Manual # 99904381

IMT Electric Cranes Operation & Safety

Revised 20180530



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Revisions

DATE	LOCATION	DESCRIPTION	
20090417	Maintenance	Added Wire Rope Lay description.	
	Stability Test	Added instructions for completing stability test.	
20090521	Crane Decals	Revised decal placement drawing to general decals for all models.	
20111121		ECN 11628 - Revised wording to stabilizers. Updated safety decals.	
20120914		Updated stability test	
20140910	Greasing Instructions	ECN 12264 – Molub-Alloy 882 was Molub-Alloy 936.	

WARNING

Operating, servicing and maintaining this vehicle or equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle or equipment in a well-ventilated area and wear gloves or wash your hands frequently when servicing. For more information go to www.P65Warnings.ca.gov.

CHAPTER 1

Introduction

GENERAL

This manual will help you operate your IMT crane correctly and safely. The manual does not replace any government regulations, safety codes or insurance carrier requirements. Read and understand the manual and all safety procedures for this crane prior to operation.

A WARNING

Failure to read, understand and follow any safety procedures for this equipment may result in death, serious injury or equipment damage.

Use caution and common sense. Refer to ANSI/ASME B30.5, the standard for Telescoping and Mobile Boom Cranes, for more information on crane design and test criteria. (Contact the American Society of Mechanical Engineers at www.asme.org for information on ANSI/ASME B30.5.) Crane operators must also be familiar with OSHA 29CFR, Subpart N, Article 1926.550 and CAL-OSHA Title 8, Article 93 (California).

CRANE AND SAFETY EQUIPMENT MODIFICATIONS

Do not modify your crane with anything other than IMT approved equipment. If in doubt, contact IMT prior to making 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 safety equipment and must be maintained. Decals must be kept clean and legible.

OWNER RESPONSIBILITIES

You must maintain and operate this unit for the safest working conditions possible. You must follow existing Federal, State, and Local codes and regulations governing the safe use and maintenance, and must make sure anyone involved in equipment operation understands how to operate and maintain the crane safely. Contact IMT or your IMT distributor for clarification.

WARRANTY

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

MANUAL STRUCTURE

Throughout the manual, NOTEs, CAUTIONs, WARNINGs and DANGERs are used to draw the attention of personnel. They are defined as follows:

NOTE

A NOTE is used to either convey additional information or to provide further emphasis for a previous point.

A WARNING

A WARNING is used when there is the potential for personal injury or death.

A CAUTION

A CAUTION is used when there is the very strong possibility of damage to the equipment or premature equipment failure.

A DANGER

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Danger is used in the most extreme situations.

NOTICE TO THE OWNER / USER

If the crane 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 Technical Support at:

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

Crane Models & Features

VERSIONS & OPTIONS

This manual includes information regarding the following IMT crane models:

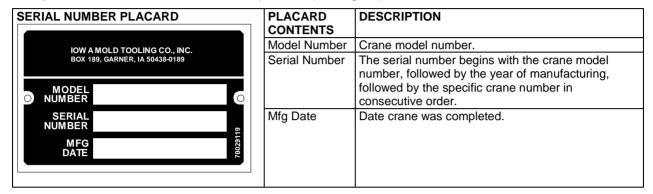
- 2003i with Short Mast or Tall Mast
- 3203i with 1 Hydraulic & 1 Manual Extension; 2 Manual Extensions; 1 Hydraulic Extension; or 1 Manual Extension
- 4004i with 1 Hydraulic & 1 Manual Extension; 2 Manual Extensions; or 1 Hydraulic Extension; or 1 Manual Extension
- 5005i
- 6006i with 12v or 24v power

These cranes feature:

- Excess load limit system (ELLS) which senses an overload and prevents winch up, boom extension and boom down functions.
- Anti-two block system, which stops the boom extension and/or the winch up functions before contact is made between the block assembly and the boom.
- Load holding valves in the hydraulic cylinders which prevent the load from dropping in case of hydraulic hose failure.
- Hydraulic system pressure relief valve which prevents excess strain on hydraulic components.
- Crane electric power disconnects in the crane cabinet and at the vehicle battery.

Crane Identification

Every IMT crane has an identification placard (see figure).



This placard is attached to the inner boom, mast, or crane base. When ordering parts, communicating warranty information, or referring to the unit in correspondence, always include the serial number and model numbers. All inquiries should be addressed to:

Iowa Mold Tooling Co., Inc. Box 189, Garner, IA 50438-0189

Telephone: 641-923-3711

Technical Support Fax: 641-923-2424

CHAPTER 2

Safety

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Safety Instructions

A WARNING

Keep children, by-standers, and persons not required in the operation of equipment at least 10'-0" (3.05 m) from the outermost range of the crane.

SAFE CRANE OPERATION

- Do NOT operate crane unless you have been trained in safe operation.
- Read, understand, and follow manual, labels, safety instructions, and your employer's work rules.
- Make sure guards, safety signs, and safety features are in place and in good condition.
- Read, understand and follow the crane load and work area charts. Do not exceed crane or winch ratings.
- Keep three wraps of loadline on winch.
- Operate crane controls slowly and smoothly.
- 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.
- Do NOT operate in excessive wind speeds.
- Keep load under boom tip. Do NOT side load boom, drag, or swing loads.
- Stow boom and stabilizers before traveling.
- Do not allow anyone to ride crane boom, hook, or load.
- Follow all inspections and maintenance practices listed in manuals.
- To protect the vehicle, position the truck so that lifting does not take place over the cab.

ELECTRICAL SYSTEM

This crane operates using electrical power from the vehicle battery.

A DANGER

Avoid electrocution! Do NOT work on the crane before turning off the crane power supply in the crane cabinet and removing the crane power disconnect cable from the vehicle battery.

ANTI-TWO BLOCK

Do NOT permit the lower load block or hook assembly to contact the upper load block or boom point sheave assembly. This is two blocking. IMT telescoping cranes with a winch are equipped with an anti-two blocking device, but the crane operator must avoid two-blocking and must not rely on the device alone.

DUTY CYCLES

This electric crane operates using a power unit with a maximum duty cycle of 5 minutes. See the technical specifications for pump performance charts and operating intervals.

A CAUTION

Avoid motor damage! The DC electric motor can overheat. Run for short periods to avoid overheating.

EXTENSION SEQUENCE

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

OVERLOAD PROTECTION SYSTEM (ELLS)

IMT cranes are equipped with an excess load limitation system (ELLS), or 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. Note 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 judgment. Refer to the capacity chart before attempting to lift a load.

