



*P/N: 142122-c
3/20/03
Rev. C*

REMTRON, INC. 1916 W. Mission Rd., Escondido, CA 92029-1114
PHONE 760-737-7800 FAX 760-737-7810

REMTRON®

REMOTE CONTROL AND TELEMETRY SYSTEMS

PUMP BOSS

RADIO CONTROL SYSTEMS



Radio Remote Control System

User's Manual

IMPORTANT

Read safety Rules & Instructions before using.

REMTRON, INC. 1916 W. Mission Rd., Escondido, CA 92029-1114
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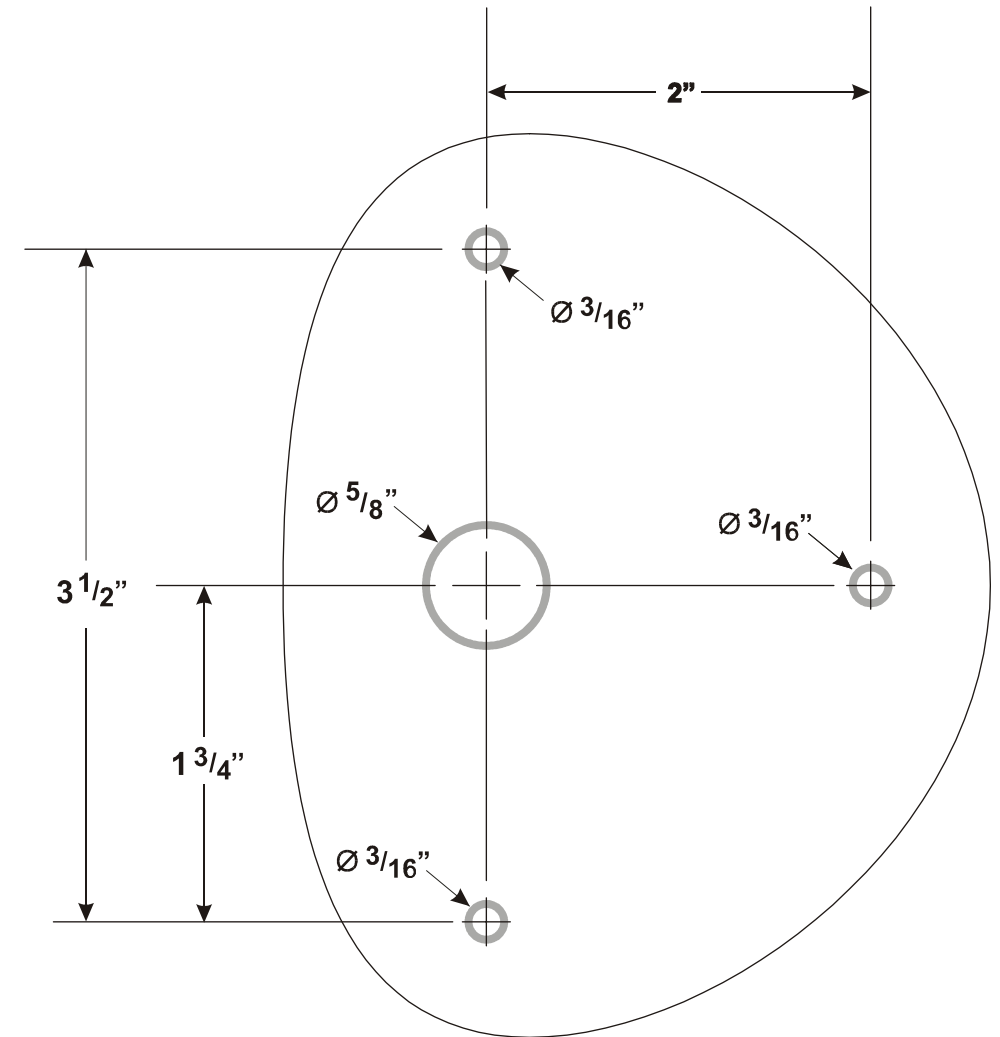
REMTRON, INC.

PUMP BOSS[®] RECEIVERS

The *PUMP BOSS*[®] Series receivers have 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 instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that harmful 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 this equipment on and off, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna connected to the device that is receiving the interference.
- Increase the separation between our equipment and the equipment that is receiving the interference.
- Consult our factory or one of our Service Representatives for additional help.

