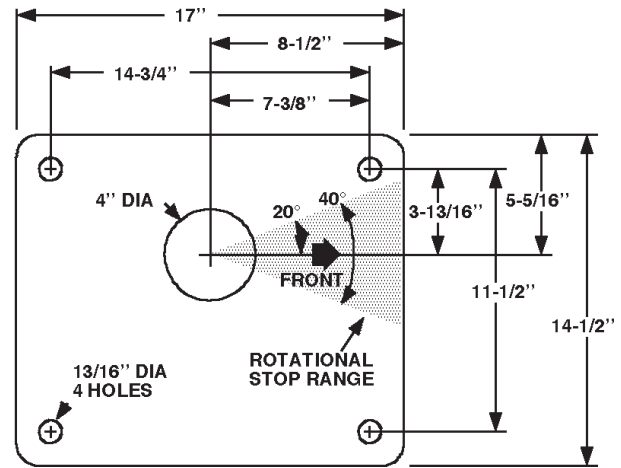
NOTE

IN ADDITION TO THESE SPECIFICATIONS, A HEAVY-DUTY BATTERY AND ALTERNATOR ARE REQUIRED. IT IS RECOMMENDED THAT THE VEHICLE HAVE POWER STEERING AND DUAL REAR WHEELS.

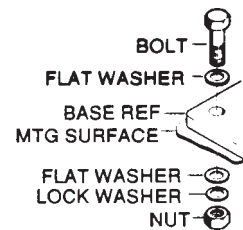
IMT RECOMMENDS ADHERENCE TO THE UPPER LIMIT OF THESE SPECIFICATIONS FOR BEST SYSTEM PERFORMANCE.

BODY REINFORCEMENT

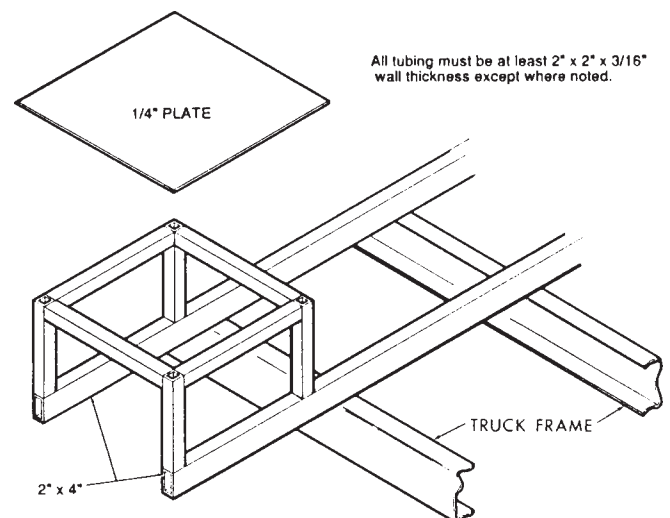
If, after talking with the factory, it has been determined that the body will not support the crane with the full, rated load, the body can be reinforced as shown. Use 1/4" fillet welds and an AWS qualified welder.



MOUNTING HOLE LAYOUT



CRANE INSTALLATION



REINFORCEMENT

4.7 MODEL 2020 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional Cab
WHEELBASE	137" - 161"
CAB TO AXLE	60" - 84"
FRAME SECTION MODULUS	8 in ³
RBM	290,000 in-lb
FRONT AXLE RATING	4000 lb
REAR AXLE RATING	7500 lb

CRANE INSTALLATION

The crane requires a mounting space of at least 17-7/16" wide by 17" long. If necessary, the truck body can be reinforced to give sufficient strength to support the crane in its operating condition. Locate and drill the four 13/16" holes (see Mounting Hole Layout drawing). Use a pilot drill first and then the 13/16" drill. Cut the 4" diameter hole with a saw after starting with a drill. Deburr all holes. Lift the crane into position on the body. Use a lifting device capable of supporting the crane - 830 lbs (376 kg) or 920 lbs (417 kg), dependent on model.

Install the bolts, lockwashers, flat washers and nuts to secure the crane to the chassis (see drawing). Torque the bolts to 200 ft. lbs. (27.66 kg-m).

NOTE

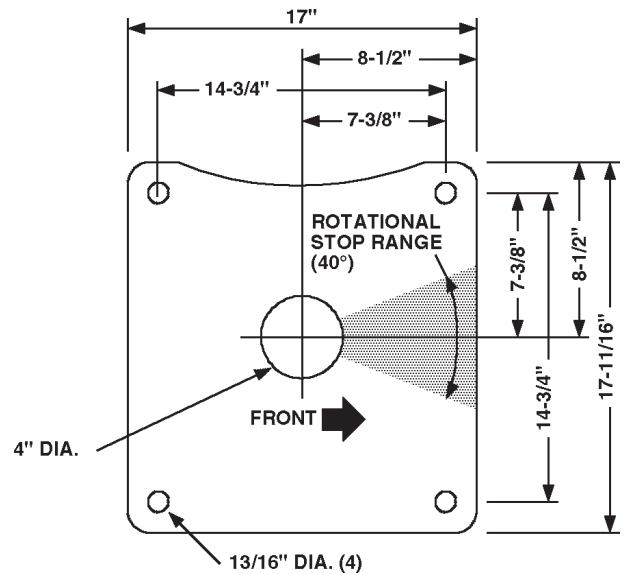
IN ADDITION TO THESE SPECIFICATIONS, A HEAVY-DUTY BATTERY AND ALTERNATOR ARE REQUIRED. IT IS RECOMMENDED THAT THE VEHICLE HAVE POWER STEERING AND DUAL REAR WHEELS.

IMT RECOMMENDS ADHERENCE TO THE UPPER LIMIT OF THESE SPECIFICATIONS FOR BEST SYSTEM PERFORMANCE.

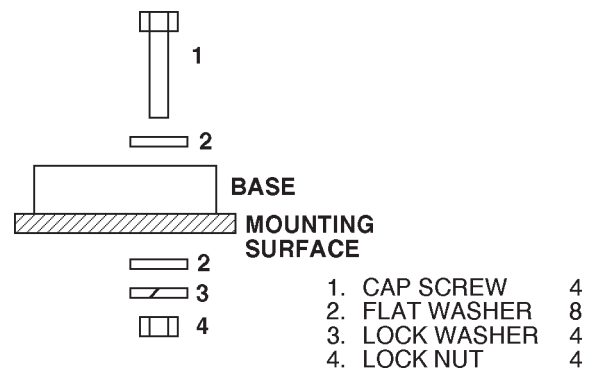
BODY REINFORCEMENT

If, after talking with the factory, it has been determined that the body will not support the crane with the full, rated load, the body can be reinforced as shown. Use 1/4" fillet welds and an AWS qualified welder.

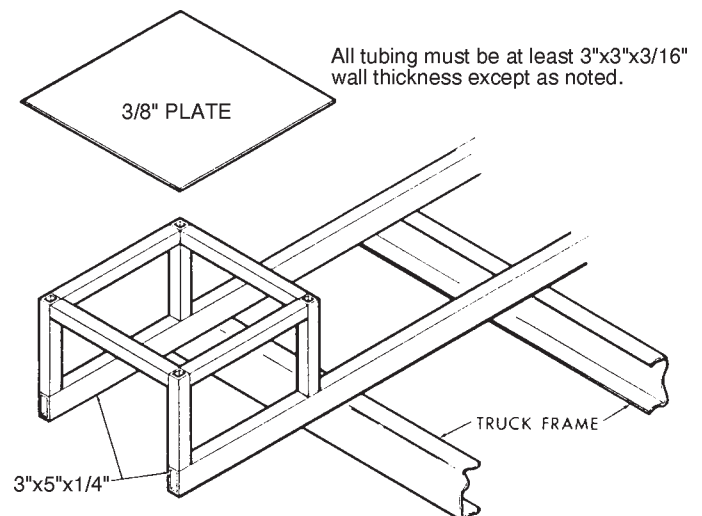
SECTION 4: INSTALLATION



MOUNTING HOLE LAYOUT



CRANE INSTALLATION



REINFORCEMENT

4.8 MODEL 3020 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	154"
CAB TO AXLE	84"
FRAME SECTION MODULUS	10 in ³
RBM	360,000 in-lb
FRONT AXLE RATING	5000 lb
REAR AXLE RATING	9500 lb
TRANSMISSION	4-speed

CRANE INSTALLATION

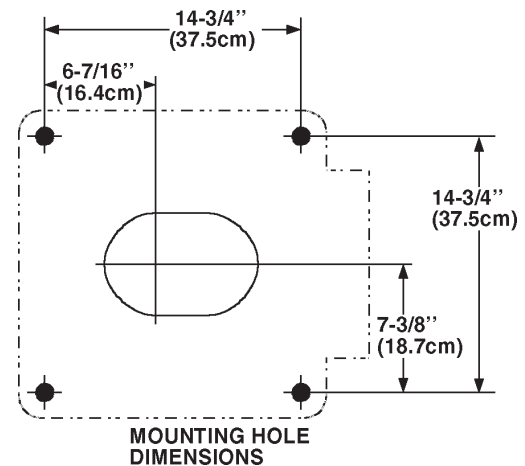
In addition to meeting Minimum Chassis Specifications, there must be sufficient room for mounting the crane and the platform must be strong enough to support the crane and rated load. Install the 3020 crane only on an IMT designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. In addition, an IMT designed body is designed to take full advantage of the standard reservoir placement. This reservoir is installed in the cargo area of the body. Before attempting to install the crane, the body must be installed.

To install the crane:

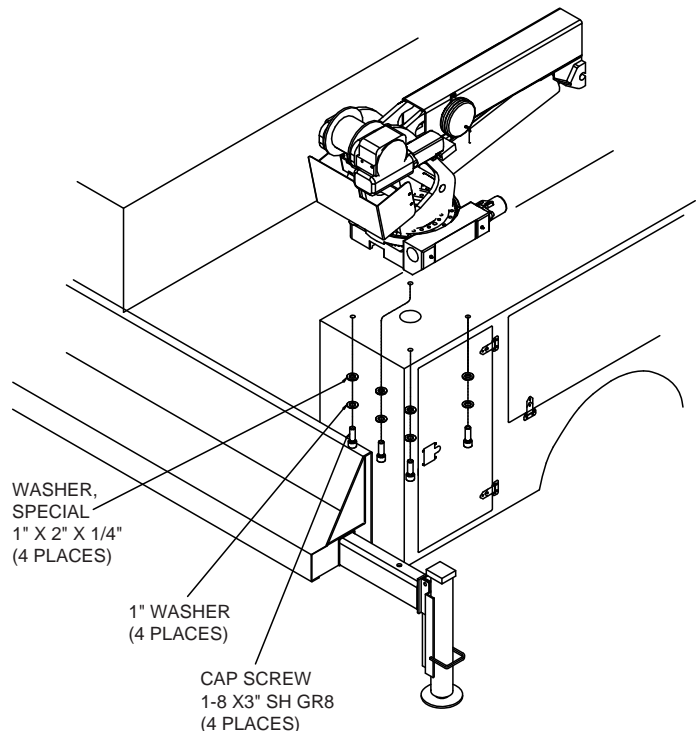
1. Use a lifting device capable of lifting the weight of the crane, 1,400 lbs (635 kg). Attach fabric slings to the crane lower boom, centered approximately 18 inches from the mast hinge. Make certain the crane is well balanced on the slings by slowly lifting approximately 6" off the ground. Lift the crane, apply a bead of waterproof compound, such as silicon based caulk, to the bottom of the base. Move the chassis under the crane and lower the crane into the desired position.
2. Install the 1-8x3" mounting cap screws and 1" washers to secure the crane base to the truck body (see Figure below). Torque the cap screws to 680 ft-lbs (94 kg-m).

CAUTION

THE 3" BOLTS SUPPLIED FOR USE ON BODIES WITH A CRANE BOX TOP PLATE THICKNESS OF 7/8"-1" ONLY. DETERMINE THE CRANE BOX TOP PLATE THICKNESS PRIOR TO MOUNTING. IF DIFFERENT LENGTH BOLTS ARE REQUIRED, THEY MUST BE 1-8, GRADE 8, ZINC COATED OF THE PROPER LENGTH. FAILURE TO USE PROPER LENGTH BOLTS MAY CAUSE THE BOLTS UNDER THE WORM HOUSING TO BOTTOM OUT BEFORE TORQUEING. INSURE A MINIMUM OF 1-1/2" THREAD ENGAGEMENT.



MOUNTING HOLE LAYOUT



CRANE INSTALLATION

4.9 MODEL 3820 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	154"
CAB TO AXLE	84"
FRAME SECTION MODULUS	12.7 in ³
RBM	456,000 in-lb
FRONT AXLE RATING	5000 lb
REAR AXLE RATING	9500 lb

CRANE INSTALLATION

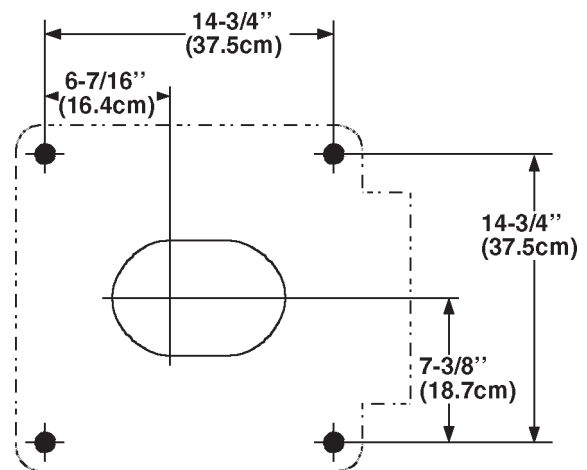
In addition to meeting Minimum Chassis Specifications, there must be sufficient room for mounting the crane and the platform must be strong enough to support the crane and rated load. Install the 3820 crane only on an IMT designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. In addition, an IMT designed body is designed to take full advantage of the standard reservoir placement. This reservoir is installed in the cargo area of the body. Before attempting to install the crane, the body must be installed.

