

LIFTek™ Corporation

L25 SERIES RADIO ANTI-TWO-BLOCK SYSTEM

OPERATOR and MAINTENANCE MANUAL

Manual P/N L2560 rev -
August 2000

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and radiates radio frequency energy, and if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

RAT SWITCH (transmitter)
RADIO A2B DISPLAY (receiver)

MODEL-S/N L25RS - _____
MODEL-S/N L20D - _____

for
**PARTS, SALES AND SERVICE
CONTACT YOUR DEALER**



file: MBTmanual1.doc

WARNING! READ THESE INSTRUCTIONS

**Read and follow all safety rules and instructions before operating this equipment.
Improper operation can lead to system failure, property damage, personal injury or loss of life!**

Customer responsibilities

The manufacturer has taken every precaution to make this a reliable system.

However, it is the operator's responsibility to follow the instructions in this manual, and to use the system properly.

Training

1. Read this manual carefully. Learn how to operate the system and how to perform daily inspections and test procedures.

2. Never allow anyone who has not been properly trained to operate the system.

3. Use the system only as intended and as described in this manual.

4. Keep the manual, refer to it as needed, and review it often.

5. If you don't understand something - call the factory or distributor. There is no charge for this assistance.

Inspection and Test

6. Follow the daily inspection and test procedures.

7. Failure to inspect and test the system can lead to system failure - see warnings.

8. Test the horn for loudness - empty any water that collects in the front cavity (especially if mounted outside). Water can reduce sound output

Operation

9. Understand how the system works and prevent and/or correct any conditions that might degrade the system performance.

10. Do not operate a damaged system.

11. Inspect and test the system thoroughly if you suspect physical damage of any kind has occurred, including: contact with structures, tree branches, or an excessive pull on the line weight.

12. Maintain a clear line of sight between the boom tip transmitter and the display panel receiver. Metal barriers in the path can block the signal and prevent the system from working.

13. Do not rely on this system if excessive radio interference is present. This may occur near radio/TV towers. If in doubt, perform a System Test.

14. Do not shorten the chain. Do not alter the system in any way without written approval from the manufacturer.

15. Do not use the switch override clip if the flag is missing.

16. You should monitor all active winch lines with an operating two-block switch.

17. Always keep the weight securely fastened around the crane cable or stowed in the cab. NEVER allow the weight to swing freely from the switch. A free swinging weight is a hazard.

18. Never stand under any suspended object.

19. Never use the system as a control device to routinely stop the hook while winching up.

WARNING!

This is an operator's aid. Never rely solely on any system to prevent two-blocking. Part failure, excessive radio noise, or damage can prevent two-block detection.

No system is 100% failsafe.

Two-blocking can cause property damage, personal injury or loss of life!

Check the system for proper operation as recommended in this manual to reduce the chances of a malfunction during crane operation.

TABLE OF CONTENTS

L25 Operator and Maintenance Manual

Warnings and Customer Responsibilities.....	2
L25 Introduction.....	4
Quick Reference For Operators	4
RAT SWITCH Operation.....	5
How to rig, inspect, test and override.	
Display Panel Operation	
KEYS:.....	6
BYPASS.....	6
HORN OFF	6
TEST (display only)	6
LEARN/ UNLEARN RAT SWITCH	7
LIGHTS AND ALARMS:	8
TWO BLOCK alarm	8
RECEIVING: Switch 1, 2	8
RECEIVING: Low Battery alarm	8
NOT! RECEIVING alarm.....	8
Operator's Daily Inspection and System Test.....	10
Maintenance Procedures	11
How To Open The Cover	11
How To Replace The Battery and Cover	11
How To Replace The RAT Antenna	12
How To Test And Service The Switch Mechanism.....	12
How To Change The Fuse In The Display.....	13
Display Wiring.....	13
User Notes	14
Appendix	15
Warranty, Service, Background - A2B Systems	16
L25 System Specifications	17
Parts List.....	18
Special Instructions (supplements as needed).....	
Operators Daily Inspection And System Test (repeated).....	