Responsible Party:
Remtron, Inc.
1916 W. Mission Rd.
Escondido, CA 92029
Ph: 800 328-5570
760 737-7800



ANTENNA MOUNTING TEMPLATE

How to Get Service

Products returned for repair (warranty or non-warranty) must be assigned an RMA (Return Material Authorization number by a Remtron Technical Support Representative. To allow us to more effectively address the repair issues, the customer is to provide a detailed description of the specific problem. Call 800-328-5570 for service or RMA assignment. To receive warranty service deliver or send the product(s) along with the assigned RMA number to our factory.

All repairs are performed at the Remtron factory in Escondido, California. This ensures that all parts of the remote system are maintained to factory standards. Repairs are billed at a flat rate irrespective of time, however, external damage caused by misuse, accident, neglect or damage to the case or other assembly components could incur additional costs.

Please include your name, address and a telephone number in case our repair technicians need more information. Enclosing a detailed description of the problem will allow us to give you better service.



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ESCONDIDO, CA 92029-1114
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Warranty Statement
for
Pump Boss®
Concrete Pumping Products

Period of Warranty: Remtron warrants the Pump Boss against malfunction or breakage for a period of one year from the date of purchase or one year from the date of the original invoice if the warranty registration card is not received.

Warranty Coverage: Pump Boss transmitters, receivers and accessories, in normal and customary use, are conditionally warranted against malfunction or breakage. The warranty does not cover: (a) defects or damage resulting from use of the product in other than its normal and customary manner; (b) defects or damage from misuse, accident or neglect; (c) defects from improper testing, operation, maintenance, installation, alteration, modification or adjustment; (d) damage from unauthorized repair or alterations; and (f) damage from water or corrosive materials beyond the specification of the case or enclosure

Warranty Service: Products returned for repair (warranty or non-warranty), must be assigned an RMA (Return Material Authorization) number by a Remtron Customer Service representative. To allow us to more effectively address the repair issues, please provide a detailed description of the specific problem. Call 800-328-5570 for service or RMA assignment. To receive service, deliver or send the product(s) along with the assigned RMA number to our factory at 1916 W. Mission Rd., Escondido, CA 92029.

General Terms of Warranty: Remtron will repair or replace the defective unit, solely at our option in the event of defect or failure to perform as specified, provided the product is returned in accordance with the terms of this warranty. Replacement parts are covered for the balance of the original warranty.

All costs of shipping to Remtron shall be borne by the purchaser. The warranty covers the cost of return one-way shipping and handling of the product. The return shipment will be via the same method as the product was shipped.

This warranty does not cover the costs of outside repair service except as authorized by Remtron. If it is determined that a third party is necessary for the service or repair of the Remtron product, prior approval by Remtron is required.

This warranty sets forth the full extent of Remtron's responsibility regarding the product(s). Repair, replacement or refund of the purchase price, at Remtron's option are the exclusive remedies. This warranty is given in lieu of all other express warranties. All other warranties, expressed or implied, including without limitation implied warranties of merchantability or fitness for a particular purpose, are specifically excluded. In no event shall Remtron be liable for damages in excess of the purchase price of the product(s), for any loss of use, loss of time, inconvenience, commercial loss, lost profits or savings or other incidental, special or consequential damages arising out of the installation, use or inability to use the product(s), to the full extent that such may be disclaimed by law.

8. Reassemble the transmitter in reverse order. Make sure the battery wires do not get pinched between the case halves.

Replacement Parts

Replacement parts are available from the distributor where you purchased the system or directly from the Remtron factory. When ordering a spare or replacement transmitter, provide the Serial Number of the receiver or the Model and ID Code of the receiver or transmitter. The Serial Number has the form: S/N 9923-3. The ID Code has the form: ID Code: 230C8D.

Pump Boss® Spare Parts List

Description	Part No.
Leather holster	620006-03
Shoulder strap for transmitter	600008-02
Weather resistant, clear plastic carry bag for transmitter (shoulder strap not included)	620011
900 MHz 12" coil whip antenna (no coax, no mount)	485022
900 MHz antenna mount with 3' coax (no antenna)	920053
900 MHz long range antenna	RCA7
Replacement Rubber Keypad	920030-03
Portable Programmer	RAC16

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WARNING !

READ ALL INSTRUCTIONS
Failure to follow the SAFETY RULES
may result in serious personal injury.

