

The LOAD & A-2-B Company Inc.

Model # 939

LONG RANGE

Radio Anti-Two-Block System

THE CONTENTS OF THIS HANDBOOK SHOULD BE
READ THOROUGHLY AND UNDERSTOOD
BEFORE ATTEMPTING TO OPERATE THE SYSTEM

INSTALLATION & OPERATING INSTRUCTION MANUAL

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Foreword

The Model 939 Radio Anti-2-Block System is a state of the art safety device for all winches. The basic system warns the winch operator of an imminent two-block condition with a visible alarm indication and an audible warning buzzer. When installed in conjunction with a function shut off, this system prevents the hook block or ball on the winch line from coming into physical contact with the sheaves.

System components

Check to be sure that you have received the following components:

- Display panel, panel cover and mounting bracket
- 1 anti-2-block switch with red flagged transportation clip
- Weld plate(s) and quick release pins
- Counterweight and Chain
- Power cord
- Antenna assembly (rubber and metal with magnetic mount)

*** ATTENTION ***

**DO NOT CONSIDER THIS SYSTEM
A SUBSTITUTE FOR GOOD JUDGMENT, EXPERIENCE
AND ACCEPTED, SAFE WINCH OPERATIONAL PRACTICES.**

**THE CONTENTS OF THIS
MANUAL MUST BE READ AND THOROUGHLY
UNDERSTOOD BEFORE OPERATING THE SYSTEM.**

**THIS SYSTEM UTILIZES A
SERIES OF ELECTRICAL AND MECHANICAL
COMPONENTS AND CANNOT BE 100% FAIL SAFE.**

Installation guidelines

Read all of these instructions completely prior to beginning

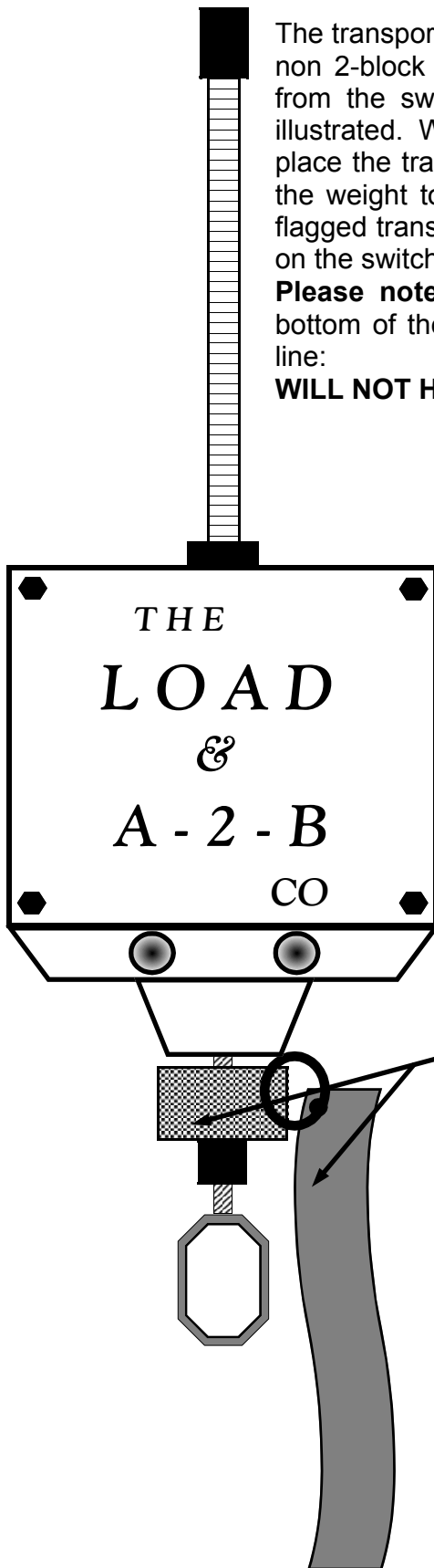
- Plan the installation
- Have the necessary tools available
- Test the system

Tools required

- Welder
- Electric drill with 3/16th inch drill bit
- Wire crimping tools – for the display power and ground connections
- Screw drivers and or socket set
- Note: Additional hydraulic hose fitting tools will be required for installation of the hydraulic solenoid valves - if included

*NOTE: The transportation clip with the red tag is a device which keeps the switch in a non 2-block state for transportation and battery saving purposes. The clip is inserted between the cable at the bottom of the metal collar on the switch and the metal grommet as illustrated on the next page.