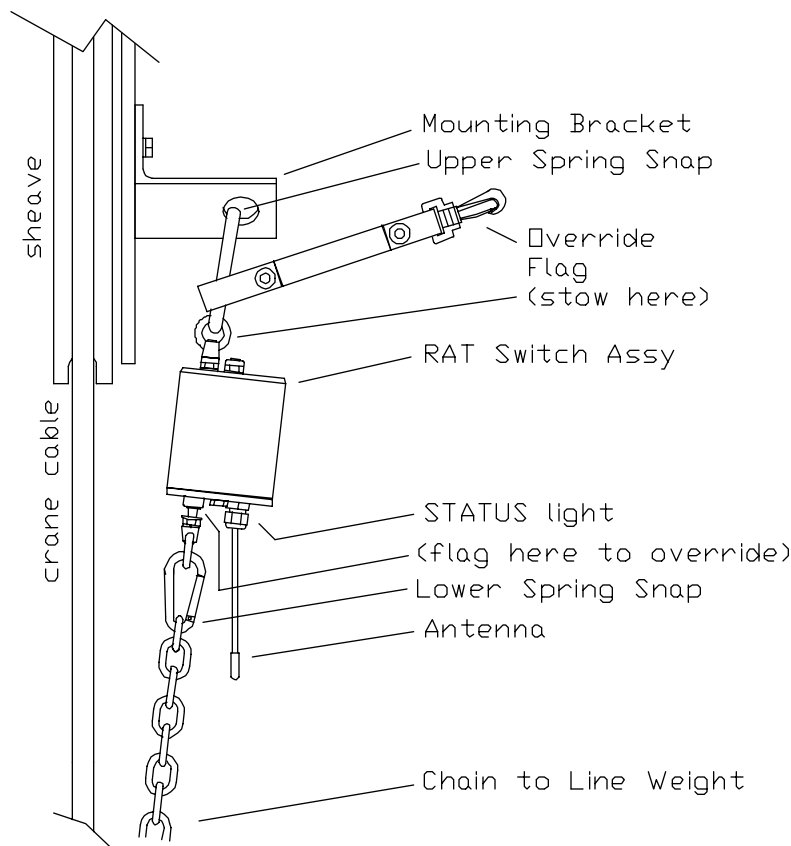
L25 INTRODUCTION

- ◆ **The L25 Radio Anti-Two-Block System** provides a high reliability wireless link - on any crane - from the boom tip to the operator's station.
- ◆ **The L25 eliminates the cable reel and all other A2B wiring on the boom** (in most cases) - including jib and auxiliary switch connections. Boom wiring, especially the cable reel cable, is highly vulnerable to damage from contact with structures, trees etc. In addition, jib wiring is often damaged by a failure to disconnect cables before extending a telescopic section or stowing a jib. The L25 Radio A2B System eliminates these types of failures.
- ◆ **The L25 battery is guaranteed for 5 years.** This saves you the very real inconvenience and down time of replacing batteries every few months.
- ◆ **The L25 has the radio transmitter inside the A2B switch.** This simplifies installation and allows the unit to be easily moved and re-mounted where you need it - on the main, jib, or rooster sheave.
- ◆ **The L25 is easy to use.** It only takes a minute to properly rig, inspect and perform a system test ... then you are ready to work.

QUICK REFERENCE FOR OPERATOR'S

1. Move the RAT (**R**adio **A**2B **T**ransmitter) Switch and line weight as needed. Always keep it rigged on the crane cable you are using. **Never** let the weight swing free!
2. Always INSPECT and perform SYSTEM TESTS as recommended.
3. For maximum switch and battery life, you may wish to disconnect the line weight and secure the chain while traveling. Or - use the hook block to suspend the line weight. It is not necessary to use the RAT switch override flag when traveling.
4. The Switch Override flag. *Single Winch Machines (1 RAT switch):* insert the flag, remove and stow the line weight. **WARNING!** *The system is now in override and will NOT detect or stop a two-block until the flag is removed and the line weight is rigged.*
5. The bypass key, on the display, provides a momentary bypass for rigging and stowing the hook block. **WARNING!** *The system will NOT stop a two-block until the bypass switch is released.*
6. Please read and understand this manual, it should contain all the information you will need. However, if you have a question or concern, please do not hesitate to contact your crane dealer or call LIFTek directly for assistance at 1-888-LIFTek8.

RAT SWITCH OPERATION



How to rig the RAT SWITCH – clip the RAT SWITCH to it's mounting with the antenna away from the boom and fasten the weight around the crane cable. Clip the OVERRIDE FLAG in the stow position to put the switch into service. Perform SYSTEM TEST.

How to inspect the RAT SWITCH -Look for and correct any loose fasteners, physical damage or excessive wear. Insure the antenna is not missing, shortened, bent or has exposed metal. Snap test switch: start w/ weight hanging on the switch, lift weight 2 inches and hold, pull chain down and release, switch should “snap” up carrying full weight of the chains.

How to test the RAT SWITCH -

Verify that the RAT STATUS LIGHT flashes as follows:

lift weight 2 in.---->	two-block condition -->	triple flashes (for 30 seconds)
lower weight ----->	all clear ----->	single flashes (for 10 seconds)
	all clear w/ low battery	double flashes....Replace Battery! See p.11
at all times ----->	RAT update signal ---->	brief single flash (every 11-16 seconds)

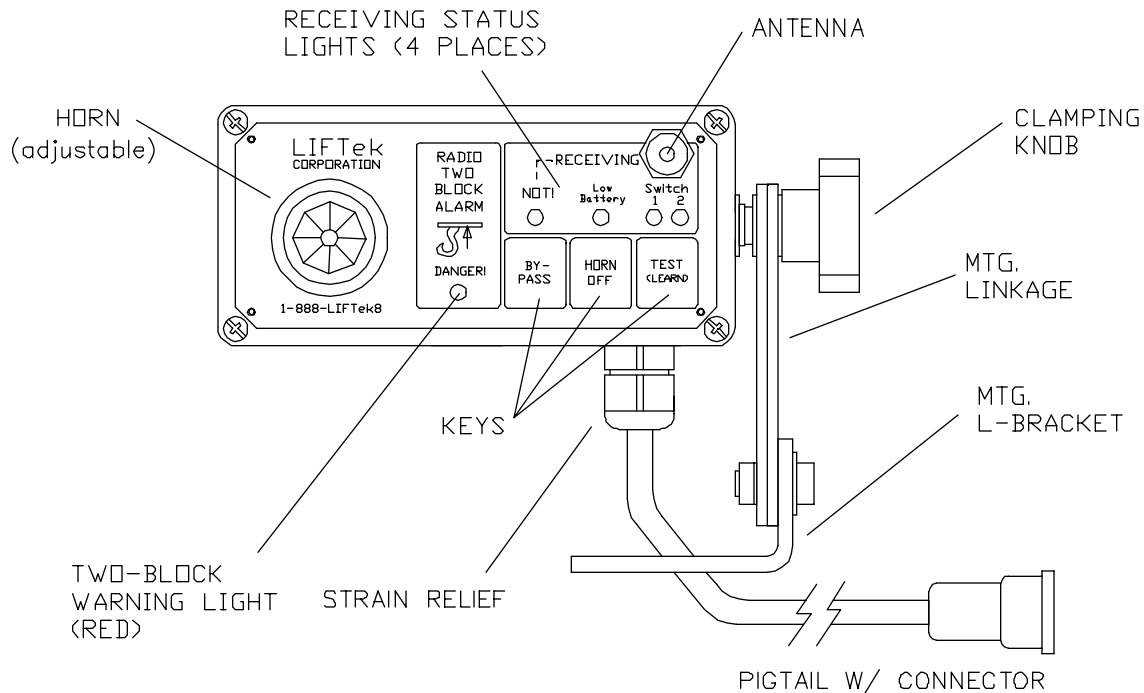
How to use the OVERRIDE FLAG – pull down on the chain and clip the flag onto the shaft as shown above (it should “snap” into place). After inserting the flag you must remove and stow the weight and chain assembly. Do not leave the line weight clamped on the line. Read below.

WARNING! Flagging the RAT switch will OVERRIDE the A2B system. Two-block conditions will NOT be alarmed or motion stopped even though the green receiving light is still on.

WARNING! You must verify that the RAT switch , weight and chain are properly rigged on the crane line and always perform a SYSTEM TEST before operation.