INSTALLATION

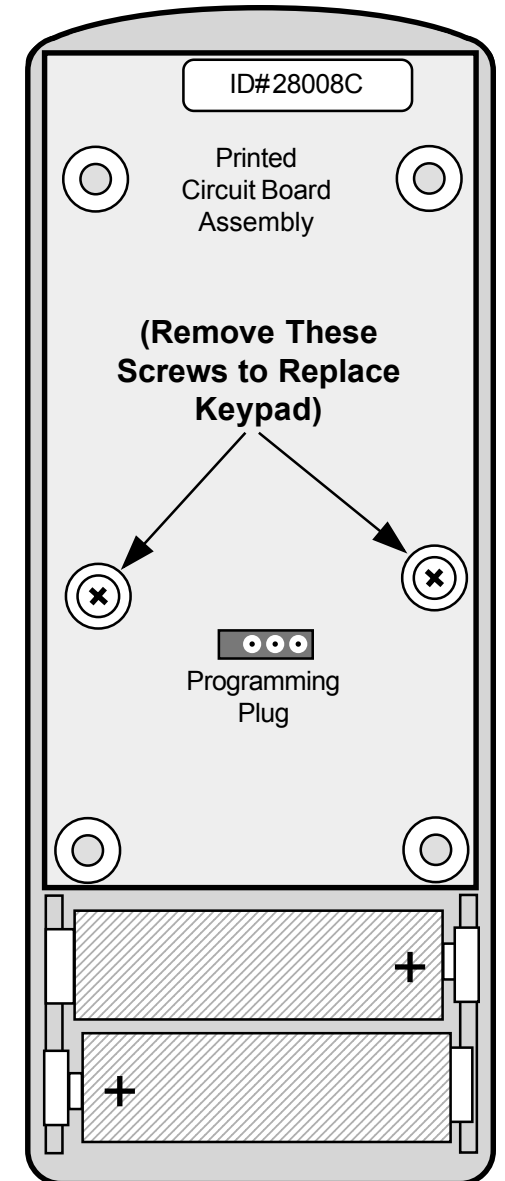
- * **PROVIDE A SAFETY CUTOFF SWITCH.** If maintenance is required, the radio must be disconnected from power to prevent accidental pump activation.
- * **USE PROPER WIRING.** Loose or frayed wires can cause accidental pump activation.
- * **DO NOT INSTALL IN HOT AREAS.** This apparatus can be damaged by heat in excess of 160 F.
- * **DO NOT INSTALL IN HIGH VIBRATION AREAS.** The life of this apparatus may be shortened through long exposure to intense shaking or vibration.

PERSONAL SAFETY

- * **MAKE SURE MACHINERY IS CLEAR BEFORE OPERATING.** Do not activate the Remote system unless it is safe to do so.
- * **TURN OFF THE RECEIVER POWER BEFORE WORKING ON MACHINERY.** Always disconnect the remote system before doing any maintenance to prevent accidental operation of the machine.

Changing the Transmitter Keypad

1. Remove the screws in the back of the transmitter and remove the back of the case. Remove the batteries from the holder.
2. Remove the screws holding the printed circuit board assembly and remove the board from the case.
3. Remove the nuts from the studs holding the support plate to the case front.
4. Remove the backing plate and rubber keypad from the case front.
5. Install the new rubber keypad onto the backing plate, making sure the tabs are pulled through each slot.
6. Install the keypad and backing plate into the case front.
7. Apply a small amount of Torque Seal® to the threads on the studs and install the nuts on the studs finger tight plus 180 degree turn. **DO NOT** use Loctite® as most formulations will cause the plastic to become brittle.



Transmitter
with Back Removed

TRANSMITTER REPAIRS

Battery Replacement

Note that when the battery is getting very low, the transmitter LED will change from quick flashes to a deliberate on/off cycling. When this occurs, or at least every year, replace the transmitter battery. Alkaline AA batteries should be used for long battery life.

CAUTION!

The transmitter electronic components are exposed when the back of the case is removed. Take caution to prevent dirt or other contaminants from entering the case. Do not allow the circuit to be scraped or damaged in any way.

Refer to the figure of the transmitter with back removed.

Remove the four screws on the bottom of the transmitter case and separate the case halves. Be careful not to damage the circuitry or get dirt inside the case. **Be sure to observe the correct polarity when installing the new batteries.** Reassemble the case and screws.