The red flagged transportation clip – on A-2-B switch



The transportation clip with the red tag is a device which keeps the A2B switch in a non 2-block state for transportation purposes. If you remove the counterweight from the switch, ensure that the red flagged transportation clip is installed as illustrated. When transporting the winch line set up long distances, ensure that you place the transportation clip in the bottom of the switch. This is done by allowing the weight to pull the switch into the non-2-block position, and inserting the red flagged transportation clip on the cable between the bottom of the aluminum collar on the switch and the metal grommet about 5/8th's inch below on the cable.

Please note: The red flagged transportation clips are to be removed from the bottom of the switch for normal system operation. If left in the switch the winch line:

WILL NOT HAVE ANTI-2-BLOCK PROTECTION.

*** I M P O R T A N T ***

REMOVE RED FLAGGED TRANSPORTATION CLIP FOR
SYSTEM OPERATION
REPLACE WHEN MOVING OR TRANSPORTING WINCH SYSTEM

**DO NOT OPEN & CLOSE TWO BLOCK CIRCUIT ON SWITCH
QUICKLY AND REPEATEDLY
AS IT COULD LOCK OUT THE SYSTEM TRANSMISSION

FOR NORMAL SYSTEM OPERATION ENSURE A **MINIMUM
DISTANCE OF 100 FEET** BETWEEN SWITCH AND RECEIVER
PANEL BEFORE REMOVING CLIP

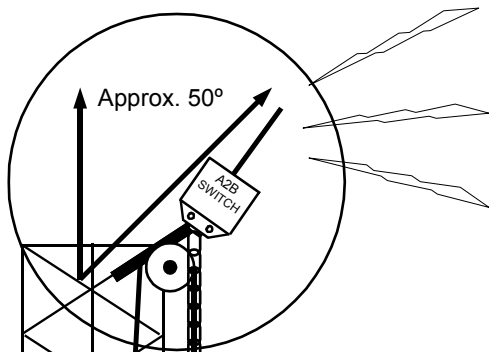
Red flagged transportation clip.

CONNECT BATTERIES BEFORE USE

To conserve battery power, the batteries in this transmitter ARE NOT CONNECTED when the system is shipped.

Upon installation of the system connect the batteries inside the aluminum transmitter switch. First remove the aluminum cover by unscrewing the 4 allen bolts. Firmly push together the two white plastic power connectors (one from the battery packs, the other at the main board) at the top of the switch. **BE VERY CAREFUL NOT TO MOVE OR CHANGE THE DIP SWITCH SETTINGS** or harm other internal components of the switch.

Before you close the cover ensure that **NO WIRES REST OVER THE EDGE OF THE GREEN CIRCUIT BOARD**, otherwise damage to the wiring may occur. Finally ensure that the **O-RING SEAL** is seated in the groove, align the cover and tighten the 4 allen bolts securely.



Installation procedure

- Anti-2-block transmitter switch

Refer to Figure at left to locate and install system components.

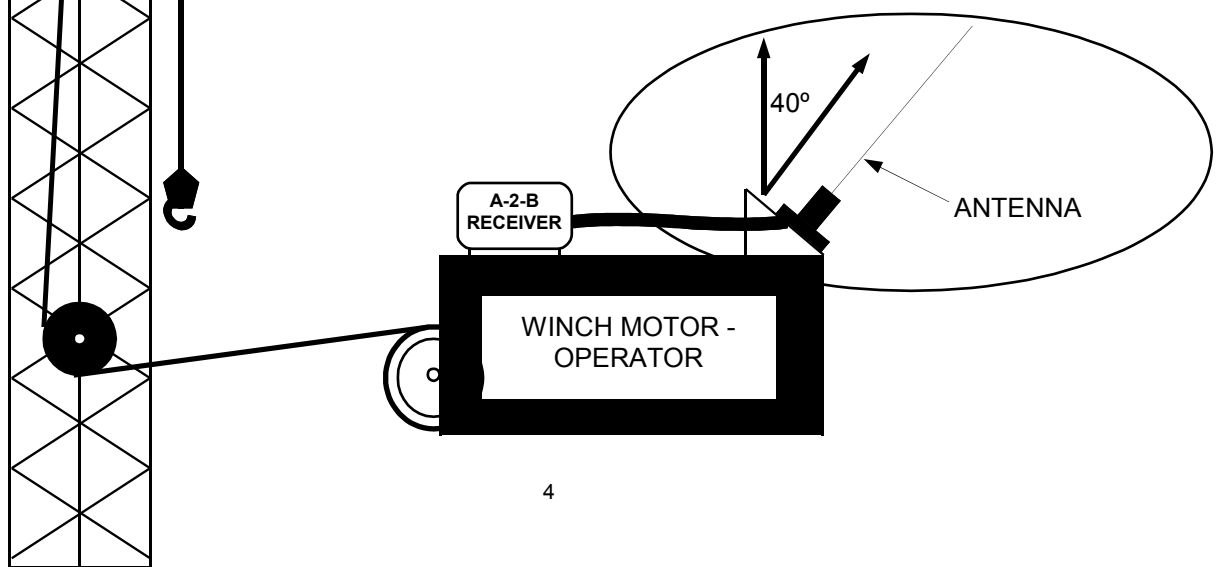
1. PLACE A-2-B SWITCH WITH WELD PLATE ATTACHED AGAINST LOCATION ON GIN POLE SHEAVE AND MARK WITH A SCRIBE. ENSURE THAT NOTHING WILL INTERFERE WITH SWITCH AND THAT ANTENNA IS NOT TOUCHING ANY METAL WHEN INSTALLED.
2. Remove weld plate on A-2-B switch removing the quick release diaper pin. Install weld plate. Note that weld plate should be offset at an approximate 50 degree angle from the tower.
3. AFTER WELDING WELD PLATE TO METAL STRUCTURE ON TOWER, ALLOW WELD PLATE TO COOL TO THE TOUCH PRIOR TO MOUNTING SWITCH BACK ON TO WELD PLATE. Installed switch should now look similar to figure at left. It should be positioned directly above the dead end or slowest speed line. Ensure that the location of the switch is such that the line of sight is not blocked from the winch and receiver panel by any brackets or flanges. The rubber antenna on the A-2-B switch should not be touching any metal.
4. Attach the counterweight and chain onto the loop on the cable at the bottom of the A-2-B switch with the quick link provided. Bolt the counterweight around the dead end line (slowest speed line) by unbolting then re-bolting the counterweight halves over the wire rope.

