



REMOTE CONTROL AND TELEMETRY SYSTEMS



Radio Remote Control System

User's Manual

This manual covers the following Remtron models:

Transmitters

21T10	☐
21T14	☐
21T18	☐
21T20	☐
21T23	☐
21T34	☐
21T44	☐
21T54	☐

Receivers

21R10	☐
21R14	☐
21R22	☐

WARNING!

Read all Safety and Warnings before
installing and operating this system

AVERTISSEMENT !

Lire toutes les consignes de sécurité
et tous les avertissements avant
de faire fonctionner ce système.

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REMTRON, INC.

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

TABLE OF CONTENTS

Section 1. System Description

- 1.1 Introduction
- 1.2 Transmitter Description
- 1.3 Receiver Description
- 1.4 Options

Section 2. Installation

- 2.1 Installation Planning
- 2.2 Mounting Location
- 2.3 Antenna Mounting
- 2.4 Receiver Installation

Section 3. Troubleshooting

- 3.1 General
- 3.2 Transmitter Testing
- 3.3 Receiver Testing

Section 4. Maintenance

- 4.1 Periodic Maintenance
- 4.2 Transmitter & Receiver Repairs
- 4.3 Programming
- 4.4 Parts Lists
- 4.5 Ordering & Repairs
- 4.6 Warranty

Section 5. Transmitter

- 5.1 Transmitter Description
- 5.2 Transmitter Functions
- 5.3 Transmitter Operation
- 5.4 Options
- 5.5 Troubleshooting
- 5.6 Transmitter Repairs
- 5.7 Transmitter Specifications

Section 6. Receiver

- 6.1 Receiver Description
- 6.2 Options
- 6.3 Receiver Specifications

WARNING!**READ ALL INSTRUCTIONS**

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

INSTALLATION

- * **GROUND THE RECEIVER CASE.** In order to insure safety of the system, the receiver case must be firmly connected to earth ground.
- * **PROVIDE A SAFETY CUTOFF SWITCH.** If maintenance is required, the radio must be disconnected from power to prevent accidental activation.
- * **USE PROPER WIRING.** Loose or frayed wires can cause accidental activation of machinery.
- * **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.
- * **DO NOT INSTALL IN AREAS WHERE WATER OR CONTAMINENTS CAN ENTER THE RECEIVER.** The receiver is enclosed in a NEMA 12 rated enclosure, however direct spraying of liquids or exposure to caustic environments may result in malfunction of the unit.

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.

CARE

- * **KEEP DRY.** If water or other liquids get inside, immediately dry the unit.
- * **KEEP ANTENNAS CLEAN.** Keep antenna connections clean and free of corrosion.

CONSIGNES DE SÉCURITÉ

AVERTISSEMENT !

LIRE TOUTES LES CONSIGNES

Le non respect des CONSIGNES DE SÉCURITÉ peut causer des blessures sérieuses.

INSTALLATION

- * **RACCORDER LE BOÎTIER À LA MASSE.** Pour que le système fonctionne en toute sécurité, le boîtier du récepteur doit être solidement raccordé à la masse.
- * **FOURNIR UN INTERRUPTEUR DE SÉCURITÉ.** Lors de travaux d'entretien du dispositif, déconnecter le poste radio afin d'éviter une mise en marche accidentelle..
- * **UTILISER LES FILS APPROPRIÉS.** Des fils découverts ou usés peuvent provoquer un démarrage accidentel de la machinerie.
- * **NE PAS INSTALLER DANS DES ENDROITS CHAUDS.** Des températures supérieures à 160 °F (71°C) peuvent endommager l'appareil.
- * **NE PAS INSTALLER DANS LES ENDROITS SOUMIS À DE FORTES VIBRATIONS.** L'exposition prolongée de cet appareil à des vibrations ou des secousses intenses peut en réduire la durée de vie.
- * **NE PAS EXPOSER LE RÉCEPTEUR À L'EAU OU À TOUT AUTRE CONTAMINANT.** Bien que le récepteur soit entouré d'une enceinte répondant à la norme NEMA 12, l'exposition directe à un liquide ou à un environnement caustique peut entraîner un mauvais fonctionnement de l'appareil.