Alkaline AA batteries should be used for long battery life. Rechargeable batteries are not recommended.

ID Code

Both the transmitter and receiver have a 6 digit identification code (ID Code) contained in memory. This ID Code must be the same for both the transmitter and receiver for the system to operate. The codes are set at the Remtron factory such that no two systems are alike.

The RAC16 portable programmer may be used to read and to change the ID Code. The RAC16 may be ordered from your dealer. If you do not have access to a RAC16, bring the unit(s) to your dealer or send them directly to the Remtron factory for programming.

DESCRIPTION

The *Pump Boss*® systems are essentially remote controlled switches consisting of a hand held transmitter and a pump mounted receiver. These systems provide a fail safe emergency stop feature which insures that the radio control system is working properly and is in “radio range” at all times the unit is operating.

When the operator presses a switch on the transmitter, a digital message is sent via radio waves to the receiver. The digital message contains one of millions of possible ID Codes. This unique code makes it possible for the receiver to respond only to the proper transmitter. Additional codes are also sent that make false commands, for any reason, impossible.

Self healing fuses rated at approximately 4 amps protect the output relays of the receiver. If too much current is drawn through the relay, the fuse will open and remain open as long as electricity is applied through the relay. Once electricity is removed, the fuse will heal itself and be ready to operate in about 1 minute.

Each receiver is provided with a permanently mounted antenna.

NOTE

Radio waves are however effected by any metallic objects and difficulty operating in certain locations may be encountered. Read the section on using your system on getting the best performance from your system.

These systems comply with the requirements for operation under Part 15 of the FCC rules and regulations. This means that neither the operator nor the company need apply or register for a license to operate this equipment.

DESCRIPTION (continued)

Transmitters

The transmitters that are used with the *Pump Boss*® systems are housed in rugged cases molded from a modified polymer plastic that stands up to extremely rugged use. A key feature is Remtron's patented switch assembly for control inputs. This long-life elastomeric keypad is ergonomically designed to provide easy operation over long periods of time with exceptional reliability. A leather holster provides added protection and convenience. An optional water tight pouch is available from your dealer.

The transmitters are designed to be very efficient, operating from two AA batteries. To ensure long battery life, the transmitters will shut themselves off after one hour of inactivity. The antenna is internal to the transmitter case, protecting it from damage. A self-test LED indicator provides a quick visual check of transmitter and battery status.

Receivers

The receivers are housed in rugged aluminum cases with end caps molded from a modified polymer plastic that stands up to extremely rugged use. Connection to the receiver are made through a multi-conductor cable.

Pump Boss® TRANSMITTERS



PBT1ES

PBT2ES

PBT3ES

PBT4ES

Transmitter Troubleshooting

The transmitters have an LED status indicator to aid in troubleshooting. Due to the rough treatment it may be subjected to, most problems are likely to occur in the transmitter. The transmitter should be thoroughly diagnosed before proceeding to the receiver.

WARNING!

When testing the transmitter, the receiver may become active resulting in system operation. Always assume the system is working and will respond when testing a transmitter.

Troubleshooting Chart:

LED Indication	Possible Cause
LED is off.	Transmitter is off.
LED flashes at low rate.	Transmitter is operating in a normal mode.
LED flashes at high rate.	Command Switch is pressed.
LED flashes on-off. (½ second on and ½ second off while the transmitter is on).	Batteries getting low. Batteries should be changed at the next convenient opportunity.
LED on continuous.	Either a switch was activated at the time the transmitter was turned on or a general failure occurred that requires factory service. Ensure no command switches are pressed while attempting to turn the transmitter on.
LED will not light.	Replace batteries. If this does not correct the problem, the transmitter must be repaired.

TROUBLESHOOTING

System Does Not Operate

- a) Check that the transmitter (see transmitter troubleshooting on the next page).
- b) Make sure the receiver **POWER** LED is lit. If not, determine if +12 VDC is present between the red and black wires of the receiver.
- c) Check that the receiver **ACTIVE** LED lights when the transmitter is turned on. If not, check that the transmitter and receiver ID Codes are the same.
- d) Examine the receiver "Function" LEDs. If they indicate the proper function is operating, the problem is usually external to the receiver.
- e) If the system shuts off after a few minutes of operation, even when the transmitter is well within operating range, the receiver's self healing fuse may be activating. This may be caused by the receiver getting too hot or from a solenoid that is drawing too much current. Move the receiver to a cooler location or replace the solenoid on your pump.