STABILITY

Use crane on solid, level surface with stabilizers properly extended, and keep vehicle level. Reduce loads when operating on uneven ground. Keep personnel clear of moving stabilizers. When you rotate the crane, the load may change from being supported by the stabilizers to the vehicle suspension. Be cautious as you rotate the crane, because the springs on the carrier vehicle will respond differently to the load than the tires will.

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.

A DANGER

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 overstress the wire rope and cause a two block condition.

Daily Safety Inspection

Use the Crane Log, IMT Manual No. 99900686, the inspection checklist in the reference section of this manual, or the following list when 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, 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.
- 7 Crane Hooks Check for the presence of a safety catch, twists, cracks, or damage.
- 8 Ropes & Slings Check for frayed edges, broken strands, kinks, flat spots, and end attachments.
- **9** Covers and Guards Check for missing or improperly maintained covers and guards.
- **10** 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.

Electrical Hazards

A DANGER

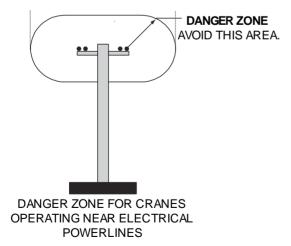
ELECTROCUTION HAZARD

- Vehicle is not insulated.
- Do NOT raise boom into power lines.
- Look up and use light to search for power lines in the dark.
- Keep boom and vehicle a minimum of 20 ft. (6.1 m) away from power lines.
- Do not step off a charged vehicle.
- If you touch a charged vehicle while standing on the ground, you will die.

Overhead power lines are not insulated. While some lines have a weather covering and appear to be insulated, they are not. The vehicle or parts of the vehicle do not need to touch the power line for the vehicle to become energized. Electricity will arc across gaps, and all overhead wires or cables should be considered hazardous and dangerous. Always operate the crane so that no part of the crane or load enters the "Danger Zone", the minimum clearance distance for a powerline.

A DANGER VOLTAGE HAZARD

The danger zone of a particular powerline is based on its voltage. High voltage levels increase the danger zone. See figure.

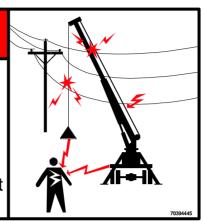


A DANGER

Electrocution Hazard

Never approach this vehicle or the load if it is near power lines.

Death or serious injury will result from touching or being near this vehicle if it becomes charged.



REQUIRED CLEARANCE OF CRANES FROM ELECTRICAL TRANSMISSION LINES				
	NORMAL VOLTAGE kV (Phase to Phase)	MINIMUM CLEARANCE REQUIRED Feet (meters)		
OPERATION NEAR HIGH VOLTAGE POWERLINES	From 0 to 350 Above 350 or unknown	20 (6.10) 50 (15.24)		
OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED	From 0 to 0.75 From 0.75 to 50 From 50 to 345 From 345 to 750 From 750 to 1000	4 (0.22) 6 (0.83) 10 (3.05) 16 (4.87) 20 (8.10)		

GUIDELINES WHEN WORKING AROUND POWER LINES:

- Make sure the work area is clear of major obstacles and overhead obstructions
- Do not work within 20 feet (6.10 m) of high-voltage lines energized up to 35,000 volts, and 50 feet (15.24 m) of high-voltage lines energized up to 50,000 volts or of unknown voltage. It is the law. The operator can be liable if activities in violation of this law cause injury or property damage.
- Only operate in conditions where the vehicle and equipment can be stabilized. Do not set up
 or operate on soft soil, mud, snow or other unstable ground conditions that could allow the
 vehicle or equipment to shift and move within 20 feet (6.10 m) of a power line.
- Look up and live. Always check the operating vicinity for power lines before you drive into it. Tree branches can hide power lines or cables from view. If operating at night, use powerful lights to search for power lines or poles.
- 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 table titled REQUIRED CLEARANCE OF CRANES FROM ELECTRICAL TRANSMISSION LINES.
- 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 If you are on or inside a vehicle that contacts or is energized by a power line, stay where you are. Exiting the vehicle is more hazardous than remaining inside. Unless there is a fire, it is safer to stay in the vehicle than to attempt an exit. Stay in or on the vehicle until a power company representative informs you that the line has been de-energized and grounded and that the area is safe.
- 2 If it is critical that you leave the vehicle, JUMP as far away as possible landing with both feet together. Maintain balance or fall forward, don't fall back towards the vehicle which could result in the body becoming a pathway between the vehicle and the ground. No part of your body should touch the vehicle and the ground at the same time.
- 3 If you are outside of the vehicle that contacts or is energized by a power line, move away from the vehicle and stay away. Warn others to stay away. You are safe from electrical shock as long as you do not become a pathway for current to flow to the ground. Do not approach the vehicle until a power company representative informs you that the line has been de-energized and grounded and that the area is safe
- 4 In certain circumstances the ground around a charged vehicle or downed power line may be energized. The ground becomes charged in concentric circles around the vehicle with varying voltage potential. Straddling these bands can result in serious injury or death as the current passes through your body. Stay away from the vehicle or power line, keeping both feet on the ground at the same time. This will prevent you from becoming a conductor between two areas of the ground that are charged differently.
- 5 If someone is trapped inside a vehicle that has come in contact with a power line, instruct them to stay inside and not to try to exit, unless their life is in eminent danger or a fire is present. Call 911 immediately and instruct the 911 operator to contact the power company. The power company personnel are trained to eliminate the hazard by de-energizing the line.
- **6** Do not attempt any rescue a person on or inside an energized vehicle, or who is energized themselves. If you touch someone whose body is conducting current, the current will flow through you too. Your muscles will seize up and you will not be able to escape.

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.

Crane Capacity

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!

The capacity chart for each model is located in the specific crane technical specifications manual and on placards on the crane and body.

A WARNING

Never exceed the crane's rated load capacities. Doing so will cause structural damage to winches and cables which can lead to death or serious injury.

