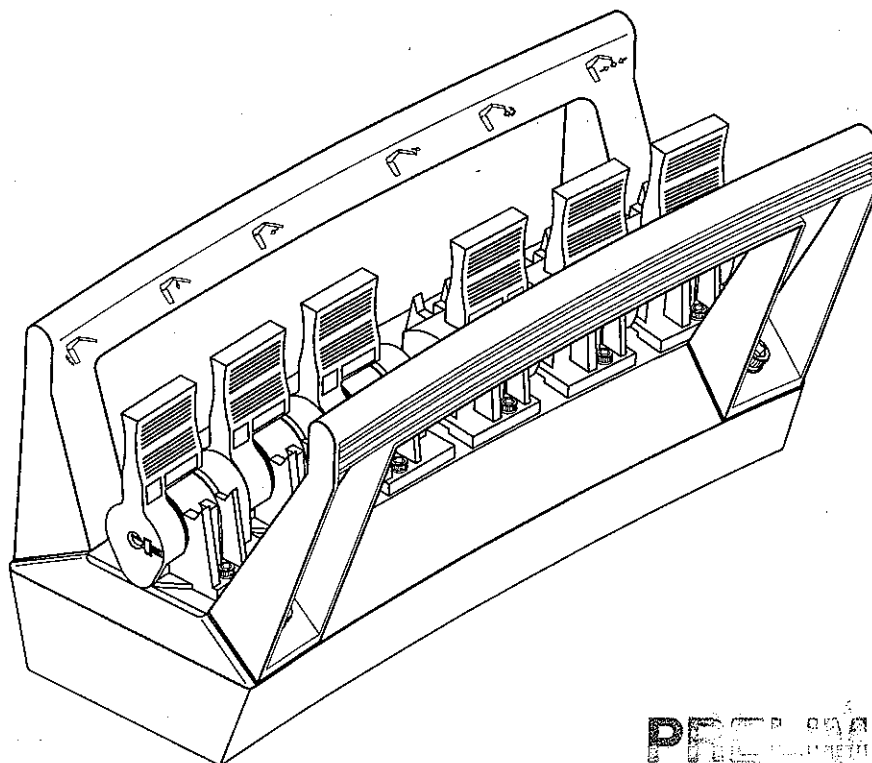


RADIO REMOTE CONTROL MANUAL



**PRELIMINARY
ONLY**

POLAR REMOTE CONTROLS
DIVISION OF ATLAS POLAR COMPANY LTD.
60 NORTHLINE RD.
TORONTO ONTARIO M4B 3E5

PART NUMBER 600-369-07
REV. #0
MARCH 2008



WARRANTY REGISTRATION

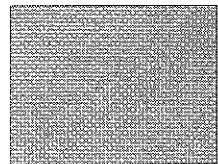
Polar Radio Remote Control (Division of Atlas Polar Company Limited)
60 Northline Road, Toronto, Ontario M4B 3E5

1. **ATLAS POLAR COMPANY LIMITED** warrants the remote controls to be free from defects in materials or workmanship for a period of one (1) year from the date of delivery to the purchaser.

NOTE: Control cables are specifically excluded from this or any other warranty.

2. During the Warranty period, Atlas Polar will repair or replace the defective goods at its sole discretion.
3. Labour charges at authorized rates to correct such defects will be covered under warranty when incurred at Atlas Polar's premises or an authorized Atlas Polar distributor.
4. This warranty does not cover the repair of damage or failure brought about by abuse, neglect, wear and tear, improper installation, drilling holes in the system or where evidence exists that the equipment has been repaired, tampered with or altered by unauthorized personnel. Such judgements shall be made at Atlas Polar's sole discretion.
5. Electronic modules which are part of the equipment shall have an extended period of coverage. Electronic modules, subject to the exceptions stated above, shall be repaired or replaced for a period of two years from the date of delivery to the purchaser. This extended warranty shall not cover any labour charges during the second year of coverage.
6. Atlas Polar Company Limited shall in no event be liable for consequential damages or contingent liability assumed through the failure of the product to operate properly.

| | |
|--|--|
| Date Installed (mm/dd/yr) _____ | |
| Polar Remote Type: <input type="checkbox"/> 100 <input type="checkbox"/> 450 <input type="checkbox"/> 2100 <input type="checkbox"/> 2100MV <input type="checkbox"/> 2206 <input type="checkbox"/> 4100 <input type="checkbox"/> 5200 | |
| <input type="checkbox"/> _____ Serial # _____ | |
| Cable Controller Serial # _____ | Radio Remote (Transmitter & Receiver) Serial # _____ |
| Customer Information Name _____ Address _____ City _____ Prov _____ Telephone _____ | Dealer Information Name _____ Address _____ City _____ Prov _____ Telephone _____ |
| NOTE: 1. This warranty is not valid outside the province of Ontario unless it is stamped and signed by the authorized dealer. 2. In Ontario, this warranty must be approved and signed by an authorized representative of Atlas Polar Company Limited. 3. To validate the warranty, this form must be filled out completely and returned to Polar Remote Control within seven days of installation. | |



**ATLAS POLAR COMPANY LIMITED
60 NORTHLINE ROAD
TORONTO, ONTARIO
M4B 3E5**

Please note:

This manual will only discuss the operation of the Radio Remote Control System, not the overall system. To understand the complete unit package, installation, operation and maintenance, ALL equipment manuals should be read thoroughly.