WARNING! Do Not use a RAT switch if it is damaged or not operating properly.
Do not alter the system. Use only LIFtek components - weight, chain, spring snaps, etc.

DISPLAY PANEL OPERATION



KEYS

BY-PASS

BYPASS - How to BYPASS the MOTION CUT for rigging - press the BYPASS key and hold it down. This will CLOSE the motion cut relay and permit crane motion regardless of any two-block alarm. Release the key to exit BYPASS mode.

WARNING! While in BYPASS, the NOT---RECEIVING light is ON and the two-block alarms are disabled. Maintain visual contact with the hookblock at all times while winching up, booming down or telescoping out. Do not operate for extended periods in BYPASS mode. The system cannot work for you in this mode.

HORN OFF

HORN OFF –press and release to silence any horn alarm. Horn “chirping” in BYPASS or during NOT---RECEIVE alarms cannot be cleared.

TEST (LEARN)

TEST - How to test the Display - Press and release the TEST key. All lights should come ON, the horn (if present) will beep and go OFF. Verify good horn volume – especially if mounted outside. Empty any collected water; water can reduce horn volume! The motion cut relay will OPEN. If your crane is equipped with motion cut hardware, these motions should be locked out.

Press and release TEST again to exit TEST mode - the display lights and crane motion controls should return to normal.

(LEARN) - How to learn a RAT SWITCH on the Display. Every RAT switch has its own identification or ID code. The display must “LEARN” this ID code in order to work with the RAT switch. Once you learn the process it can be completed in about 1-2 minutes.

Caution! Put all crane controls in neutral when LEARNING.
Entering LEARN mode will close the motion cut relay.

1. To start the Learn process, no RAT switches nearby can be currently sending a two-block alarm (that is... they must **not** be triple blinking).
2. Use **UNLEARN** (below) to clear **all** current switch ID's from the display. *Note: if you are adding a 2nd switch, skip this step.*
3. Press and hold the TEST (LEARN) key for about 5 seconds until the horn beeps (if present). Also the two-block light and a green switch light will blink.

The display is asking you to two-block the RAT switch to be “LEARNED” on this light. You may also press LEARN again to toggle from light 1 to 2, or to exit LEARN MODE without making any changes.

4. Now, carefully two-block the RAT SWITCH you wish the display to learn. Lower, then lift, the line weight if necessary to send a fresh two block alarm.

When the display shows this two-block alarm, then the new RAT SWITCH has been learned. This normally takes about 5 seconds. The display will then automatically exit Learn Mode.

5. Repeat the process, starting from step 3., to learn a second switch.
6. Perform a System Test.

(UNLEARN) - How to unlearn all RAT SWITCHES on the Display.

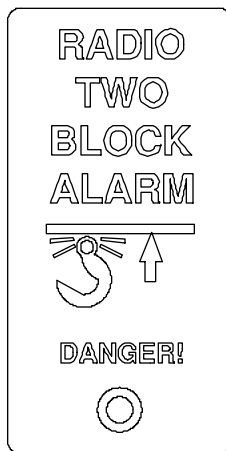
To clear all learned RAT SWITCHES from the display:

1. Turn display power (crane ignition) OFF.
2. Hold the LEARN key down firmly while turning the crane power back on. Hold until the display beeps or the NOT light blinks. This takes about 5 or 6 seconds.

Now, the display will open the motion cut relay and blink the yellow NOT! light until a RAT SWITCH is learned. You may use BYPASS to operate the crane.

Both green lights are now available - enter LEARN mode as above to learn on light 1; press again to learn on light 2; press again to exit LEARN mode without learning on either light.

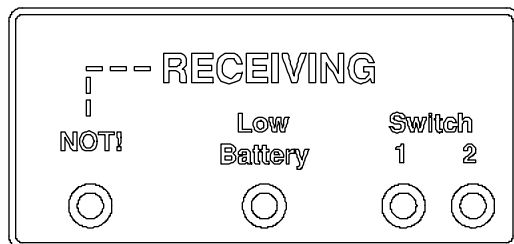
LIGHTS AND ALARMS



TWO-BLOCK ALARM LIGHT - This red light blinks, together with the SWITCH 1 or 2 light, indicating which switch is two-blocked.

Survey the situation and take appropriate action. The usual response is: 1) stop all motion immediately 2) lower the hook or telescope “in” to relieve the alarm condition.

Or - you may press the HORN OFF key to silence the horn (if present) and use the BYPASS key to continue lifting the hookblock for rigging or stowage (see above for details on using the BYPASS key).



RECEIVING LIGHTS - these lights indicate what is being received from the RAT SWITCH(ES) on the boom.

RECEIVING: Switch 1, 2 - (green lights, 1 and/or 2) stay ON when a good signal has been received from that Switch in the last 16 seconds. **CAUTION! You must verify that the switch is properly rigged on the crane.** A properly learned, flagged switch will also cause a green light (1 or 2) to be ON.

RECEIVING: Low Battery - The low battery light blinks together with the switch light 1 or 2, to indicate which switch has the low battery. See page 11 for instructions on how to change the battery.

NOT! --- RECEIVING Switch (1 OR 2) - (yellow light) turns ON and flashes together with the switch light (1 and/or 2) indicating that switch is **NOT** being received. The NOT! --- RECEIVING alarm can occur when:

- 1) A RAT SWITCH has been damaged and is unable to transmit. Press HORN OFF to silence the horn. Perform a SYSTEM TEST to verify the failure. The lights will continue to blink until the RAT SWITCH is repaired (see Maintenance section) or removed from service by clearing its' ID code from the display (use UNLEARN above).
- 2) There is excessive RADIO NOISE: on rare occasions, excessive noise can prevent a RAT SWITCH update signal from getting to the display. The L25 will generally not be effected by any sources except the following: close proximity (one hundred yards) to a powerful TV (ch.12) or FM radio transmitter (104.5 FM), or very close proximity (100 ft) to a large electric arc, for example: a steel furnace. Press HORN OFF to silence the horn. If caused by radio noise, the alarm will probably clear itself shortly. If the alarm persists, move the boom position slightly. If the alarm still persists, perform a SYSTEM TEST to see if a two-block signal will get through (see below). If the signal is delayed, or does not get through – STOP! - do not rely on the system under these conditions. See warnings below.