* I M P O R T A N T *

REMOVE RED FLAGGED TRANSPORTATION CLIP FOR SYSTEM OPERATION.

REPLACE WHEN MOVING OR TRANSPORTING SYSTEM.

FOR NORMAL SYSTEM OPERATION ENSURE A MINIMUM DISTANCE OF 100 FEET BETWEEN SWITCH AND RECEIVER PANEL
BEFORE REMOVING CLIP.



Display Panel - Mounting and Power Supply:

Remove the lower portion of the quick release mounting bracket from the bottom of the panel by loosening the two plastic star knobs. Mount this lower bracket portion on the dash or where the receiver panel will be easily seen and heard by the winch operator. Place receiver panel into the lower mounting bracket and tighten the panel upright in place with the two star knobs.

Power is provided to the receiver panel using a (supplied) three conductor cable. Connect the red wire to the positive terminal (ignition key switch, in the run position, +12 or +24 volts DC), and the black wire to ground or negative terminal on the winch engine assembly. **The white wire is the output to the optional shut-off devices and is normally hot with +12 volts. Make certain that it does not contact bare metal or a short in your system may occur.**

WHEN ATTACHING POWER CABLE TO RECEIVER PANEL, PUSH MALE END OF PLUG INTO FEMALE PANEL RECEPTACLE FIRMLY. SLIDE PLUG NECK TOWARDS PANEL & TIGHTEN CLOCKWISE ½ TURN.

Antenna installation / Positioning:

Attach the metal whip magnetic mount antenna lead to the blue receiver panel by ALIGNING THE GROOVES IN THE PLUG AND PUSHING MALE END OF ANTENNA LEAD INTO FEMALE PANEL RECEPTACLE FIRMLY. TIGHTEN CLOCKWISE ½ TURN. Ensure that this is done correctly. Position the antenna so that it will not be in the way of normal winch operation. **Angle the antenna so that it is in line of sight of the anti-2-block switch on the tower.** Place the mount of the antenna to provide an approximate 40 degree angle to the tower for best reception. **Do not allow the metal antenna to contact any metal.**

Once again, ensure a clear line of sight is between the magnetic mount antenna and the A-2-B switch on the tower. Metal objects between the switch and antenna may interfere with the system operation.

PLEASE NOTE: Use of the 5 foot metal whip antenna is for ranges greater than 150 feet. If and when you are using the system at distances less than 150 feet, install the 10 inch rubber antenna on the blue receiver panel. This will ensure correct operation of the system.

Optional Shut-Off Devices – see next page for instructions

The 939 Radio Anti-2-Block system provides an output signal of 10 amps (max.) matching the winch engines voltage, usually +12 volts, to be used with external shut off components. The shut off components may be relays, hydraulic valves, magnetic valves or any other functionally similar devices.

Under normal operating conditions, the output signal from the A-2-B system (the white wire) is hot (+12 volts) and will energize the shut-off components permitting the winch to operate normally. When in a two-block condition, the indicator panel will alarm and the output signal will be discontinued. We can provide outputs which are normally cold (non-energized) upon request when ordering.

