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PAT America, Inc.

RADIO ANTI-TWO-BLOCK

INSTALLATION, OPERATOR'S & CALIBRATION MANUAL

P/N 031-300-190-136 Rev. F 03/26/203

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MANUAL REVISIONS

REV	DATE	NAME	DESCRIPTION
-	7/19/01	KH	CREATED OPERATOR'S MANUAL, ECN 01-213
A	8/29/01	GJO	REFER TO ECN 01-245
B	10/25/01	JR	UPDATED WIRING DIAGRAM
C	02/20/02	JR	UPDATED PHOTOS
D	04/19/02	JR	Updated photos
E	11/18/02	CH	ECN 02-275
F	03/26/03	CH	ECN 03-037

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Manufacturer’s Declaration of Conformity

We declare under our sole responsibility that the PAT Anti–Two-block System, to which this declaration relates, is in conformity with the following standards or other normative documents:

Federal Communications Commission (FCC) Compliance Notice: Radio frequency Notice:

DECLARATION OF CONFORMITY

We, PAT America, declare under our sole responsibility that the Name of Device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

The devices:

• Device relating to this Compliance Notice: PAT Anti–Two-block System

comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

— Reorient or locate the receiving antenna.

— Increase the separation between the equipment and receiver.

— Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

— Consult the dealer or an experienced radio/TV technician for help.

Any modifications to the unit, unless expressly approved by PAT America, could void the user's authority to operate the equipment.

1 GENERAL INFORMATION

The PAT Anti–Two-block System has been designed to warn the crane operator of a two-blocking condition of the crane. If a two-blocking condition is approached, the system will warn the operator by sounding an audible alarm, lighting a warning light and locking out those functions which may aggravate the crane's condition, whenever applicable.

NOTE: The term "two-block" is a crane term that refers to a condition when the load handling device comes in contact with the boom head. This condition, if not prevented, may cause the wire rope to break, allowing the load to fall. Either raising the load into the boom head, or telescoping the boom out without paying attention to the hoist line can cause a "two- block" condition.

2 WARNINGS

The PAT Anti-Two- Block System is an operational aid, which warns a crane operator of approaching two-block conditions, which could cause damage to equipment and personal injury.

This device is not, and must not be a substitute for good, sound operator judgment, experience and use of accepted safe crane operating procedures.

The responsibility for the safe operation of the crane remains with the crane operator who must ensure that all warnings and instructions supplied are fully understood and observed.

Prior to operating the crane, the operator must carefully and thoroughly read and understand the information in this manual to ensure that the operation and limitations of the system and the crane are known.

Proper functioning is dependent upon proper daily inspection and observations of the operating instructions set forth in this manual.

Caution: changes or modifications to this product which are not expressly approved by PAT America could void the user's authority to operate the equipment .

3 SYSTEM DESCRIPTION

The PAT Radio Anti Two Block, RATB, uses state-of-the-art technology. The radio communication electronics were designed cooperatively between PAT and OMNEX controls. OMNEX was chosen because of its established name and proven experience with wireless communications in the construction equipment industry. Our system transmits an OK signal ~ every two seconds on up to three separate channels. This is to ensure accurate and consistent reception of data and to reduce the possibility of unnoticed failure. The separate channels greatly reduce the probability of failure due to external interferences.

Unique, serialized transmitter identifiers are used to ensure proper operation even though other cranes are in the area.

The PAT RATB is easily configured to communicate with up to two transmitters. Simply by pressing and holding the "ID" button for five seconds, the receiver can sense the transmitters being used and configure the receiver to listen to only those transmitters. There are no numbers, ID's or codes to remember or write down.

The PAT RATB has been designed to be easily and quickly installed. It can be installed in an OEM application in under an hour.

The PAT RATB works like our normal Anti-Two-Block. It alerts to an impending two-block condition. This alert can come in the form of an audible alarm and visual LED or with the optional function lockout if the crane is so equipped.

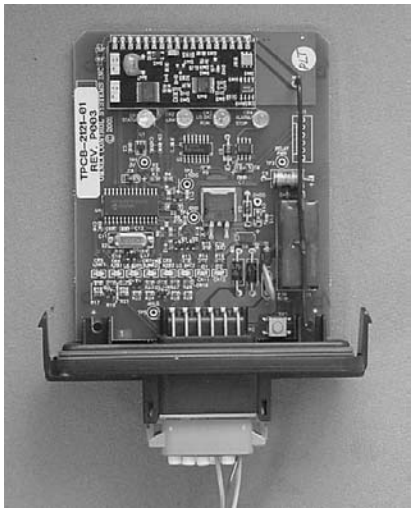
The PAT RATB transmitter is modular by design, containing three separate parts, the transmitter, the switch and the battery housing. It was designed so these individual components can be replaced easily and separately.