SÉCURITÉ

- * **S'ASSURER QUE LA MACHINERIE EST DÉGAGÉE AVANT DE LA FAIRE FONCTIONNER.** Ne pas faire fonctionner le système de téléguidage à moins que cela puisse être fait en toute sécurité.
- * **METTRE LE RÉCEPTEUR HORS TENSION AVANT D'EFFECTUER DES TRAVAUX SUR LA MACHINERIE.** Afin de prévenir la mise en marche accidentelle de la machinerie, toujours débrancher le système de téléguidage avant de d'effectuer des travaux d'entretien.

ENTRETIEN

- * **GARDER AU SEC.** Sécher immédiatement l'appareil, s'il est exposé à de l'eau ou tout autre liquide.
- * **GARDER LES ANTENNES PROPRES.** Garder les raccordements d'antenne propres et exempts de corrosion.

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 unpluggable. The relay board can be easily removed without the necessity of tracking wire numbers and positions.

SECTION 1: SYSTEM DESCRIPTION

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

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 of 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

SECTION 2: INSTALLATION

controls when the switch is in the pendant position. It should also be wired to transfer control between the pendant and the radio circuits.

2. Output Relay Connections.

The relay contacts are rated for 16 Amp, 240 VAC to provide maximum reliability and life. It is recommended that the load applied to the output circuits be limited to 5 Amps to achieve best system life. Connection to equipment or contactors with higher voltage or current ratings requires an auxiliary relay.

The receiver has been pre-wired for a single phase control system. If you have multiple phase control lines you must wire the relay commons accordingly.

Refer to the configuration sheet supplied with your system for the specific relay assignments.

3. Power Connections.

The receiver is normally provided for 115 VAC, 50/60 Hz power. Make sure the receiver is ordered for the correct operating voltage of your power system. Connect line and return connections directly to the terminal strip X1 and X2. Observing the polarity of the connections as shown in Appendix A will prevent conflicts with any other wiring on the crane system.

3. Installation Testing.

Before putting the system into service, the following tests must be performed.

Apply power to the receiver and verify the power and OPI indicators light.

Turn on the transmitter and verify the OPI indicator goes off. Verify the OPR indicator lights and the Signal indicator flashes.

Verify voltage is present at the receiver output to the Main Line Contactor. Verify no voltage is present at any of the relay outputs.

WARNING !

If voltage is present at any output, the receiver grounding is not adequate. Make sure the cabinet is grounded before operating the crane.

AVERTISSEMENT !

La présence de tension à l'une ou l'autre des sorties indique un raccordement inadéquat du récepteur à la masse. S'assurer que le boîtier est raccordé à la masse avant de faire fonctionner la grue.

SECTION 3: TROUBLESHOOTING

3.1 GENERAL

The following procedures are for diagnosing problems within the system and isolating them down to the module level. No special test equipment is required.

Both the transmitter and receiver have built in test and diagnostic devices to aid in troubleshooting. In the event of a system malfunction, the following guide presents a logical approach to pinpointing the cause and quickly restoring the equipment to operation.

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.

3.2 TRANSMITTER TESTING

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.

AVERTISSEMENT !

Lors des essais du transmetteur, le récepteur peut s'activer et entraîner la mise en marche du système. Prendre en considération que le système fonctionnera et répondra toujours aux commandes lors des essais du transmetteur.

When the transmitter is OFF the LED should be off.

Press and release the ON/ALARM button. The LED should flash at a low rate. Press a command switch. The LED should flash at a high rate.

If the batteries are getting low, the LED will flash on-off. (1/2 second on and 1/2 second off) while the transmitter is ON. The batteries should be changed at the next convenient opportunity.

If the LED remains on continuously there is either a switch activated at the time the transmitter is turned on, or a general failure that requires factory service. If the LED remains lit continuously on power-up, insure that no other switches are pressed while attempting to turn the transmitter on.

If the test LED does not light at all, replace the batteries. If this does not fix the problem, the transmitter is inoperable and must be repaired.

3.3 RECEIVER TESTING

Receiver LEDs. Refer to Section 6 for the locations of the decoder diagnostic LEDs inside the receiver cabinet.