Insufficient Range

Check that the receiver antenna is installed properly and is **not** touching metal.

If using the standard antenna mount, make sure the bottom of the antenna mount is making contact with metal. Note that the antenna works best when mounted on a metallic surface. If mounted on fiberglass or other nonmetallic surfaces glue aluminum foil or place an aluminum plate on the bottom of the mounting surface covering at least 10 inches in diameter around the antenna mount. Make sure the metal is connected to the bottom of the antenna mount and is not touching the center terminal of the mount.

DESCRIPTION (continued)

The safety relay is controlled by the microprocessor and by a hardware circuit to ensure operation even in the event of circuit failure. During normal operations, this relay is closed (activated). If for any reason valid data is not being received, this relay will open. It is also opened any time an operator sends an E-Stop command.

The use of surface mount parts and a special floating circuit board mount inside a waterproof case make the **Pump Boss**® receivers mechanically strong. 15 Amp relays, self healing fuses and advanced programming make them electrically able to stand up to the expectations of your pumping environment. The use of a maintained radio link plus three levels of safety insure the control is there when you need it.

Receiver/Decoder

The Receivers use an advanced synthesized FM Receiver designed to work in the presence of potential interfering signals such as might be encountered from pagers, cell phones, two way radios, etc. The microprocessor-based decoder insures a great deal of safety as well as versatility. Commands are received on one of 81 possible frequencies and are checked against a 16-bit address code for proper identity and further tested against a 16-bit CRC check code. This insures only valid information meant only for the particular unit is decoded.



Pump Boss®
RECEIVER

The receiver assembly monitors and indicates its status on a continuous basis. The diagnostics are presented in a simple, easy to understand format.

The **POWER** LED lights when power is applied to the receiver. The **ACTIVE** LED lights when a valid signal is being received from the transmitter. Other LEDs light to indicate that a command function is activated.

USING YOUR SYSTEM

WARNING !

Before operating the remote control system, make sure it is safe to do so. Make sure the same safety precautions normally required for safe pump operation are adhered to.

DO NOT leave the transmitter unattended while the pump engine is operating.

WARNING!

Do not operate the system until you are familiar with the operation and safety procedures for the pump.

IMPORTANT

The Emergency Stop button for the system is the OFF/ESTOP button. Press and hold this button to stop all functions.

Place the ignition switch ON to power up the receiver. Verify the receiver **POWER LED** is lit. If not, check the power connections to the receiver.

Press the transmitter **ON** switch. The transmitter LED should slowly flash and the receiver **ACTIVE LED** should light.

Note that the antenna for the transmitter is located inside the top of the transmitter case. Normal range should be achieved with the transmitter worn on your body. Extended range and operation in difficult areas can be achieved by moving the transmitter away from your body or holding it in the air. Pointing the transmitter towards the receiver will provide the greatest signal.

HELPFUL HINTS

If the Pump Boss does not operate properly, check the wiring. Always make sure the electrical connections are clean and tight. Pumps vibrate and loose wires can easily become disconnected. It is also a good idea to tie the wires from the receiver to solid points to keep them from swaying.

The Pump Boss uses a self healing fuse device in line with each relay. If the receiver is overloaded, the fuse device will open to protect the unit. When it cools down, the device will close restoring normal operation to the output.

When using inductive loads such as solenoids or motors, connect the wires according to the instructions. Internal circuits in the receiver will then protect the relay from high energy voltage spikes that may be produced by the load, thereby ensuring long reliable life of the relay.