The following winch function should be disabled:

- Winch Up -

****NOTE: If you have purchased multiple A-2-B systems, ensure that you DO NOT MIX UP THE MATCHED SYSTEMS. Should you be in doubt, check serial numbers on the switch and panel to ensure that you install matched components.**

Installation instructions

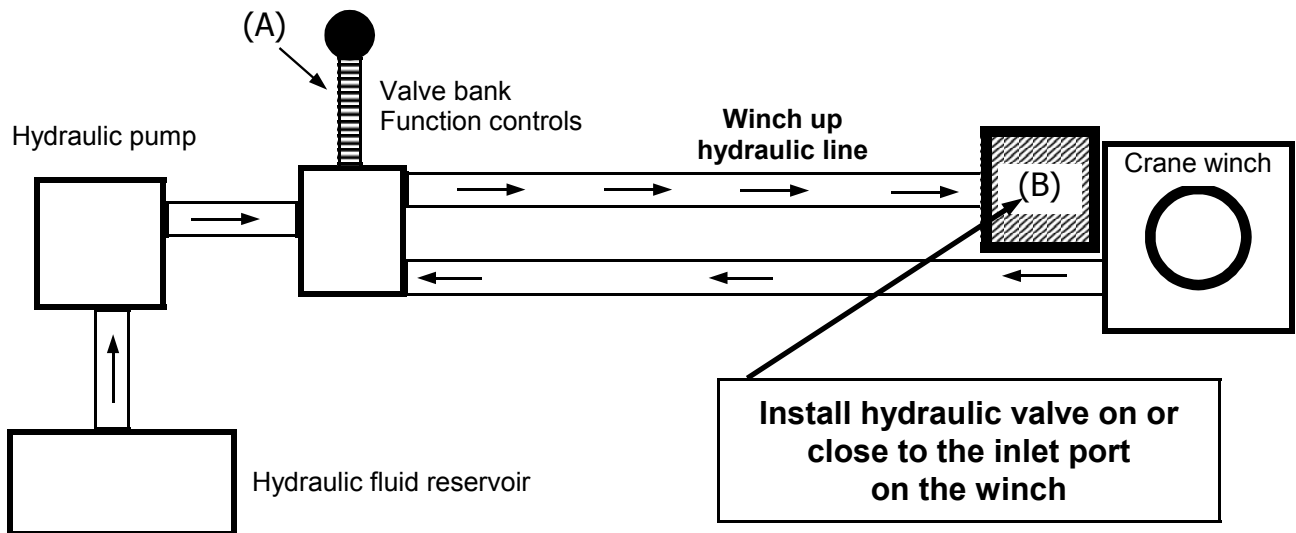
Solenoid directional hydraulic valves

The solenoid valves are normally closed, preventing hydraulic fluid flow when 0 volts or no power is connected to them. When a constant +12VDC is applied, the valves open allowing constant hydraulic fluid flow.

The valves come with standard one inch SAE threads for both the Input and Output, which are marked on the valve itself. Once you determine your hydraulic hose fitting size, you must get fittings that will join your hydraulic line to the valve. The valve is threaded internally on each end to accept your fittings. Make certain that the OUTPUT side of the valve is facing the winches and the INPUT side of the valve is facing the hydraulic pump.

To connect +12VDC to your valve, find the two black wires on the valve block assembly. Run the +12VDC white wire (on the power cable from the blue receiver panel of the 939 radio A2B system) to either black wire on the valve. Simply ground the other black wire to the crane. It does not matter which black wire you use for power or ground on your valve.

In normal operation the 939 Radio Anti-2-Block system will provide a constant +12VDC output to the solenoid valve allowing normal hydraulic flow. When the counterweight is lifted the +12VDC will drop to 0 volts closing your valve which will stop the hydraulic fluid flow and shut down that winch function. Refer to below diagram illustrating an installation.



1. When the function control (Figure 'A') is pulled it activates the flow of hydraulic fluid. Our anti-2-block system provides a constant +12VDC of power to the valve (Figure 'B') keeping the valve open and allowing the flow of hydraulic fluid.
2. When the counterweight is lifted the +12VDC of signal from the blue receiver panel via the white wire to the hydraulic valve drops to 0 zero volts. This immediately closes the valve and the flow of hydraulic fluid to the winch function stops. The following winch operations may be disabled:

Main Winch Up / Auxiliary Winch Up (if applicable)

Start up

Upon power up, the receiver panel runs through an initialization sequence in which all the lights on the panel illuminate and the alarm sounds for two seconds. After this, the A-2-B alarm, bypass, battery & system lights sequence on and off. During this initialization, the shut off output will be de-energized causing the winch to be disabled if the white shut off lead is attached to a shut off device. After this power up sequence, the A-2-B system will be functional, and the shut off output will energize allowing the winch to be operational.