On 21R10 and 21R14 receivers, the **Power**, **Address** and **Signal** LEDs are on the RF/Processor board which is mounted below the Relay board.

On 21R22 receivers the **Power** and **Signal** LEDs are on the RF/Processor board which is mounted on top of the Relay board.

POWER - Indicates the +12 VDC, receiver operating voltage is present.

ADDRESS - This will flash each time a signal received matches the decoders address. This is not used for the 21R22 receiver.

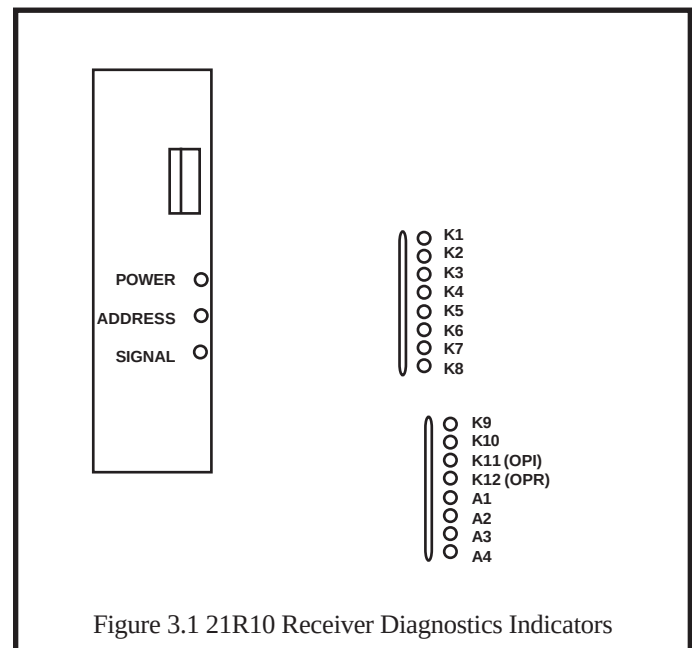


Figure 3.1 21R10 Receiver Diagnostics Indicators

SECTION 3: TROUBLESHOOTING

SIGNAL - This will flash each time a signal is being received. For the 21R22 receiver, this also indicates a proper address was received.

K1 through Kxx - indicates the corresponding relays are energized.

A1 through A4 (R14) or SCAN 1 through SCAN 3 (R22) - These LEDs cycle while the receiver is scanning. When on steady, it indicates which frequency the receiver is locked on to.

OPI and OPR - When the receiver is either in standby or has detected a problem which requires the system to be shut down, OPR will be off and OPI will be on. This releases the main contactor on the crane and prevents any operation of the crane.

During normal operation, with the transmitter turned on, OPR will be on and OPI will be off. The main contactor on the crane will be energized and the decoder will be enabled to control the crane functions.

Receiver Troubleshooting.

WARNING !

Throughout the troubleshooting procedure, work is performed within the receiver cabinet while the system is powered. Certain points in the cabinet contain dangerous voltages. Use extreme caution when working inside the cabinet with power on.

AVERTISSEMENT !

Tout au long des procédures de dépannage, un travail est effectué dans le boîtier puisque le système est sous tension. Certains endroits du boîtier contiennent des tensions dangereuses. Être extrêmement vigilant lors de travaux à l'intérieur du boîtier lorsque le système est sous tension.

1. Check the POWER on indicator. If it's not lit, make sure the power switch on the right hand side of the receiver cabinet is in the on position.

Check the fuse on the relay board next to TB3 (TB4 on the 21R22) and replace if necessary.

Check for A.C. input power between terminals X1 and X2 of the terminal strip. If AC power is present and the POWER on LED is not on replace the relay board.

2. Make sure the transmitter is off. Turn the receiver power switch off then on. Check that the OPI is on. If no indicators come on after 1 second, the microprocessor circuits are possibly defective. Replace the RF/Decoder board.

3. Turn the transmitter on. If the SIGNAL LED remains off, test the transmitter.

Verify the identity code is the same for the transmitter and receiver.

Replace the RF/Decoder board.