The receiver is mounted into a receiver box, which is water-tight when submerged in up to three feet of water. The receiver box provides the following indications: Power (status), LINK, Low Battery, and A2B.

If battery saving measures are used, the battery life will be greater than one year or up to two years, even with transmitting every two seconds. Several power saving methods are incorporated into the design of the electronics as well as the other hardware.

The receiver will work with either 12VDC or 24 VDC. It is fused to 1 Amp and protected to 36 VDC.

3.1 RECEIVER



Radio Anti-Two-Block Receiver **Receiver Box**

3.1.1 LEDs:

1.The POWER LED (Green)	Shows that there is power to the system.
2.The LINK LED (Green)	Indicates the status of the communication link between the main hoist A2B transmitter and the receiver. Failure of the communication link will turn off the Green LED and turn off the output to the lockout relay.
3.The LOW BATTERY LED (Yellow)	Indicates that the battery of the main transmitter needs to be replaced.
4. The A2B LED (Red)	Indicates an impending two-block condition of the main hoist. The Red LED will light when the load-handling device has lifted the A2B weight. This LED will light simultaneously with the engaging of the lock out solenoids (if installed).

3.1.2 ID button

The yellow ID button, located in the lower right-hand corner of the receiver board, is used to set the transmitter ID of the transmitter into the receiver.

3.2 TRANSMITTER / SWITCH

The transmitter and battery housing are made of a special plastic that resists impact and will not become brittle even in low temperatures.

3.2.1 Transmitter LED

The transmitter has an LED on the bottom for diagnostics. The LED should be on when in a two-block condition or when the weight is lifted. The LED will flash rapidly during a 2-block condition and will stop flashing after the switch is in a two-block condition for more than 15 seconds. The LED will flash randomly approximately every 2 seconds when the switch is transmitting. When in sleep mode, the LED will not flash.

3.2.2 Storage of the A2B transmitter for Travel

The weight should remove from the switch when traveling to extend battery life. The system is in permanent lockout and the system will not function until the chain is unhooked. To use the feature, attach any part of the chain into the hook. When it is desired to use the switch again, simply unhook the chain to allow the switch to close.

⚠ WARNING

The weight and chain must be hung from the switch and/or the chain must be unhooked before the crane is operated.

4 INSTALLATION

4.1 TRANSMITTER/SWITCH

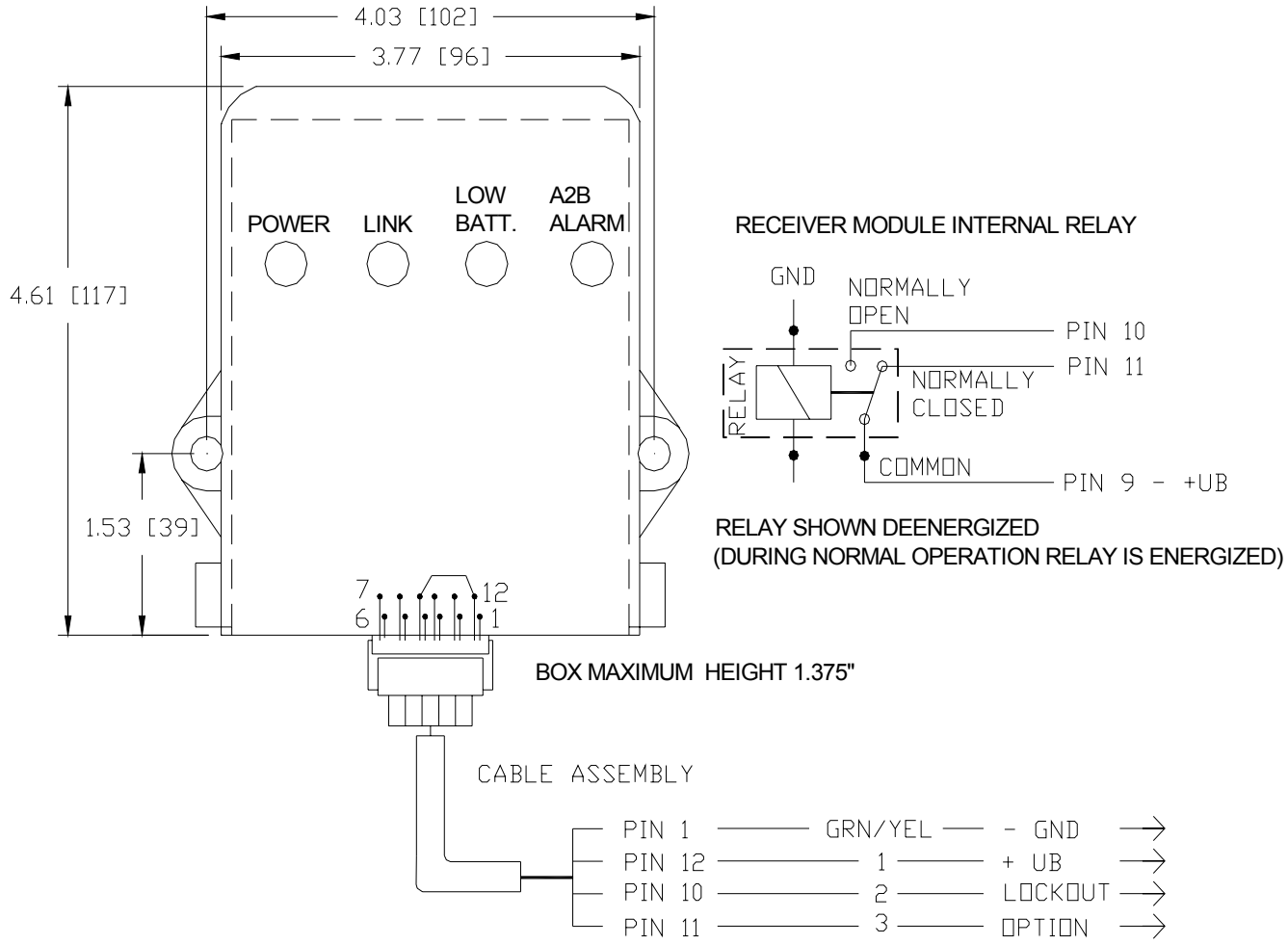
Install the standoff to the boom head using a 5/16x3/4” HEX bolt. The hole pattern for the standoff is the same as that of conventional PAT A2B switches. In most cases the standoff can be mounted in the same location as the conventional switch.