The Polar 2100B/4100/5200 works in conjunction with the Radio Remote, therefore the Polar 2100B/4100/5200 operator's manual should be read in its entirety.

POLAR RADIO REMOTE SYSTEM

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.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

POLICY

Our policy is one of continuous improvement and we reserve the right to alter any detail of our products at any time without notice.

**ATLAS POLAR COMPANY
POLAR REMOTE CONTROL DIVISION**

ATLAS POLAR COMPANY LIMITED

POLAR 9900R

TECHNICAL DATA

SYSTEM

| | |
|-----------------------|--|
| Frequency: | 902-924 MHz Frequency Hopping Spread Spectrum |
| Operating Temperature | -25°C to +50°C |
| Transmission Range | 122 m or 400 feet |
| Data Transmission | 11 bytes including Identity and CRC error values |
| Addressing | Programmable. 65,500 unique addresses |
| Approved by | Pending |
| Operating Licensing | Not required |

RECEIVER

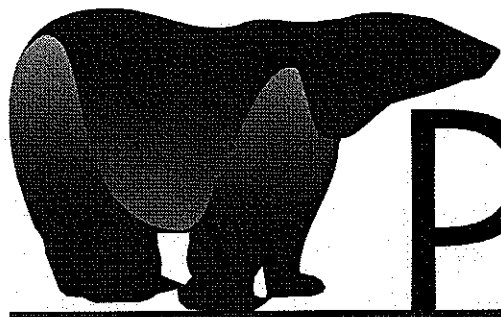
9900 RX

| | |
|-----------------|--|
| Operating power | 12V DC (Obtained directly from Polar Remote unit) |
| System | Narrow band tuner for FM frequency hopping spread spectrum |

TRANSMITTER

9900 TX

| | |
|----------------|--|
| Power supply | 8.4V high performance NiMH rechargeable battery with internal smart charging using AC adapter, or cigarette lighter |
| Operating Time | 8 – 10 hours of continuous operating time |
| Functions | Standard Polar Remote lever version controlling 6 proportional functions Extra on/off functions available with either latching or momentary operation |
| Housing | Weather resistant and durable casing equipped with guard and belt |
| Dimensions | 5 1/2" x 12" x 5" (H x L x D) |



Polar
Remote Controls

SECTION TWO

OPERATION

TRANSMITTER

The radio controller transmitter is the part of the Radio Remote Control system, used by the operator to inform the receiver to manipulate the actuator box and control the crane.

The controls available to the operator include a red mushroom head switch and six control levers, one for each crane function.

The mushroom head switch (E-stop) places the entire system in **STAND BY** or **OPERATE MODE**, works as ON/OFF switch too.

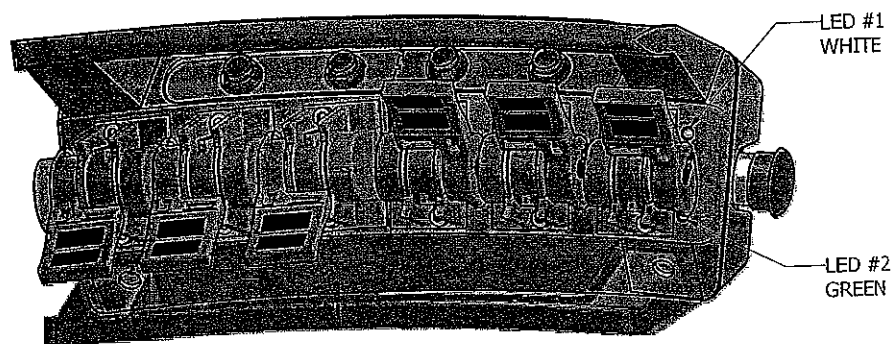
The control levers are spring loaded and always return to the centre position when released by the operator. The control levers are directly attached to potentiometers. As a control lever is moved, a signal from the potentiometer changes. This change is sensed by the electronic module at the main unit that in turn drives the corresponding actuator to a new position. The greater the movement of control lever the further the actuator travels, and the faster the crane moves.

The system is designed to allow all six functions to be electronically controlled so that they may operate simultaneously. However, the hydraulic flow from the pump will not produce enough oil for all six functions at one time.

Auto Shutdown

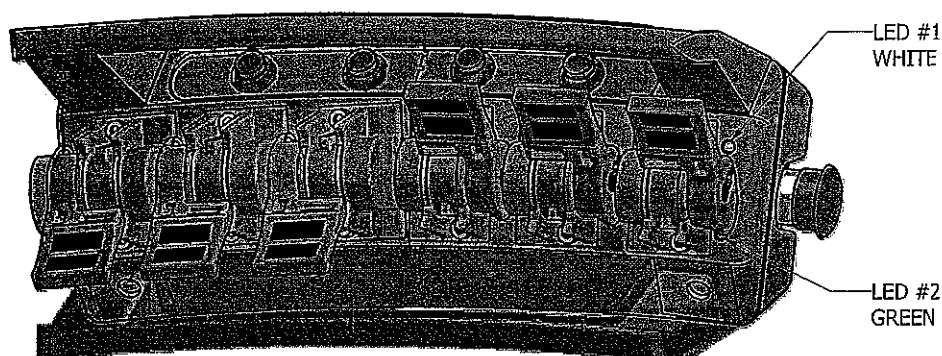
If there is no movement of the control lever or multifunction switches for 6 minutes, the LED #1 will be solid red. This alarm state & state timer will reset each time control lever is moved or multi function switch is activated (red LED #1 will go off). If the alarm state is allowed to go for another 6 minutes (total of 12 minutes), the unit will stop transmitting the LED #1 will go out but LED #2 will stay green. The transmitter will stay active for 12 minutes and will go in shutdown mode. To operate again, the radio control system mushroom switch on the transmitter has to be reset.