To install the crane:

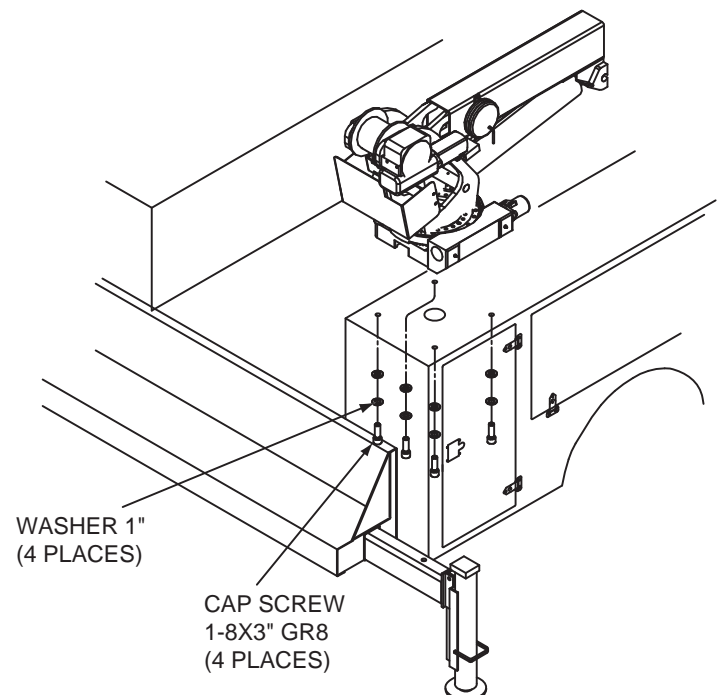
1. Use a lifting device capable of lifting the weight of the crane, 1,400 lbs (635 kg). Attach fabric slings to the crane lower boom, centered approximately 18 inches from the mast hinge. Make certain the crane is well balanced on the slings by slowly lifting approximately 6" off the ground. Lift the crane, apply a bead of waterproof compound, such as silicon based caulk, to the bottom of the base. Move the chassis under the crane and lower the crane into the desired position.
2. Install the 1-8x3" mounting cap screws and 1" washers to secure the crane base to the truck body (see Crane Installation drawing). Torque the cap screws to 680 ft-lbs (94 kg-m).

CAUTION

THE 3" BOLTS SUPPLIED FOR USE ON BODIES WITH A CRANE BOX TOP PLATE THICKNESS OF 7/8"-1" ONLY. DETERMINE THE CRANE BOX TOP PLATE THICKNESS PRIOR TO MOUNTING. IF DIFFERENT LENGTH BOLTS ARE REQUIRED, THEY MUST BE 1-8, GRADE 8, ZINC COATED OF THE PROPER LENGTH. FAILURE TO USE PROPER LENGTH BOLTS MAY CAUSE THE BOLTS UNDER THE WORM HOUSING TO BOTTOM OUT BEFORE TORQUEING. INSURE A MINIMUM OF 1-1/2" THREAD ENGAGEMENT.



MOUNTING HOLE DIMENSIONS
MOUNTING HOLE LAYOUT



CRANE INSTALLATION

4.10 MODEL 5020 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	154"
CAB TO AXLE	84"
FRAME SECTION MODULUS	12 in ³
RBM	600,000 in-lb
FRONT AXLE RATING	7000 lb
REAR AXLE RATING	15,000 lb
GROSS VEHICLE RATING	22,000 lb
TRANSMISSION	5-speed

CRANE INSTALLATION

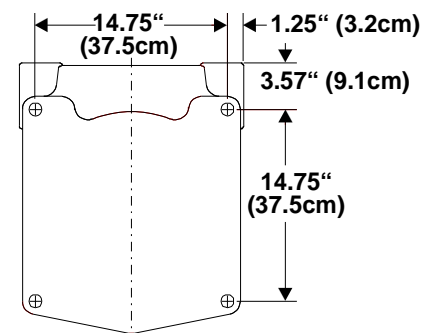
In addition to meeting Minimum Chassis Specifications, there must be sufficient room for mounting the crane and the platform must be strong enough to support the crane and rated load. Install the crane only on an IMT designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. In addition, an IMT designed body is designed to take full advantage of the standard reservoir placement. This reservoir is installed in the cargo area of the body. Before attempting to install the crane, the body must be installed.

To install the crane:

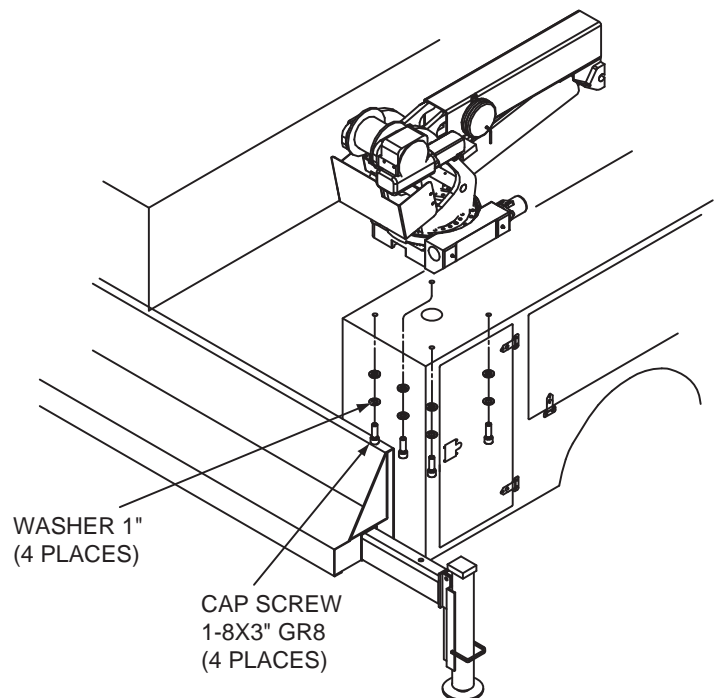
1. Use a lifting device capable of lifting the weight of the crane, 1,625 lbs (737 kg). Attach fabric slings to the crane lower boom, centered approximately 18 inches from the mast hinge. Make certain the crane is well balanced on the slings by slowly lifting approximately 6" off the ground. Lift the crane, apply a bead of waterproof compound, such as silicon based caulk, to the bottom of the base. Move the chassis under the crane and lower the crane into the desired position.
2. Install the 1-8x3" mounting cap screws and 1" washers to secure the crane base to the truck body (see Crane Installation drawing). Torque the cap screws to 680 ft-lbs (94 kg-m).

CAUTION

THE 3" BOLTS SUPPLIED FOR USE ON BODIES WITH A CRANE BOX TOP PLATE THICKNESS OF 7/8"-1" ONLY. DETERMINE THE CRANE BOX TOP PLATE THICKNESS PRIOR TO MOUNTING. IF DIFFERENT LENGTH BOLTS ARE REQUIRED, THEY MUST BE 1-8, GRADE 8, ZINC COATED OF THE PROPER LENGTH. FAILURE TO USE PROPER LENGTH BOLTS MAY CAUSE THE BOLTS UNDER THE WORM HOUSING TO BOTTOM OUT BEFORE TORQUEING. INSURE A MINIMUM OF 1-1/2" THREAD ENGAGEMENT.



MOUNTING HOLE PATTERN



CRANE INSTALLATION

4.11 MODEL 6020 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	154"
CAB TO AXLE	84"
FRAME SECTION MODULUS	14.5 in ³
RBM	720,000 in-lb
FRONT AXLE RATING	9000 lb
REAR AXLE RATING	17,000 lb
GROSS VEHICLE RATING	26,000 lb
TRANSMISSION	5-speed

CRANE INSTALLATION

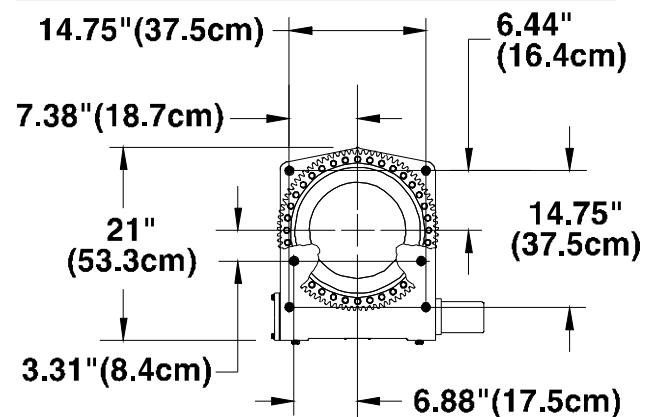
In addition to meeting Minimum Chassis Specifications, there must be sufficient room for mounting the crane and the platform must be strong enough to support the crane and rated load. Install the crane only on an IMT designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. In addition, an IMT designed body is designed to take full advantage of the standard reservoir placement. This reservoir is installed in the cargo area of the body. Before attempting to install the crane, the body must be installed.

To install the crane:

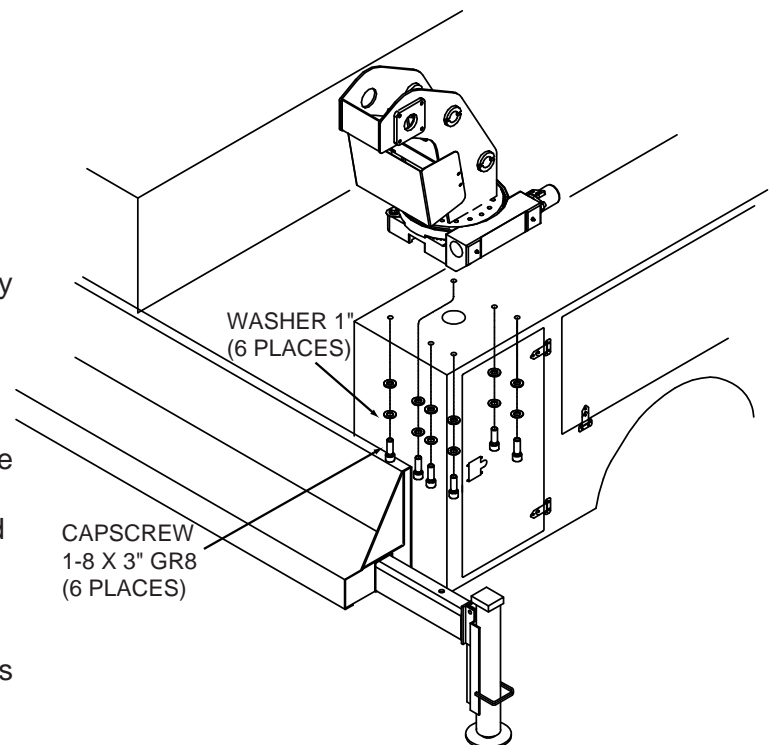
1. Use a lifting device capable of lifting the weight of the crane. See Specifications Section for crane weight. Attach fabric slings to the crane lower boom, centered approximately 18 inches from the mast hinge. Make certain the crane is well balanced on the slings by slowly lifting approximately 6" off the ground. Lift the crane, apply a bead of waterproof compound, such as silicon based caulk, to the bottom of the base. Move the chassis under the crane and lower the crane into the desired position.
2. Install the 1-8x3" mounting cap screws (use Permanent Thread Lock) and 1" washers to secure the crane base to the truck body (see Crane Installation drawing). Torque the cap screws to 680 ft-lbs (94 kg-m).

CAUTION

THE 3" BOLTS SUPPLIED FOR USE ON BODIES WITH A CRANE BOX TOP PLATE THICKNESS OF 7/8-1" ONLY. DETERMINE THE CRANE BOX TOP PLATE THICKNESS PRIOR TO MOUNTING. IF DIFFERENT LENGTH BOLTS ARE REQUIRED, THEY MUST BE 1-8, GRADE 8, ZINC COATED OF THE PROPER LENGTH. FAILURE TO USE PROPER LENGTH BOLTS MAY CAUSE THE BOLTS UNDER THE WORM HOUSING TO BOTTOM OUT BEFORE TORQUEING. INSURE A MINIMUM OF 1-1/2" THREAD ENGAGEMENT.



MOUNTING HOLE LAYOUT



CRANE INSTALLATION

4.12 MODELS 5525, 6025, AND 6625 CRANE INSTALLATION

5525 MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	154"
CAB TO AXLE	84"
FRAME SECTION MODULUS	12 in ³
RBM	600,000 in-lb
FRONT AXLE RATING	7000 lb
REAR AXLE RATING	17,500 lb
GROSS VEHICLE RATING	24,500 lb
TRANSMISSION	5-speed

6025 MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	154"
CAB TO AXLE	84"
FRAME SECTION MODULUS	14.5 in ³
RBM	720,000 in-lb
FRONT AXLE RATING	9000 lb
REAR AXLE RATING	17,000 lb
GROSS VEHICLE RATING	26,000 lb
TRANSMISSION	5-speed

6625 MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	154"
CAB TO AXLE	84"
FRAME SECTION MODULUS	16 in ³
RBM	800,000 in-lb
FRONT AXLE RATING	9000 lb
REAR AXLE RATING	17,000 lb
GROSS VEHICLE RATING	26,000 lb
TRANSMISSION	5-speed

CRANE INSTALLATION

In addition to meeting Minimum Chassis Specifications, there must be sufficient room for mounting the crane and the platform must be strong enough to support the crane and rated load. Install the crane only on an IMT

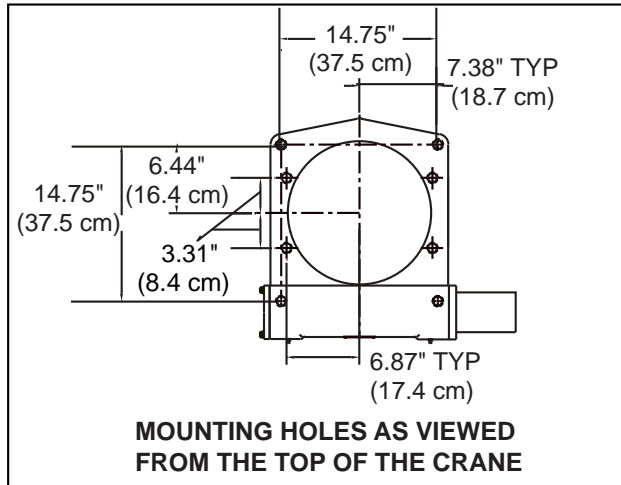
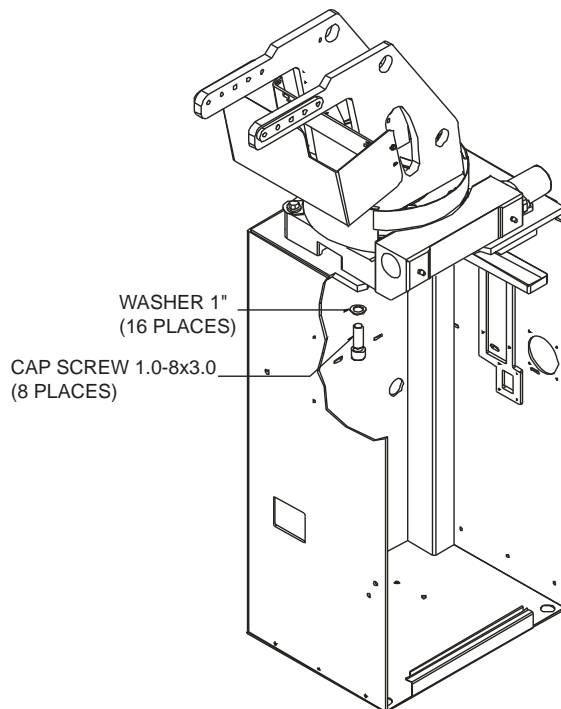
designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. In addition, an IMT designed body is designed to take full advantage of the standard reservoir placement. This reservoir is installed in the cargo area of the body. Before attempting to install the crane, the body must be installed.