If not replacing an existing switch, the proper location would be one that allows the switch to rotate freely without being obstructed by any part of the boom head. It should be mounted close to the dead end mounting gusset. The switch should normally be mounted on the cab side of the crane.

For jib installations, locate the switch close to the jib head.

Remove the lynch pin from the standoff. Slide the A2B switch onto the standoff. Replace the lynch pin into the standoff.

Install the weight and chain onto the A2B switch.



Wiring For Power Cable to Receiver Board Module

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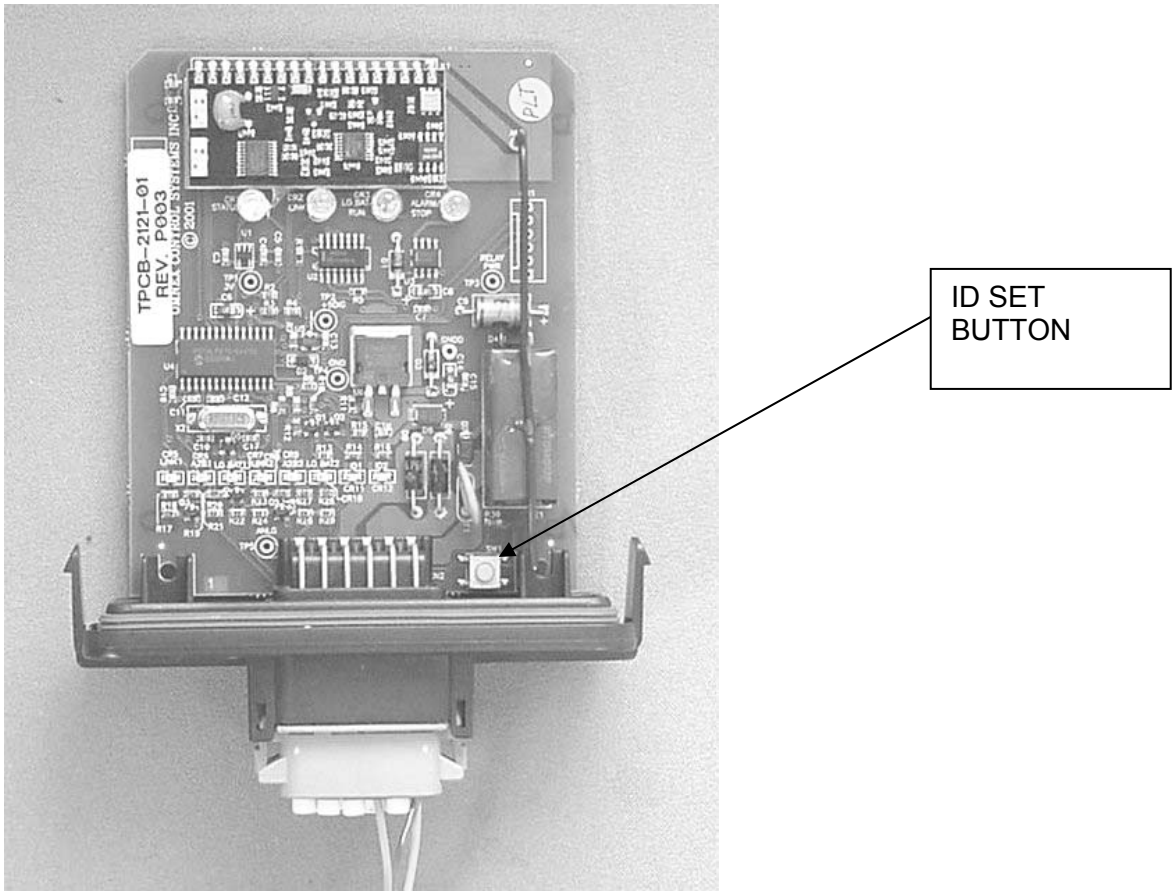
4.2 RECEIVER