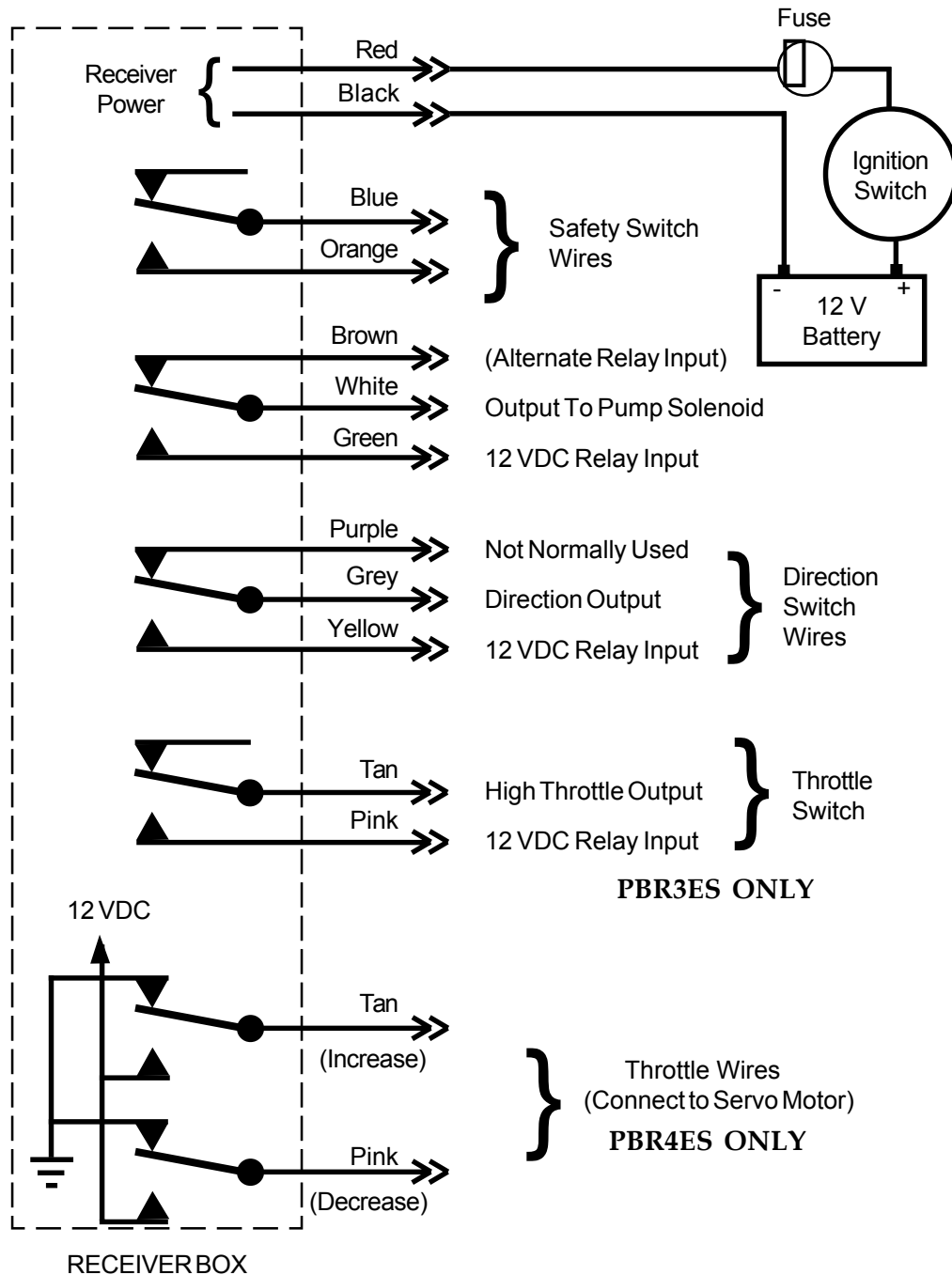
IMPORTANT

Water may enter the receiver through the jacket of the electrical cable if the outer jacket is cut close to the receiver case. To minimize the chance of this happening, leave a minimum of 6 inches of outer jacket on the electrical cable and position the open end of the jacket so that it faces downward.

IMPORTANT

This system operates in a fail safe mode. If the receiver does not receive a signal for about 10 seconds, it will open the safety relay and turn off all output relays. To restart the operation, move the transmitter within signal range of the receiver and again command the Pump, Reverse and Throttle commands as necessary.

Pump Boss® Electrical Connections



Pump Start/Stop (All Models)

To start the pump, momentarily press the transmitter switch to **PUMP**. This will close the pump relay in the receiver and allow the pump to operate. The receiver **PUMP** LED should light. To stop the pump, momentarily press the transmitter switch to **STOP**. The receiver **PUMP** LED should go out.

To turn the transmitter off, press the OFF/ESTOP button. (Note that the transmitter will turn itself off if no commands are sent for 1 hour.) This will release the safety relay in the receiver and stop all functions. When released, the transmitter will be turned off.