NOTE

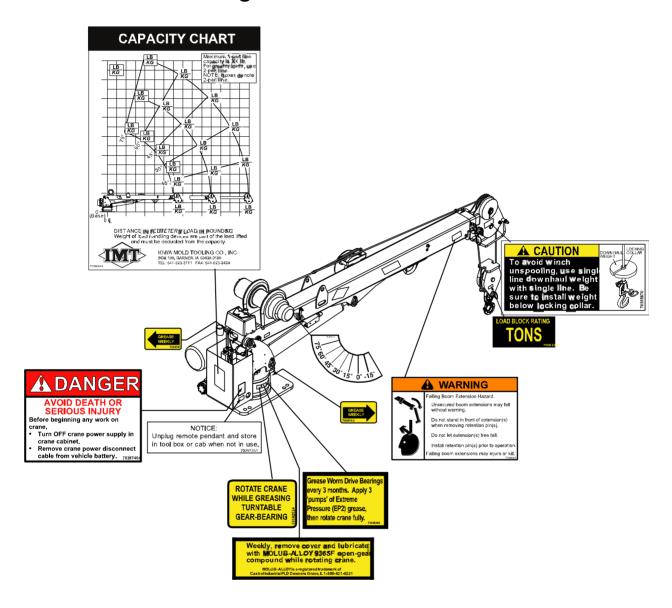
Capacity Placards are intentionally located near the operator to assure ready reference in determining when a load can or cannot be handled

Load limit information on the capacity placards is formulated on 85% of tipping. Tipping refers to the crane actually tipping with its opposite stabilizer and tires having broken contact with the surface.

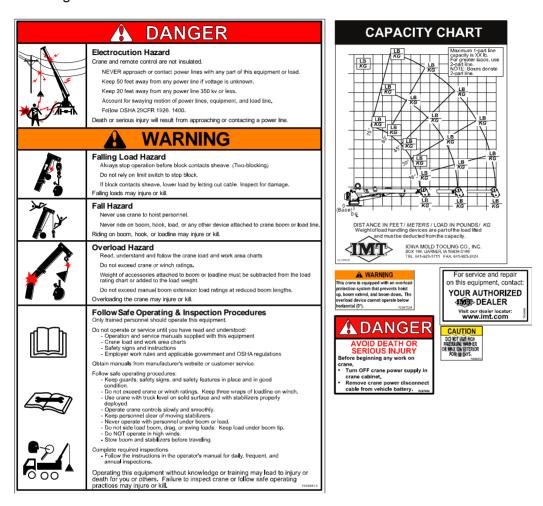
Prior to lifting a load:

- 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 is 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.

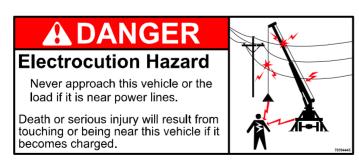
Electric Crane Danger Decal Placement



Additional danger decals are applied inside the truck body door. These decals include the following.

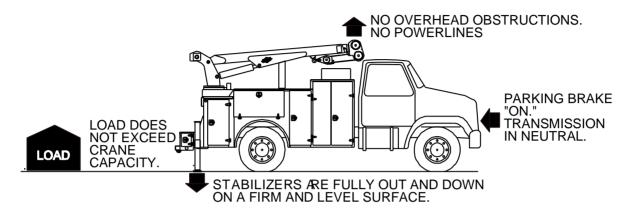


There are two warning decals applied to the front, sides and rear of the carrier vehicle.





Work Site Planning



Lift safety depends on work site preparation. Plan your lifts carefully. Consider:

- Powerlines
- Bystanders
- Overhead obstructions
- Solid surface support

Determine the weight of the load to be lifted. Use the crane capacity chart to make sure all lifts are performed within the rated capacity of the crane. Position the carrier vehicle with these capacities in mind and avoid any overhead obstructions which can impair the lift.

A DANGER

AVOID POWER LINES! Read and understand the Electrical Hazard section of this manual before attempting any crane operations near powerlines.

Position the carrier vehicle so that when the crane is fully extended it can't contact electrically charged lines or apparatus. Twenty feet (6.10 meters) is the minimum distance that any portion of the crane, loadline or load can be to electrical lines carrying up to 35,000 volts. Allow 50 feet (15.24 m) minimum for powerlines with unknown voltages, or with voltages above 35,000 volts.

In windy conditions, allow extra space for powerline and loadline sway and deflection. Provide additional clearance between the crane and electrical lines. If the powerline or apparatus voltage is not known, contact the electrical utility prior to the lift.

If a lift is impossible to perform within the minimum distance between electrical source and crane, ask the power company to de-energize the powerlines or apparatus before any lift is attempted.

Use a qualified signal person or spotter when working near electrical sources, even if the powerline has been de-energized.

Stabilizer Operation

Stabilizers help stabilize the crane and carrier vehicle during a lift, but 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 contact the ground.

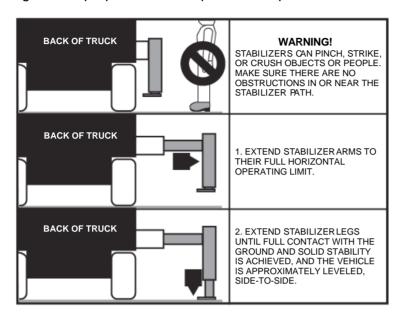
A WARNING

Stabilizers can cause serious injury!

Avoid stabilizer injuries including:

- 1 Hitting people while moving out.
- **2** Crushing people or equipment when contacting the ground.
- **3** Pinching people when being retracted.

There are various stabilizer designs available, but all require extreme caution in their use. See figures for proper stabilizer operation sequence and warnings.





Ground Support

Position the carrier vehicle on a firm, level surface for adequate stabilizer support. If stabilizers appear to bury themselves in a less than firm surface, then DO NOT perform a lift until a suitable location is found. DO NOT position the stabilizers near sharp drop-offs or areas of uncertain firmness.

Before a lift is made, be certain that the parking brake is set and the drive axle is disengaged.

Extend stabilizers fully out and then down. Park the carrier vehicle so that it is level from the front to the rear. Use the power down stabilizer function to level the vehicle from side-to-side. Utilize a signal person if the stabilizers are not in view from the operator's station when extending or lowering the stabilizers.

Winch Safety

- 1 DO NOT pull the load block or sheave back so that it makes contact with the boom tip. This is two blocking and should be avoided.
- 2 Pay out loadline before the boom is extended to avoid two blocking.
- **3** DO NOT permit personnel to ride the boom, loadline, hook or load. This action may cause DEATH or serious injury.
- 4 Use only specified wire rope for lifting.
- **5** Retain at least three full wraps of wire rope on the winch drum at all times.
- **6** See *Wire Rope Precautions* for additional information.