To install the crane:

1. Use a lifting device capable of lifting the weight of the crane. See Specifications Section for crane weight. Attach fabric slings to the crane lower boom, centered approximately 18 inches from the mast hinge. Make certain the crane is well balanced on the slings by slowly lifting approximately 6" off the ground. Lift the crane, apply a bead of waterproof compound, such as silicon based caulk, to the bottom of the base. Move the chassis under the crane and lower the crane into the desired position.
2. Install the 1-8x3.0" mounting cap screws and 1" washers to secure the crane base to the truck body (see Crane Installation drawing). Torque the cap screws to 680 ft-lbs (94 kg-m).

CAUTION

THE 3.0" BOLTS SUPPLIED ARE FOR USE ON BODIES WITH A CRANE BOX TOP PLATE THICKNESS OF 7/8-1" ONLY. DETERMINE THE CRANE BOX TOP PLATE THICKNESS PRIOR TO MOUNTING. IF DIFFERENT LENGTH BOLTS ARE REQUIRED, THEY MUST BE 1-8, GRADE 8 (MINIMUM) OF THE PROPER LENGTH. FAILURE TO USE PROPER LENGTH BOLTS MAY CAUSE THE BOLTS UNDER THE WORM HOUSING TO BOTTOM OUT BEFORE TORQUEING. INSURE A MINIMUM OF 1-1/2" THREAD ENGAGEMENT.

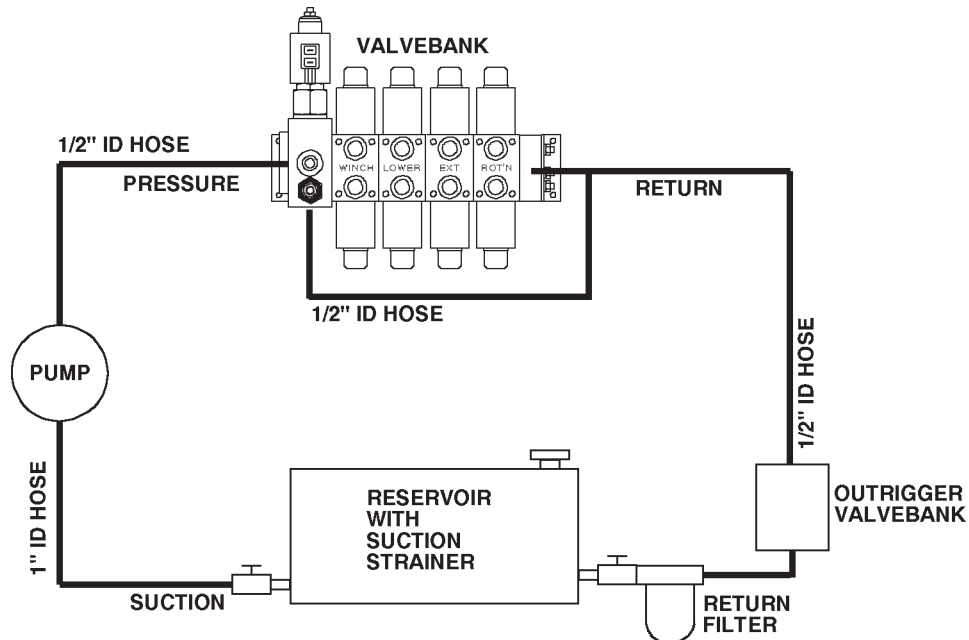
MOUNTING HOLE LAYOUT AND CRANE INSTALLATION DRAWINGS - 5525, 6025, AND 6625 MODEL CRANES**MOUNTING HOLE LAYOUT****CRANE INSTALLATION**

4.13 HYDRAULIC INSTALLATION - MODELS 3020, 3820, 5020, 5525, 6020, 6025, 6625

Before installation, familiarize yourself with the installation kit drawing in the parts section for specific hydraulic components used. The figure below is used to show major components and general hose routings only.

1. Plumb the hydraulic components as shown in the applicable installation kit in the parts section. Make certain all fittings are securely tightened and that hoses are free of possible chafing or contact with hot or sharp edges which could cause damage.

2. Fill the hydraulic reservoir with oil as specified in the Maintenance Section of the Telescopic Crane Operation, Maintenance & Repair Manual.
3. Check all connections for leaks.
4. Start the vehicle engine and test each crane function individually. Conduct a visual inspection to make certain that there are no leaks and that everything is operating properly.
5. Check oil level in the reservoir and add oil if necessary.



HYDRAULIC INSTALLATION

4.14 MODEL 7020 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional
	Cab
WHEELBASE	189"
CAB TO AXLE	120"
FRAME SECTION MODULUS	19.2 in ³
RBM	900,000 in-lb
FRONT AXLE RATING	11,000 lb
REAR AXLE RATING	21,000 lb
TRANSMISSION	5-speed

CAUTION

DO NOT ATTEMPT TO APPLY THE SAME TORQUE TO THE SELF LOCKING NUTS AND TIE RODS AS SHOWN IN THE TORQUE DATA CHART. DO NOT EXCEED 200 FT-LBS. EXCEEDING THE STATED TORQUE OF 200 FT-LBS. (28 KG-M) MAY DAMAGE EITHER THE CRANE BASE OR THE BODY.

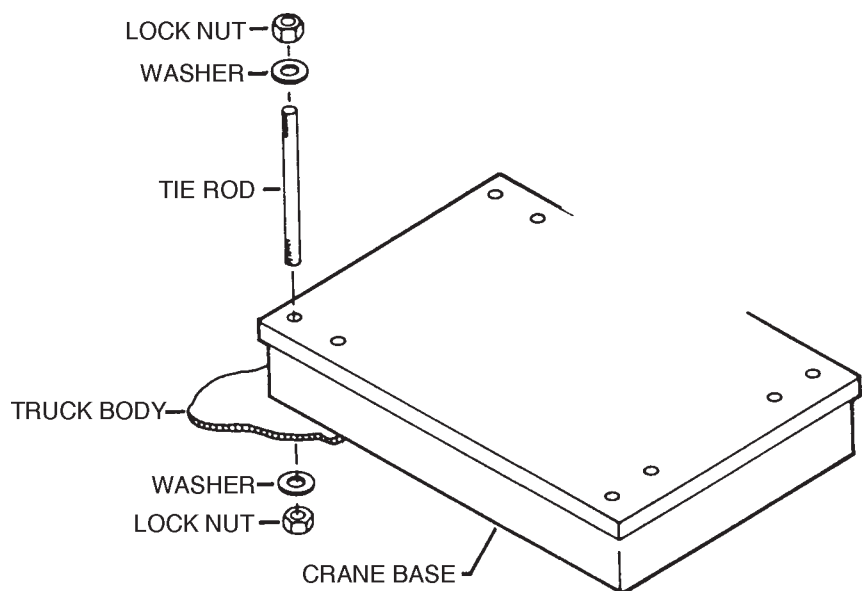
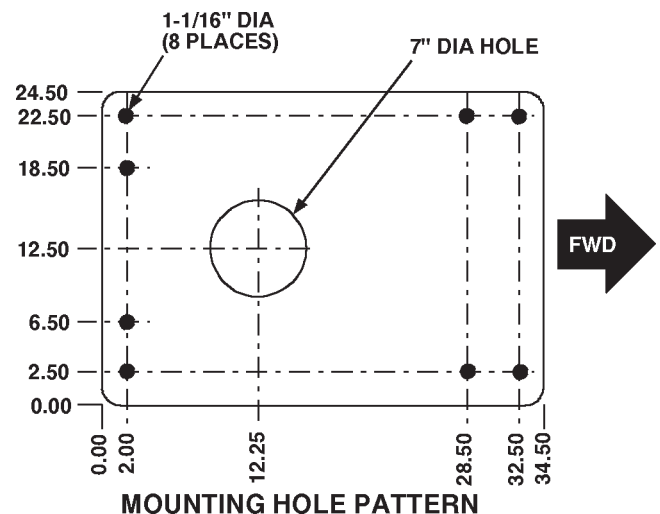
POWER WRENCHING OF THE NUT IS NOT RECOMMENDED UNTIL THE LEAD THREAD OF THE NUT INSERT IS ENGAGED BY HAND TURNING.

CRANE INSTALLATION

Install the 7020 crane only on an IMT-designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. Before attempting to install the crane, first install the truck body.

To install the crane:

1. Use a lifting device capable of lifting the weight of the crane, 2960 lbs. (1343kg.). Lift the crane and move the carrier vehicle with body installed under the crane. Lower the crane into position on the body.
2. Install the mounting tie rods, washers, and nuts to secure the crane base to the truck body. Tighten and torque to 200 ft- lbs. (28 kg-m).



CRANE INSTALLATION

4.15 MODEL 7025 CRANE INSTALLATION

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional Cab
WHEELBASE	189"
CAB TO AXLE	120"
FRAME SECTION MODULUS	19.2 in ³
RBM	900,000 in-lb
FRONT AXLE RATING	11,000 lb
REAR AXLE RATING	21,000 lb
TRANSMISSION	5-speed

CAUTION

DO NOT ATTEMPT TO APPLY THE SAME TORQUE TO THE SELF LOCKING NUTS AND TIE RODS AS SHOWN IN THE TORQUE DATA CHART. DO NOT EXCEED 200 FT-LBS. EXCEEDING THE STATED TORQUE OF 200 FT-LBS. (28 KG-M) MAY DAMAGE EITHER THE CRANE BASE OR THE BODY.

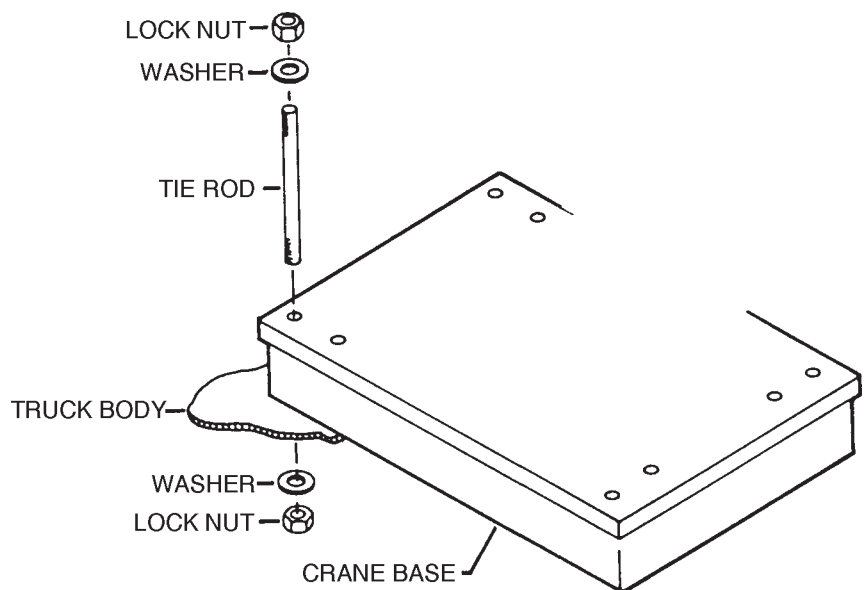
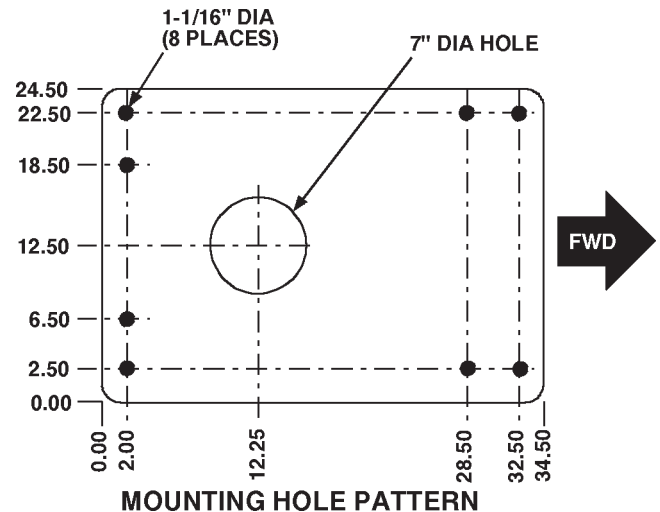
POWER WRENCHING OF THE NUT IS NOT RECOMMENDED UNTIL THE LEAD THREAD OF THE NUT INSERT IS ENGAGED BY HAND TURNING.

CRANE INSTALLATION

Install the 7025 crane only on an IMT-designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. Before attempting to install the crane, first install the truck body.

To install the crane:

1. Use a lifting device capable of lifting the weight of the crane, 2960 lbs. (1343kg.). Lift the crane and move the carrier vehicle with body installed under the crane. Lower the crane into position on the body.
2. Install the mounting tie rods, washers, and nuts to secure the crane base to the truck body . Tighten and torque to 200 ft- lbs. (28 kg-m).



CRANE INSTALLATION

4.16 HYDRAULIC & ELECTRICAL INSTALLATION - MODELS 7020 & 7025

HYDRAULIC INSTALLATION

Before beginning hydraulic installation, refer to the Installation Kit in the Parts Section for specific components and routing.

To install the crane hydraulics:

1. Install the suction filter on the carrier vehicle's frame. Install the 1-1/4" gate valve and hose on the suction filter inlet. Route the 1-1/4" ID hose between the reservoir and filter. Install the barbed nipples and hose clamps.
2. Install the 1-1/4" ID hose between the pump and the suction filter, using barbed nipples and hose clamps.
3. Install the 1/2" ID hose between the pump and the valvebank.
4. Install the 3/4" ID return hose between the return filter and the return port on the valvebank.