WARNING! Do Not rely on a switch that has a NOT!--RECEIVING alarm.

Correct this condition immediately.

Contact LIFTek Corporation for assistance if you experience NOT!—RECEIVING alarms on a regular basis (more than 2 each workday).

NOTE: when the display is in BYPASS the NOT!-- RECEIVING light will be ON solid and both green switch lights (1 and 2) will be OFF – the switches are **not** available.
Release the BYPASS key to exit BYPASS.

WARNING! The display panel cannot receive any signals from the boom tip while crane power is turned off. If there is any change in conditions, the display cannot detect them until the first update signal is received - usually within 15 seconds after power up.

Before operating the crane always verify that it is not in a two-blocked condition.

OPERATOR'S DAILY INSPECTION and SYSTEM TEST

USER'S RESPONSIBILITY: It is the user's responsibility to understand the operation of this system, to inspect and perform a System Test:

- * At the beginning of every shift and before any lift where two-blocking is possible.
- * Always before lifting personnel or performing any other critical lift.
- * After an attachment - jib, aux sheave, switch, line weight has been added or removed.
- * After a winch line has been added, removed or changed.
- * When any hardware is added to the boom that might block the signal
- * At any time that conditions warrant.
Including, but not limited to: when the boom head is used in a location where the signal may be blocked or degraded by interference, after contact with any object that may damage the boom hardware, when ice, insect activity, or contamination is present that may jam the switch, etc. and after periods of disuse or if the boom has been grounded.

INSPECTION: Check for physical damage on all components as follows:

RAT SWITCH: check that fasteners are tight, check the chain and spring snaps for wear, loose connections, and entanglements. Snap test the switch: start w/ the weight hanging from the switch, lift the weight 2 inches, pull down on the chain and release - the switch should snap up carrying the weight of the chains. Insure that the antenna is present, its coating is undamaged.

DISPLAY PANEL: Check for frayed or broken cables. Insure that the mounting has not been altered. Repeat antenna inspection. Verify good horn volume.

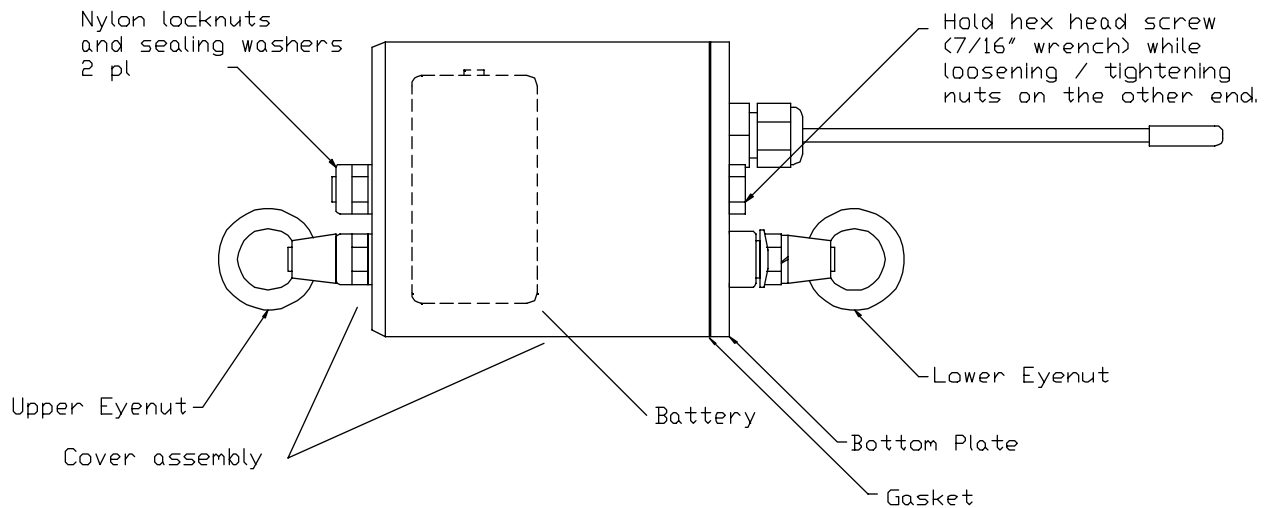
SYSTEM TEST: With the crane properly leveled and outriggers extended. Use the winch to carefully raise the line weight a few inches only, check that the two-block light and switch light come ON and blink, and the motion cut hardware disables WINCH-UP and TELESCOPE OUT. Verify that the horn volume is adequate. Now lower the hookblock - the alarms should clear after a few seconds. Repeat the test for each monitored line.

WARNING! If this system fails to pass any of these tests. Do not use the crane. Contact your supervisor. Use this manual to isolate and repair the problem. If you cannot correct the problem, call for technical assistance.

**For Technical Assistance Contact your
Manitowoc Boom Truck
Dealer**

MAINTENANCE PROCEDURES

CAUTION! Always perform a SYSTEM TEST after any maintenance on the system...