Electric Crane Anti Two Block System

A WARNING

Any Anti Two Blocking System consists of a series of mechanical components and cannot be 100% fail safe.

Do NO T use the Anti Two Block System as a substitute for good judgement, experience and accepted safe crane operating practices.

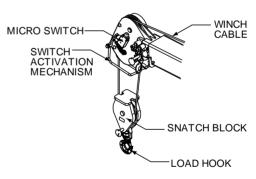
With untrained or inexperienced operators, two blocking the winch cable is a very likely possibility. When the winch cable end attachments contact the underside of the sheave case, whether by winching up or by extending the boom without paying out winch cable, the winch cable can be damaged by crimping or over-tensioning. The sheave may also be damaged.

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.

Restore normal crane function by winching down or retracting the boom until the anti two block weight is once again suspended freely.

Inspect the anti two block system daily as follows:

- 1 Examine 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 Slowly winch loadline up until anti two block weight comes in contact with the hook end of the loadline cable. At the moment the weight is fully supported, the winch up function should stop functioning and have no pull capability. If anything else happens, stop and reverse the function. Failure to do so will risk damage to the cable or the crane.
- 4 If the winch up function works properly, actuate the boom extend function slowly. Gradually increase to full actuation. The boom extend function should be non-existent with no tightening of the winch cable. If anything else happens, stop and reverse the function.



If the anti two block function appears to be functioning normally, winch the cable down until the sensing weight swings free.

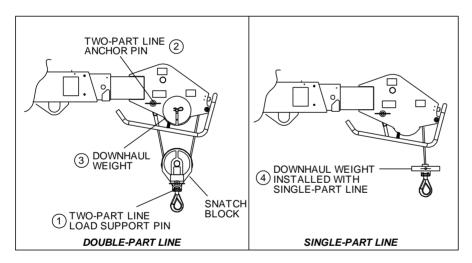
Holding Valves

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. In addition, the hydraulic system has a relief valve to prevent excess strain on the hydraulic components. Both the cylinder holding valves and the hydraulic relief valve are factory-set and cannot be adjusted.

Double & Single Line

Your crane can be operated with two-part or single-part line. Single-part line gives you a longer load distance and faster line speed. If you require a longer 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 procedure.

- 1) Disconnect the two-part line load support pin which holds the hook/snatch block assembly in place. Set aside the pin and the snatch block.
- 2) Disconnect the two-part line anchor pin.
- 3) Remove the downhaul weight from the crane boom tip.
- 4) Slide the downhaul weight onto the wire rope, below the locking collar. 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.

CHAPTER 3

Operation

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Electric Crane Start-up and Task Performance

A CAUTION

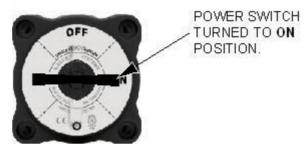
AVOID MO TOR DAMAGE! The DC electric motor can overheat. Run for short periods to avoid overheating. The maximum pump working period depends on the pressure required, but working periods should never exceed 5 minutes followed by cool down to ambient temperature. See the technical specifications for pump performance charts and operating intervals.

Prior to lifting a load:

- 1 Find the weight of the load.
- 2 Find the weight of any load handling devices.
- **3** Add the load and load handling device weights. The sum is the total weight of the load being lifted.
- 4 Find the distance from the crane rotation centerline to the load centerline.
- **5** Find the distance from the crane rotation centerline to the centerline of where the load is to be moved to.
- **6** The crane reach required is the larger of items 4 and 5 above.
- 7 Check crane capacity using this distance and the load weight.

Lifting a Load:

- 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. Make sure the vehicle engine is on and the transmission is in park or neutral.
- **3** Make sure the crane electric power switch, located in the crane remote storage cabinet, is turned to the "ON" position.



- **4** See the *Electric Crane Controls* (see "IMT Electric Crane Controls" on page 29) section for information on how to move a load using your controls.
- 5 Before conducting any boom operations, make sure vehicle is stable. Extend both stabilizers on carrier vehicle. Level the vehicle side to side. Provide blocks if necessary to level the unit on sloping ground or bearing pads if the stabilizers tend to sink into soft terrain or hot asphalt. Some concrete or asphalt surfaces are relatively thin and cannot withstand the stabilizer loading. Concrete can break through and cause instability.

A WARNING

Avoid injury or equipment damage! Do NOT attempt to handle a load if the stabilizers are unable to make solid contact with the ground.

Stability over the front (without front stabilizers) can be hampered by raising the vehicle excessively. Use extreme caution when operating in areas around the truck which are not supported by stabilizers because of cushion of tires and springs. When swinging loads from areas supported by stabilizers, use extreme caution because of potential sudden shifting of the support point. Always keep the load as close to the ground as possible.

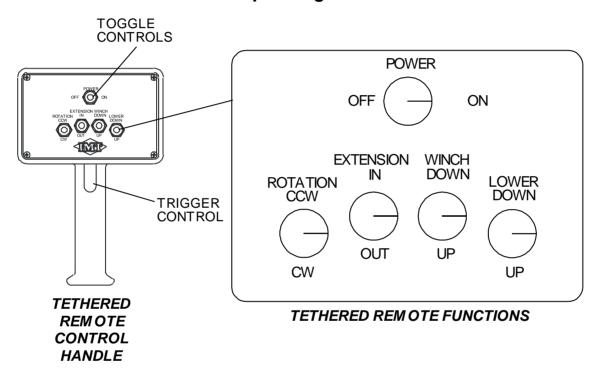
A CAUTION

Avoid injury or equipment damage! Do NOT attempt to rotate the crane before placing it in the deployed position.

- 6 Raise the lower boom.
- **7** Rotate the boom to the selected location. If the crane is equipped with a winch, be sure to lower the hook block to an adequate length to allow for extended boom length before extending any telescoping boom sections.

IMT's electric cranes are controlled by radio or tethered remote controls. This telescopic crane includes a tethered remote control with a radio remote control option.

Tethered Remote Handle Operating Instructions



- 1 Make sure the vehicle engine is on; the vehicle is in park or neutral; and the parking brake is on.
- 2 Make sure the crane electric power switch, located in the crane cabinet, is turned to the "ON" position.
- 3 Turn on the crane remote power via the on/off switch of the tethered remote handle.
- 4 Pull back on the trigger until the power unit begins to run.
- 5 Select the required function on the crane handle to move the crane as desired, making sure not to release tension on the trigger assembly.
- **6** When done with the function, continue to hold the trigger assembly in until all immediate movements of the crane have been completed.
- 7 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.