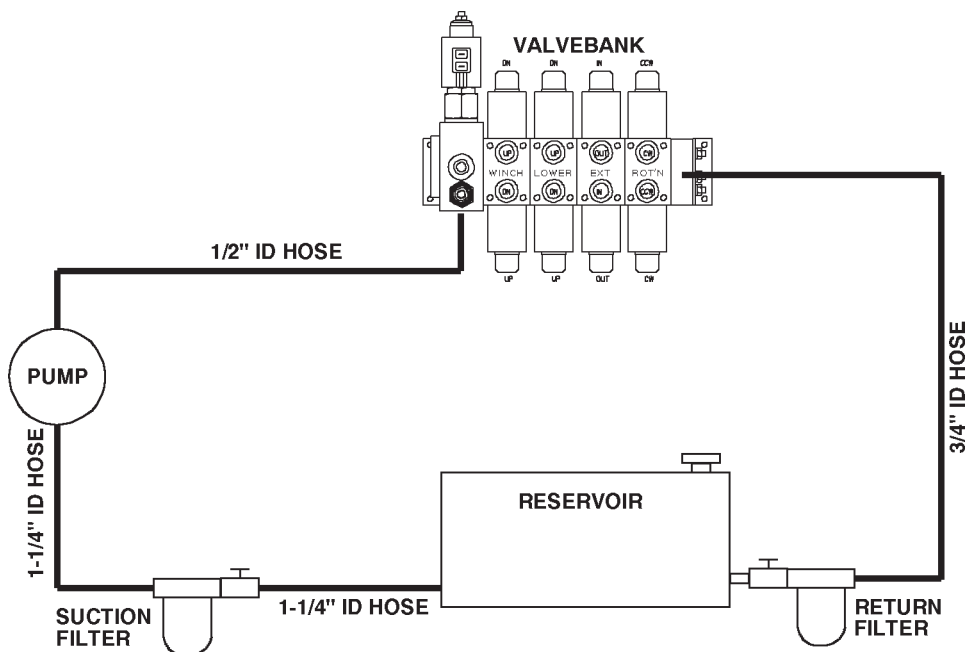
ELECTRICAL INSTALLATION

Familiarize yourself with the information on Proportional Remote Controls contained in this manual. Install the electrical components per the diagrams shown in the Parts Section.

TEST

Test operate the crane and controls as follows:

1. Fill the hydraulic reservoir with oil as specified in the Maintenance Section of the Telescopic Crane Operation, Maintenance & Repair Manual.
2. Check all connections for leaks.
3. Start the vehicle engine and test each crane function individually. Conduct a visual inspection to make certain that there are no leaks and that everything is operating properly.
4. Check the oil level in the reservoir and add oil if necessary.



HYDRAULIC INSTALLATION

SECTION 5: DECALS

5-1. DECAL PLACEMENT-TELESCOPING CRANES 2

5-2. “DANGER” DECAL DESCRIPTIONS 3

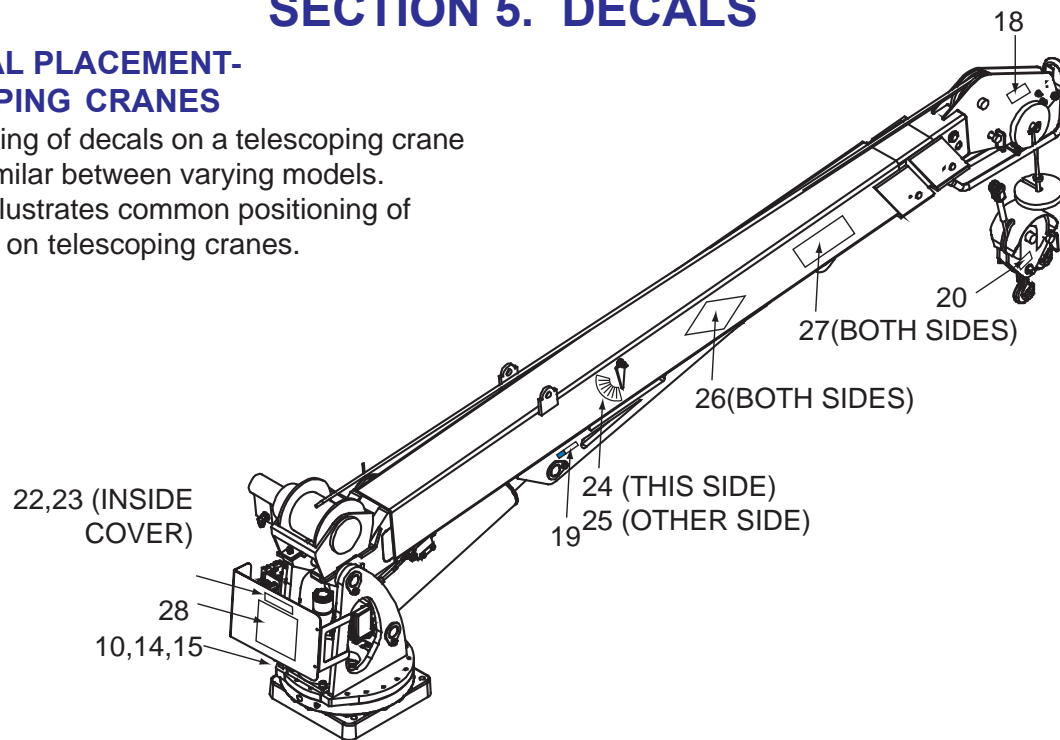
5-3. INSTRUCTIONAL DECAL DESCRIPTIONS 6

SECTION 5. DECALS

5-1. DECAL PLACEMENT- TELESCOPING CRANES

The positioning of decals on a telescoping crane is usually similar between varying models.

Figure E-1 illustrates common positioning of decals used on telescoping cranes.



NOTE

PLACEMENT OF A HAZARD WARNING DECAL MUST BE IN A POSITION WHICH IS EASILY VISIBLE TO THE PERSON RESPONSIBLE FOR TAKING THE APPROPRIATE ACTION WHICH THAT DECAL ADDRESSES.

ITEM	DECAL DESCRIPTION	QTY	SEE FIG
1.	CRANE OPERATION HAZARDS	1	E-2
2.	ELECTROCUTION HAZARD	4	E-3
3.	WARNING-HOISTING PERSONNEL	4	E-4
4.	ELECTROCUTION HAZ. - REMOTE	1	E-5
5.	DANGER-ROTATING DRIVELINE	1	E-6
6.	STABILIZER FOOT CRUSH HAZARD	2	E-7
7.	WARNING-MANUAL EXT. FREE FALL	1	E-8
8.	WARNING-MANUAL STABILIZERS	2	E-9
9.	GREASE WEEKLY	AR	E-10
10.	GREASE WORM DRIVE BEARING	1	E-11
11.	CONTACT IMT	1	E-12
12.	RETURN LINE	1	E-13
13.	SUCTION LINE	1	E-14
14.	LUBRICATE GEAR	1	E-15
15.	ROTATE WHILE GREASING	1	E-16
16.	CAUTION-DO NOT WASH/WAX	1	E-17
17.	CAUTION-OIL LEVEL	1	E-18
18.	CAUTION-DOWNSHAUL WEIGHT	2	E-19
19.	ASME B30.5	1	E-20
20.	LOAD BLOCK RATING	2	E-21
21.	HYD OIL RECOMMENDATIONS	1	E-22
22.	MANUAL OVERRIDE	1	E-23
23.	MANUAL OVERRIDE PROCEDURE	1	E-24
24.	ANGLE INDICATOR, RH	1	E-25
25.	ANGLE INDICATOR, LH	1	
26.	IMT DIAMOND	2	
27.	CRANE MODEL	2	
28.	CAPACITY CHART	2	
29.	FULLY DEPLOYED STAB	2	E-26

DECAL PLACEMENT

ITEM	LOCATION
1, 11, 16, 17	AT OR NEAR REMOTE CONTROL HANDLE STORAGE POINT
2,3	ON ALL FOUR SIDES OF CARRIER VEHICLE
4	ON REMOTE CONTROL
6, 8, 29	ON STABILIZERS
5	AT OR NEAR DRIVELINE
7	AT OR NEAR MANUAL EXTENSION BOOM RETENTION MECHANISM
9	ON ALL GREASE ZERKS
12,13	ON HYD RESERVOIR LINES
10, 14, 15	ON ROTATION GEAR COVER
18	ON BOOM TIP
21	ON HYDRAULIC OIL RESERVOIR
20	ON BOTH SIDES OF SNATCH BLOCK

FIGURE E-1. DECAL LOCATIONS ON TELESCOPING CRANES

5-2. "DANGER" DECAL DESCRIPTIONS

All operators must familiarize themselves with the "DANGER" decals shown in this section. Your equipment may have additional safety decals that are not described here. Any safety decals affixed to your equipment must be identified, read and understood.

The materials and adhesives used in the production of these decals were designed for maximum durability, adhesion and legibility. Nevertheless, if a decal (including capacity chart) becomes damaged or illegible, replace it at your earliest opportunity. If a crane is repaired or repainted, replace all decals before the crane is put back into service. Individual decals as well as complete decal kits are available from IMT.

The following figures show the safety decals used on IMT cranes. They are illustrated here as an aid in their identification with an explanation of their purpose, where they are placed on the crane and the normal quantity used on each crane.

Figure E-2

DECAL: Crane Operation Hazards


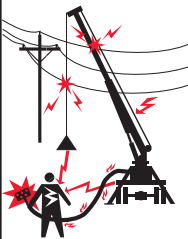







PART NUMBER: 70396613

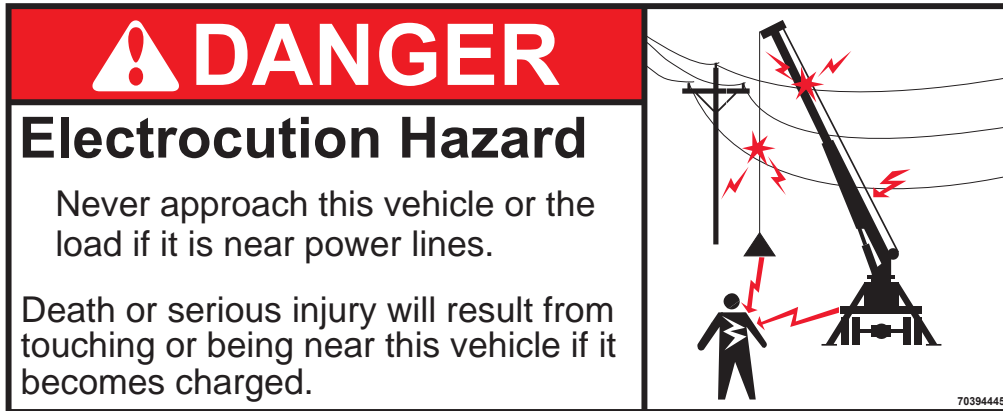
FUNCTION: To inform the operator of the hazards associated with untrained operation, contact or proximity to electrical lines, crane two-blocking, and lifting personnel. The decal defines the possible consequences should the hazard occur and how to avoid the hazard.

WHERE USED: Telescoping Cranes

PLACEMENT: At or near the remote control handle storage point.

QUANTITY: 1

 DANGER	
	<p>Electrocution Hazard Crane and remote control are not insulated.</p> <p>NEVER approach or contact power lines with any part of this equipment or load.</p> <p>Keep 50 feet away from any power line if voltage is unknown.</p> <p>Keep 20 feet away from any power line 350 kv or less.</p> <p>Account for swaying motion of power lines, equipment, and load line.</p> <p>Follow OSHA 29CFR 1926. 1400.</p> <p>Death or serious injury will result from approaching or contacting a power line.</p>
 WARNING	
	<p>Falling Load Hazard Always stop operation before block contacts sheave. (Two-blocking)</p> <p>Do not rely on limit switch to stop block.</p> <p>If block contacts sheave, lower load by letting out cable. Inspect for damage.</p> <p>Falling loads may injure or kill.</p>
	<p>Fall Hazard Never use crane to hoist personnel.</p> <p>Never ride on boom, hook, load, or any other device attached to crane boom or load line.</p> <p>Riding on boom, hook, or loadline may injure or kill.</p>
	<p>Overload Hazard Read, understand and follow the crane load and work area charts</p> <p>Do not exceed crane or winch ratings.</p> <p>Weight of accessories attached to boom or loadline must be subtracted from the load rating chart or added to the load weight.</p> <p>Do not exceed manual boom extension load ratings at reduced boom lengths.</p> <p>Overloading the crane may injure or kill.</p>
  	<p>Follow Safe Operating & Inspection Procedures Only trained personnel should operate this equipment.</p> <p>Do not operate or service until you have read and understood:</p> <ul style="list-style-type: none"> - Operation and service manuals supplied with this equipment - Crane load and work area charts - Safety signs and instructions - Employer work rules and applicable government and OSHA regulations <p>Obtain manuals from manufacturer's website or customer service.</p> <p>Follow safe operating procedures:</p> <ul style="list-style-type: none"> - Keep guards, safety signs, and safety features in place and in good condition. - Do not exceed crane or winch ratings. Keep three wraps of loadline on winch. - Use crane with truck level on solid surface and with stabilizers properly deployed. - Operate crane controls slowly and smoothly. - Keep personnel clear of moving stabilizers. - Never operate with personnel under boom or load. - Do not side load boom, drag, or swing loads. Keep load under boom tip. - Do NOT operate in high winds. - Stow boom and stabilizers before traveling. <p>Complete required inspections.</p> <ul style="list-style-type: none"> - Follow the instructions in the operator's manual for daily, frequent, and annual inspections. <p>Operating this equipment without knowledge or training may lead to injury or death for you or others. Failure to inspect crane or follow safe operating practices may injure or kill.</p>

**Figure E-3****DECAL:** Electrocution Hazard**PART NUMBER:** 70394445

FUNCTION: To inform the operator and other personnel in the work area of the hazard associated with contact or proximity to electrical lines, the possible consequences should the hazard occur, and how to avoid the hazard.

WHERE USED: Service body mounted Telescoping Cranes - remote controls

PLACEMENT: On all four sides of the carrier vehicle.

QUANTITY: 4

**Figure E-4****DECAL:** Riding on Boom, Hook, or Loadline Hazard**PART NUMBER:** 70392868

FUNCTION: To inform personnel in the work area of the possible consequences of riding on the boom, boom hook, the load or winch loadline, and how to avoid the hazard.

USED ON: Service body mounted Telescoping Cranes.

PLACEMENT: On all four sides of the vehicle.

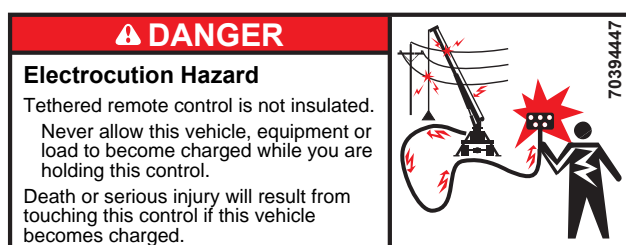
QUANTITY: 4

Figure E-5**DECAL:** Electrocution Hazard via Remote Control**PART NUMBER:** 70394447

FUNCTION: To inform the operator of the lack of protection from electrocution afforded by the remote control handle, the possible consequences of the crane becoming electrically charged, and how to avoid the hazard.