NOTE: WHEN OPERATING TWO FUNCTIONS SIMULTANEOUSLY, THE HYDRAULIC OIL WILL FLOW TO THE LEAST RESISTANT PATH AND MAY CAUSE ONE FUNCTION TO OPERATE MORE QUICKLY.



TRANSMITTER POWER/BATTERY INDICATOR

| FUNCTION | STATUS LED 1 | STATUS LED 2 |
|---|---|--------------------------|
| Charger plugged in to transmitter and charger voltage okay. | Green solid ON | OFF |
| Charger plugged into transmitter and no battery installed in the transmitter. | Green solid ON stays green | OFF |
| Charger plugged into transmitter (battery installed) | Red flashing 1/2 second ON 10 second OFF (when red OFF , green ON) | OFF |
| Charger plugged into transmitter. After 10 minutes of verifying condition of battery full charge begins | Red flashing 1/2 second ON 1/2 second OFF | OFF |
| Battery fully charged (as long as charger plugged in) | Red solid ON | OFF |
| Transmitter switch ON with mushroom head switch out. Transmitter battery charge is good. | Flashes red twice. | Solid Green ON |
| Transmitter switch ON and no levers or push buttons operated for 6 minutes. The transmitter will go into alarm mode. | Red solid ON | Solid Green ON |
| If the alarm modes is allowed to go on for 6 minutes (transmitter will go out of alarm mode whenever any control lever, or pushbutton is activated), the transmitter will stop transmitting. | OFF | Solid Green ON |
| Transmitter switched ON with mushroom head switch OUT . Transmitter battery low power. | Flashes red 3 times and oscillates every 10 seconds. | Solid Green |
| Transmitter switched ON and any levers or switch /not in neutral position at start up. (Function out of neutral position will default to no output, until it centers. All other functions will operate) | Red solid ON | Solid Green ON |
| Above function not in neutral position at start up when returned back to neutral position. | Red flashes twice and goes OFF | Solid Green ON |



TRANSMITTER POWER SUPPLY

Transmitter module is powered by a 8.4 volt NiMH rechargeable battery pack.

NiMH is a relatively new battery technology, having higher charge capacities and longer run times than older NiCd batteries, and do not suffer from the dreaded "memory effect".

NiMH has a much more continuous voltage response than NiCd. Only towards the very end of its charge does it begin to fall off. When you see this happening, recharge your batteries immediately for best performance.

NiMH batteries reach their absolute maximum charge capacity within 2-5 hour full charge/discharge cycles. It is not required to "condition" them by charging/discharging several times. Simply use the cells normally, knowing they will attain full capacity after several charge cycles.

Whenever the transmitter is not in use the E Stop should be in OFF position to ensure safety and optimum timer per charge.

Pay attention to the battery indicator, and remember:

Low battery has no affect on radio remote range.

Low power levels may result in loss of radio contact which will cause the Polar 2100B/4100/5200 actuator to shutdown.

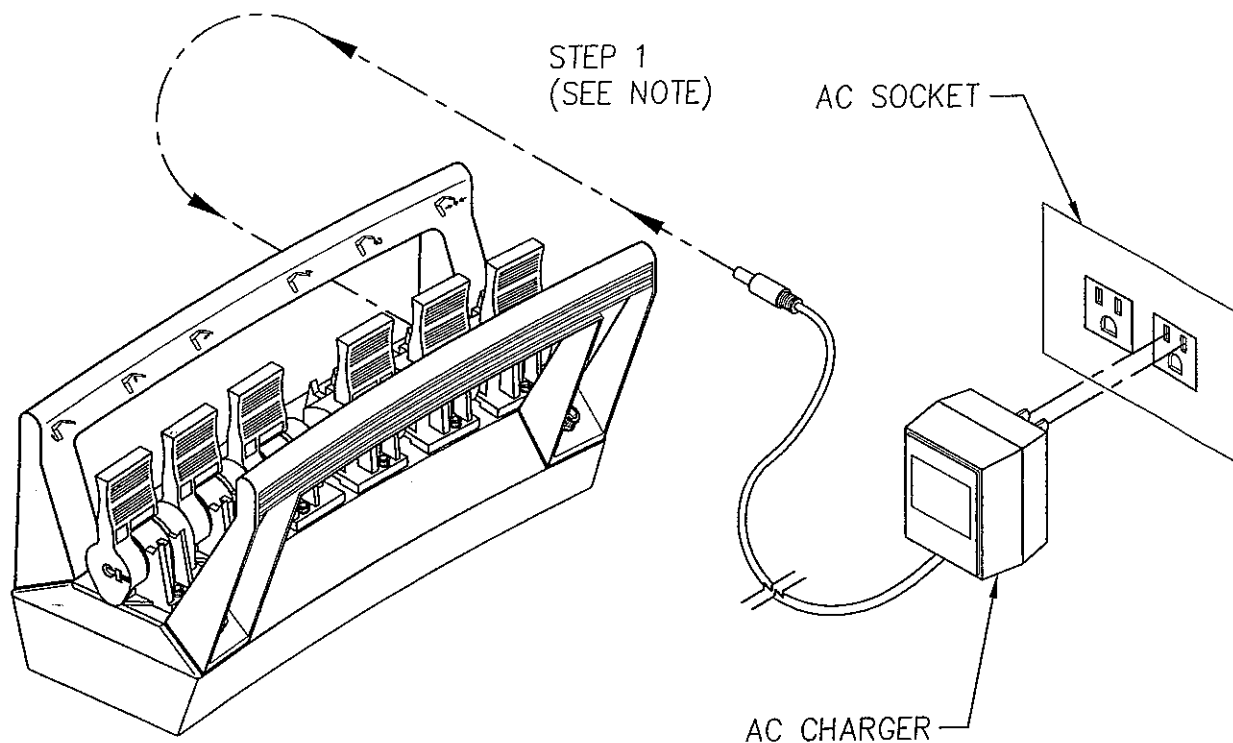
TRANSMITTER BATTERY CHARGING INSTRUCTIONS