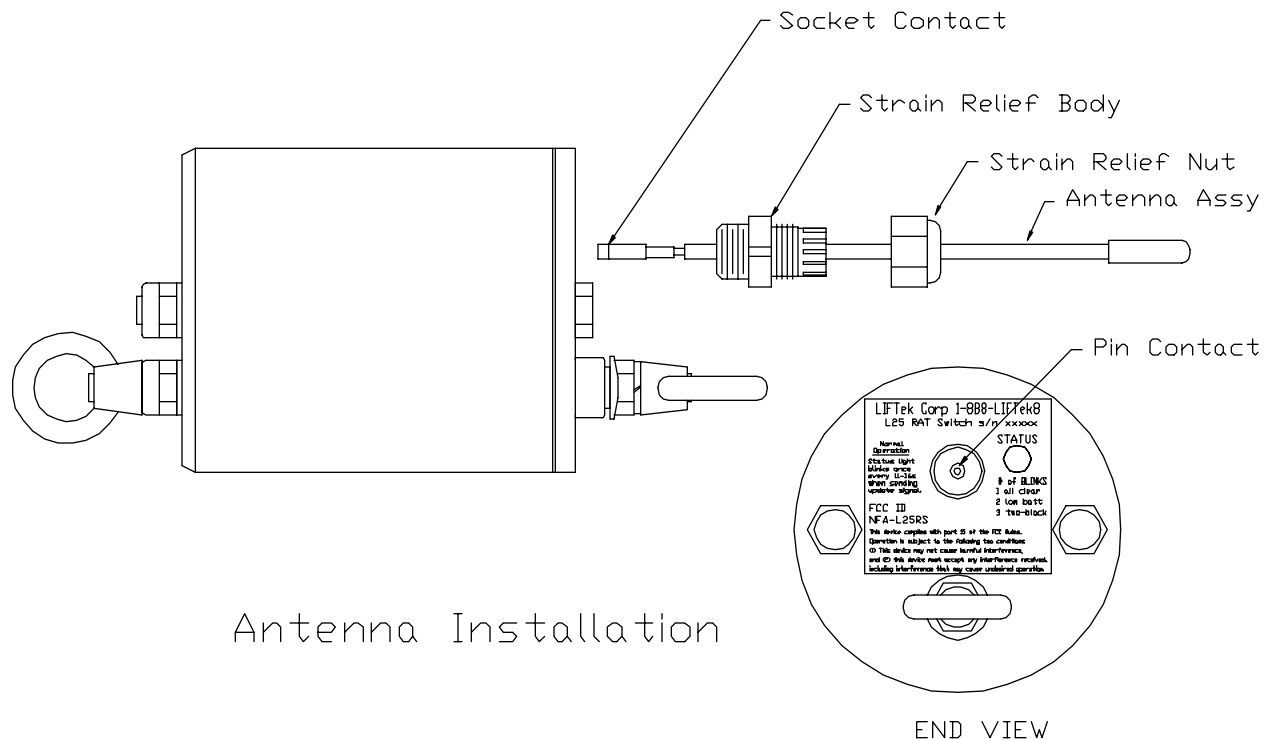
Cover Removal / Battery Replacement

How to remove the cover – Use a 7/16" wrench on both ends. Hold the lower screw heads while tightening or loosening the nylon locknuts on the top. Remove the locknuts and sealing washers. Hold the bottom plate firmly and slide the cover off, taking care not to damage the gasket.

How to replace the battery – The RAT switch uses a 3.6V lithium battery with an expected life of 8+ years. A standard or alkaline "D" cell will not work. First, remove the cover (see above). Carefully, remove the old battery. Insert the new battery and connector the same way. If the battery is inserted properly, the RAT SWITCH status light will flash 4 times on power up. If you do not get a light, check polarity. A reverse polarity connection will not damage the unit, but will drain the battery more quickly. If the polarity is correct, contact your dealer or the factory for assistance.

Always test the system after replacing the battery.

How to Replace the Cover - before replacing the cover, check that the battery connector is attached and that the Status light is flashing properly (See RAT switch operation p.5). Inspect and check for proper switch operation. Make sure the gasket is not damaged. Install the cover with the upper eyenut aligned with the lower eyenut. You must use the sealing washers and nylon locknuts to prevent water entry into the unit. Hold the lower hex screw heads with a 7/16" wrench while tightening the nylon locknuts.



How to replace the antenna – Remove the old strain relief fitting. The new strain relief body should be threaded on the antenna as shown. Insert the socket contact onto the gold pin contact on the circuit board. Push down until it is seated - it should go on easily - do not push too hard. Screw the strain relief body down until it contacts the bottom plate plus one-quarter turn maximum – do not over tighten. Gently, again make sure the antenna is seated. Tighten the strain relief nut until the seal just closes around the antenna plus one-half turn. Do not over tighten. Perform a SYSTEM TEST.

How to Test the Switch Mechanism – begin with the weight hanging from the switch, lift the line weight 2 inches, so that only the weight of the entire chain is hanging from the switch. Now pull down on the chain to clear the alarm. There is a 1 or 2 second delay, then the RAT switch status light will flash 5 times (for 10 seconds) while sending an “all clear”. Now release the chain. The switch should SNAP up and trigger a two-block alarm immediately on the display. (The triple flashes on the RAT status light may be delayed slightly - this is normal.) Repeat several times. If the mechanism does not snap up or seems sluggish for any reason - do not use the switch. See the procedure below to clean and lubricate the switch.

CAUTION! If the switch mechanism does not snap up while lifting the weight of the chain, then
DO NOT USE THE SWITCH.
Follow the procedure below to clean and lubricate the switch mechanism.

How to Service the Switch Mechanism – the switch plunger, spring and bushing may be cleaned and lubricated with WD-40. Avoid spraying cleaners on the circuit board.

CAUTION! If cleaning and lubrication does not correct the problem –
DO NOT USE THE SWITCH. Contact your dealer for assistance.

How to Change the Fuse in the Display - The motion cut relay inside the display panel is protected by a 10A fuse (Mini-ATO). If the motion cut wire does not supply current when the relay is closed, then the fuse is probably burned out. Before replacing the fuse, locate and correct the fault which caused the fuse to blow - typically this occurs when one of the motion cut wires is shorted (or connected) to ground accidentally.

To check the fuse, unscrew the four large screws on the front of the unit and pull the face off and down - carefully. The fuse holder is next to the relay - check the existing red 10A fuse to see if it is blown. If necessary, replace the fuse. Do not replace with a fuse rated at higher than 10A, or the motion cut relay may be damaged.

There is a spare fuse inside the display. It is located inside the plastic clip which is mounted on the inner back wall of the enclosure. Fuses are also available at any automotive supply store.

Display Wiring

Unless marked otherwise, the display is wired as follows:

Black – ground

White – battery (9-16VDC)

Green – lockout wire, controls motion cut.

No Alarm Condition: supplies battery voltage, 10A max (fused in display)

Alarm Condition: open, supplies no voltage to solenoids

USER NOTES

APPENDIX

WARRANTY

All material supplied by the Seller is guaranteed against failure caused by defective material and/or workmanship only. The Seller's only obligation hereunder is to repair or replace, F.O.B. its facilities, the defective part within twelve (12) months after the date of shipment (36 months for the "C" battery, 60 months for the "D" battery). No allowance shall be granted for repairs or alterations made by the Purchaser without the Seller's written consent. This guarantee shall not be construed to cover the cost of any work done by the Purchaser on material furnished by the Seller. The Seller shall not be liable for any special, indirect or consequential damages. This warranty does not cover repairs necessary because of operator abuse, negligence, or failure to maintain the equipment. The above warranty is in lieu of any other warranties, express or implied, including any implied warranty of merchantability or fitness for a particular purpose. Neither LIFTek Corp., nor any of its distributors or agents assumes any other liability in connection with this system or any of its components.