WHERE USED: Service body mounted Telescoping Cranes - remote controls

PLACEMENT: On the hand held controller.

QUANTITY: 1**Figure E-7****DECAL:** Stabilizer Foot Crushing Hazard**PART NUMBER:** 70392864

FUNCTION: To inform the operator and other personnel in the work area of the hazard associated with the operation of the stabilizers, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: Service body mounted Telescoping Cranes

PLACEMENT: On each stabilizer.

QUANTITY: 2**Figure E-6****DECAL:** Rotating Driveline Hazard**PART NUMBER:** 70392891

FUNCTION: To inform personnel of the hazard associated with servicing an operating driveline or PTO, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: Service body mounted Telescoping Cranes that are driven by a PTO/pump system.

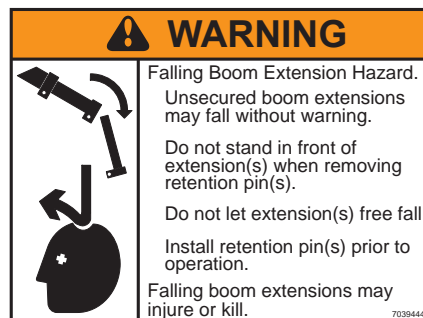
PLACEMENT: At or near the drive line.

QUANTITY: 1**Figure E-8****DECAL:** Free Falling Manual Boom Extension(s) Hazard**PART NUMBER:** 70394443

FUNCTION: To inform the operator of precautions necessary in the safe deployment of manually operated extension booms, and the possible consequences of not taking those precautions.

USED ON: Service body mounted Telescoping Cranes.

PLACEMENT: At or near the manual boom extension(s) retention mechanism(s).

QUANTITY: 1

5-3. INSTRUCTIONAL DECAL DESCRIPTIONS

Shown in this section are instructional decals which may be affixed to your crane. Some are relevant to maintenance while others focus on operation. They are provided here as reference in the understanding of their purpose and placement.

Figure E-9

DECAL: Warning - Manual Stabilizers

PART NUMBER: 70391598

FUNCTION: To warn the operator of precautions necessary in the deployment of manual stabilizers and to instruct in their use.

USED ON: All cranes equipped with manual stabilizers.

PLACEMENT: On each stabilizer.

QUANTITY: 1 per stabilizer leg.



Figure E-10

DECAL: Grease Weekly - Left Arrow

PART NUMBER: 70391612

DECAL: Grease Weekly - Right Arrow

PART NUMBER: 70391613

FUNCTION: To inform maintenance personnel of the location and necessity to apply grease to zerks on a weekly basis.

USED ON: All cranes.

PLACEMENT: At grease zerks with arrow pointing toward the zerk.

QUANTITY: 1 per grease zerk



Figure E-11

DECAL: Grease Worm Drive Bearings

PART NUMBER: 70395090

FUNCTION: To inform and remind maintenance personnel to grease worm drive bearing every three months.

USED ON: All cranes with worm drive bearings.

PLACEMENT: On gear cover

QUANTITY: 1 per grease zerk

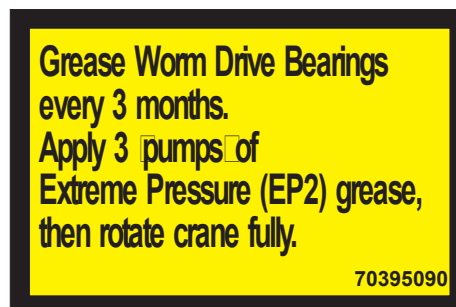


Figure E-12

DECAL: Contact IMT

PART NUMBER: 70392982

FUNCTION: To provide the owners/operators and maintenance personnel with the address and telephone number of IMT for service and repair purposes, safety questions, etc.

USED ON: All cranes.

PLACEMENT: Visible from the operator's station.

QUANTITY: 1



Figure E-13

DECAL: Return Line

PART NUMBER: 70392109

FUNCTION: To aid in the identification of the hydraulic system return line to minimize errors during hydraulic maintenance.

USED ON: All cranes with hydraulic fluid reservoirs.

PLACEMENT: On the hydraulic fluid reservoir at the return line.

QUANTITY: 1



Figure E-14

DECAL: Suction Line

PART NUMBER: 70392108

FUNCTION: To aid in the identification of the hydraulic system suction line to minimize errors during hydraulic maintenance.

USED ON: All cranes with hydraulic fluid reservoirs.

PLACEMENT: On the hydraulic fluid reservoir at the suction line.

QUANTITY: 1



Figure E-15

DECAL: Lubricate Gear

PART NUMBER: 70392399

FUNCTION: To inform maintenance personnel of the need to lubricate the rotation gear on a weekly basis.

USED ON: All cranes which use a gear drive for crane swing.

PLACEMENT: On the gear cover.

QUANTITY: 1

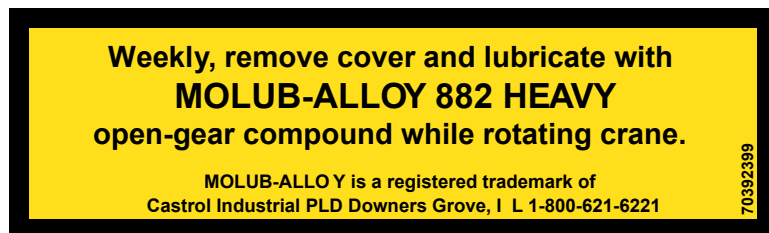


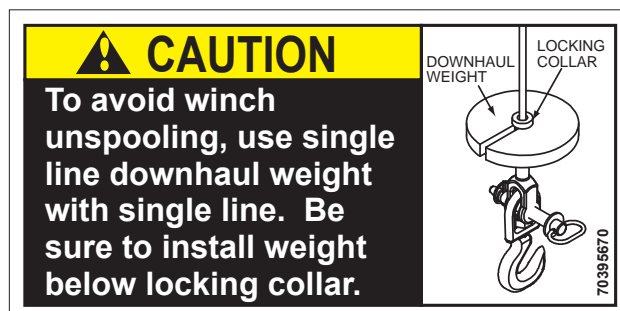
Figure E-16**DECAL:** Rotate While Greasing**PART NUMBER:** 70392524**FUNCTION:** To inform and remind operators to rotate the crane while greasing the turntable rotation system.**USED ON:** All cranes.**PLACEMENT:** On the gear cover.**QUANTITY:** 1**Figure E-17****DECAL:** Caution - Do Not Wash/Wax**PART NUMBER:** 70392213**FUNCTION:** To inform maintenance personnel not to use high pressure washers and not to wax the crane for a period of 60 days after delivery. The use of high pressure washers and wax is detrimental to the crane's paint until cured.**USED ON:** All cranes.**PLACEMENT:** Near the crane operating station.**QUANTITY:** 1**Figure E-18****DECAL:** Caution - Oil Level**PART NUMBER:** 71039134**FUNCTION:** To caution the operator to check the hydraulic reservoir oil level regularly.**USED ON:** All cranes with hydraulic fluid reservoirs.**PLACEMENT:** At or near the normal operating station.**QUANTITY:** 1**Figure E-19****DECAL:** Caution - Downhaul Weight**PART NUMBER:** 70395670**FUNCTION:** To show operator how to use downhaul weight with single line.**USED ON:** All cranes.**PLACEMENT:** On or near downhaul weight.**QUANTITY:** 1

Figure E-20**DECAL:** ASME B30.5**PART NUMBER:** 70395324

FUNCTION: To inform operator and maintenance personnel of the specification to which the crane was manufactured.

USED ON: All cranes.**PLACEMENT:** On crane base.**QUANTITY:** 1**NOTICE**

This crane has been manufactured in accordance with ASME B30.5, Mobile and Locomotive Cranes.

70395324

Figure E-21**DECAL:** Load Block Rating**PART NUMBER:** Depends on load block

70396546 - 1.0 tons

70396547 - 1.2 tons

70396548 - 1.6 tons

71394083 - 2.0 tons

71394080 - 2.5 tons

71394081 - 3.0 tons

70393860 - 5.5 tons

71394082 - 7.0 tons

LOAD BLOCK RATING
5.5 TONS

SNATCH BLOCK WEIGHT: 22 POUNDS

70393860

FUNCTION: To inform operator of the amount the load block can lift.

USED ON: All cranes.**PLACEMENT:** On the snatch block.**QUANTITY:** 2**Figure E-22**

DECAL: Hydraulic Oil Reservoir Fill Recommendations

PART NUMBER: 70394189

FUNCTION: To inform operator and maintenance personnel of the recommended hydraulic oil to be used under differing climatic conditions.

USED ON: All cranes.**PLACEMENT:** On or near the hydraulic oil reservoir.**QUANTITY:** 1

Iowa Mold Tooling Co., Inc.
Garner, Iowa
USA
641-923-3711



70394189

**HYDRAULIC OIL RESERVOIR
FILL RECOMMENDATIONS**

HYDRAULIC OIL	AMBIENT TEMPERATURE RANGE	
	°F	°C
ISO 32	0° to 90°	-18° to 32°
ISO 15	Below 0°	Below -18°
ISO 46	Above 90°	Above 32°

For Arctic conditions, consult your oil supplier.

Figure E-23**DECAL:** Manual Override**PART NUMBER:** 70396631**FUNCTION:** To inform operator about location of manual override instructions.**USED ON:** All remote controlled cranes.**PLACEMENT:** On outside of valvebank cover.**QUANTITY:** 1**Figure E-24****DECAL:** Manual Override Instructions

PART NUMBER: Varies based on valvebank.
 70396631 on 5525, 6025, 6625.
 70394166 on all telescopic cranes except 1015 and 2020, and 5525, 6025, and 6625 after January 2005.

FUNCTION: To inform operator about location of manual override instructions.**USED ON:** Remote controlled cranes.**PLACEMENT:** On inside of valvebank cover.**QUANTITY:** 1**Figure E-25****DECAL:** Boom Angle Indicator - Left Hand**PART NUMBER:** 71391523**DECAL:** Boom Angle Indicator - Right Hand**PART NUMBER:** 71391522**FUNCTION:** To display to the operator the actual angle of the boom of a telescoping crane.**USED ON:** All telescoping cranes.**PLACEMENT:** On the left or right side of the lower boom in alignment with the angle indicator arrow.**QUANTITY:** 1 EACH

**SEE MANUAL
OVERRIDE PROCEDURE
INSIDE COVER**

70396631

MANUAL OVERRIDE PROCEDURE**FOR FULL FLOW TO VALVE BANK:**

Manually press and hold plunger (located on the end of the proportional valve). While holding, operate the desired function.

TO OPERATE INDIVIDUAL CRANE FUNCTIONS:

Manually depress plunger located on the end of each solenoid spool.

70396632

**INSTRUCTIONS FOR
MANUAL OPERATION****To allow full flow to valve bank:**

Loosen locknut located on top of proportional valve and turn Allen head screw clockwise to full "in" position.

To operate individual crane functions:

Depress plunger located on the end of each solenoid spool.

70394166

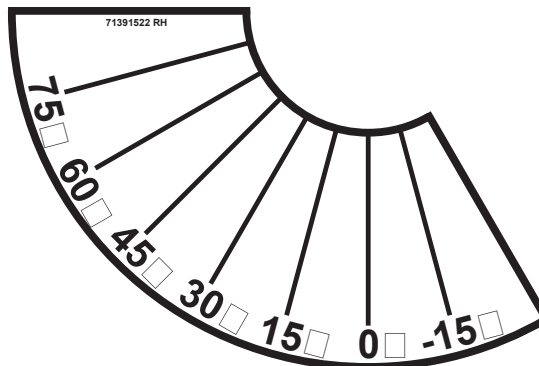


Figure E-36**DECAL:** Stabilizer - Fully Deployed**PART NUMBER:** 70399271

FUNCTION: To inform operator when the stabilizer arm is fully deployed (extended). When the stabilizer arm is fully extended, this decal will be completely visible.

USED ON: All cranes with stabilizers which extend out.

PLACEMENT: On the top of the stabilizer arm when fully deployed.

QUANTITY: 1 per stabilizer which extends out.



SECTION 6: REFERENCE

INSPECTION CHECKLIST 2

CRANE CAPACITY & STABILITY 6

UNDERSTANDING THE CAPACITY PLACARD 6

STABILITY TEST 7

TORQUE DATA CHART - DOMESTIC 11

TORQUE DATA CHART - METRIC 12

TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE 13

TURNTABLE BEARING INSPECTION FOR REPLACEMENT 14

DIRECTION TERMINOLOGY 15

CONVERSION FACTORS 16

NOTICE	
The user of this form is responsible in determining that these inspections satisfy all applicable regulatory requirements	
OWNER/COMPANY	
CONTACT PERSON	
CRANE MAKE & MODEL	
CRANE SERIAL NUMBER	
UNIT I.D. NUMBER	
LOCATION OF UNIT	

Inspection Checklist	
CRANES	
TYPE OF INSPECTION (check one) <input type="checkbox"/> DAILY (if deficiency found) <input type="checkbox"/> QUARTERLY <input type="checkbox"/> MONTHLY <input type="checkbox"/> ANNUAL	
DATE INSPECTED	
HOUR METER READING (if applicable)	
INSPECTED BY (print)	
SIGNATURE OF INSPECTOR	

REV: 11-22-11

TYPE OF INSPECTION
<p>NOTES:</p> <p>Daily and monthly inspections are to be performed by a “competent person”, who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.</p> <p>Quarterly and annual inspections are to be performed by a “qualified person” who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.</p> <p>One hour of normal crane operation assumes 20 complete cycles per hour. If operation exceeds 20 cycles per hour, inspection frequency should be increased accordingly.</p> <p>Consult Operator / Service Manual for additional inspection items, service bulletins and other information.</p> <p>Before inspecting and operating crane, crane must be set up away from power lines and leveled with stabilizers deployed according to the crane manufacturer’s directions.</p> <p>DAILY (D): Before each shift of operation, those items designated with a (D) must be inspected.</p> <p>MONTHLY (M): Monthly inspections or 100 hours of normal operation (which ever comes first) includes all daily inspections plus items designated with an (M). This inspection must be recorded and retained for a minimum of 3 months.</p> <p>QUARTERLY (Q): Every three months or 300 hours of normal operation (which ever comes first) includes all daily and monthly inspection items plus items designated with a (Q). This inspection must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection.</p> <p>ANNUAL (A): Each year or 1200 hours of normal operation (which ever comes first) includes all items on this form which encompasses daily, monthly and quarterly inspections plus those items designated by (A). This inspection must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection.</p>

FREQUENCY	ITEM	KEY	✓ = SATISFACTORY R = RECOMMENDATION (Should be considered for corrective action) NA = Not Applicable	X = Deficient (Note: If a deficiency is found, an immediate determination must be made as to whether the deficiency constitutes a safety hazard and must be corrected prior to operation.)	STATUS ✓, R, X, NA
			INSPECTION DESCRIPTION		
D	1	Labels	All load charts, safety & warning labels, & control labels are present and legible.		
D	2	Crane	Check all safety devices for proper operation.		
D	3	Controls	Control mechanisms for proper operation of all functions, leaks & cracks.		
D	4	Station	Control and operator’s station for dirt, contamination by lubricants, & foreign materials.		
D	5	Hyd System	Hydraulic system (hoses, tubes & fittings) for leakage & proper oil level.		
D	6	Hook	Presence & proper operation of hook safety latches.		
D	7	Wire Rope	Inspect for apparent deficiencies per applicable requirements and manufacturer’s specifications.		
D	8	Pins	Proper engagement of all connecting pins & pin retaining devices.		
D	9	General covers.	Overall observation of crane for damaged or missing parts, cracked welds & presence of safety		
D	10	Operation	During operation, observe crane for abnormal performance, unusual wear (loose pins, wire rope damage, etc.). If observed, discontinue use & determine cause & severity of hazard.		
D	11	Remote Ctrls	Operate remote control devices to check for proper operation.		
D	12	Electrical	Operate all lights, alarms, etc. to check for proper operation.		
D	13	Anti Two-Block or Two-Block Damage Prevention	Operate anti-two-blocking or two-block prevention devices to check for proper operation.		