The receiver comes packaged in a waterproof housing. The module must be mounted into a suitable location using the supplied hardware. The location of the receiver should be in direct line of site of the transmitter and not blocked by any metal between the transmitter and receiver.

5 SETUP/CALIBRATION

5.1.1 Setup Overview

The PAT RATB is easily configured to communicate with up to 2 transmitters. Simply by pressing and holding the yellow “ID” button for 7 seconds, the receiver can sense the transmitters being used and configure the receiver to listen to only those transmitters. There are no numbers, ID’s or codes to remember or write down.



5.1.2 Clear Existing Setup Switches

Press and hold the yellow “ID” button for 15 seconds, the ID LED will begin to blink and then go off when cleared. **Note: It is only necessary to complete this operation when changing from a duel switch setup to a single switch**. When setup is complete, the new transmitter switch will over write the old ID code with a new one.

5.1.3 First ID Setup

To configure the system, install batteries into the transmitter to be used. Turn on the crane power. Open the receiver enclosure and slide out the receiver board. Press and hold the yellow ID button on the OEM module for 7 seconds until the ID 1 LED blinks. Release the yellow ID button. The receiver will search for a transmitter for the next 30 seconds. Pull on the cable of the transmitter and then release it. The yellow ID 1 LED should now be on solid. The transmitter and receiver are now set up and will work only with each other.

5.1.4 Second ID Setup

To program second radio a2b switch: Ground pin 3 of ithe receiver (as shown below). Install batteries into the transmitter to be used. Turn on the crane power. Open the receiver enclosure and slide out the receiver board. Press and hold the yellow ID button on the OEM module for 7 seconds until the ID 2 LED blinks. Release the yellow ID button. The receiver will search for a transmitter for the next 30 seconds. Pull on the cable of the transmitter and then release it. The yellow ID 1 LED should now be on solid. The transmitter and receiver are now set up and will work only with each other.

The transmitter(s) and receiver are now set up to work only with each other. Test the system using the instructions in section 7, System Testing.

6 OPERATION

The function of the system must be tested daily before each use of the crane hoist. Refer to Pre-Operation Inspection and Calibration Verification.

During the normal operation of the system the LINK and POWER LED's should be on.

POWER LED
The POWER LED shows that the OEM module is getting power from the crane. The receiver is on any time the crane is operating and supplying power to the system.

LINK LED
The LINK LED indicates the status of communication of the transmitter(s). During normal operation of the system, the LED will be on. The LED is off when there is an interruption in the transmission. The system should not be operated if the LINK LED is not lit.

LOW BATTERY LED
The low battery indicator will light indicating that you have a limited time to operate before the system goes dead. When the battery level is to the point that it is too low to operate, the system will stop functioning. Use any off-the-shelf alkaline C-cells; Duracell, Eveready, etc.

A2B ALARM LED
Indicates an impending two-block condition of the main hoist. The Red LED will light when the load-handling device has lifted the A2B weight. This LED will light simultaneously with the engaging of the lock out solenoids (if installed).

Test the electronics
Cycle the power to the system, each LED on the receiver will light for 2 seconds when the system is powered. All of the indicator lights must come on or the system is not functioning properly. If any light does not function, do not use the system until it has been repaired.

7 SYSTEM TESTING

To test the electronics:

Each LED on the receiver will light for 2 seconds when the system is powered. All of the indicator lights must come on or the system is not functioning properly. If any light does not function, do not use the system until it has been repaired.

Following the successful testing, the LINK LED should come on. If the LED's do not come on, there is an error in the transmission. Do not use the system until it has been repaired or replaced. (Refer Troubleshooting section.)

To test the hoist limiting:

After the electrical connections have been checked to ensure that the system is properly connected for the crane configuration, the following checks must be made:

⚠ WARNING

The following tests must be performed with care to prevent damage to the machine or injury to personnel. Proper functioning of the system requires successful completion of these tests before operating the machine.

- Check the anti two-block switches and weights for free movement. If the operator cannot see the load-handling device approaching the boom nose, an assistant (signal person) must watch the load-handling device. The operator must be prepared to stop the machine immediately should the RATB system not function properly. This is indicated by lighting the red warning light, sounding the audible alarm and locking the following crane movements: hoist up, telescope out and boom down.