SERVICE

The material supplied must be serviced by qualified technicians who have received training from LIFTek Corp. or their authorized representative. Except for user serviceable parts (designated in this manual), any repair or attempt to repair any component in this system will result in loss of warranty for that component and any other component that may be damaged after that repair.

BACKGROUND- A2B SYSTEMS

Two-Blocking is the dangerous condition where the hook block contacts any part of the boom tip hardware. Two-blocking may occur while winching up, while telescoping the boom out or when booming down (unless the winch is mounted on the boom). Continuing any of these actions will cause the hook block to be drawn over the top sheave or cause the wire rope to break - either of which will cause the load to fall out of control to the ground.

Two-Block Warning System: a warning system alerts the operator with a light and a horn when a two-block condition is about to occur.

Two-Block Warning and Limit System: is a two-block warning system which also "limits" or stops crane motions (also called "motion cut") when a two-block condition is about to occur.

Motion Cut - means to stop crane motions which cause two-blocking. Motion cut hardware may consist of hydraulic valves, magnetic lever lockouts (mag valves) or pneumatic valves. These valves are controlled by the "motion cut" relay inside the operators display.

Bypass - refers to the display. This means to "bypass" or disable the system alarms and motion cut hardware and return full control to the operator .

Override- refers to boom tip hardware, it means to "turn off" a two-block switch or transmitter when it is not being used. WARNING! When all switches learned on the display are flagged, the A2B system is DISABLED and will NOT alarm or stop two-blocking.

TECHNICAL SPECIFICATIONS – Manitowoc Boom Trucks

RADIO A2B SYSTEM SPECIFICATIONS:

Range: 400 feet minimum, clear line of sight, 5 ft or more above the ground.

Temperature: -30 to +185°F (-34 to 85°C)

ID Code Learning System: No DIP Switches to set

Sealing: equivalent to NEMA 4X

Corrosion / Sunlight Resistant materials.

FCC Part 15 Approved

RADIO A2B TRANSMITTER (RAT SWITCH or RAT)

Periodic Update Signal

Status Light: shows status on transmit.

Battery: 3.6 volt high capacity Lithium

Battery Life: 5 year guarantee. Expected life 10 years, Shelf Life: 15+ years.

Low Battery Detection, Reverse Battery Protection and Warning Light

Mounting: hanging mount. PAT* switch compatible mounting bracket.

Antenna: Field replaceable, nylon coated, galvanized steel whip.

RAT Switch Override Flag – flagging all active switches Overrides the A2B system.

A2B SWITCH MECHANISM (in RAT SWITCH or SWITCH)

Switch Life: 100K cycles min.

Switch Overload Pull Limit: 1000 lbs typical w/o internal failure (fails safe).

Weight and Chain: Chain WLL: 440lbs, SS Lower Spring snap WLL: 200 lbs (pull limit 400 lbs typ)

Impact Testing: 150,000 cycles passed w/o damage.

RADIO A2B DISPLAY PANEL

Supply Voltage: 9 - 16 VDC (12 VDC)

Display Supply Current: 0.3A nominal (self resetting fuse)

Motion Lockout Supply Current: 10A at crane voltage standard (internal fuse)

Overvoltage, Transient and Reverse Polarity Protection

Connector for easy removal and storage of display (optional).

Antenna: external standard.

Horn off and volume control.

Warning Lights: high brightness, daylight visible.

Bypass Modes: momentary bypass only at display

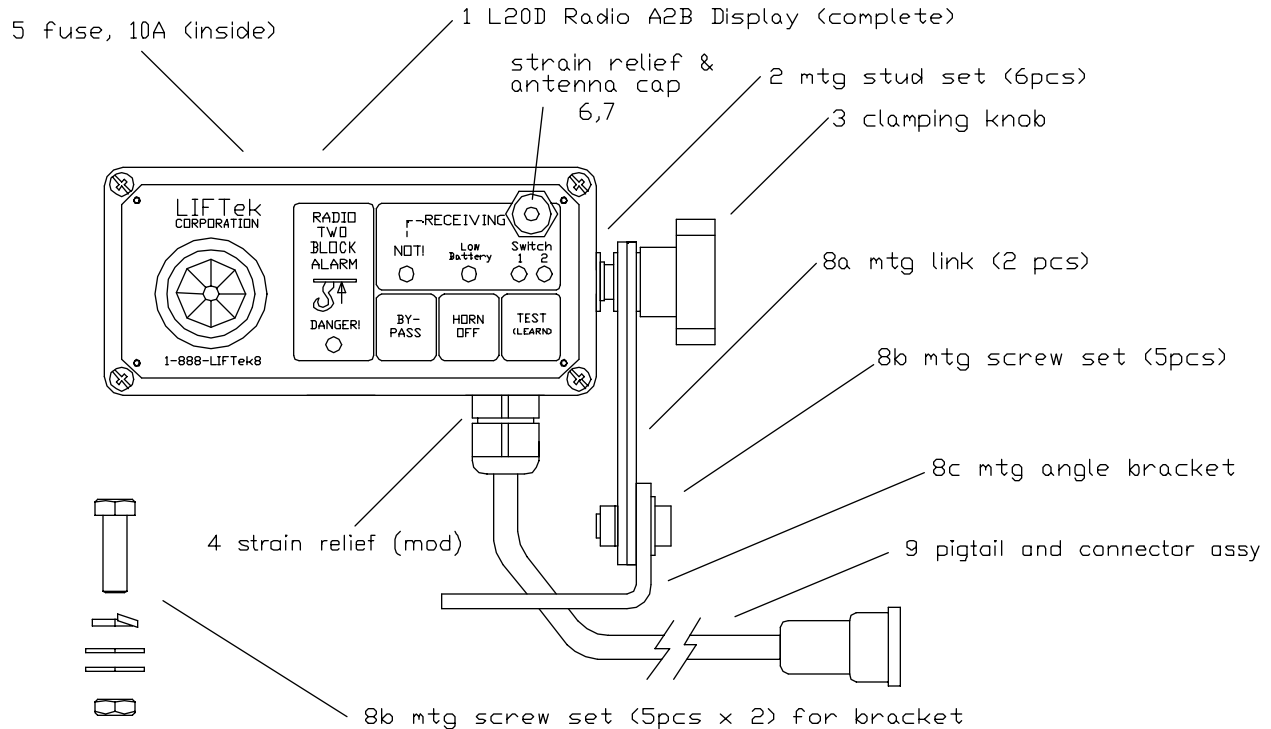
Self-Test Mode: checks display warning lights, horn and motion lockouts.