Inspection Checklist**CRANES****2**

FREQUENCY	ITEM	KEY	✓ =SATISFACTORY R =RECOMMENDATION (Should be considered for corrective action) NA = Not Applicable	X = Deficient (Note: If a deficiency is found, an immediate determination must be made as to whether the deficiency constitutes a safety hazard and must be corrected prior to operation.)	STATUS ✓, R, X, NA
			INSPECTION DESCRIPTION		
D	14	Tires	Check tires (when in use) for proper inflation and condition.		
D	15	Ground conditions around and around stabilizers and supporting foundations, ground water accumulation, or similar.	Ground conditions around the equipment for proper support, including ground settling under and around stabilizers and supporting foundations, ground water accumulation,		
D	16	Level Position	The equipment for level position within tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.		
D	17	Operator Cab Windows	Significant cracks, breaks, or other deficiencies that would hamper the operator's view.		
D	18	Rails, rail stops, clamps, supporting surfaces.	Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling.		
D	19	Safety Devices	Safety devices and operational aids for proper operation.		
D	20	Electrical	Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.		
D	21	Other			
D	22	Other			
M	23	Daily	All daily inspection items.		
M	24	Cylinders	Visual inspection of cylinders for leakage at rod, fittings & welds. Damage to rod & case.		
M	25	Valves	Holding valves for proper operation.		
M	26	Valves	Control valve for leaks at fittings & between sections.		
M	27	Valves	Control valve linkages for wear, smoothness of operation & tightness of fasteners. Relief valve for proper pressure settings.		
M	28	General	Bent, broken or significantly rusted/corroded parts.		
M	29	Electrical accumulation.	Electrical apparatus for malfunctioning, signs of apparent excess deterioration, dirt or moisture accumulation. Electrical systems for presence of dirt, moisture and frayed wires.		
M	30	Structure	All structural members for damage.		
M	31	Welds	All welds for breaks & cracks.		
M	32	Pins	All pins for proper installation & condition.		
M	33	Hardware	All bolts, fasteners & retaining rings for tightness, wear & corrosion		
M	34	Wear Pads	Condition of wear pads.		
M	35	Pump & Motor mounting bolts.	Hydraulic pumps & motors for leakage at fittings, seals & between sections. Check tightness of		
M	36	PTO	Transmission/PTO for leakage, abnormal vibration & noise, alignment & mounting bolt torque.		
M	37	Hyd Fluid	Quality of hydraulic fluid and for presence of water.		
M	38	Hyd Lines	Hoses & tubes for leakage, abrasion damage, blistering, cracking, deterioration, fitting leakage & secured properly.		
M	39	Hook	Load hook for abnormal throat distance, twist, wear & cracks.		
M	40	Wire Rope	Condition of load line.		
M	41	Manual	Presence of operator's manuals with unit.		
M	42		Other		
M	43		Other		
Q	44	Daily	All daily inspection items.		
Q	45	Monthly	All monthly inspection items.		
Q	46	Rotation Sys	Rotation bearing for proper torque of all mounting bolts.		
Q	47	Hardware	Base mounting bolts for proper torque.		
Q	48	Structure	All structural members for deformation, cracks & corrosion.		
	49		1 Base		
	50		1 Stabilizer beams & legs		
	51		1 Mast		
	52		1 Inner boom		
	53		1 Outer boom		
	54		1 Extension(s)		
	55		1 Jib boom		
	56		1 Jib extension(s)		
	57		1 Other		
Q	58	Hardware	Pins, bearings, shafts, gears, rollers, & locking devices for wear, cracks, corrosion & distortion.		

Inspection Checklist**CRANES****3**

FREQUENCY	ITEM	KEY	✓ = SATISFACTORY R = RECOMMENDATION (Should be considered for corrective action) NA = Not Applicable	X = Deficient (Note: If a deficiency is found, an immediate determination must be made as to whether the deficiency constitutes a safety hazard and must be corrected prior to operation.)	STATUS ✓, R, X, NA
			INSPECTION DESCRIPTION		
	59		1	Rotation bearing(s)	
	60		1	Inner boom pivot pin(s) & retainer(s)	
	61		1	Outer boom pivot pin(s) & retainer(s)	
	62		1	Inner boom cylinder pin(s) & retainer(s)	
	63		1	Outer boom cylinder pin(s) & retainer(s)	
	64		1	Extension cylinder pin(s) & retainer(s)	
	65		1	Jib boom pin(s) & retainer(s)	
	66		1	Jib cylinder pin(s) & retainer(s)	
	67		1	Jib extension cylinder pin(s) & retainer(s)	
	68		1	Boom tip attachments	
	69		1	Other	
Q	70	Hyd Lines	Hoses, fittings & tubing for proper routing, leakage, blistering, deformation & excessive abrasion.		
	71		1	Pressure line(s) from pump to control valve	
	72		1	Return line(s) from control valve to reservoir	
	73		1	Suction line(s) from reservoir to pump	
	74		1	Pressure line(s) from control valve to each function	
	75		1	Load holding valve pipe(s) and hose(s)	
	76		1	Other	
Q	77	Pumps & Motors	Pumps & motors for loose bolts/fasteners, leaks, noise, vibration, loss of performance, heating & excess pressure.		
	78		1	Winch motor(s)	
	79		1	Rotation motor(s)	
	80		1	Other	
Q	81	Valves	Hydraulic valves for cracks, spool return to neutral, sticking spools, proper relief valve setting, relief valve failure.		
	82		1	Main control valve	
	83		1	Load holding valve(s)	
	84		1	Stabilizer or auxiliary control valve(s)	
	85		1	Other	
	86		1	Other	
Q	87	Cylinders	Hydraulic cylinders for drifting, rod seal leakage & leakage at welds. Rods for nicks, scores & dents. Case for damage. Case & rod ends for damage & abnormal wear.		
	88		1	Stabiliizer cylinder(s)	
	89		1	Inner boom cylinder(s)	
	90		1	Outer boom cylinder(s)	
	91		1	Extension cylinder(s)	
	92		1	Rotation cylinder(s)	
	93		1	Jib lift cylinder(s)	
	94		1	Jib extension cylinder(s)	
	95		1	Other	
Q	96	Winch	Winch, sheaves & drums for damage, abnormal wear, abrasions & other irregularities.		
Q	97	Hyd Filters	Hydraulic filters for replacement per maintenance schedule.		
A	98	Daily	All daily inspection items.		
A	99	Monthly	All monthly inspection items.		
A	100	Quarterly	All quarterly inspection items.		
A	101	Hyd Sys	Hydraulic fluid change per maintenance schedule.		
A	102	Controls	Control valve calibration for correct pressures & relief valve settings		
A	103	Valves	Safety valve calibration for correct pressures & relief valve settings.		
A	104	Valves	Valves for failure to maintain correct settings.		
A	105	Rotation Sys	Rotation drive system for proper backlash clearance & abnormal wear, deformation & cracks.		
A	106	Lubrication	Gear oil change in rotation drive system per maintenance schedule.		
A	107	Hardware	Check tightness of all fasteners and bolts.		
A	108	Wear Pads	Wear pads for excessive wear.		
A	109	Loadline	Loadline for proper attachment to drum.		

Deficiency / Recommendation / Corrective Action Report

4

[illegible]

If additional space is required, reproduce this page and attach to this report.

CRANE CAPACITY & STABILITY

The crane capacity is defined on the capacity placard, a decal which is mounted near the operator's station on the crane. The capacity placard information is based on the crane, winch, cable and stabilizers being structurally sound and a stability factor of 85% of the balance point.. All load ratings are dependent upon compliance with the following:

1. Stabilizers fully extended and stabilizer pads firmly contacted with a solid, stable and level surface.
2. The crane has been installed on a factory approved vehicle and in a factory approved fashion.
3. The carrier vehicle's tires are properly inflated.
4. Any load handling devices have been added to the weight being lifted.
5. Extreme wind velocities are not present.
6. The crane is operated in a smooth and controlled manner.
7. Any required counterweights have been added.

In addition, each stated capacity is directly related to the radius of a given operation. The radius is measured from the load line to the centerline of rotation on the horizontal plane.

WARNING

THE MINIMUM CURB WEIGHTS SHOWN IN THE SPECIFICATIONS IN VOLUME 2, PARTS AND SPECIFICATIONS DO NOT ENSURE THE UNIT WILL BE STABLE. ACTUAL STABILITY RATINGS WILL BE OBTAINED FROM THE INITIAL START-UP AND TESTING PROCEDURES.

Required axle weights for the crane mounted on a chassis meeting the minimum chassis requirements are shown in Volume 2, Specifications.

CAUTION

STABILITY FACTORS DO NOT TAKE THE FRONT AXLE LOAD RATING INTO CONSIDERATION. DUE TO THE CAPACITY RATING OF THE FRONT AXLE, THE LOADING 75° EITHER SIDE OF THE CENTERLINE OVER THE CAB MUST BE SEVERELY RESTRICTED.

UNDERSTANDING THE CAPACITY PLACARD

The following information is defined on Figure F-1, a sample capacity placard. **This placard is an example only! The capacity information is not intended for use on any particular crane.**

1. Crane model number.
2. This note is a reminder that it is necessary to add the weight of load handling devices to the weight of the object being lifted in order to derive the actual total load being lifted.
3. Capacities which are "boxed" indicate crane capacities which exceed 1-part line capabilities. To lift these maximum loads in these ranges, it is necessary to use 2-part line.
4. Capacities which are not "boxed" are within 1-part line limits.
5. Distances from centerline of rotation to various lifting points.
6. Lifting height reference dimensions from base of crane. The mounting height of the crane must be added to these dimensions to determine accurate vertical heights.
7. Crane boom angle reference figures. The angle of the lower boom as shown by the angle indicator on the lower boom should be compared to these figures.

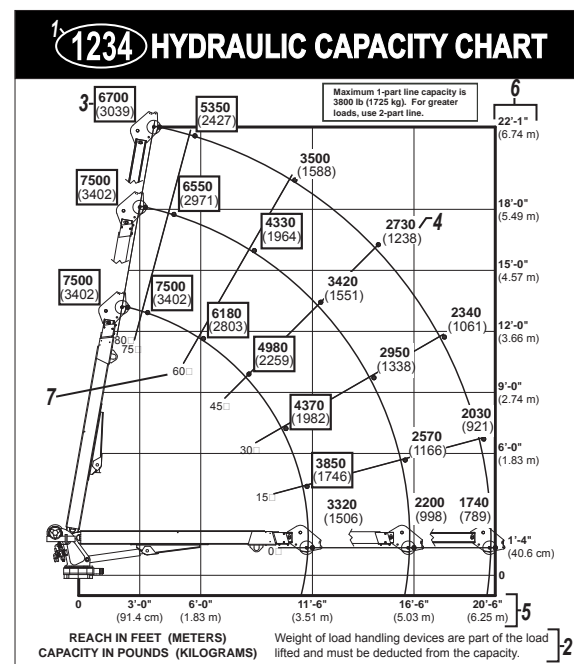


FIGURE F-1: SAMPLE CAPACITY PLACARD

STABILITY TEST

Every IMT factory-installed crane includes a completed stability chart. Any installer other than IMT also has the responsibility to complete a stability chart. Cranes are tested for stability to 85% of “tipping”, where the crane load is balanced with the truck, and any additional load would result in tipping. The Stability Test is per SAE J765a.

Figures entered on the stability chart are for a specific truck and crane combination. If the crane or vehicle are modified or replaced with another, it is necessary to recalculate stability. By referring to the stability chart for your crane/chassis combination, it is possible to determine the loads permitted in the derated load range of your crane.

CAUTION

THE PERCENTAGES GIVEN IN THE GRAY AREA OF THE STABILITY CHART ARE BASED ON ACTUAL VEHICLE STABILITY AND DO NOT TAKE FRONT AXLE RATING INTO CONSIDERATION. DUE TO THE CAPACITY RATING OF THE FRONT AXLE, THE LOADING 75° TO EITHER SIDE OF THE CENTERLINE OVER THE CAB MUST BE SEVERELY RESTRICTED.

Determine the stability of your truck and crane combination per the following procedure:
1) Use *Figure F-2: Stability Chart - Crane Mounted Behind Cab* for cranes mounted directly behind the chassis cab, and use *Figure F-3: Stability Chart -Rear Mounted Crane* for cranes mounted at the rear of the chassis.

- 2) On the appropriate figure, fill out items A through L.
- 3) Perform the stability test on a flat hard surface. Ideally this surface will be concrete, but asphalt or hard-packed gravel are acceptable. Only authorized testing personnel may be in or near the test area. Per SAE J765a, the area must be within 1% of level.
- 4) Position and lower the stabilizers until the weight of the crane has been removed from the truck springs.
- 5) Extend the crane to full horizontal position, centered over the rear of the truck.
- 6) From the capacity placard, determine the rated load at the maximum horizontal reach. Place a

weight equal to 118% of that rated load at the maximum horizontal reach (L). Keep the load close to the ground to avoid excessive tipping.

L =ft.

7) Slowly start rotating the load counterclockwise. Through every 5° increment, check whether all vehicle tires remain in contact with the test surface.

NOTE: To make it easier to visualize degrees, compare the rotation to numbered positions on a clock face. As a point of reference, the rear center of the truck is the 0° (12 o'clock) position, and the front center is the 180° (6 o'clock) position.