- Manually lift the weight attached to the anti two-block switches. When the weight is lifted, the audible alarm should sound, the anti two-block alarm light should light.

With optional lockout installed the following additional tests must be performed:

- Slowly raise the main boom load-handling device to create a potential two-block condition. When the load-handling device lifts the weight, the audible alarm should sound, the anti two- block alarm light should light and the motion of the load-handling device should be stopped. Lower the load-handling device slightly to eliminate this condition.

- Slowly lower the boom to create a potential two-block condition. When the load-handling device lifts the weight, the audible alarm should sound, the anti two-block alarm light should light and the boom lowering function should be stopped. Lower the load-handling device slightly to eliminate this condition.

- Slowly extend (telescope) the boom to create a potential two-block condition. When the load-handling device lifts the weight, the audible alarm should sound, the anti two-block alarm light should light and the boom telescope out function should be stopped. Lower the load-handling device slightly to eliminate this condition.

⚠ WARNING

If the light and audible alarm does not function as described and the crane movements are not stopped, the system is not working properly. The malfunction must be corrected before operating the crane.

If the crane is equipped with a second transmitter, repeat the test on the second transmitter.

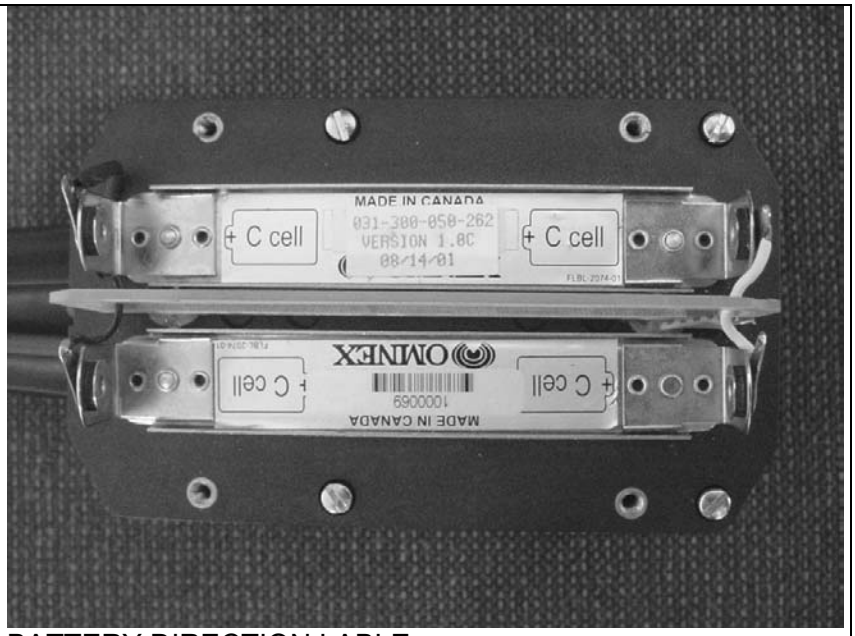
8 MAINTENANCE

The only maintenance required is to change the batteries when required. Also, check the mounting hardware daily to ensure that there is no damage. Replace any damaged parts before operating the crane.

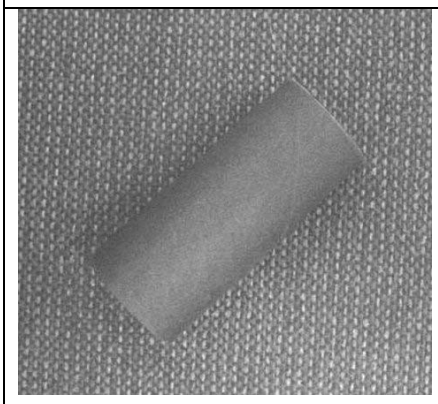
8.1 BATTERY REPLACEMENT

To replace the batteries, remove the 4 screws from the transmitter housing. Install 4 fresh batteries into the proper location and direction as indicated on the battery holder. Make sure that the cardboard tube is installed as shown.

