OPERATIONAL DESCRIPTION

SECTION 1: SYSTEM DESCRIPTION

1.1 INTRODUCTION

The Remtron Command Pro Radio Remote Control Systems are designed for control of industrial rated machinery. This system complies with requirements for operation under part 15 of the FCC rules and regulations. This means neither the operator nor the company need apply or register for a license to operate this equipment.

The basic system consists of a transmitter and a receiver. The transmitter sends commands to the receiver by means of radio waves in the 900 MHz band. Receivers operate from 115 VAC 50/60 Hz power. Operation from 220 VAC is also available.

1.2 TRANSMITTER DESCRIPTION

The Command Pro hand held transmitters are housed in rugged cases molded from a modified polymer plastic that stands up to extremely rugged use. A key feature of the hand held transmitters 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.

The Command Pro lever and joystick transmitters provide rugged yet lightweight housings that allow daylong use without a strain on the back.

All the transmitter functions are controlled by a microprocessor with a special memory for configuration information. This offers a great degree of capability and versatility while at the same time providing simplicity of operation and maintenance.

The antenna is internal to most transmitter cases, protecting it from damage. An indicator LED provides a quick visual check of the transmitters status.

The transmitter sends data at two rates. When a switch is pressed or released, three rapid commands are generated to insure a fast system response. The transmitter then reverts to a 1/3 rate to conserve battery power.
The crane control transmitters are designed to be very efficient. Only two AA batteries are needed to provide power for the 21T10 or 21T14 transmitters for a month's normal use. Other transmitters contain additional batteries for even longer operating time between battery changes. An additional feature automatically shuts the transmitter off after a preset time interval of inactivity to further extend the battery life.

Refer to Section 5 for details on the specific transmitter supplied with your system.

1.3 RECEIVER DESCRIPTION

The Command Pro receivers consist of two subassemblies, an RF/Decoder board and a Relay board, mounted inside a NEMA 12 cabinet. They are equipped with two safety relays in addition to the control relays.

RF/Decoder Board

The RF/Decoder Board contains the Radio Receiver and the Microprocessor based control system. Signals are received by an advanced synthesized RF module that operates in conjunction with the microprocessor. Commands are received on one of 87 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.

The microprocessor contains a nonvolatile memory that retains the frequency, address and particular operating parameters for the system. The receiver is programmable by means of PC compatible computers equipped with an RS-232 serial port or by an independent programming unit.

Relay board.

The Relay board contains the output relays and the power supply. Two (2) relays form part of the safety system. All outputs include spike snubbers to remove transient voltages from the control lines.
For convenience, the interface terminal strips are un-pluggable. The relay board can be easily removed without the necessity of tracking wire numbers and positions.

The power is from 115 VAC, 50/60 Hertz. Optional

SECTION 1: SYSTEM DESCRIPTION

220 VAC, 50/60 Hertz, 250 VDC and other power inputs are available. The input is protected by a fuse.

Safety Features

Controlling heavy industrial equipment requires that the remote control system be reliable with built-in safety features. Each transmission goes through several checks to insure that the information being received is error free.

The safety interlocks for the crane's Main Line Contactor (MLC) consist of the operate (OPR) and operate inhibit (OPI) relays. These relays are controlled by the microprocessor and by a hardware circuit. Further, one relay has normally open contacts while the other has normally closed contacts. This provides three levels of safety in controlling the Main Contactor for the crane.

Over 5 million combinations of frequencies and address codes means that no two systems will ever be produced with the same frequency and address code, thereby insuring that no transmitter will ever be able to unintentionally control another crane.

Diagnostics

Even though the receivers are technically very complex, it is exceptionally easy to maintain and troubleshoot. Diagnostic LEDs plus an LED for each output relay are all that are required to isolate a problem should one occur. Both the transmitter and receiver assembly monitor and indicate their status on a continuous basis.

1.4 OPTIONS

The following options are available on all receivers:

First Come-First Serve.

Pitch and Catch.

The following options are only available on the 21R22 receiver:

Stepless (proportional) Outputs:

External Hard Wire Inputs.

Extra Relay Outputs.

Pilot Lights.

Intermediate Relay Panel.

DC Power Supply.

Transfer Switch.

Refer to Section 6 for more information on the options.

SECTION 2: INSTALLATION

2.1 INSTALLATION PLANNING

To ensure reliable and safe operation of the system, the following points must be considered before installing the receiver assembly.