The battery can be charged with a spare battery charger, a Polar cigarette lighter adapter, or the Polar 115V AC adapter.

To charge the E-Stop switch should be in OFF position. Full charge cycle does not begin until after 10 minutes of being in charge mode. It is recommended to leave the charger plugged for at least 3-4 hours with E-Stop in the OFF position.

The battery charging system is integrated in the transmitter and uses a quick charge system. The charging system uses intelligent voltage sensing to prevent over charging of the battery. Leaving the charger plugged in after the charging is complete or disconnecting the charger before the charge is complete will not damage the battery, but as batteries have a finite number of charge/discharge cycles it may result in replacement of battery more often.

A fully charged battery should provide approximately 10 hours of operation.



NOTE:

— TO AVOID ANY SHORTS
PLUG IT STRAIGHT.

PR1052-001-1R0

TRANSMITTER BATTERY CHARGING

EMERGENCY SWITCH

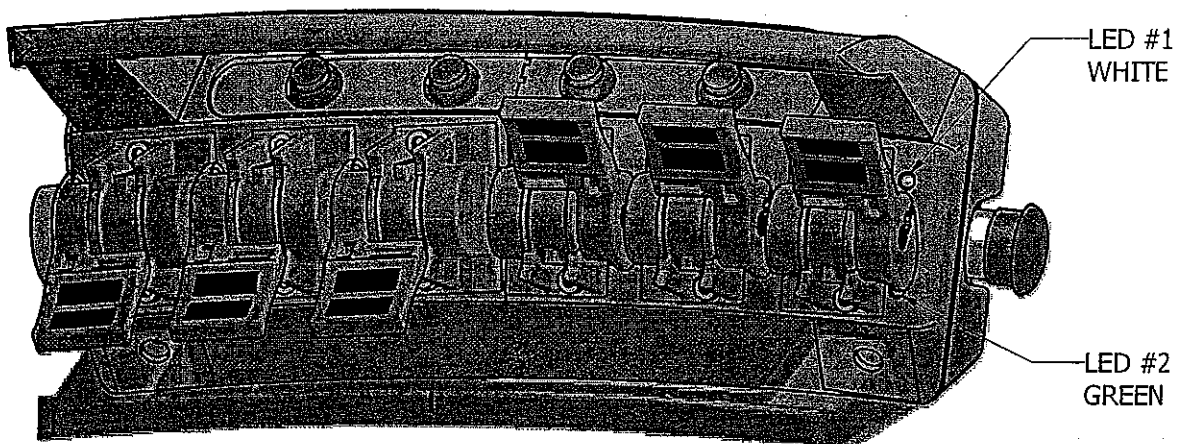
The emergency switch on your radio remote system, is incorporated into the complete Polar 2100B/4100/5200 system in the form of a locking red mushroom head switch.