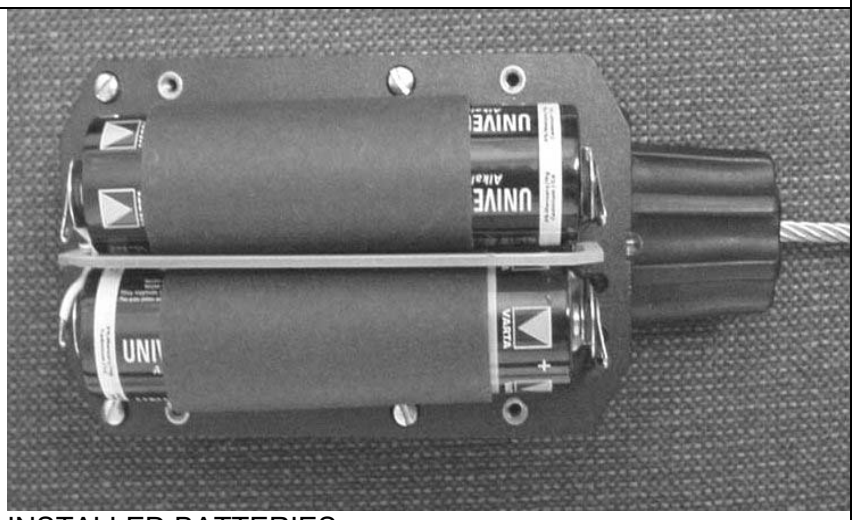
LOOSEN 4 SCREWS



BATTERY DIRECTION LABLE

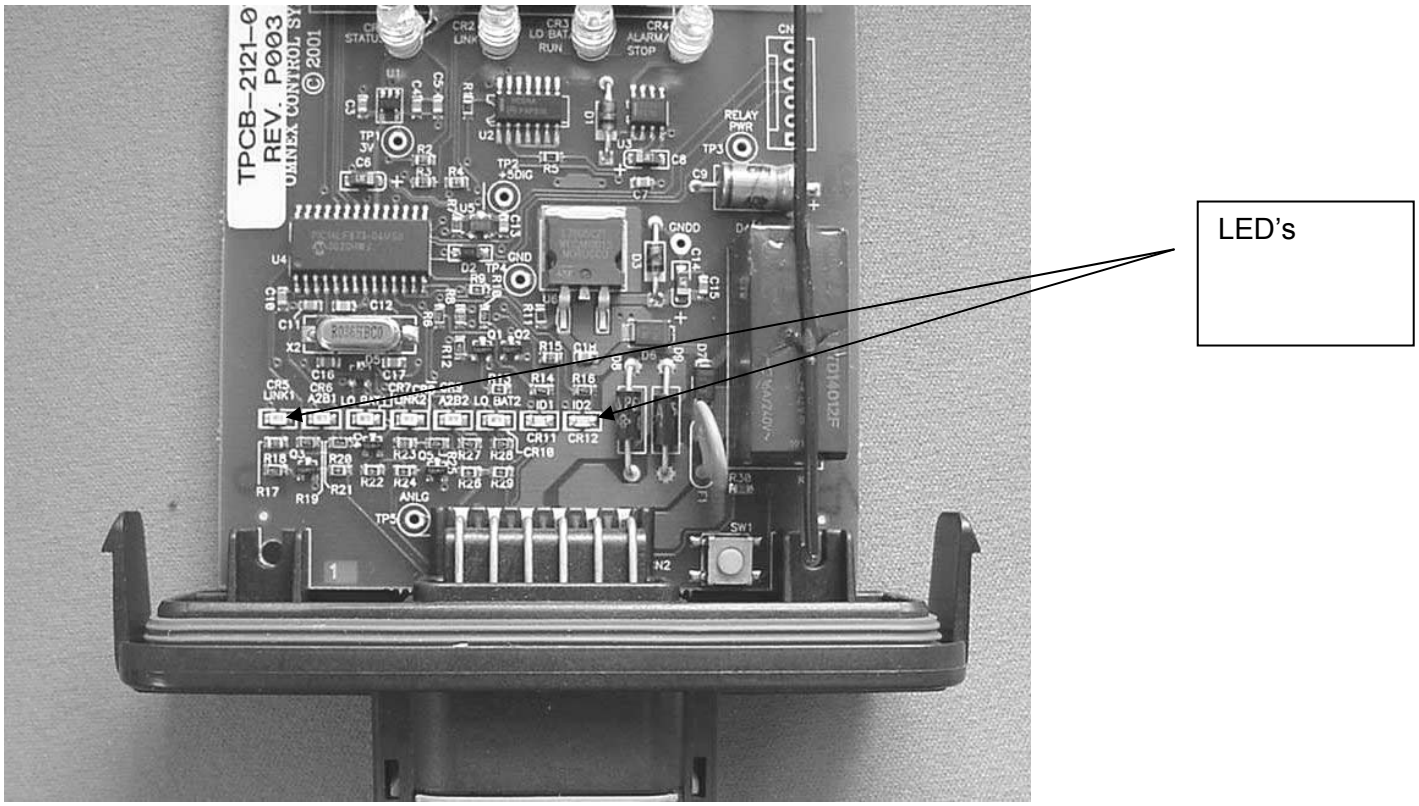


CARDBOARD TUBE



INSTALLED BATTERIES

9 TROUBLESHOOTING



Receiver Board

Numbers from left to right on Receiver Board, above, are:

1. Link1 Green
2. A2B1 Red
3. LO BAT1 Red
4. Link2 Green
5. A2B2 Red
6. LO BAT2 Red
7. ID1 Orange
8. ID2 Orange

Note: The board must be removed from the housing in order to see the LED's

9.1 LED'S

(Refer to Numbers below photo on previous page)