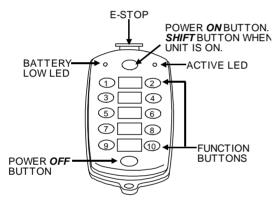
8 Turn off power to the handset.

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.

Radio Remote Controls

The electric crane radio remote is factory-programmed with the functions shown in the following chart. Refer to the radio remote manual for additional programming options and more information.

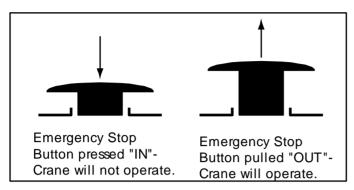


FUNCTION BUTTON #	FUNCTION	FUNCTION BUTTON #	FUNCTION
1	Boom Up	2	Boom Down
3	Extend Out	4	Extend In
5	Winch Up	6	Winch Down
7	Rotate CW	8	Rotate CCW
9	Not Used	10	Not Used

To operate the crane using the radio remote:

- 1 Make sure the vehicle engine is on; the vehicle is in park or neutral; and the parking brake is on.
- 2 Make sure the crane electric power switch, located in the crane cabinet, is turned to the "ON" position.
- **3** Twist the E-stop button, located on the top of the remote, to power up the remote. The *active LED* will blink. When the E-stop button is released, the *active LED* will go to a solid, green color, indicating the crane is ready to operate.
- 4 Select the required function on the crane handle to move the crane as desired.
- 5 If no further work with the crane is needed, push the E-stop button again to shut down the remote.

6 Turn the crane electric power switch, located in the crane cabinet, to the "OFF" position.



Proportional Remote Controls

The electric crane proportional remote is factory-programmed with the functions shown in the following chart. Refer to the remote manual for additional programming options and more information.

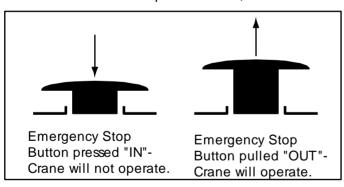


REMOTE FUNCTION (FROM LEFT)	GRAPHIC	TOGGLE UP	TOGGLE DOWN
ROTATE		CLOCKWISE ROTATION (CW)	(CCW)
EXTENSION	7/3 1/3	OUT (BOOM EXTENDS)	IN (BOOM RETRACTS)

WINCH	↓ ℃	WINCH UP (WINCH LINE RETRACTS)	WINCH DOWN (WINCH LINE EXTENDS)
	↑		
LOWER BOOM	//13	DOWN (MOVES DOWN)	UP (MOVES UP)
	//13		

To operate the crane using the radio remote:

- 1 Make sure the vehicle engine is on; the vehicle is in park or neutral; and the parking brake is on.
- 2 Make sure the crane electric power switch, located in the vehicle cab, is turned to the "ON" position.
- **3** Power up the remote.
 - a) Press the E-Stop button.
 - b) Toggle any switch.
 - c) Twist and release the E-Stop button.
- 4 Select the required function on the crane handle to move the crane as desired.
- 5 If no further work with the crane is needed, push the E-stop button again to shut down the remote.
- **6** Turn the crane electric power switch, located in the vehicle cab, to the "OFF" position.



Crane Shut Down

- 1 Retract the extension boom (and cable if applicable).
- **2** Stow the crane in its travel configuration.
- 3 Secure the hook.
- 4 Stow the stabilizers.
- **5** Turn the crane power supply, located in the crane cabinet, to the OFF position. See figure.
- 6 Secure loose items on truck bed.
- 7 Unplug and stow the remote control.
- 8 Release the auxiliary brake.



Operation in Poor Conditions

Operating your equipment in poor weather conditions can affect the performance. Please note the following operation procedures for poor weather conditions.

- 1 Dusty and Sandy Areas Operating in dusty or sandy areas presents special problems due to the abrasive action of dust. This will shorten the life of equipment parts. Keep dust and sand out of the moving parts of the machinery and engine. Keep lubricants clean, and cap lubrication and fluid fill areas tightly.
- 2 High Humidity and Salt Air Moisture and salt will deteriorate paint, cables, wiring and exposed metallic parts. Keep parts dry and well lubricated in high humidity or salt air conditions. Remove rust and corrosion if and when it appears.
- **3** High Altitudes 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.
- **4** Cold Weather Warm up vehicle engine per manufacturer requirements. Use appropriate hydraulic oil for outside air temperature.

Hand Signals

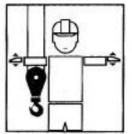
Hand signals can be used to communicate between crane operators and assistants when the job site noise level is too high to communicate in other ways.

Signals to the operator shall follow ASME B30.5 standards, 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.

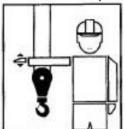
For operations not covered by the ASME hand signals, additions to or modifications may be made. These special signals must be agreed upon by the operator and signal person before the crane is operated.

If verbal instructions are required rather than hand signals, all crane motions must be stopped before doing so. Figure 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 ASME/ANSI B30.5 - Mobile and Locomotive Cranes, published by the American Society of Mechanical Engineers.

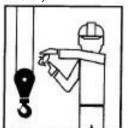
The hand signals presented by The American Society of Mechanical Engineers have been accepted by the Occupational Safety and Health Administration (OSHA).



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



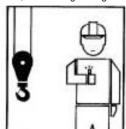
STOP- Arm extended, palm down, move arm back and forth horizontally.



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.



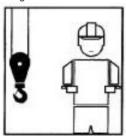
EXTEND BOOM- (Telescoping Booms) One Hand Signal. One fist in front of chest with thumb tapping chest.



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



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



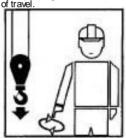
EXTEND BOOM- (Telescoping Booms) Both fists in front of body with thumb pointing outward.



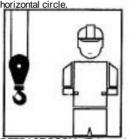
USE WHIPLINE- (Auxiliary Hoist) - Tap elbow with one hand; then use regular signals.



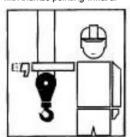
TRAVEL- Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



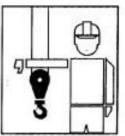
LOWER- With arm extended downward, forefinger pointing down, move hand in small



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 Arms extended, thumb pointing up flex fingers in and out until desired movement is completed.



DOG EVERYTHING - Clasp hands in front of body.