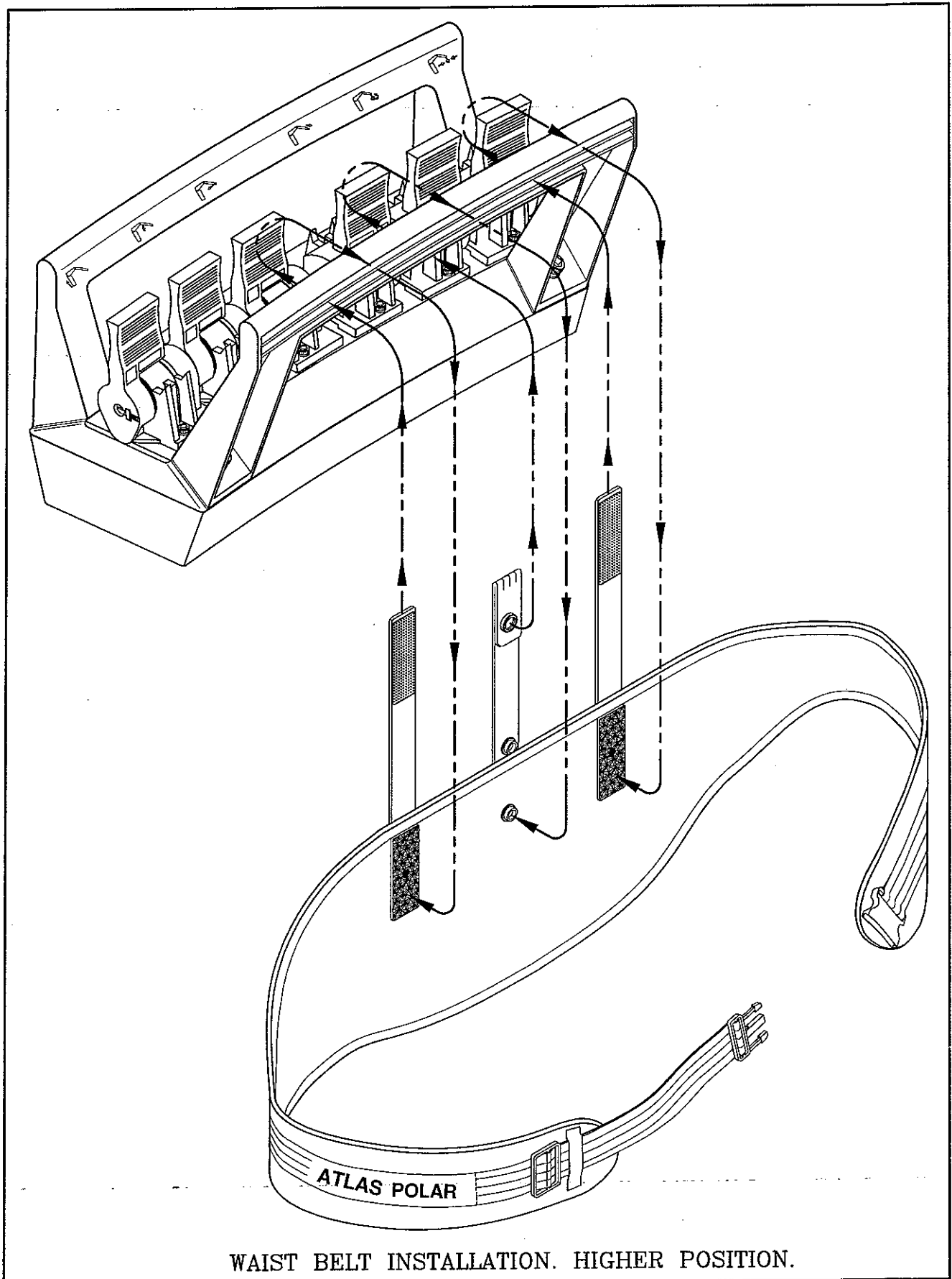
When this switch is pressed in and locked, two safety features are activated:

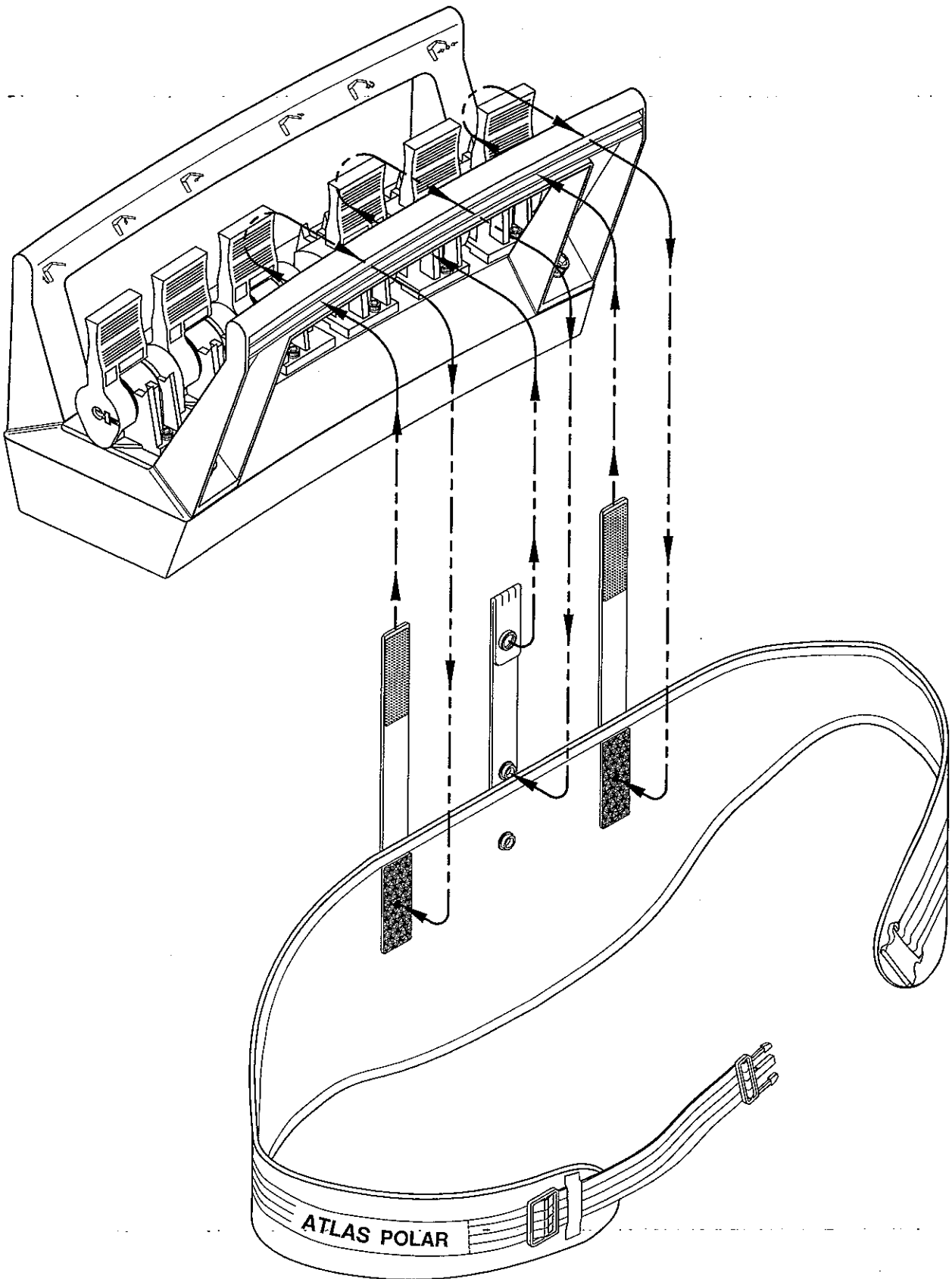
- (1) The hydraulic oil is diverted from the crane and dumped back to the tank, to prevent accidental hydraulic movement.
- (2) The Polar 2100B/4100/5200 is placed in a standby mode.