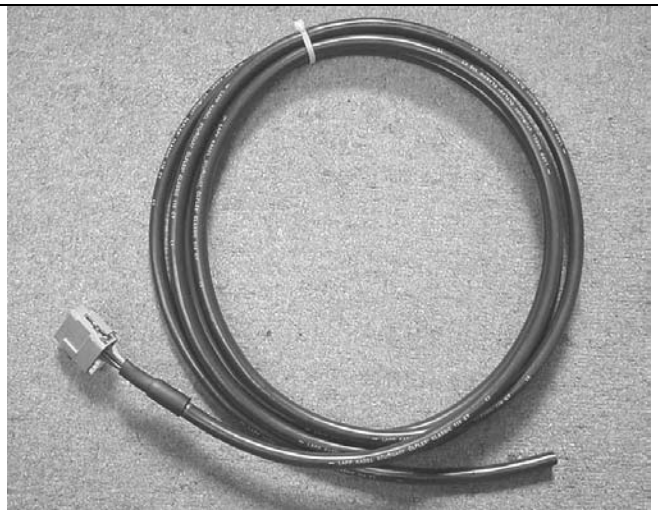
1.The LINK 1 LED Link1 (Green)	Indicates the status of the communication link between the main hoist A2B transmitter and the receiver. Failure of the communication link will turn off the Green LED and turn off the output to the lockout relay.
2. The A2B 1 LED A2B1(Red)	Indicates an impending two-block condition of the main hoist. The Red LED will turn off when the load-handling device has lifted the A2B weight. This LED will light simultaneously with the engaging of the lock-out solenoids (if installed).
3.The LOW BATTERY 1 LO BAT1 LED (Red)	When the light goes off, it indicates that the battery of the main transmitter needs to be replaced.
4. The LINK 2 LED Link2 (Green)	Indicates the status of the communication link between the auxiliary hoist A2B transmitter and the receiver. Failure of the communication link will turn off the Green LED and turn off the output to the lockout relay.
5. The A2B 2 LED A2B2(Red)	Indicates an impending two-block condition of the auxiliary hoist. The LED will turn off when the load-handling device has lifted the A2B weight. This LED will light simultaneously with the engaging of the lock-out solenoids (if installed).
6.The LOW BATTERY 2 LED LO BAT2 (Red)	When the light goes off, it indicates that the battery of the main transmitter needs to be replaced.
7. The ID 1 LED ID1(Orange)	Lights to show the successful setup of the main transmitter. This LED will stay on once the transmitter is set up.
8. The ID 2 LED ID2(Orange)	Lights to show the successful setup of the AUX. Transmitter. This LED will stay on once the transmitter is set up.

All LEDs are located inside the receiver box.

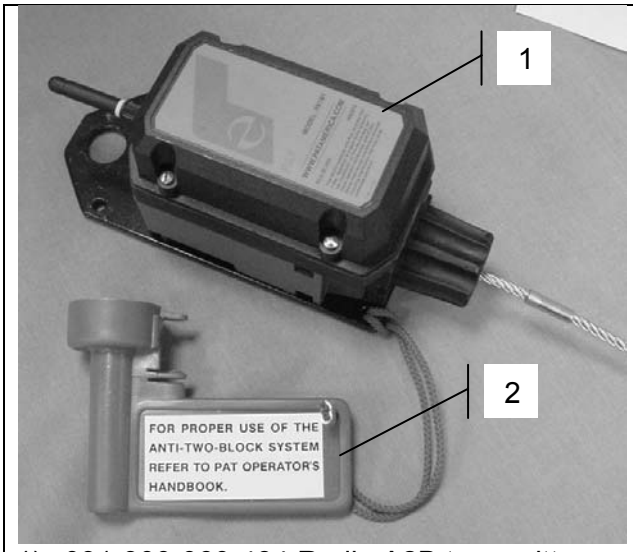
Problem	Cause	Solution
No LED's light on receiver	No power to receiver	Make sure the module is getting power from the crane. Check wiring. Ensure correct polarity of the power. Replace OEM receiver
Crane functions locked out all the time	No power to the receiver	Check LED lights on module. Make sure the module is getting power from the crane. Check wiring. Ensure correct polarity of the power. Replace OEM receiver
Crane functions locked out all the time	Incorrect wiring	Check for power to lockout device.
Crane functions locked out all the time	No reception.	Check if the green Link LED is on. The green Link1 LED must be on for single hoist operation. Link1 and Link2 must be on for 2-hoist operation. See Link 1 LED troubleshooting.
Crane functions locked out all the time	Fault in receiver module.	Check relay output voltage from receiver to lockouts
Transmitter LED does not flash		Pull switch wire rope. Red LED will flash ~each 2 sec. Replace batteries. Replace transmitter.
Link 1 LED not on	ID1 not set.	Set the ID of the transmitter. See Section 5, Setup.
Link 1 LED not on	Poor communication caused by interference.	Remove potential interference sources from the area. Mount the receiver in a different location.
Link 1 LED not on	Object blocking the transmission path.	Improper location of the receiver. Move the receiver to a line of site location. Check antenna
Link 1 LED not on	Fault in the main transmitter.	Pull main switch wire rope. Replace batteries. Replace transmitter.
Link 2 LED not on	ID2 not set.	Set the ID of the transmitter. See Section 5, Setup.
Link 2 LED not on	Poor Communication caused by interference.	Remove potential interference sources from the area. Mount the receiver in a different location.
Link 2 LED not on	Object blocking the transmission path.	Improper location of the receiver. Move the receiver to a line of site location. Check antenna.
Link 2 LED not on	Fault in the aux transmitter.	Pull main switch wire rope. Replace batteries. Replace transmitter.
LO BAT1 or LO BAT2 LED off	No or low batteries in the transmitter.	Replace batteries.