Pump Reverse (PBS2ES, PBS3ES and PBS4ES)

To reverse the pump, momentarily press the transmitter switch to **REV**. This will close the Reverse relay in the receiver and reverse the pump. The receiver **REVERSE** LED should light. To change to forward, momentarily press the transmitter switch to **FWD**. The receiver **REVERSE** LED should go out.

Throttle High/Low (PBS3ES)

To increase the throttle, momentarily press the transmitter **THROTTLE** switch to **INCREASE**. This closes the throttle relay in the receiver and increases the throttle. The receiver **THROTTLE** LED should light. Pressing the transmitter **THROTTLE** switch to **DECREASE** opens the throttle relay, extinguishing the receiver **THROTTLE** LED and reduces the engine speed.

Variable Throttle (PBS4ES)

To increase the throttle, press the **THROTTLE** switch to **INCREASE**. This closes the increase throttle relay in the receiver and increases the throttle as long as the switch is depressed or until maximum throttle is reached. The receiver **THROTTLE** LED should light while the switch is depressed.

To decrease the throttle, press the **THROTTLE** switch to **DECREASE**. This closes the decrease throttle relay in the receiver and decreases the throttle as long as the switch is depressed or until minimum throttle is reached. The receiver **THROTTLE** LED should light while the switch is depressed.

INSTALLATION

NOTE: Since pump machines will vary between different manufacturers, some connections may be different than are listed in this manual. If you have questions on your installation call Remtron Customer Service for assistance.

CAUTION !

DO NOT INSTALL THE RECEIVER NEAR EXHAUST PIPES OR IN OTHER HOT AREAS

This *Pump Boss*® system consists of:

- Hand Held Transmitter
- Receiver with attached multiwire cable
- Antenna and antenna mount with coaxial cable

Mechanical

In selecting a place to mount the receiver consider the following points:

- Access to the wiring for the control box on your machine.
- Protection from mechanical damage during towing or during use.
- Select a location with a flat mounting surface.
- If possible, protect the receiver from direct exposure to sun and rain. Even though the receiver is weather resistant, it's still a good practice to protect it from the elements.

Securely mount the receiver box to the pump. Secure the box to the surface using #10 hardware.

INSTALLATION (Continued)

Wiring Instructions (continued)

WIRE COLOR	WIRE FUNCTION	CONNECTION
Reverse Switch		
Purple		Not Normally Used
Grey	Relay Input	Connect to +12 VDC power source
Yellow	Reverse Relay Output	Connect to the "REVERSE" side of the pump Fwd/Rev switch.

Throttle Control (PBR3ES ONLY)

Tan	High Throttle Output	Connect to Throttle Increase
Pink	Relay Input	Connect to +12 VDC power source.

Throttle Control (PBR4ES ONLY)

Tan	Servo Increase	Connect to Servo Motor +.
Pink	Servo Decrease	Connect to Servo Motor -.

Notes

Pump Relay Power Input

The **GREEN** wire is normally used for the pump switch Input. On pumps with reversed logic, i.e.; voltage is applied to stop pumping and removed to start pumping, the **BROWN** wire must be used for the Input.

Safety Switch

The receiver contains a safety switch that is activated when the hand held transmitter is ON and within operating range of the receiver. If the pump is equipped for use of an emergency stop switch, connect these wires to this circuit. If your pump is not equipped with an emergency stop circuit, connect the **ORANGE** wire to the **GREEN** wire using a wire nut. Use the **BLUE** wire in place of the **GREEN** wire for the Pump Switch Input connection.

INSTALLATION (Continued)

Wiring Instructions

All connections are made to the pump with a cable that is supplied with the *Pump Boss*® system. Refer to the wiring diagram and application notes for reference. Improper Installation could cause damage to the pump and/or the Remtron control. Qualified personnel should make all electrical installations.

The relays in the *Pump Boss*® receiver are rated to provide long trouble free service. This long life can be ensured by using the connections as listed in the table below.

For safety, disconnect the battery prior to installing the *Pump Boss*® radio control system.

WIRE COLOR	WIRE FUNCTION	CONNECTION
Basic Power		
Red	Power	Connect to fused 12VDC. Recommend connection be made to a point that can be switched on by ignition (possibly ignition switch itself).
Black	Ground	Connect to negative battery supply (usually bare metal on pump chassis).
Safety Switch		
Orange	Safety Switch	See Notes
Blue	Safety Switch	See Notes
Pump On/Off Control		
Brown	Alt Pump Relay In	See Notes
Green	Pump Switch Input	Connect to 12 VDC power source.
White	Pump Switch Output	Connect to the "ON" side of the pump on/off switch

INSTALLATION (Continued)

Antenna Installation

NOTE

Proper antenna installation is essential for peak performance of the Pump Boss. Take care to install the antenna properly.