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

CHAPTER 4

Maintenance & Repair

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Maintenance Introduction

Proper, regularly scheduled maintenance is essential in keeping your crane at peak operating efficiency. This section outlines maintenance information and service intervals which should be followed by maintenance personnel.

Following the designated lubrication procedures is important in providing maximum crane life. The procedures and lubrication charts in this section include information on the types of lubricants used, location of lubrication points and frequency of lubrication. Information concerning the lubrication requirements of the truck chassis is not included. Refer to the appropriate truck manufacturer's manuals for chassis lubrication requirements.

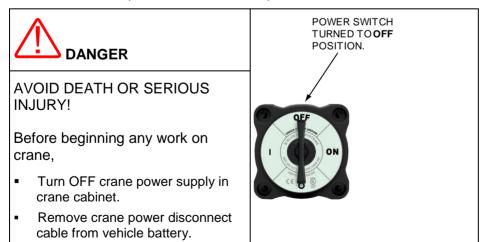
The service intervals specified are for normal operation where moderate temperatures, humidity and atmospheric conditions prevail. In areas of extreme conditions, the service periods and lubrication specifications should be altered to meet those conditions. For information concerning extreme condition lubrication, contact your local service representative.

A CAUTION

All maintenance personnel must be familiar with equipment operation and safety per the specific operation manual for their product prior to beginning maintenance.

Electric Crane Power Safety

Your electric crane runs using power from the vehicle battery. Before beginning major maintenance or repairs, disconnect the power to the crane.



1 Make sure the power switch located inside the crane cabinet is turned to the OFF position.

2 Make sure the crane power disconnect cable is disconnected from the vehicle battery.

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.

TIME FRAME	MAINTENANCE ACTIVITY
Weekly	Lubricate:
VVCCINIY	Grease Zerks
	Hinge Pins
	Turntable Bearing
Monthly	Lubricate:
	Worm gear bearings
	■ PTO
	Complete all required monthly inspections. (See IMT Inspection Checklist in the General Reference section of this manual.)
After the first 50 hours of service	Change hydraulic filter.
Quarterly	Complete all required quarterly inspections. (See IMT Inspection Checklist in the General Reference section of this manual.)
Every 6 months or 800 hours	Purge hydraulic system and replace hydraulic oil and filter.
Every year	Complete all required annual inspections. (See IMT Inspection Checklist in the General Reference section of this manual.)
Every 2 years	Inspect pins.

Electric Crane 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 METHOD	INTERVAL
Turntable Bearing (rotate	Shell Alvania 2EP or	Hand Grease Gun or	Weekly
while greasing)	Shell Retinax "A" or	Pneumatic Pressure	
Cylinder Pins	Mobilith AW2 or	Gun	
Boom Hinge Pins	equivalent		

Gearbox bearings	Lithium or GP bearing	Grease gun	Every 50 hours
	lube		

Grease Zerks

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.



Crane worm gear teeth and bearing teeth must be lubricated weekly with Molub-Alloy 882 Heavy or equivalent. See chart for the lubrication product schedule. Apply products with a grease gun or brush as directed.

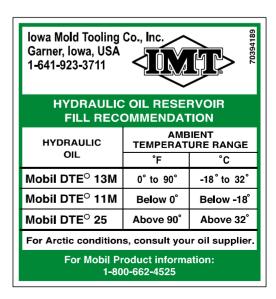
Crane Hydraulic Oil Specifications

Hydraulic Oil Specifications

The hydraulic oil for your electric crane must be ISO VG32, low pour, anti-wear hydraulic oil. IMT recommends SAE oil based on the following temperature ranges:

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)

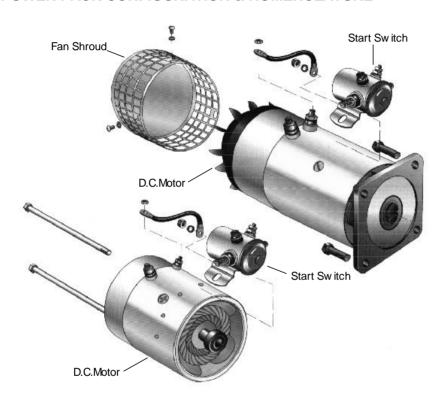
Mobil DTE meets these specifications and is the hydraulic oil used when the crane is manufactured.



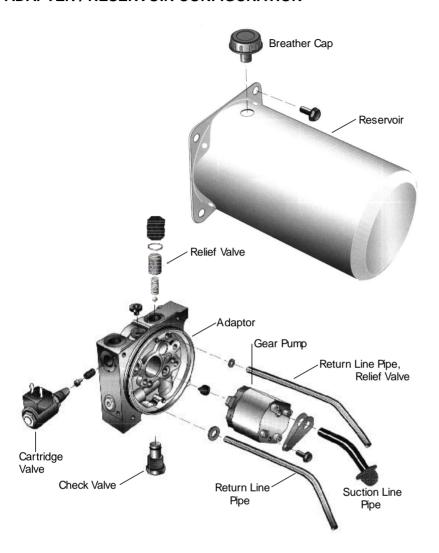
Electric Crane Power Unit Components

Your electric crane includes a power unit made up of a DC battery power source, motor, hydraulic pump, and hydraulic reservoir.

POWER PACK CONFIGURATION & NOMENCLATURE



ADAPTER / RESERVOIR CONFIGURATION



Power Unit Troubleshooting

CAUTION:

AVOID MOTOR DAMAGE! The DC electric motor can overheat. Run for short periods to avoid overheating. The maximum pump working period depends on the pressure required, but working periods should never exceed 5 minutes followed by cool down to ambient temperature. See the technical specifications for pump performance charts and operating intervals.

NOTE:

The pressure relief valve is factory set to 2500 psi (172 bar).