No Reception Detection and Warning (NOT!---RECEIVING alarm)

RAT Low Battery Warning.

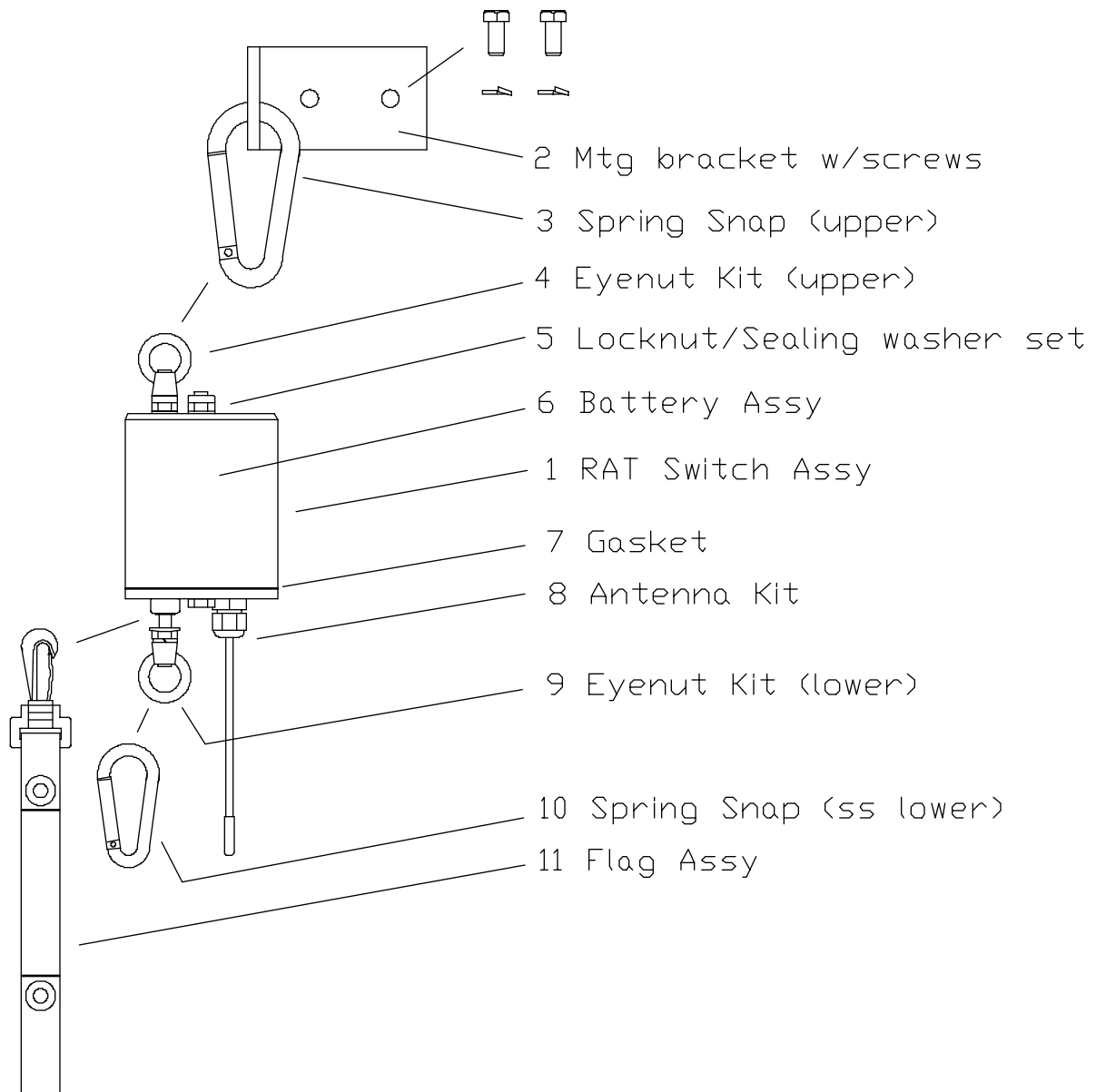
*Pietszch Automatisierungstechnik

L25 PARTS LIST



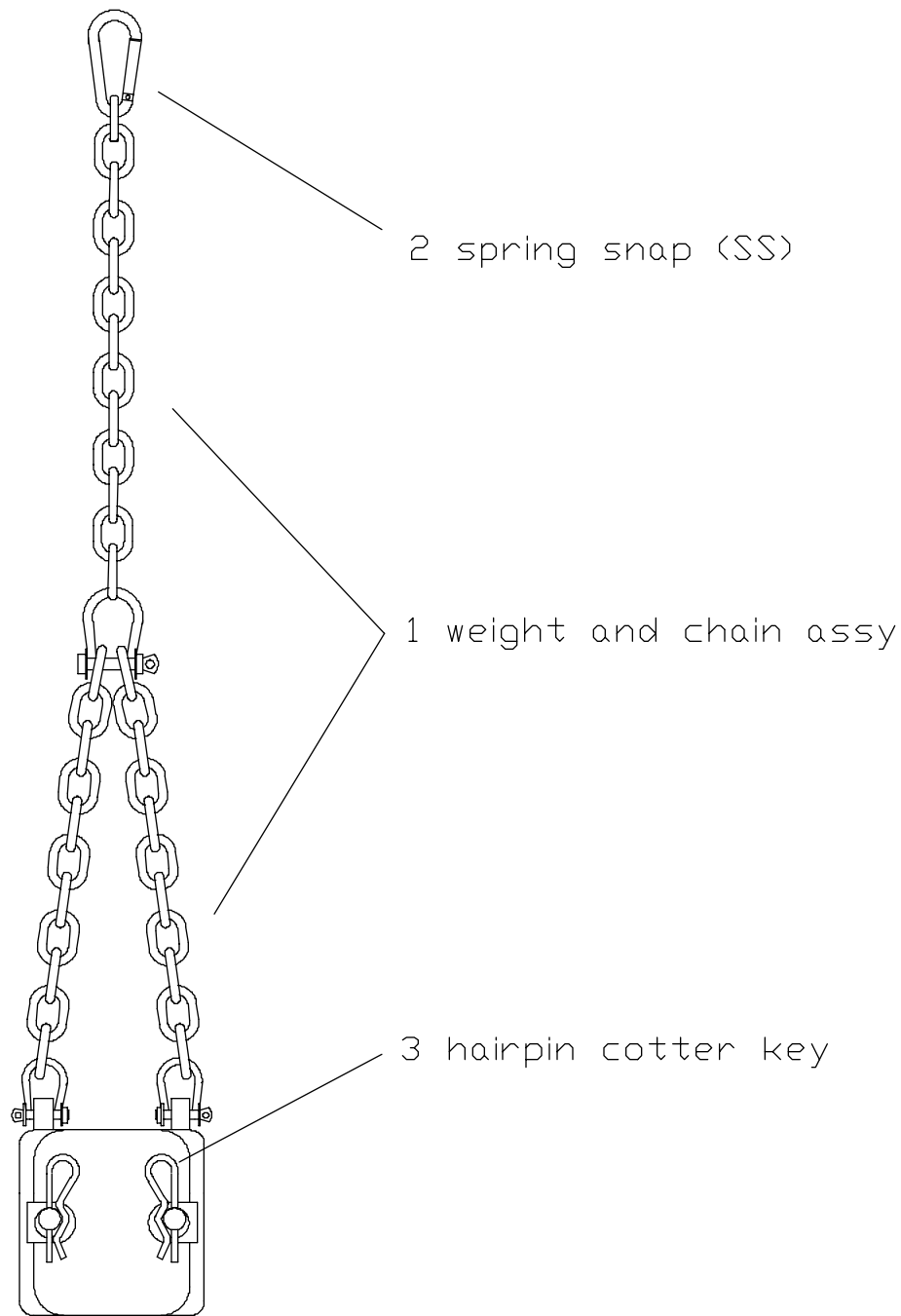
L20D-5 DISPLAY - PARTS LIST

ITEM#	P/N	DESCRIPTION
1	L20D-5	L20D Radio A2B Display (MBT version, w/ clamping knob and pigtail)
2	L2122	mtg stud set (5/16" x 1.25" SS hexhd, nut, lockwasher, washers (3))
3	L2033	knob, clamping (5/16")
4	L2408	strain relief, modified (PG-13)
5	L2124	fuse, 10A (Mini-ATO red 10A)
6	L2266	strain relief, watertight (PG-7)
7	L2167	cap, antenna
8	L2253	mounting kit, (items 8a,b,c)
8a	L2034	mounting link (2 pcs)
8b	L2035	mounting angle bracket
8c	L2118	bracket mtg screw set (5/16" x 1" hexhd, nut, washers-5pcs) x 3
9	L2561	display pigtail and connector assy



L25RS-1 RAT SWITCH - PARTS LIST

Item #	P/N	DESCRIPTION
1	L25RS-1	L25RS Radio A2B Transmitter Switch (complete assy w/o flag)
2	L2549	mounting bracket w/ SS 5/16-18 x 5/8" hex hds, lockwashers
3	L2257	spring snap, zinc plated (upper)
4	L2558	eyenut kit, upper
5	L2532	locknut/sealing washer set
6	L2535	battery assy ("D" cell)
7	L2508	gasket
8	L2545	antenna kit, (includes antenna and strain relief)
9	L2559	eyenut kit, lower
10	L2059	spring snap, SS (lower)
11	L2516	flag assy



L20WC-5 WEIGHT AND CHAIN ASSY - PARTS LIST

Item #	P/N	DESCRIPTION
1	L20WC-5	L20 Weight and Chain Assy (complete assy)
2	L2059	spring snap, SS
3	L2242	hairpin cotter key (2 pl)

OPERATOR'S DAILY INSPECTION and SYSTEM TEST

USER'S RESPONSIBILITY: It is the user's responsibility to understand the operation of this system, to inspect and perform a System Test:

- * At the beginning of every shift and before any lift where two-blocking is possible.
- * Always before lifting personnel or performing any other critical lift.
- * After an attachment - jib, aux sheave, switch, line weight has been added or removed.