Two different styles of antenna are available for the *Pump Boss*® systems. Both must be permanently attached to the pump for proper performance.

Locating the Antenna

For best reception, the antenna must be mounted to a horizontal surface with the top of the antenna at least 8 inches away from all major metal structures (vents, splash panel, exhaust, etc). There should be a clear line-of-sight between the antenna and the transmitter when pumping. The top of the pump hood is an excellent mounting location.

To ensure trouble-free performance, the cable should be routed away from sources of heat such as the engine block, exhaust manifold and exhaust pipe. The cable is rated for a maximum of 185° F. The cable must be secured in an out-of-the-way location where it will not be crushed or snagged. Before mounting the antenna, make sure the cable will reach the receiver box.

Standard Antenna Mount

Tools Needed:

Drill or punch for 3/4 inch dia. hole.

The standard antenna mount accepts the whip type of antenna.

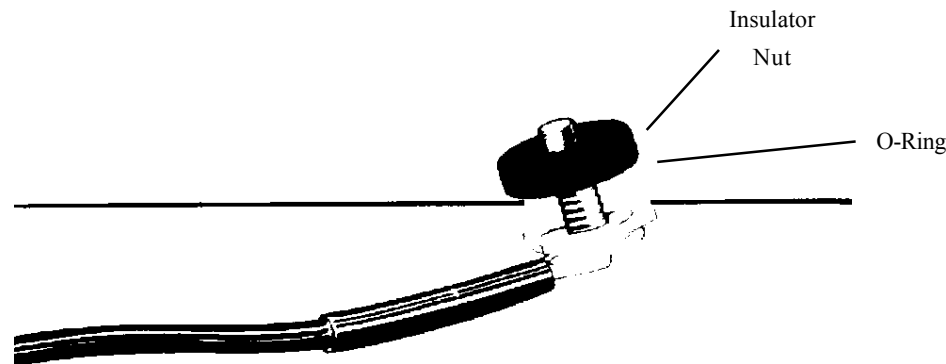
INSTALLATION (Continued)

Drill or punch a clean 3/4 inch hole in the panel where the antenna will be mounted. **Take care to make a smooth hole for the mounting surface.** Hole saws are available from most hardware and home maintenance stores. Remove paint in a narrow ring around the underside of the hole. Note that metal-to-metal contact between the vehicle and the antenna mount will provide the best performance.

If installation is on a fiberglass or other non-metallic surface, a minimum 10" diameter (or square) metal plate or foil must be placed under the mount to achieve proper performance from the antenna.

Unscrew the black insulator nut from the antenna mount. Place the mount on the bottom center of the hole and screw the insulator nut onto the stud. Make sure the mount is centered on the hole. **Be sure the antenna mount center stud does not contact any metal.** Tighten the insulator nut using the small allen wrench supplied with the mount. **Do Not overtighten.**

Route the cable to the receiver and secure with cable ties.



Standard Antenna Mount Installation

INSTALLATION (Continued)

RCA 7 Extended Range Antenna

Tools Needed:

Drill or punch for 3/16 and 5/8 inch dia. holes.

#1 Phillips screwdriver

Center punch

Adhesive tape (such as masking tape)

The RCA7 extended range antenna provides greater operating range than the standard antennas. It is mounted directly to the pump. An antenna mounting template is located on the back cover of this manual.

Installation Procedure:

1. Tape the mounting hole template to the mounting surface. Locate the four hole centers on the mounting surface by punching through the paper template with the center punch.
2. Remove the template and drill the four holes as indicated on the template.
3. Feed the antenna cable through the center (5/8" Dia.) hole. Insert the rubber grommet in the hole to protect the cable from chafing. Note that two grommets are supplied on each cable to accommodate either a 5/8" Dia. or a 3/4" Dia. hole. Cut off the unused grommet.
4. Secure the antenna using the #6 hardware supplied. Insert the screws through the antenna and secure with the lockwashers and nuts.
5. Route the cable to the receiver and secure with cable ties.