COMPONENT	ISSUE	PROBABLE CAUSE
MOTOR	Motor does not run.	Check battery, battery cables, cable connections, and start switch operation.
	Motor runs hot.	Check voltage. Check motor for worn bearings, burned wires, corrosion, or water or oil in motor.
	Motor overheats.	Check motor size in relation to pump displacement size. Check relief valve setting. Check for pump damage and motor damage.
	Motor does not run.	Check DC power source. Check motor brushes for wear, and motor for internal damage. Check pump rotation.
HYDRAULIC SYSTEM	Slow operation.	Check battery, battery cables, and cold temperature ratings. Check relief valve pressure.
	Runs hot.	Check for pump wear, damage or failure. Check pump inlet line size. Check relief valve pressure setting.
	Lowers too quickly.	Check for defective release valve, defective pressure compensated flow control valve, and lowering control device.
	Lowers too slowly.	Check for defective release valve and defective pressure compensated flow control valve.
	Load will not hold position.	Check for defective check valve. Check manual or electrical release valve.
	Load will not lower.	Check for defective pressure compensated flow control valve, manual release valve, and release valve coil.
HYDRAULIC PUMP	Motor runs but hydraulic system does not function.	Check drive connection between motor and pump. Check for pump wear, damage, or failure.
	Slow operation.	Check for pump wear, damage, or failure. Check pump displacement. Check line sizes and relief valve settings.
	Short pump life.	Check for contaminated or dirty oil, or wrong oil type. Check for water in system.
RESERVOIR	Motor and pump run but hydraulic system does not function.	Check reservoir oil level. Fill if low.
	Slow hydraulic system operation.	Check reservoir oil level. Fill if low.
	Hydraulic oil is too hot.	Check reservoir oil level. Fill if low.

Purging Air from 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.

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.

A WARNING

Setting the pressure relief higher than the specification for your model crane is unsafe. DO NOT ATTEMPT. Excessive relief pressure will damage the equipment and can result in 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.

Hydraulic Cylinder Holding Capability

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 valves are 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 (lower) 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.

Pin Removal & Inspection

A DANGER

Avoid serious injury! Support the crane with hoists or straps prior to removing any pins. Removing crane pins can cause crane sections to suddenly come apart.

Pins are frequently used as structural components on IMT cranes. Critical structural pins which require inspection and repair include pins which secure the lower boom assembly to the mast, pins which secure the main cylinder base end to the mast, pins which secures the main cylinder rod end to the lower boom assembly, pins which secure the main cylinder to the extension cylinder section, and pins which secure the extension boom assembly to the boom tip.

Every two years, disassemble the crane and inspect the critical structural pins (noted above) for damage. Check pins for signs of wear, using Pin Defect chart. 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. To repair pins, 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.

PIN DEFECT	MAXIMUM TOLERANCE
Nick, gouge or scratch	Up to 1/8" (3.2 mm) diameter
Circular scratch around the pin	Up to 1/16" (1.6 mm) wide or deep
Lengthwise scratch	Up to 1/32" (0.8 mm)

NOTE

Use care when removing pins not to crush the snap ring groove.

Apply a lubricating compound like Never-Seez prior to reinstalling pins. Avoid getting Never-Seez on Gar-Max bushings.

A WARNING

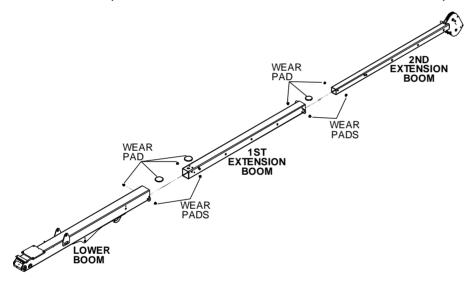
Disconnect electrical power to crane prior to beginning major maintenance or repairs.

See *Maintenance Safety* (see "Electric Crane Power Safety" on page 38) for details.

Electric Crane Wear Pads

IMT crane booms extend and retract on synthetic wear pads. The pads drop in place at the top or bottom of the inside of the booms, or snap in place into the sides of the booms. See figure for wear pad locations. With crane use, wear pads wear and must be replaced. Replace wear pads when any of the following conditions exist:

- When pads wear such that boom sections rub on boom sections with the result of metal scraping and the removal of paint on the boom sections.
- With the boom sections extended in the horizontal position, there is noticeable droop. Any visible droop in the boom sections indicates the need for wear pad replacement.



To remove boom wear pads:

- 1 Remove cable and limit switch on boom tip.
- 2 Raise the lower boom slightly to provide clearance for the extension cylinder base pin. Remove pin. You will to remove all the wear pads at the end of the boom prior to removing the cylinder, as it is trapped in place.
- 3 Lower the boom to drop back to the horizontal position.
- **4** Manually pull out the required extension boom section sufficiently to allow wear pad access. Remove wear pads. Replace.
- **5** For manual extensions, you will need to remove the stop screws between the hydraulic and manual extensions to remove the extension and replace any worn wear pads.

To reassemble crane:

- 1 Reverse steps to re-assemble with new wear pads. Torque according to torque charts in general reference section.
- 2 Start the crane. Slowly cycle the boom in and out with no load to purge air from system.

3 After the air has been purged from the system, check the reservoir oil level. Top off oil level if needed.

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 CRITERIA

- 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.

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.

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 understand 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.

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™ Chain and Wire Rope lubricant, Vitalife® 400, 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.

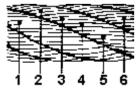
Wire Rope Maintenance

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.

Wire Rope Inspection & Replacement

Wire rope with any of the deficiencies shown below shall be removed and replaced immediately.

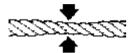
- **a** Corrosion can be cause for replacement. Any development of corrosion must be noted and monitored closely.
- **b** When there are either three broken wires in one strand or a total of six broken wires in all strands in any one rope lay.



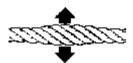
c When flat spots on the outer wires appear and those outside wires are less than 2/3 the thickness of the unworn outer wire.



d When there is a decrease of diameter indicating a core failure.



e When kinking, crushing, birdcaging or other distortion occurs.



f When there is noticeable heat damage (discoloration) of the rope by any means.



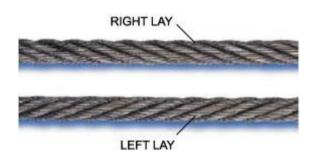
g When the diameter is reduced from nominal size by 1/32" (0.8 mm) or more.



h If a broken wire protrudes or loops out from the core of the rope.

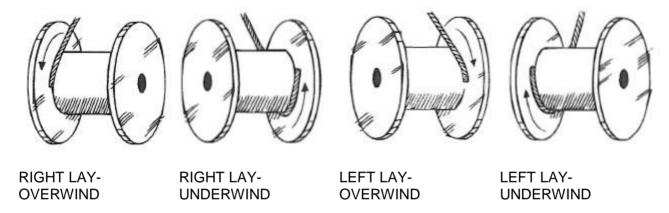


Wire Rope Lay



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.