Function test

1. Start the winch engine. The Model 939 A-2-B System will automatically power up and sequence. The power indicator light will illuminate green.
2. Push and hold the test button. The red alarm light is on and the audible alarm sounds.
3. Release the test button. The red light should be off and the audible alarm silent.
4. The system is equipped with a bypass button on the front of the panel, which when depressed and held, will bypass the optional shut off system if installed. Pressing & holding the bypass button will also cause the bypass light to illuminate.

Physical test

1. Remove the transportation clip and lift the A-2-B counterweight to simulate a two-block condition. The red alarm light should come on and audible alarm should sound.
2. Lowering the counterweight should cause the red alarm light and the audible alarm to quit.

Emergency shut-off by-pass plug

When shut offs are wired from the panel and the system malfunctions, remove this plug found attached to the panel mounting bracket.

Next remove power cable from the panel by twisting the coupling 1/2 turn counter-clockwise and pull away from the panel. Insert this by-pass plug into the end of the power cable and turn plug 1/2 turn clockwise.

This will over-ride the shut off power signal enabling the continued uninterrupted use of your winch. Please note that you will not have anti-2-block protection once the power cable is removed from the blue receiver panel. Call the service department of The Load & A-2-B Company for further assistance.

*** Please note ***

It is recommended that the A-2-B System be ‘physically’ tested as above at the beginning of each work period, by lifting the counterweight to momentarily cause an alarm condition. This ensures that the complete system is fully functional.

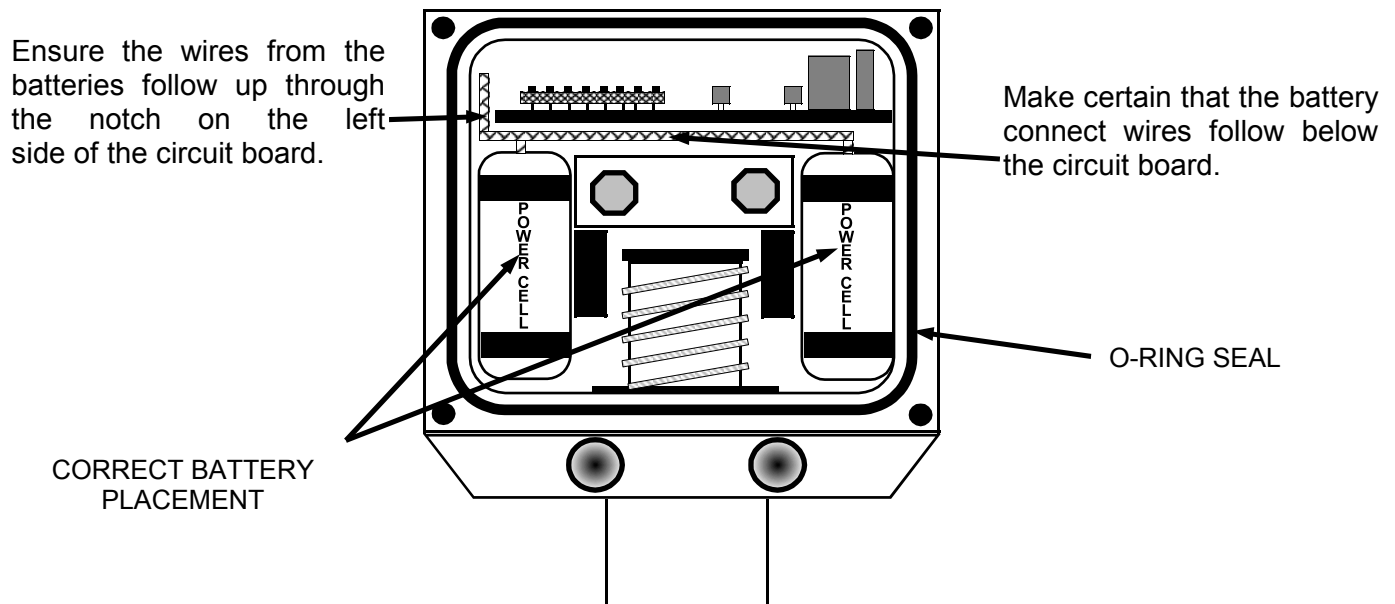
Troubleshooting

The 'BATTERY' Light

The battery light indicates low voltage power cells in the A-2-B switch. The system will continue to operate normally for approximately 3-4 days after this light illuminates. The lithium ion power cells should be replaced within this period. The power cells are available by contacting The Load & A-2-B Company at 1-888-562-3222.