4. Turn the transmitter on. If the SIGNAL LED lights but the ADDRESS LED does not, there is a difference between the transmitter and receiver address code. Change the identity code on the transmitter or receiver so that they are the same. Refer to section 5.2 for setting the identity code.

5. If only some of the functions are operating, check to see if the relay LED's come on for the inoperative functions.

Check the output voltage of the respective relays and the crane circuits.

Check the condition of the transmitter switches.

If the unit is new, check the configuration sheet to verify the function has been programmed.

6. If you experience intermittent operation, check all connections and make sure that the terminal strips

SECTION 3: TROUBLESHOOTING

are firmly snapped in place and that the RF/Decoder board is firmly attached to the back of the Relay board.

Check antenna connections.

7. If Operating Range is short, Check all antenna connections and the transmitter operation.

On new installations, verify the receiver antenna is placed properly. If necessary, use an antenna mounting kit to relocate the antenna to a more favorable location.

Replace the RF/Decoder board.

8. If any of the Contact Sense (Relay Sense) indicators are lit (21R22 only), a difference between the intended output command and the relay (or contactor state occurred. This is usually caused by a failed relay contact.

The indicator will remain illuminated even after the transmitter is turned off. The next time the transmitter is turned on, or if the receiver power is cycles, the indicator will turn off unless the problem remains.

If external inputs are used for contact sensing, examine and repair if appropriate the wiring between the back contacts of the directional contactor and the receiver input. Also examine the contactor for a problem.

SECTION 4: MAINTENANCE

4.1 PERIODIC MAINTENANCE

Once a year inspect the transmitter for damage to the keypad and case.

Once a month all electrical and antenna connections should be inspected. Make sure all antenna and electrical connections are clean and tight and that all terminal strips are firmly in place.

4.2 TRANSMITTER & RECEIVER REPAIRS

Refer to section 5: TRANSMITTER or Section 6: RECEIVER for details on transmitter and receiver repairs.

4.3 PROGRAMMING

Each transmitter and receiver can be programmed for any operating frequency, address code and specific operating parameters required by the particular system. Each system is fully programmed and tested before shipment from the factory and should require reprogramming only in the case of spares.

Programming Hardware Requirements

The RAC17, a computer based programming system, is available that consists of an RS-232 interface box and a computer program for PC compatible computers. This system allows storage of configurations for each system

Table 4.1 Frequency codes

<u>FREQ.</u>	<u>CODE</u>	<u>FREQ.</u>	<u>CODE</u>	<u>FREQ.</u>	<u>CODE</u>	<u>FREQ.</u>	<u>CODE</u>
903.0	03	909.3	18	915.6	2D	921.9	42
903.3	04	909.6	19	915.9	2E	922.2	43
903.6	05	909.9	1A	916.2	2F	922.5	44
903.9	06	910.2	1B	916.5	30	922.8	45
904.2	07	910.5	1C	916.8	31	923.1	46
904.5	08	910.8	1D	917.1	32	923.4	47
904.8	09	911.1	1E	917.4	33	923.7	48
905.1	0A	911.4	1F	917.7	34	924.0	49
905.4	0B	911.7	20	918.0	35	924.3	4A
905.7	0C	912.0	21	918.3	36	924.6	4B
906.0	0D	912.3	22	918.6	37	924.9	4C
906.3	0E	912.6	23	918.9	38	925.2	4D
906.6	0F	912.9	24	919.2	39	925.5	4E
906.9	10	913.2	25	919.5	3A	925.8	4F
907.2	11	913.5	26	919.8	3B	926.1	50
907.5	12	913.8	27	920.1	3C	926.4	51
907.8	13	914.1	28	920.4	3D	926.7	52
908.1	14	914.4	29	920.7	3E	927.0	53
908.4	15	914.7	2A	921.0	3F		
908.7	16	915.0	2B	921.3	40		
909.0	17	915.3	2C	921.6	41		

SECTION 4: MAINTENANCE

as well as programming of application information. This is recommended for larger installations that must maintain systems with a variety of configurations.

A stand alone programmer, RAC16, is available for most applications. It provides a convenient method for changing the identity code and making basic application changes to the transmitters and receivers.