To regain radio control, release the emergency button by turning clockwise the mushroom head switch so that it pops into the OUT position.

The emergency switch is a vital part of the Polar 2100B/4100/5200 system. It should always be depressed when the crane is stopped and during momentary and / or lengthy breaks in crane operation.







WAIST BELT INSTALLATION. LOWER POSITION.

RECEIVER

The receiver processes all data that is transmitted by the transmitter.

Before data is accepted, the receiver will first confirm that the correct communicator link has been received. After this has been verified, it will begin to process the data input and relay the information to the Polar 2100B/4100/5200 actuator.

During the transfer of information, the receiver continuously checks the data for the correct communication link.

The receiver obtains its power and sends its control signals to the Polar actuator through the standard 10 pin connector and cable.

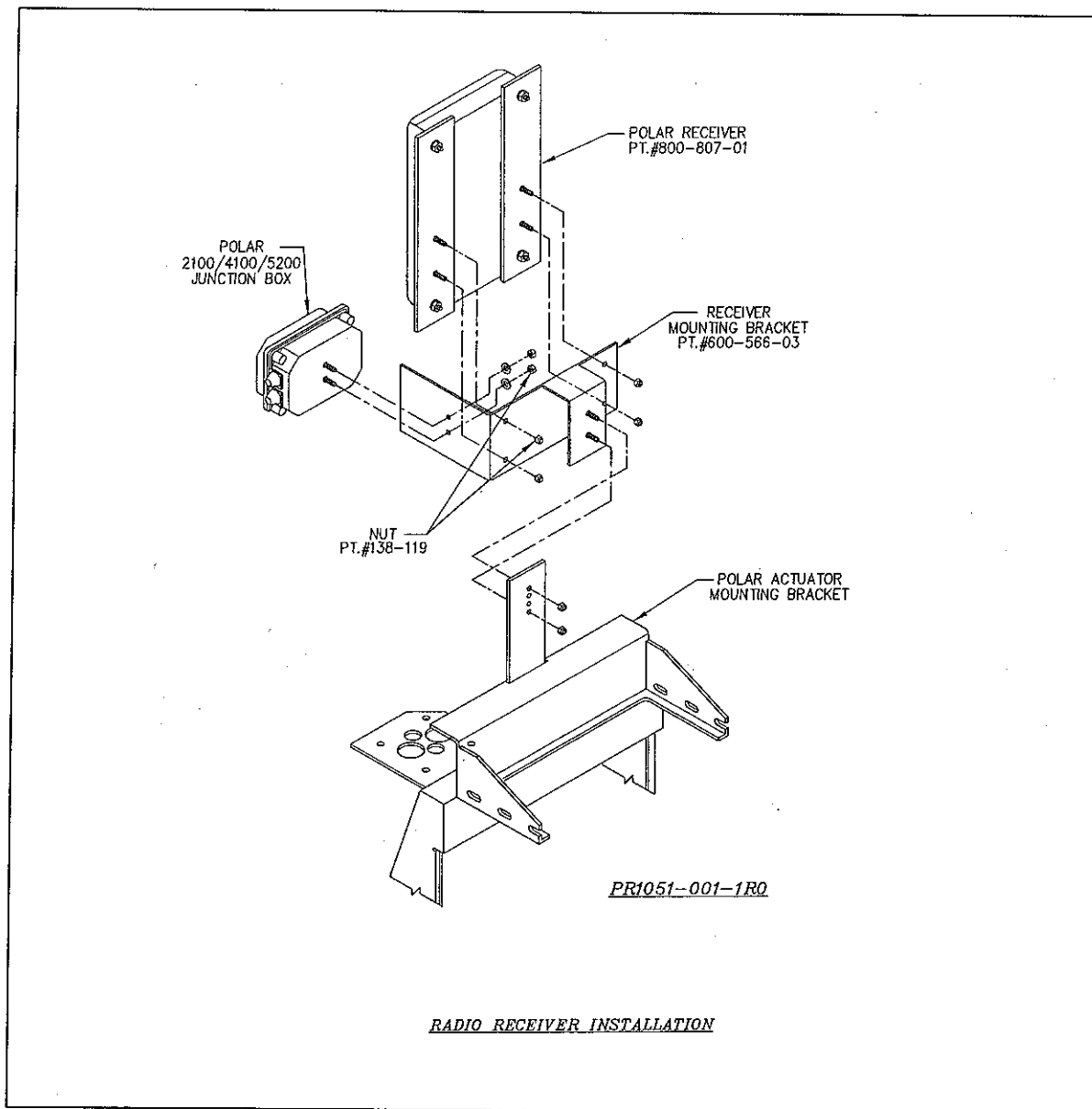
To operate the remote control, simply plug the receiver into the actuator connector point. With the transmitter and main power ON, the receiver will power up and begin communicating with the Polar actuator.