Replacing the Batteries (see figure below) NOTE: Although these batteries may appear to be an ordinary 'batteries', they are not. They must be replaced with specific 7.2 volt (2 X 3.6 = total 7.2 volts) lithium ion power cells.

- a/ Remove the face plate of the A-2-B switch by unscrewing the 4 Allen cap screws. Discard the old O-RING seal.
- b/ Carefully unplug the power cells by gently separating the white plastic connector. Gently remove used power cells.
- c/ To reseal the switch align the new O-RING seal, then the aluminum cover (careful not to pinch any wires) and replace the allen cap screws tightening firmly. Follow instructions below.



The 'SYSTEM' Light

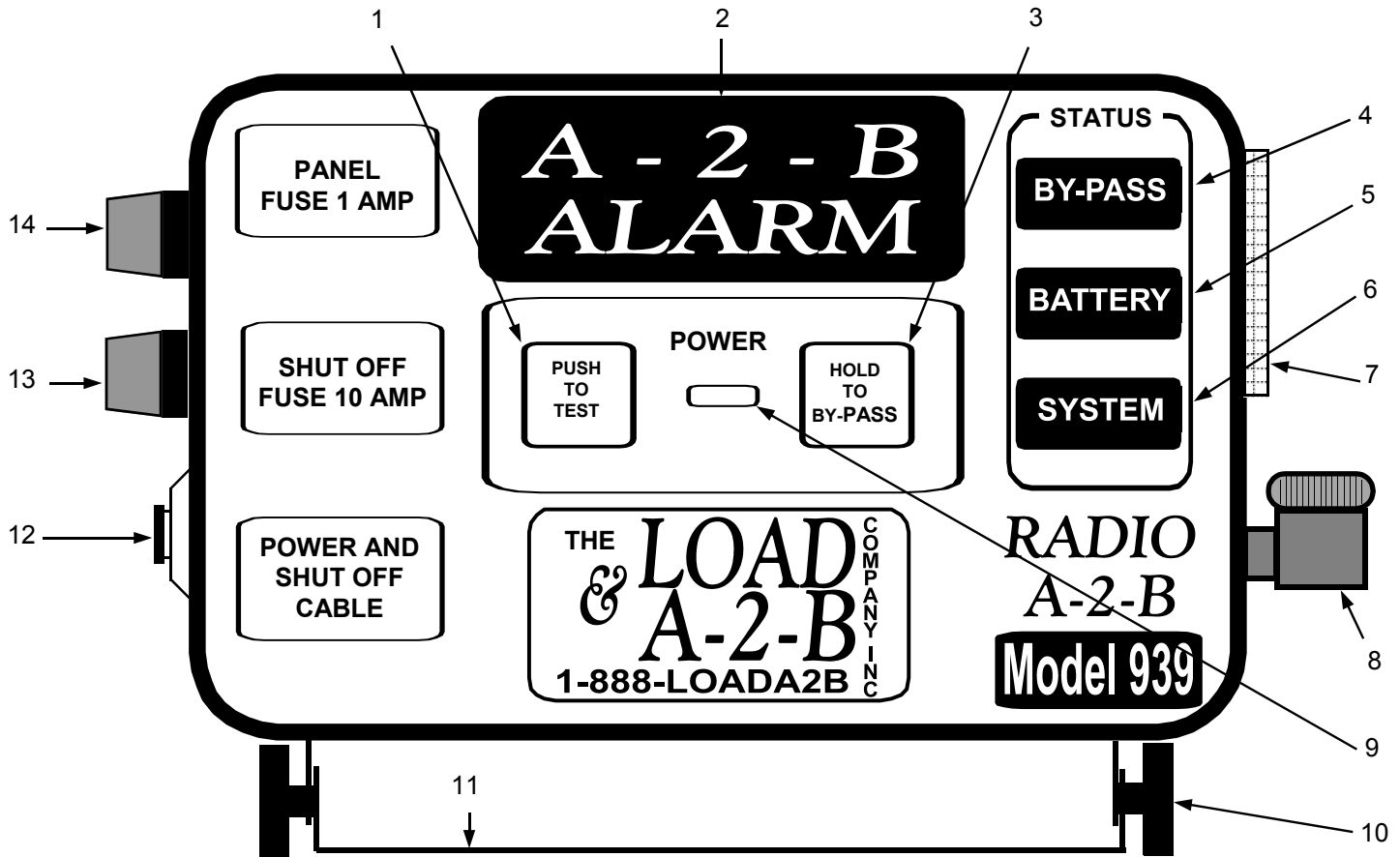
The 'system light' is a 'system fault' indicator.