CLOCK POS.	DEGREES (°)	CLOCK POS.	DEGREES (°)
1	30	7	150
2	60	8	120
3	90	9	90
4	120	10	60
5	150	11	30
6	180	12	0

8) If at any point through the rotation cycle, any one of the vehicle tires starts to break contact with the test surface, stop the rotation and note the position of the crane (X°). This is the balance point which determines 85% of tipping for the rated load.

X° =

9) After the balance point has been reached, retract the extension boom until all tires are in full contact with the test surface again.

10) Continue rotating the boom after stability has been regained. Again, watch all vehicle tires for a point of instability. If a point of instability reoccurs (one of the vehicle tires breaks contact with the test surface), retract the extension boom until stability is regained.

11) Repeat this cycle through a full 180°.

12) At the end of the 180° arc, physically measure the existing horizontal distance from the centerline of rotation to the centerline of the load (K).

K =ft.

13) To determine the percent of full capacity in the derated zone, divide the remaining horizontal distance (K) by the original maximum horizontal distance (L). Multiply this figure by 100.

$K / L \times 100 =$	%
----------------------	---

14) Enter the derated percent of full capacity (Z%) obtained in step 13 on the appropriate figure *Figure F-2: Stability Chart - Crane Mounted Behind Cab* or *Figure F-3: Stability Chart -Rear Mounted Crane*. In the derated zone, each individual capacity on the capacity chart must be multiplied by the derated percent of full capacity (Z%). The reduced capacities must maintain 85% of tipping in the derated zone.

15) If the crane is a side mount, repeat the stability test by rotating the crane clockwise through 180° of arc to find X_1° , Y_1° and Z_1° .

$X_1^\circ =$

$Y_1^\circ =$

$Z_1^\circ =$

16) The figures obtained indicate the stability range of the particular truck and crane combination only. If either the truck or crane is changes or modified, the stability calculations must be repeated.

17) Rotate the crane at least 5 times to using the completed figure to ensure the rating is accurate.

18) Be sure all information has been recorded on the appropriate figure., and in the service manual.

19) Record the total length of time to test the crane (total crane test and inspection time should approximate 4 hours per SAE J765a (1979).

Total hours:

When applicable, this stability test conforms to SAE J765a, ANSI B30.15 and USAS B30.5.

LIFTING IN THE DERATED ZONE

If it is absolutely necessary to perform a lift within the derated load capacity zones (Y or Y1), proceed as follows:

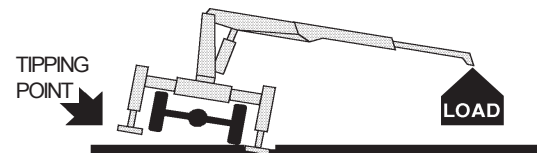
- 1) Determine the distance from centerline of rotation to the centerline of the load being lifted.
- 2) Determine the distance from centerline of rotation to the centerline of where the load is to be moved to.
- 3) The actual distance used should be figured as the larger of items 1 and 2 above.
- 4) Refer to the crane's capacity placard and determine within which range the lift will be accomplished.
- 5) Refer to the capacity of that range and multiply that figure by the derated capacity percentage (Z or Z1).
- 6) Make certain that the weight of the load plus any load handling devices does not exceed that figure.

EXAMPLE

If $Z\% = 70\%$ and crane capacity at the desired range = 2000 lb, then:

$$.70 \times 2000 \text{ lb} = 1400 \text{ lb}$$

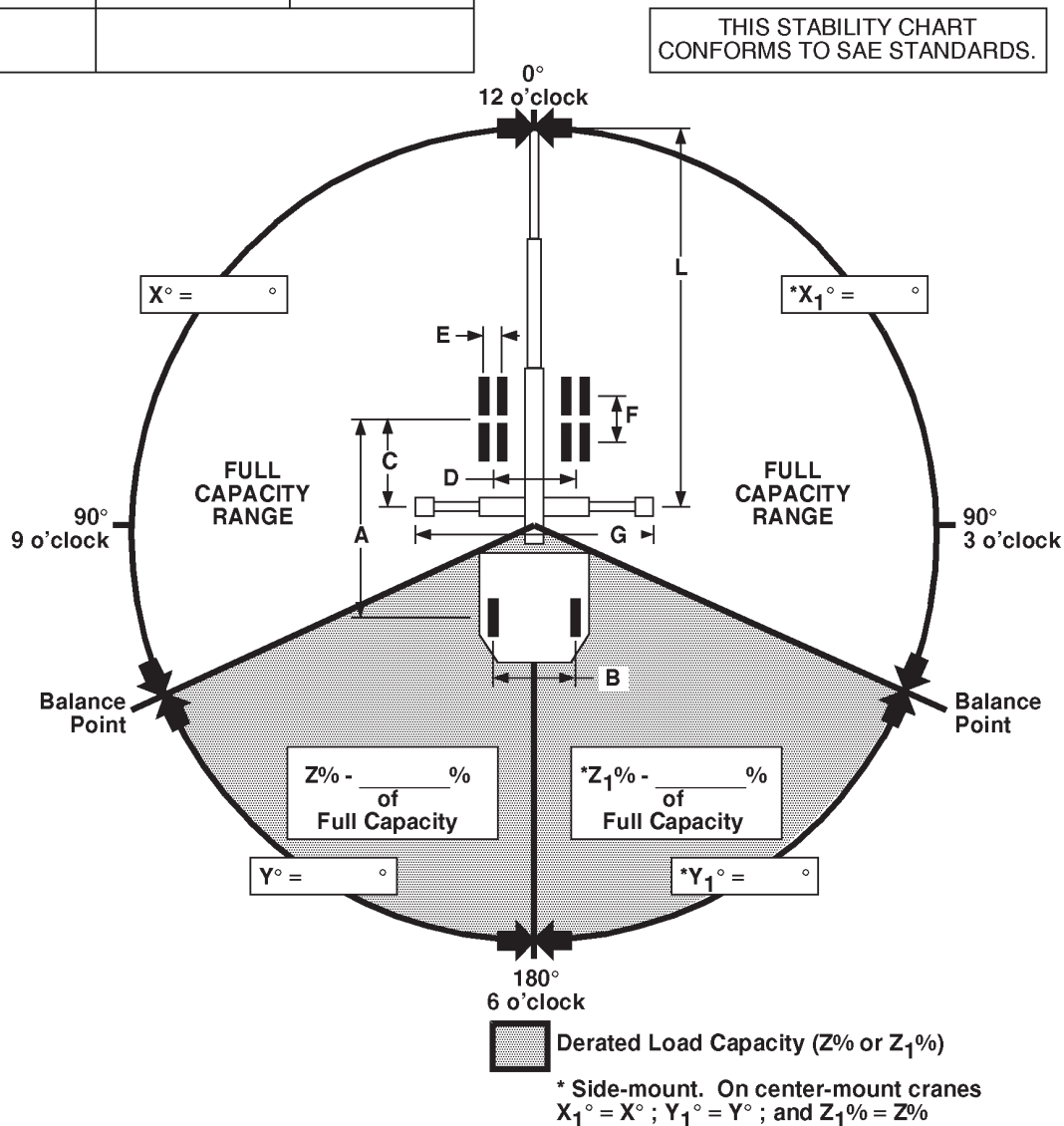
Thus, even though the crane is rated for 2000 lb at that particular range, by making the lift within the derated load capacity zone the load must not exceed 1400 lb.



BOOM IN STORED POSITION (no payload) ACTUAL WEIGHTS		
	LEFT	RIGHT
FRONT AXLE (lbs)		
REAR AXLE (lbs)		
TOTAL (lbs)		

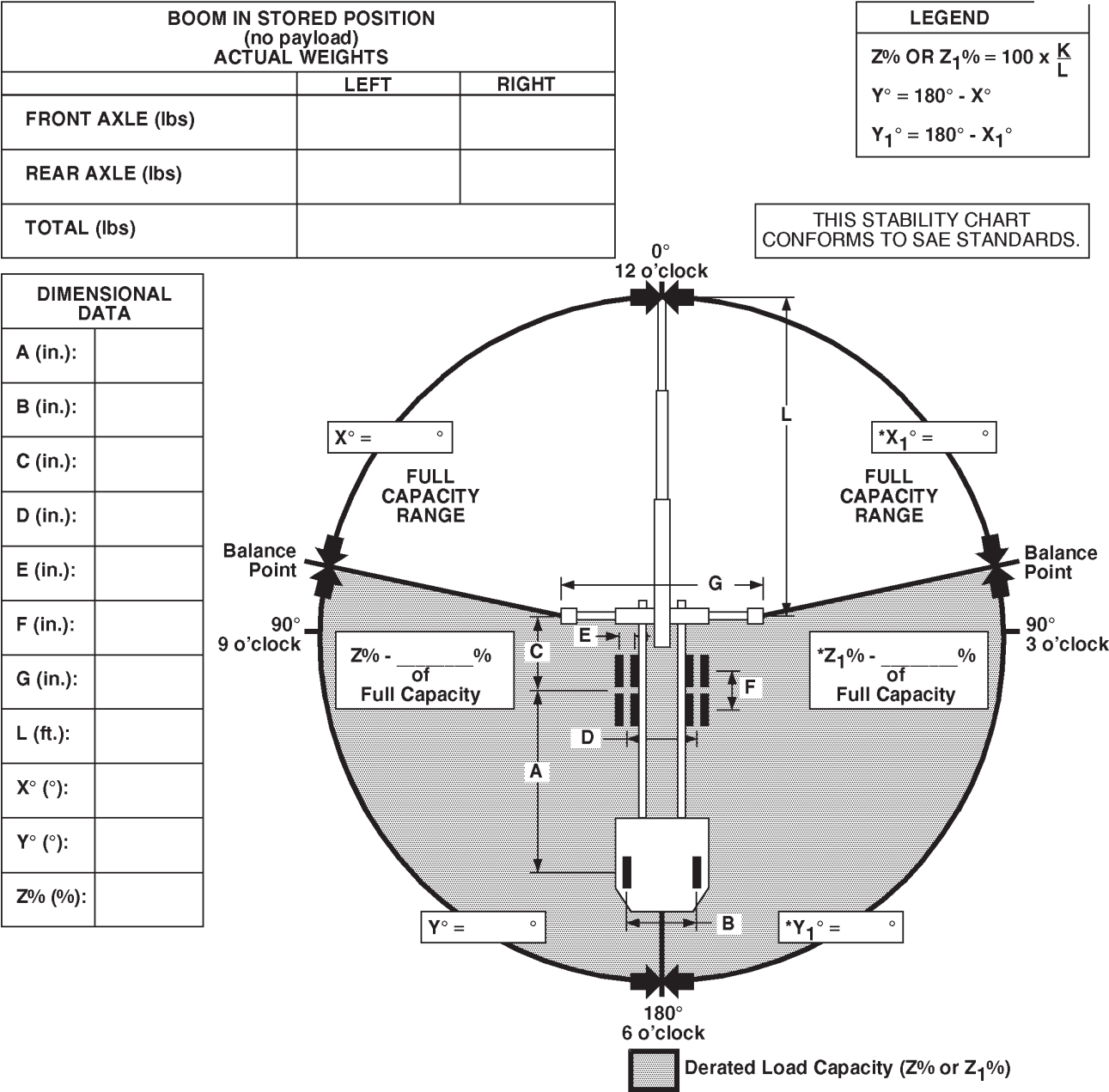
LEGEND
$Z\% \text{ OR } Z_1\% = 100 \times \frac{K}{L}$
$Y^\circ = 180^\circ - X^\circ$
$Y_1^\circ = 180^\circ - X_1^\circ$

DIMENSIONAL DATA	
A (in.):	
B (in.):	
C (in.):	
D (in.):	
E (in.):	
F (in.):	
G (in.):	
L (ft.):	
X° (°):	
Y° (°):	
Z% (%):	

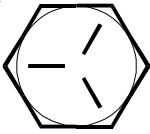
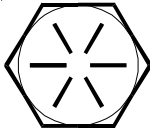


REACH (per capacity chart)	FULL RATED LOAD	X	$\frac{Z\%}{100}$	$\frac{Z_1\%}{100}$	=	DERATED LOAD FOR Z%	DERATED LOAD FOR Z ₁ %
		X			=		
		X			=		
		X			=		
		X			=		

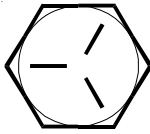
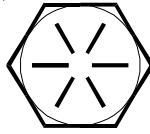
FIGURE F-2: STABILITY CHART - CRANE MOUNTED BEHIND CAB



TORQUE DATA CHART - DOMESTIC**FINE THREAD BOLTS**

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
					
		SAE J429 GRADE 5		SAE J429 GRADE 8	
		PLAIN (FT-LBS)	PLATED (FT-LBS)	PLAIN (FT-LBS)	PLATED (FT-LBS)
5/16-24	0.3125	19	14	27	20
3/8-24	0.3750	35	26	49	35
7/16-20	0.4375	55	41	78	58
1/2-20	0.5000	90	64	120	90
9/16-18	0.5625	120	90	170	130
5/8-18	0.6250	170	130	240	180
3/4-16	0.7500	300	225	420	315
7/8-11	0.8750	445	325	670	500
1-12	1.0000	645	485	995	745
1 1/8-12	1.1250	890	670	1445	1085
1 1/4-12	1.2500	1240	930	2010	1510
1 3/8-12	1.3750	1675	1255	2710	2035
1 1/2-12	1.5000	2195	1645	3560	2670

COARSE THREAD BOLTS

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
					
		SAE J429 GRADE 5		SAE J429 GRADE 8	
		PLAIN (FT-LBS)	PLATED (FT-LBS)	PLAIN (FT-LBS)	PLATED (FT-LBS)
5/16-18	0.3125	17	13	25	18
3/8-16	0.3750	31	23	44	33
7/16-14	0.4375	49	37	70	52
1/2-13	0.5000	75	57	105	80
9/16-12	0.5625	110	82	155	115
5/8-11	0.6250	150	115	220	160
3/4-10	0.7500	265	200	375	280
7/8-9	0.8750	395	295	605	455
1-8	1.0000	590	445	910	680
1 1/8-7	1.1250	795	595	1290	965
1 1/4-7	1.2500	1120	840	1815	1360
1 3/8-6	1.3750	1470	1100	2380	1780
1 1/2-6	1.5000	1950	1460	3160	2370

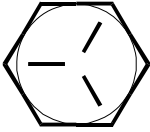
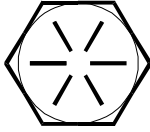
When using the torque data in the charts above, the following rules should be observed.