The receiver must be powered up before the transmitter. Upon powering up the transmitter, there is about a **1 second delay** while the transmitter and receiver synchronize communication before the system is active. When the communication task is completed, the transmitter should be powered down with the e-stop to preserve battery power. If the communication has been stopped due to pressing of an E-stop, powering down, or loss of range, the communication may be resumed by cycling the power switch.

Once the communication link between transmitter and receiver is established another tuned transmitter cannot interfere unless the first link is disconnected assuring no unwanted interference.

RECEIVER INSTALLATION

The receiver circuit board is installed inside a weatherproof enclosure and must be mounted behind the polar actuator as shown in the drawing. The control cable connector can be left plugged into the unit and locked in place permanently. The sealing ring of the connector will provide protection against water damage and corrosion.



DO NOT POWER WASH

| WIRE COLOUR | CONNECTOR PIN NUMBER |
|----------------|-------------------------|
| Brown | 1 |
| Red | 2 |
| Orange | 3 |
| Yellow | 4 |
| Blue/Black | 5 |
| Blue | 6 |
| Yellow/Black | 7 |
| Red/Black | 8 |
| Black | 9 |
| Orange/Black | 10 |

Figure 3: Shows the Control Cable Connector Wiring.

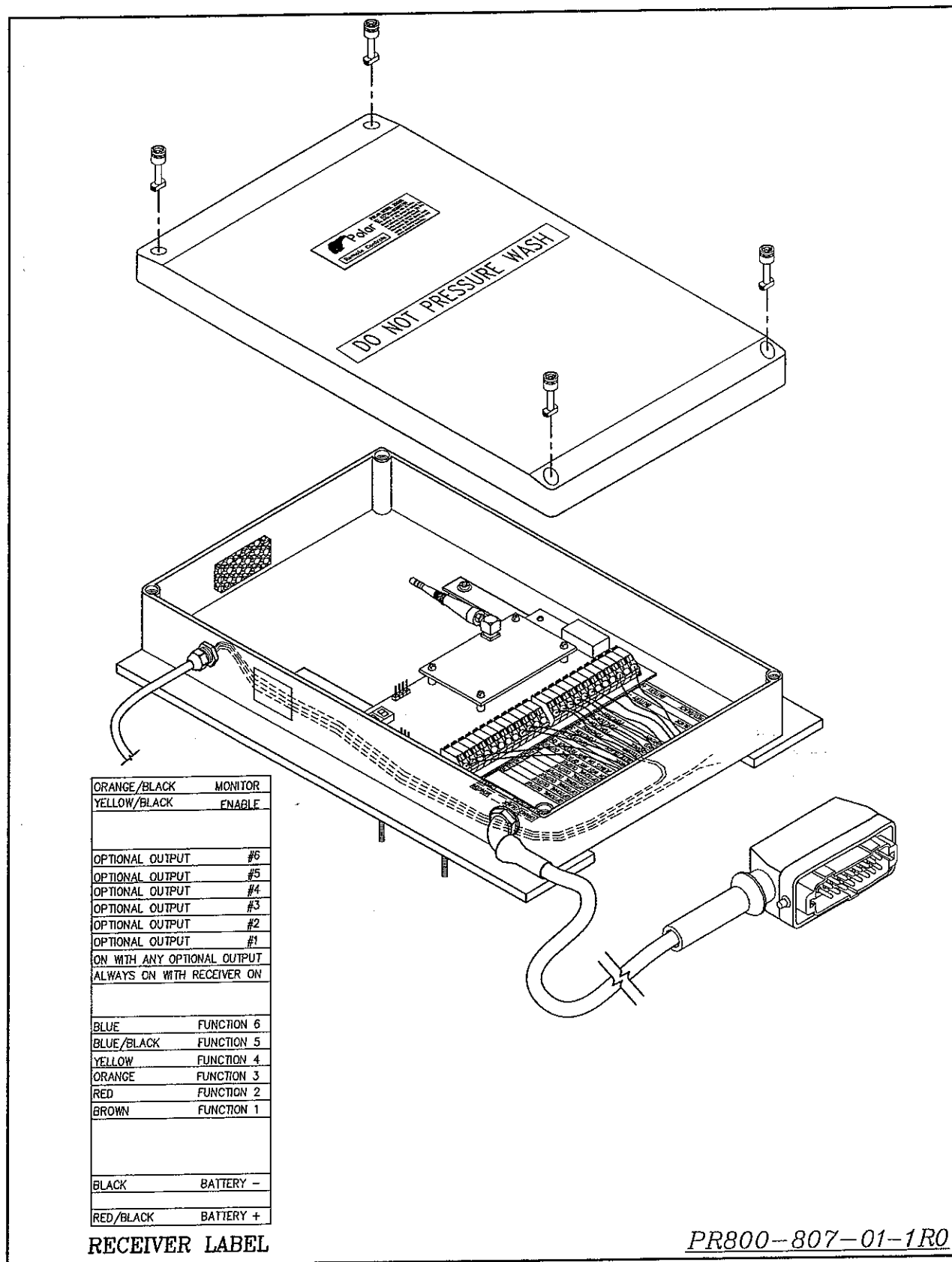


Figure 4: Shows the Radio Receiver connector strip with control cable wires Identified by colour code.

SAFETY

AT ANY SIGN OF RADIO REMOTE CONTROL SYSTEM FAILURE YOU SHOULD:

- (1) PRESS THE EMERGENCY SWITCH.**
- (2) DISENGAGE THE P.T.O.**
- (3) TURN THE MAIN POWER CAB SWITCH OFF**

You may want to investigate further by substituting the cable controller, with the P.T.O. off, to see if the problem still occurs.

DO NOT engage the P.T.O. until you are confident the unit is working properly.

If a problem continues, do not operate the equipment. Take your equipment to a Polar Remote Control authorized service outlet.

If problem does not continue with cable remote operate crane with cable remote and ship radio remote (transmitter and receiver) to authorized service outlet.

PRE-OPERATIONAL CHECKS

Before operating the equipment always check your remote control system thoroughly as part of your pre-operation inspection routine before engaging the P.T.O. and operating the crane. (Refer to Polar 2100B/4100/5200 operator manual for instructions on pre-operational check).

NEVER use the equipment if there is any sign of jerky, unsafe or intermittent operation.

OPERATIONAL

Using the Polar Radio Remote Control system allows the operator a greater range of movement around the crane. With this added manoeuvrability, it is possible that the operator will not be in view of others who enter the job site.

It is very important to place safety pylons and signs around the working area to indicate that the crane is in operation and may start to move at any time.