Additional Inspections

Every three months, and more frequently when the equipment is subject to heavy usage, 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 the installation drawing in the crane parts manual for mounting bolt torque.
- 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 3.2 mm (1/8") to 4.8 mm (3/16").
- **3** Check for proper gear mesh in turntable gear-bearing. Check motor and gear-mounting 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 extension cylinder head and piston positions.
- d) Check cylinder case for dents.

2 HYDRAULIC POWER UNIT

- 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.
- e) Note any unusual vibration or noise.

Excessive Load Limitation System

Excessive Load Limitation System (ELLS) Testing

Excessive Load Limit System (ELLS) used on the IMT Telescoping Crane models ensures 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.

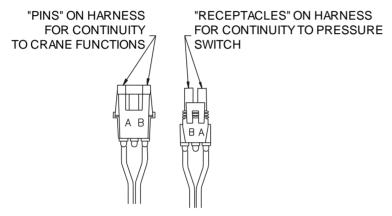
The load rating of the crane is determined by the pressure induced in the lower boom cylinder. The ELLS senses the pressure in the base end of the lower boom cylinder with a normally closed pressure switch located on the valve block on the top of the cylinder. When the pressure in the base end of the 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.

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. The wires are marked with the crane function, and ground.

Determine which solenoid actuates which function:

1 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.)



- 2 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 that plugs into the connector on the "WINCH UP" solenoid. They should not be continuous. If they are, the harness is the problem and must be either repaired or replaced.
- **3** Reconnect the pressure switch.
- 4 The crane functions are labeled on each wire. When you have identified the solenoid which controls the function you want to test, unplug the connector protruding from the solenoid, and unplug the connector for the pressure switch. Again using the multi-meter, check continuity for the Lower Boom Up, Winch Up, Extension Out, and Ground functions. Each function should be continuous with the ground receptacle on the connector that plugs into the connector on the pressure switch. If they are not, there is a problem with the harness which either needs to be repaired or replaced.
- **5** Reconnect the pressure switch.
- **6** If there is no problem found with the harness, the pressure switch is the problem and it will need to be replaced.

CHAPTER 5

Stability Test

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Crane Stability

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" based on the balance point for a specific truck and crane combination. 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. The "tipping point" is defined as the balance point, which per SAE J765a is when the load on the crane is balanced with the load of the truck and stabilizers. Any additional load will cause the truck to tip. Cranes are tested for stability to 85% of the balance point.

SET-UP:

- 1 The testing area must be a flat, hard surface (ideally concrete, but asphalt or hard-packed gravel is acceptable). Only authorized testing personnel will be in or near the test area. SAE J765a specifies that the area must be within 1% of level.
- 2 Position and lower stabilizers until the weight of the crane has been removed from the truck springs. Use all stabilizers. Make sure the truck is level and all stabilizers are in contact with the ground.
- **3** Operate the crane under partial load to assure operator proficiency and proper machine function.

STABILITY TEST:

- 1 Extend the crane to full horizontal position, centered over the rear of the truck.
- 2 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).

Maximum horizontal reach (L)	ft
Test load value	l b

A WARNING

At 118% of rated capacity, you are in overload! Operate the crane very carefully. Keep the load within 3.9" (0.1 m) of the ground at all times, and operate controls slowly.

3 Slowly start rotating the load counterclockwise. Through each area on Figure 1 (30° increments), check for stability. If the crane carries the load through the entire area without becoming unstable, the crane is stable in that area, and 100% can be noted in the area in Figure 1.

NOTE

The tires can lift from the ground without the truck becoming unstable. The truck is unstable when it reaches the balance point.

- **4** If at any point through the rotation cycle the vehicle becomes unstable, stop the rotation. Determine the area, as shown in Figure 1, in which the crane is positioned.
- **5** Retract the extension boom until stability is regained. Measure the horizontal reach when the unit is stable, from the center of rotation to the boom tip. Note this reach in Figure 1, in the area which became unstable in step #4.
- 6 Continue rotating the boom after stability has been regained. Again, watch for instability as defined by the balance point. If a point of instability reoccurs, retract the extension boom until stability is regained. Again, measure the stable horizontal reach at this point, and note this distance in the appropriate area in Figure 1.
- **7** Repeat this cycle through a full 180° of arc. Fill in all of the reach boxes for Areas 1 through 5 in Figure 1.
 - Repeat for Areas 6 through 10.
- 8 If the crane was stable in all areas, fill in 100% in all of the percentage boxes in Figure 1.
- **9** If the stable horizontal reach in any area was less than the maximum horizontal reach (L, noted in step 2), calculate the percent of full capacity allowed in the area as follows:
- **10** Enter the derated percent of full capacity, calculated in step 8, on Figure 1. In the derated zone, each individual capacity on the capacity placard must be multiplied by the derated percent of full capacity. The reduced capacities maintain 85% of tipping in the derated zone.

NOTES:

- 1 The figures obtained indicate the stability range of that particular truck and crane combination, only. If either the truck or crane is changed or modified, the stability calculations must be repeated.
- **2** Contact IMT if you need a modified stability chart for your vehicle.
- **3** Rotate the crane at least 5 times using the completed figures to ensure the rating is accurate.
- **4** Be sure all information is recorded on the appropriate figure, and in the service manual.
- 5 Record the total length of time to test the crane (total crane test and inspection time should approximate 4 hours 1979 SAE J765a). ______ hrs.

Where applicable, this test conforms to SAE J765a, ASME B30.5 and ASME B30.22.

Stability Chart

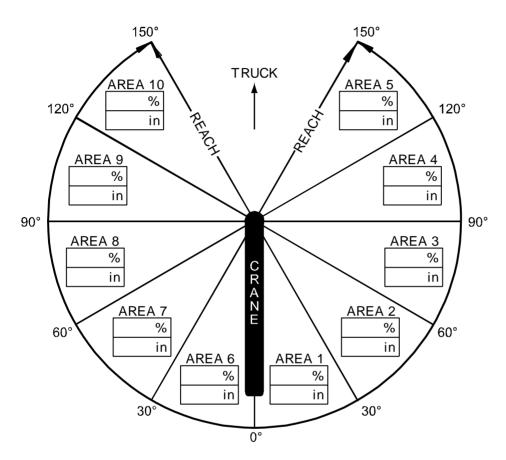


Figure 1: Crane Stability Chart

BOOM IN STORED POSITION (no payload) ACTUAL WEIGHTS	
FRONT AXLE (lb)	
REAR AXLE (lb)	
TOTAL WEIGHT (lb)	