1. Bolt manufacturer's particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.
4. Torque values specified are for bolts with residual oils or no special lubricants applied.
If special lubricants of high stress ability, such as Never-Seez compound graphite and oil, molybdenum disulphite, colloidal copper or white lead are applied, multiply the torque values in the charts by the factor .90. The use of Loctite does not affect the torque values listed above.
5. Consult the parts manual for torque values on socket head capscrews.

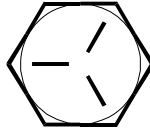
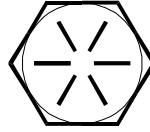
WARNING

Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing. Failure to replace gear-bearing bolts may result in bolt failure due to metal fatigue causing serious injury or DEATH.

TORQUE DATA CHART - METRIC**FINE THREAD BOLTS**

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
					
		SAE J429 GRADE 5		SAE J429 GRADE 8	
		PLAIN (KG-M)	PLATED (KG-M)	PLAIN (KG-M)	PLATED (KG-M)
5/16-24	0.3125	3	2	4	3
3/8-24	0.3750	5	4	7	5
7/16-20	0.4375	8	6	11	8
1/2-20	0.5000	12	9	17	12
9/16-18	0.5625	17	12	24	18
5/8-18	0.6250	24	18	33	25
3/4-16	0.7500	41	31	58	44
7/8-11	0.8750	62	45	93	69
1-12	1.0000	89	67	138	103
1 1/8-12	1.1250	123	93	200	150
1 1/4-12	1.2500	171	129	278	209
1 3/8-12	1.3750	232	174	375	281
1 1/2-12	1.5000	304	228	492	369

COARSE THREAD BOLTS

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
					
		SAE J429 GRADE 5		SAE J429 GRADE 8	
		PLAIN (KG-M)	PLATED (KG-M)	PLAIN (KG-M)	PLATED (KG-M)
5/16-18	0.3125	2	2	3	2
3/8-16	0.3750	4	3	6	5
7/16-14	0.4375	7	5	10	7
1/2-13	0.5000	10	8	15	11
9/16-12	0.5625	15	11	21	16
5/8-11	0.6250	21	16	30	22
3/4-10	0.7500	37	28	52	39
7/8-9	0.8750	55	41	84	63
1-8	1.0000	82	62	126	94
1 1/8-7	1.1250	110	82	178	133
1 1/4-7	1.2500	155	116	251	188
1 3/8-6	1.3750	203	152	329	246
1 1/2-6	1.5000	270	210	438	328

When using the torque data in the charts above, the following rules should be observed.

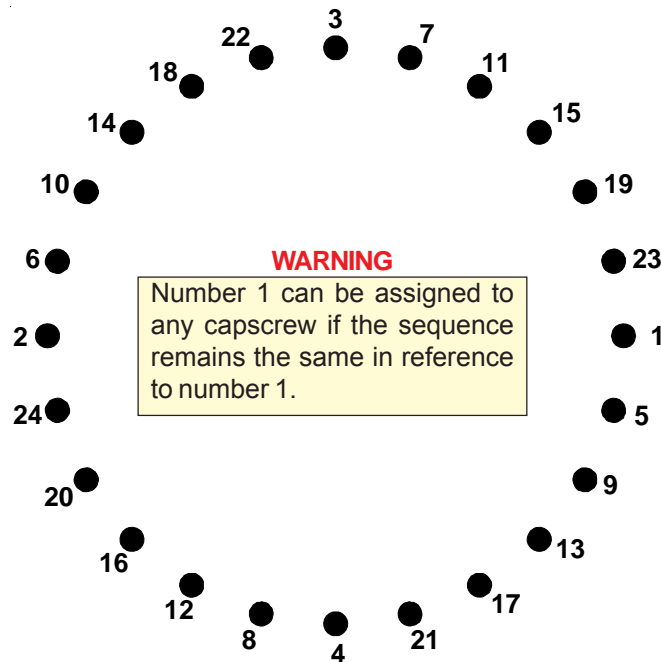
1. Bolt manufacturer's particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in kilogram-meters.
4. Torque values specified are for bolts with residual oils or no special lubricants applied.
If special lubricants of high stress ability, such as Never-Seez compound graphite and oil, molybdenum disulphite, collodial copper or white lead are applied, multiply the torque values in the charts by the factor .90. The use of Loctite does not affect the torque values listed above.
5. Consult the parts manual for torque values on socket head capscrews.

WARNING

Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing. Failure to replace gear-bearing bolts may result in bolt failure due to metal fatigue causing serious injury or DEATH.

TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

Refer to the diagram below for proper tightening/torquing sequence of the turntable bearing to the crane base and crane mast. The total quantity of cap screws varies dependent on crane model.



TIGHTENING PROCEDURE:

1. Refer to the Torque Data Chart to determine the proper torque value to apply to the size of cap screw used.
2. Follow the tightening sequence shown in the diagram. Note that the quantity of cap screws may differ from the diagram, but the sequence must follow the criss-cross pattern as shown in the diagram.
3. Torque all cap screws to approximately 40% of the specified torque value, by following the sequence.
 (EXAMPLE: .40 x 265 FT-LBS = 106 FT-LBS)
 (EXAMPLE-METRIC: .40 x 36 KG-M = 14.4 KG-M)
4. Repeat Step 3, but torquing all cap screws to 75% of the specified torque value. Continue to follow the tightening sequence.
 (EXAMPLE: .75 x 265 FT-LBS = 199 FT-LBS)
 (EXAMPLE-METRIC: .75 x 36 KG-M = 27 KG-M)
5. Using the proper sequence, torque all cap screws to the listed torque value as determined from the Torque Data Chart.

TURNABLE BEARING INSPECTION FOR REPLACEMENT

Before a bearing is removed from a crane for inspection, one of the following conditions should be evident:

1. Metal particles present in the bearing lubricant.
2. Increased drive power required to rotate the crane.
3. Noise emitting from the bearing during crane rotation.
4. Rough crane rotation.
5. Uneven or excessive wear between the pinion gear and turntable gear.

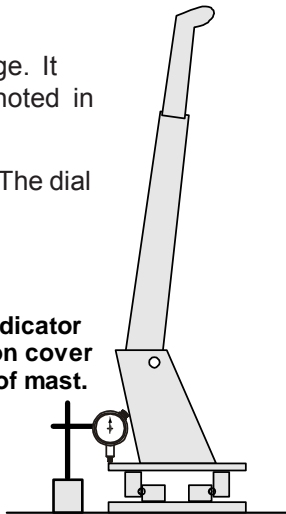
If none of the above conditions exists, the bearing is functioning properly and need not be replaced. But, if one or more of the above conditions exists, inspection may be required. Limits are measured in "TILT" which is dependent on the internal clearances of the bearing. TILT is the most practical determination of a bearing's internal clearance once mounted on a crane.

Periodic readings indicating a steady increase in TILT may be an indicator of bearing wear. Note that a bearing found to have no raceway cracks or other structural irregularities should be reassembled and returned to service.

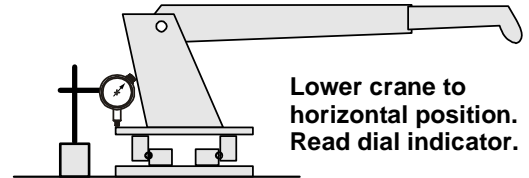
TEST PROCEDURE

1. Place crane in vertical position.
2. Set a dial indicator at 0 on the pinion cover plate at back side of mast.
3. Lower crane to the horizontal position.
4. Check and record the dial indicator change. It should not exceed the tilt measurement noted in the chart below.
5. Return the crane to the vertical position. The dial indicator should return to 0.

Set up dial indicator to 0" on pinion cover at back side of mast.



Lower crane to horizontal position. Read dial indicator.

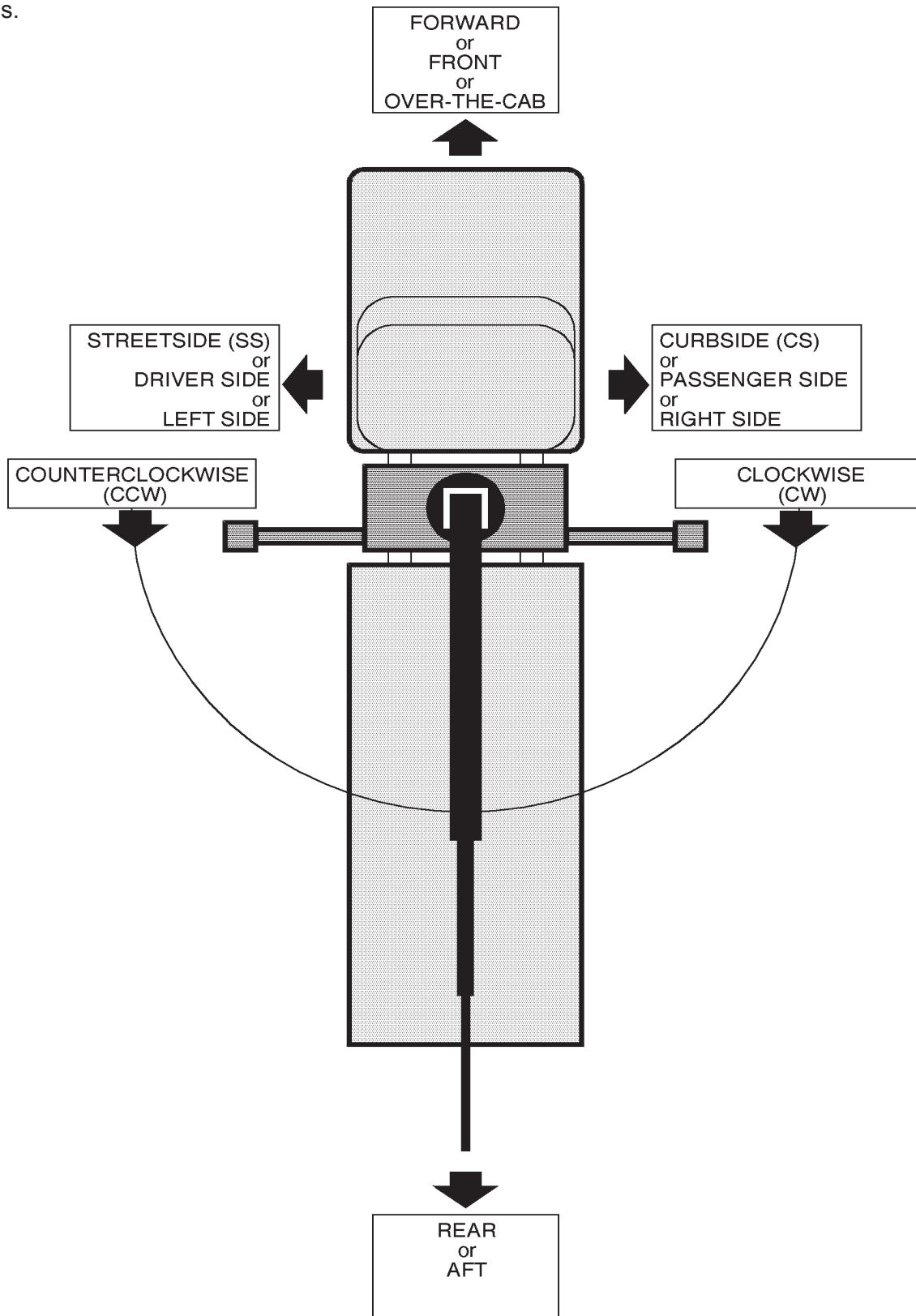


COMPARISON CHART - MODEL TO MEASURED TILT DIMENSION

<p>NOTE</p> <p>THE FIGURES LISTED IN THIS CHART ARE SERVICE GUIDELINES AND DO NOT, IN THEMSELVES, REQUIRE THAT THE BEARING BE INSPECTED.</p> <p>IF THERE IS REASON TO SUSPECT AN EXCESS OF BEARING WEAR AND THE MEASURED TILT DIMENSION EXCEEDS THE DIMENSION LISTED, REMOVE THE BEARING FOR INSPECTION.</p>	<p>IMT CRANE, LOADER OR TIREHAND MODEL</p>	<p>1007 1014 1014A 1015 2015/2020 2109 3000 3816/3820 3016/3020 421/425 4300 5016/5020 6016/6020 TH7 BODY ROT'N TH1449 BODY ROT'N TH15B CLAMP TH2551B CLAMP TH2557A CLAMP</p>	<p>5200 5200R 5217 5800 7020 7025 7200 7415 9000 TH10 BODY ROT'N TH14 BODY ROT'N</p>	<p>16000 32018 32027 32030 T30 T40</p>	<p>9800 12916 13031 13034 14000 15000 18000 20017 8000L H1200 H1200RR T50 TH2551B BODY ROT'N TH2557B BODY ROT'N TH2557A BODY ROT'N</p>
	<p>BALL DIA. (REF)</p>	<p>.875" (22mm)</p>	<p>1.00" (25mm)</p>	<p>1.18"-1.25" (30-32mm)</p>	<p>1.75" (44mm)</p>
	<p>TILT DIM. (A₁-A₂)</p>	<p>.060" (1.524mm)</p>	<p>.070" (1.778mm)</p>	<p>.075" (1.905mm)</p>	<p>.090" (2.286mm)</p>

DIRECTION TERMINOLOGY

Various terms may be used to describe directions associated with crane operation. Illustrated here are some of those terms and their variations.



CRANE OPERATION DIRECTIONAL TERMINOLOGY

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY BY
bars	Pounds/sq in (PSI)	14.5
centimeters	inches	0.3937
cubic centimeters	cubic inches	0.06102
cubic feet	cubic centimeters	28,320.0
cubic feet	cubic inches	1,728.0
cubic feet	cubic meters	0.02832
cubic inches	cubic centimeters	16.39
cubic meters	cubic feet	35.31
cubic meters	cubic inches	61,023.0
degrees (angle)	radians	0.01745
degrees centigrade	degrees fahrenheit	$(^{\circ}\text{C} \times 9/5) + 32$
degrees fahrenheit - 32	degrees centigrade	$5/9$
feet	centimeters	30.48
feet	meters	0.3048
foot-pounds	ton-meters	.0001383
gallons	liters	3.785
horsepower (metric)	horsepower	0.9863
horsepower	horsepower (metric)	1.014
inches	centimeters	2.540
inches	millimeters	25.40
kilograms	pounds	2.205
kilogram-meters	foot-pounds	7.233
liters	gallons (US)	0.2642
meters	centimeters	100.0
meters	feet	3.281
meters	inches	39.37
meters	millimeters	1,000.0
meters/second	feet/second	3.281
millimeters	centimeters	0.1
millimeters	inches	0.03937
millimeters	meters	0.001
pounds	kilograms	0.4536
pound/sq inch	kgs/sq meter	703.1
radians	degrees	57.30
tons (metric)	pounds	2,205.0