10 RADIO A2B SPARE PARTS

031-300-060-488 Radio A2B receiver

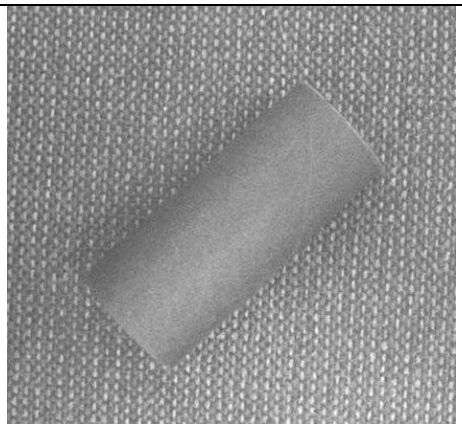


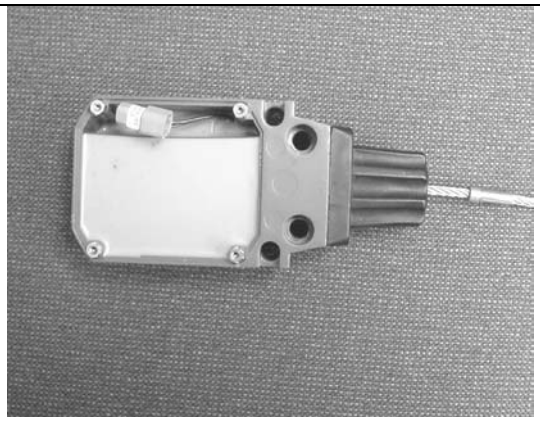
031-300-060-377 Cable Assembly 12'
Note: part number may change depending on length



1) 031-300-060-484 Radio A2B transmitter assembly
2) 031-300-100-722 A2B flag assembly

031-300-050-262 Radio A2B transmitter
031-300-050-537 Battery cover

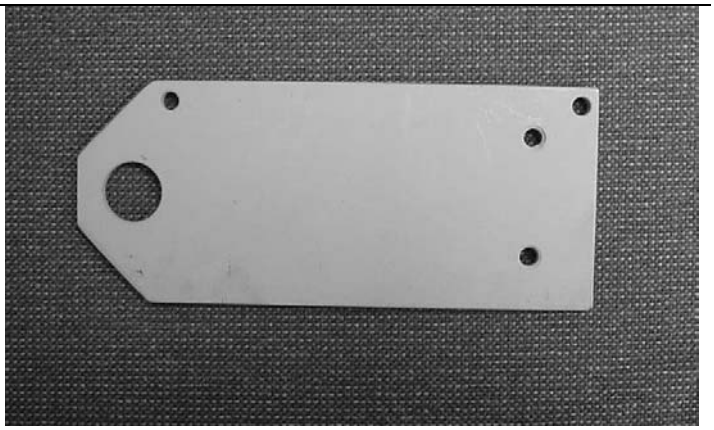




031-300-050-536 Card board tube

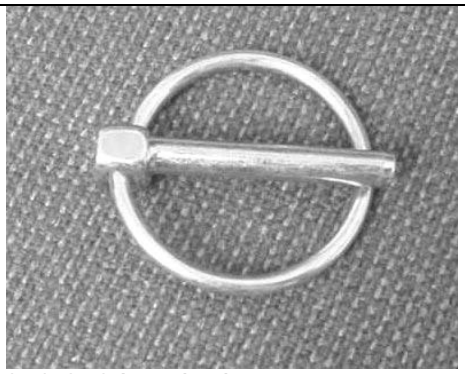
031-300-050-276 A2B Mounting standoff

031-300-060-022 Radio A2B switch



031-300-050-264 A2B mounting plate

031-300-210-012 Weight and chain
031-300-100-037 Chain connector, quick link



031-300-050-272 Lynch pin