Programming Levels

Most programming changes involve only the assignment of the identity code. The identity code is a six digit alphanumeric number that contains the operating frequency and address of the unit. This level of programming is described in this manual.

Higher levels of programming, those that allow changing of time constants, relay assignments and decoding logic are covered in a separate manual.

Identity Code

The unit identity code consists of a six digit alphanumeric number such as 2E005B. The range of numbers is 0 through 9 and A through F.

The first two numbers designate one of the 81 frequencies that are used for these systems. In a plant with many units located in a close area, each system can be assigned a different frequency. For reference, table 4.1 lists the frequency for each code.

The last four numbers designate one of the 65,536 possible address codes. Again, the range of numbers is 0 through 9 and A through F.

Each system in a plant must have a separate identity code. Two systems with the same identity code will be able to "talk" to each other. All systems are shipped from the factory with a unique identity code. It is highly recommended that the receiver identity code not be changed, rather a transmitter identity code be made to match that of a receiver.

Programming

The transmitter and receiver are programmed using the same method.

Transmitters have a four position connector with one pin removed for keying. Receivers may have a four position or a six position connector with one pin removed for keying. The programmer has a six position connector with one position blanked.

Locate the programming connector on the transmitter board or the RF/Decoder board in the receiver and connect the plug from the programmer. Note that the plug is polarized and must be connected with the plug aligned with the position of the blank pin.



6 pos connector



4 pos connector

If programming a transmitter, make sure the batteries are installed. If programming a receiver, make sure power is applied to the RF/Decoder board (power LED is ON). Note that an RF/Decoder board with the six position programming connector can be powered from the programming box and does not need external power.

If the programmer is not already on, turn the programmer power on by pressing the ON button. The display will show what the programmer is connected to for 5 seconds

TX CONNECTED

and then will read and display the ID CODE of the unit.

ID CODE 28008C

SECTION 4: MAINTENANCE

Enter a new six digit unit identity number using the keypad on the programming unit. Verify the number on the LCD display. Press the PRG push-button on the programming unit.

For additional programming instructions refer to the manual supplied with the programmer.

4.4 PARTS LISTS

Accessories available for the remote control system include:

<u>Item</u>	<u>Part Number</u>
Antenna mounting kit (9 Ft.)	600038-1
Antenna mounting kit (18 Ft.)	600038-2
Programmer (Stand Alone)	RAC16
Programmer (PC Based)	RAC17

Tables 5.1 and 6.1 list the spare parts available from Remtron for field repair of the transmitter and receiver. Detailed parts lists and schematics are available to support depot level maintenance activities.

4.5 ORDERING & REPAIRS

Ordering

When ordering a Remtron product use the appropriate Remtron part number or model number, ID Code and any other applicable information.

Orders for standard Remtron products may be placed with an authorized representative, distributor or direct with the factory.

Orders for special products or modified standard products may also be placed with an authorized representative, however, close coordination with the factory is recommended.

Repairs

All products in need of repair should be sent directly to the factory at the address listed below. We recommend calling the factory for a Return Material Authorization (RMA) number prior to sending in the equipment. A note should be included describing the nature of the problem and the conditions under which the problem occurred. Also included with the returned product, should be the name, address and phone number where the product is to be returned and the name and phone number of a person familiar with the problem, who we may contact should the need arise. Products should be returned to:

Remtron, Inc.
1916 W. Mission Rd.
Escondido, CA 92029

PH 760-737-7800

4.6 Warranty

Remtron, Inc. warrants its material handling products to be free from defects in material and workmanship for a period of two (2) years from the date of the original invoice. This warranty is void if the product was used in other than its normal and customary manner or subjected to misuse, neglect, accident, physical damage or was altered or tampered with by unauthorized personnel.

Remtron further warrants its Command Pro "hand-held" Radio Remote Control products against malfunction or breakage, excepting total destruction of the internal circuit board, for a period of two (2) years and thirty (30) days from the date of the original invoice.

In event of a defect or failure to perform as specified, Remtron will, at its discretion, repair or replace the product. This warranty does not cover the cost of shipping and handling of the product from the customers' location to the factory.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.