To prevent erratic operation when using the Radio Remote Control, please note the following:

DO NOT...

1. ...operate the unit with low battery power.
2. ...operate during heavy rain or snowstorms.
3. ...operate in temperatures lower than -25°C.

IN ALL THE ABOVE SITUATIONS, THE CABLE HAND-HELD CONTROLLER SHOULD BE USED.

A NOTE REGARDING THE OPERATION OF THE RECEIVER:

A special safety feature has been built into the receiver. If radio contact between the transmitter and the receiver happens to be lost, the receiver is designed to enter into a 'FAIL-SAFE' condition.

In the fail-safe condition, the receiver will cause the Polar 2100B/4100/5200 actuator to quickly decelerate and then stop any crane movement. The Polar actuator is then disabled and the oil is diverted away from the crane, back to the tank.

To regain crane control, the operator must first restore the Radio contact (it may be possible to restore radio contact if the operator simply walks a few steps to a different position) and then reset the Emergency Stop switch once.

The receiver will recognize the Emergency Stop reset operation as a signal to restore the Polar 2100B/4100/5200 to an operational condition.

WARNING:
TO PREVENT PERSONAL INJURY, OR POSSIBLE FATALITIES
NEVER OPERATE YOUR CRANE AND POLAR REMOTE CONTROL
SYSTEM NEAR HIGH VOLTAGE LINES.

CARE AND MAINTENANCE

TRANSMITTER:

The Polar Remote transmitter is a ruggedly designed instrument and will withstand normal field use. However, as with any electronic device, care should be taken not to subject the transmitter to excessive abuse.

The transmitter housing is made of a durable material and will serve through many years of usage. The toggle switches are of industrial grade and are environmentally sealed.

The battery pack will provide several years of reliable service under normal conditions. Service life may be reduced by extreme temperatures or excessive overcharging. Use the Quick Charger supplied to recharge the battery pack. The battery pack will need replacement when it no longer holds a charge.

To remove dirt, grease, oil etc. from the housing, wipe with a cloth soaked with soap and water. for more difficult stains, a light alcohol-based cleaner should be used.

RECEIVER:

The receiver should be protected from moisture such as rain, snow, mud or spray.

Dirt and grease can be removed from the chassis using soap and a damp cloth. Mild petroleum solvents can be used if they are washed away using soap and a damp cloth.

There are no user serviceable parts inside the receiver chassis. Note that damage to the receiver's electrical may result due to static electricity if the electronic circuit board inside the receiver chassis is handled improperly.

For service, contact a Polar Remote Control authorized service facility.

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