- * After a winch line has been added, removed or changed.
- * When any hardware is added to the boom that might block the signal
- * At any time that conditions warrant.
Including, but not limited to: when the boom head is used in a location where the signal may be blocked or degraded by interference, after contact with any object that may damage the boom hardware, when ice, insect activity, or contamination is present that may jam the switch, etc. and after periods of disuse or if the boom has been grounded.

INSPECTION: Check for physical damage on all components as follows:

RAT SWITCH: check that fasteners are tight, check the chain and spring snaps for wear, loose connections, and entanglements. Snap test the switch: start w/ the weight hanging from the switch, lift the weight 2 inches, pull down on the chain and release - the switch should snap up carrying the weight of the chains. Insure that the antenna is present, its coating is undamaged.

DISPLAY PANEL: Check for frayed or broken cables. Insure that the mounting has not been altered. Repeat antenna inspection. Verify good horn volume.

SYSTEM TEST: With the crane properly leveled and outriggers extended. Use the winch to carefully raise the line weight a few inches only, check that the two-block light and switch light come ON and blink, and the motion cut hardware disables WINCH-UP and TELESCOPE OUT. Verify that the horn volume is adequate. Now lower the hookblock - the alarms should clear after a few seconds. Repeat the test for each monitored line.

WARNING! If this system fails to pass any of these tests. Do not use the crane. Contact your supervisor. Use this manual to isolate and repair the problem. If you cannot correct the problem, call for technical assistance.

**For Technical Assistance Contact your
Manitowoc Boom Truck
Dealer**