When it illuminates and the alarm beeps intermittently, the system is indicating:

- a temporary blockage of the radio channel, check for line of sight of the two components
- a temporary blockage of the radio channel, excessive local RF interference
- the A-2-B switch is exceeding the transmission/reception range of 1,500 feet
- low voltage from the winch engine electrical supply (less than 9.6 volts approx.)
- a system malfunction in either the A-2-B switch or receiver panel

You may re-position the antenna and angle of antenna to trouble shoot. Again, ensure line of sight between A2B switch on tower and receiver panel antenna is not obstructed. If the system light stops, the problem could have been temporary radio interference or transmission problems. Please verify that the system works by lifting the counterweight to initiate a two block condition before proceeding with your operations. If the problem persists, please contact **The Load & A-2-B Company at 1-888-562-3222.**

939 long range radio anti-2-block receiver panel functions



1. Push to Test Button – When depressed allows the operator to verify the A-2-B alarm functions.
2. Red Alarm Warning Light – Visual warning that an impending two block condition has been detected.
3. Hold to Bypass Button – When depressed it turns off the alarm light and buzzer and allows the operator to bypass the hydraulic shut-offs to operate the winch.
4. Bypass Warning Light – Shows the operator that the bypass button has been pressed.
5. Battery Warning Light – Indicates battery status and comes on when a low battery is detected in the switch. If it is lit please refer to troubleshooting guide.
6. System Warning Light – Indicates status of system and is designed to alert the operator of a problem so that he does not rely on a faulty system. When flashing please refer to troubleshooting guide.
7. Alarm Buzzer – Continuous buzzing indicates that a pending 2-block condition has been detected. When it is beeping then it indicates a system failure. Please refer to the troubleshooting guide for more information.
8. Antenna Connector
9. Green Power Indicator Light – Green light indicates that power is applied to unit.
10. Fluted Knobs
11. Mounting Bracket
12. Power Connector
13. Fuse Holder – Shut-Off power – 10 amp
14. Fuse Holder – Panel power – 3 amp

Troubleshooting guide

Please do not attempt to open the A-2-B switch or the receiver panel. Read this section completely or contact The Load & A-2-B Company service department at 1-888-562-3222.

Problem description	Possible solution
1. Panel does not power up.	<ul style="list-style-type: none"> A. Review the wiring instructions in the installation section of the manual. B. Power cable may be disconnected. C. Verify that there is +12VDC to +24VDC going to the panel. D. Check 1A Fuse. E. Check power cable for damage. (cuts, nicks, etc.)
2. Panel powers up but does not run through the full start up sequence e.g. Lights burnt out, etc.	<ul style="list-style-type: none"> A. Verify that there is +12VDC to +24VDC going to the panel. B. Power the panel directly with +12VDC from the winch platforms battery bypassing any fuse panels and connections or on a separate 12 volt battery to assure that it is not a power problem. C. Call the service department at 1-888-562-3222.
3. Panel gets extremely hot to the touch when using a +24VDC supply.	<ul style="list-style-type: none"> A. If the panel is installed in a cab remove the black dust cover and try improving the air circulation around the panel. B. Change the power to the panel so that it runs on +12VDC. If you need assistance in doing this contact the service department at 1-888-562-3222.
4. Battery warning light is flashing.	<ul style="list-style-type: none"> A. Battery needs replacement. Please refer to the Battery Replacement section of this manual. (page 8)
5. System warning light is flashing.	<ul style="list-style-type: none"> A. Loss of communication with A-2-B. Refer to the No Communication page in this troubleshooting guide.
6. Red A-2-B alarm light is on and buzzer is on constantly.	<ul style="list-style-type: none"> A. The system has detected an A-2-B condition, check position of the counterweight. B. The counter-weight is not hanging free, check to see if the weight is still hung or is it is caught up on something.
7. Buzzer is beeping.	<ul style="list-style-type: none"> A. Loss of communication with A-2-B. Refer to the No Communication section at the end of this troubleshooting guide.
8. Shut-offs have been installed and now winch speed has been slowed down or shut down altogether.	<ul style="list-style-type: none"> A. Check voltage on shut off control wire (white wire) to ground – it should be +12 VDC. If not see step #9 below. B. Check the installation of the valves, most models are directional. If they are installed in reverse the valves will be closed during normal operation.
9. There is no +12 VDC on the shut-off control wire (white wire).	<ul style="list-style-type: none"> A. Check the 10 Amp Shut-off fuse. B. Verify that the white control wire hasn't been cut or disconnected. C. Check the power cable. Using a multi-meter set to ohms verify that each of the 3 wires connects to a pin on the connector. D. Verify that the system was not sold with the shut-off reversed for use with normally open valves.