If the receiver cabinet is to be installed outdoors, connections to the cabinet must be water tight.

If the receiver is installed in a corrosive environment, consult the factory for optional NEMA 4X cabinets, or house the receiver cabinet in a secondary protective enclosure.

If the receiver is to be installed in environments where the ambient temperature drops below -20°F (-7°C) or rises above +160°F (+70°C) measures must be taken to maintain the interior of the enclosure to within these temperature limits.

2.2 MOUNTING LOCATION

Refer to section 6, **Receiver Description**, for the receiver cabinet dimensions and layout. When planning the location for mounting the receiver, observe the following rules:

1. Allow sufficient room to swing the cabinet door open for ease of wiring and service.

2. If the antenna is mounted directly on the receiver cabinet, allow a minimum or 8 inches below the cabinet for clearance. Refer to 2.3 ANTENNA MOUNTING for more information.

3. If possible, avoid mounting the receiver on a surface where excessive vibration or shock is present. If this is not possible, appropriate shock mounts must be used.

4. Allow for positive earth ground to the receiver cabinet.

2.3 ANTENNA MOUNTING

The antenna is one of the most important parts of a radio receiving system. The receiver is designed with a specially tuned antenna to provide excellent operating reliability under most conditions. Care in placing the receiver antenna will ensure reliable operation under the most severe conditions.

A direct "line-of-sight" between the transmitter and receiver antenna will provide the best performance. The radio signal will often "bounce" off metallic objects and reach the receiver even when the antenna is directly shielded from the transmitter.

In most cases the antenna may be mounted directly on the receiver cabinet. If the receiver cabinet location is not suitable and the antenna must be mounted at a remote location, the p/n 600038 antenna kit should be used. The remote mounting kit includes a right angle bracket with antenna mount and a coaxial extension cable.

It is recommended that the receiver not be connected to power lines where large transients are present. These transients are typically caused by motors, contactors and other large inductive loads.

2.4 RECEIVER INSTALLATION

Inspect all items to insure they have been received in good condition. The following items are included unless otherwise noted on the packing list.

- Transmitter
- Transmitter leather holster
- Transmitter shoulder strap
- Receiver assembly
- Receiver antenna

SECTION 2: INSTALLATION

Mounting

WARNING!

The receiver cabinet must be connected to earth ground to insure proper safety. Verify the presence of earth ground before operating the receiver system.

AVERTISSEMENT !

Le boîtier du récepteur doit être raccordé à la masse afin de respecter les conditions de sécurité. Vérifier le raccordement à la masse avant de faire fonctionner le récepteur.

Mount the receiver cabinet securely to a solid surface. Use appropriate locking type hardware to prevent loosening. Refer to Figure 6.1.

Mechanical

1. Connect the conduit or raceway to the receiver cabinet and route the wiring into the cabinet.

2. The receiver cabinet should be properly grounded. Make sure all paint is removed from the bonding surfaces.

Electrical Connections.

WARNING!

Verify that the main input power is off before attempting to make any connections.

AVERTISSEMENT !

S'assurer que l'arrivée principale de courant soit hors tension avant de faire quelque raccordement que ce soit.

If you have any questions regarding the installation, call Remtron applications engineering.

When wiring the receiver, it is recommended the wires be dressed along the sides of the cabinet. This will allow easy troubleshooting and maintenance should it be required. Some receiver cabinets are provided with a pre-punched hole for ease of conduit installation.

Refer to the diagram in Appendix A for typical wiring installation of the receiver. The configuration sheet provided with your equipment will have the specific relay assignments for your system.

1. **Power/Transfer Switch Wiring.**

WARNING!

The safety of this system depends on the proper wiring of this switch. Call Remtron Applications Engineers if you have any questions regarding the wiring of this switch.

AVERTISSEMENT !

La sécurité de ce système dépend du raccordement approprié de cet interrupteur. Contacter les ingénieurs de Remtron spécialisés dans les applications pour toute question concernant le raccordement de cet interrupteur.

A three pole transfer switch is normally provided with each receiver. Wiring of this switch will depend on the electrical configuration of your crane. Appendix A shows wiring of the switch for a single phase crane with a common control circuit for all motions. Additional switch poles can be used for systems with isolated control circuits for the motions.

The switch should be wired so that the crane's main line contactor (MLC) is controlled by the radio OPI and OPR relays when in the radio position, and by the pendant