No communication between A-2-B switch and blue receiver panel

If you have a suspected communication problem between the anti-2-block switch(es) and the receiver panel please use the following steps in troubleshooting. Please try the following steps in the order they appear.

Possible installation problem with receiver panel	
<p>A. Thoroughly review the Installation Procedures at the front of this manual. B. Verify that there is +12VDC to +24VDC going to the panel. C. Power the panel directly with +12VDC from the winch platforms battery bypassing any fuse panels and connections or on a separate 12 volt battery to assure that it is not a power problem. D. Ensure that all antennae connections are free of debris and tight.</p>	
Possible installation problem with A-2-B switch	
<p>A. Thoroughly review the Installation Procedures at the front of this manual. B. To test and verify the operation of the system: 1. Remove the switch from the gin pole and bring it about 100' from the metal whip antenna. 2. Pull the switch cable out and cycle the power on the panel verifying that the system powers up without a system failure. If this is successful then let the cable go into the switch verifying the alarm. Repeat. 3. If the system is working move toward farther away keeping line of sight with panel. Repeat. 4. Mount the switch on the gin pole and verify operation again. The switch may need to be spaced out from the gin pole. (see note 'C' below) 5. If the system fails at any point call the service department for more help. C. If any part of the antenna on the A-2-B switch is touching the gin pole or very close to any metal bracing or fittings on the tower there may be interference with the signal to the panel. Spacing out the A-2-B switch 1" further from the pole may improve the signal strength. ATTENTION: If you purchased multiple systems, please check for matching serial numbers on the panel and switch to ensure that you are installing/servicing a matched set of components.</p>	
Possible antenna problem	
<p>A. Check the antenna connectors for signs of corrosion, dirt and moisture. Clean if necessary. B. The antenna should not be touching any glass or metal. C. Make sure the antenna is not damaged. D. Make sure the cable lead is not kinked or damaged. E. There should be a good line of sight to the switch at all times. Never cut or otherwise modify the antenna without contacting the service department at 1-888-562-3222.</p>	
High interference area operation	
<p>This system was not designed to work on or close to towers with active operating antennae of any kind. High power interference will block the transmission of the signal from the switch to the blue panel.</p>	
Possible dead battery	
<p>A. Please call our service department at 1-888-562-3222 before attempting to test or replace a battery. B. The battery pack can be tested with a multi-meter and should read between 6.6V and 7.3V. The batteries have internal fuses so care must be taken not to short them out while testing.</p>	
Damage to A-2-B switch	
<p>A. If the A-2-B switch has been damaged please call our service department immediately. B. If the cable is broken call our service department immediately. C. If the seal has been damaged it will allow moisture to effect the electronics. Please call the service department at 1-888-562-3222 immediately.</p>	

Technical component specifications

Receiver panel

reception range	minimum of 1500 feet
power supply	12 or 24 VDC standard
shut-off output	12 or 24 VDC standard
weight	3½ pounds
length	9 inches
height	6 inches
width	2 ½ inches
antenna	metal whip
oper. temp in °F	-40 to +122 (-40 to 50 °C)

Switch

transmit range	minimum of 1500 feet
response time	0.1 second
weight	3 pounds
length	5½ inches
width	4 inches by 2 inches
antenna	10 inch (rubber flexible)
weld plate	2 x 4 x 1 inches
oper. temp in °F	-40 to +122 (-40 to 50 °C)
battery	lithium ion

Display information consists of an A-2-B Alarm, both audible horn & red light, system status, battery status, by-pass status

FCC Compliance

FCC ID: NFB LAB 939

This 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.

Unauthorized changes or modifications to the Model 939 Radio Anti-2-Block System are expressly prohibited by the Load & A-2-B Company. Unauthorized changes or modifications could void the operator's authority to operate the equipment.

If you require any modifications, please contact The Load & A-2-B Company toll free at 1-888-562-3222.

Warranty

The Load & A-2-B Company Inc. warrants to the purchaser of each new Anti-Two-Block System that any part thereof which proves to be defective in material or workmanship within one (1) year from date of delivery will be repaired or replaced at no charge, if the system is returned to us in Edmonton, Alberta with all freight charges prepaid.

If a performance problem should occur, contact our office in Edmonton, Alberta toll free at 1-888-562-3222. This warranty does not cover defects resulting from accident, alteration, improper use, or failure of the purchaser to follow normal operating procedures as outlined in the instruction manual.

THIS WARRANTY IS IN LIEU OF ANY WARRANTY OF MERCHANTABILITY AND OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ALL OF WHICH ARE HEREBY EXCLUDED.

The Load & A-2-B Company Inc. shall in no event be liable for any special, indirect, or consequential damages whatsoever and neither assumes nor authorizes any person to assume for it any other obligation or liability.