

Flex EM/EX Transmitter

Engineered

Remote Equipment Control



MAGNETEK
RADIO CONTROLS

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Your New Radio Remote

Thank you for your purchase of Magnetek's Enrange® brand Flex Radio Remote Equipment Control. Magnetek has set a whole new standard in radio-remote performance, dependability, and value with this unique new line of handheld transmitters.

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1. PRODUCT MANUAL SAFETY INFORMATION

Magnetek, Inc. (Magnetek) offers a broad range of radio remote control products, control products and adjustable frequency drives, and industrial braking systems for overhead material handling applications. This manual has been prepared by Magnetek to provide information and recommendations for the installation, use, operation and service of Magnetek's radio control products and systems (Magnetek Products). Anyone who uses, operates, maintains, services, installs or owns Magnetek Products should know, understand and follow our instructions and safety recommendations in this manual for Magnetek Products.

The recommendations in this manual do not take precedence over any of the following requirements relating to devices controlled by radio controls:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where the radio system is used,
- Plant safety rules and procedures of the employers and the owners of facilities where the Magnetek Products are being used,
- Regulations issued by the Occupational Health and Safety Administration (OSHA),
- Applicable local, state or federal codes, ordinances, standards and requirements, or
- Safety standards and practices for the overhead material handling industry.

This manual does not include or address the specific instructions and safety warnings of these manufacturers or any of the other requirements listed above. It is the responsibility of the owners, users and operators of the Magnetek Products to know, understand and follow all of these requirements. It is the responsibility of the owner of the Magnetek Products to make its employees aware of all of the above listed requirements and to make certain that all operators are properly trained. **No one should use Magnetek Products prior to becoming familiar with and being trained in these requirements.**

WARRANTY INFORMATION

FOR INFORMATION ON MAGNETEK'S PRODUCT WARRANTIES BY PRODUCT TYPE, PLEASE VISIT WWW.MAGNETEK.COM.

WARNINGS and CAUTIONS

Throughout this document WARNING and CAUTION statements have been deliberately placed to highlight items critical to the protection of personnel and equipment.

WARNING – A warning highlights an essential operating or maintenance procedure, practice, etc. which if not strictly observed, could result in injury or death of personnel, or long term physical hazards. Warnings are highlighted as shown below:



CAUTION – A caution highlights an essential operating or maintenance procedure, practice, etc. which if not strictly observed, could result in damage to, or destruction of equipment, or loss of functional effectiveness. Cautions are highlighted as shown below:



WARNINGS and CAUTIONS SHOULD NEVER BE DISREGARDED

The safety rules in this section are not intended to replace any rules or regulations of any applicable local, state, or federal governing organizations. Always follow your local lockout and tagout procedure when maintaining any radio equipment. The following information is intended to be used in conjunction with other rules or regulations already in existence. It is important to read all of the safety information contained in this section before installing or operating the Radio Control System.

2. CRITICAL INSTALLATION CONSIDERATIONS



WARNING

PRIOR TO INSTALLATION AND OPERATION OF THIS EQUIPMENT, READ AND DEVELOP AN UNDERSTANDING OF THE CONTENTS OF THIS MANUAL AND THE OPERATION MANUAL OF THE EQUIPMENT OR DEVICE TO WHICH THIS EQUIPMENT WILL BE INTERFACED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

ALL EQUIPMENT MUST HAVE A MAINLINE CONTACTOR INSTALLED AND ALL TRACKED CRANES, HOISTS, LIFTING DEVICES AND SIMILAR EQUIPMENT MUST HAVE A BRAKE INSTALLED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

AN AUDIBLE AND/OR VISUAL WARNING MEANS MUST BE PROVIDED ON ALL REMOTE CONTROLLED EQUIPMENT AS REQUIRED BY CODE, REGULATION, OR INDUSTRY STANDARD. THESE AUDIBLE AND/OR VISUAL WARNING DEVICES MUST MEET ALL GOVERNMENTAL REQUIREMENTS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

FOLLOW YOUR LOCAL LOCKOUT TAGOUT PROCEDURE BEFORE MAINTAINING ANY REMOTE CONTROLLED EQUIPMENT. ALWAYS REMOVE ALL ELECTRICAL POWER FROM THE CRANE, HOIST, LIFTING DEVICE OR SIMILAR EQUIPMENT BEFORE ATTEMPTING ANY INSTALLATION PROCEDURES. DE-ENERGIZE AND TAGOUT ALL SOURCES OF ELECTRICAL POWER BEFORE TOUCH-TESTING ANY EQUIPMENT. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

THE DIRECT OUTPUTS OF THIS PRODUCT ARE NOT DESIGNED TO INTERFACE DIRECTLY TO TWO STATE SAFETY CRITICAL MAINTAINED FUNCTIONS, I.E., MAGNETS, VACUUM LIFTS, PUMPS, EMERGENCY EQUIPMENT, ETC. A MECHANICALLY LOCKING INTERMEDIATE RELAY SYSTEM WITH SEPARATE POWER CONSIDERATIONS MUST BE PROVIDED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH OR DAMAGE TO EQUIPMENT.

2.1 GENERAL

Radio controlled material handling and mobile hydraulic equipment operates in several directions. Cranes, hoists, lifting devices, other material handling and mobile hydraulic equipment can be large, and operate at high speeds. Quite frequently, the equipment is operated in areas where people are working in close proximity to the equipment. **The operator must exercise extreme caution at all times.** Workers must constantly be alert to avoid accidents. The following recommendations have been included to indicate how careful and thoughtful actions may prevent injuries, damage to equipment, or even save a life.

2.2 PERSONS AUTHORIZED TO OPERATE RADIO CONTROLLED EQUIPMENT

Only properly trained persons designated by management should be permitted to operate radio controlled equipment.

Radio controlled cranes, hoists, lifting devices, other material handling, and mobile hydraulic equipment should not be operated by any person who cannot read or understand signs, notices and operating instructions that pertain to the equipment.

Radio controlled equipment should not be operated by any person with insufficient eyesight or hearing or by any person who may be suffering from a disorder or illness, is taking any medication that may cause loss of equipment control, or is under the influence of alcohol or drugs.

2.3 SAFETY INFORMATION & RECOMMENDED TRAINING FOR OPERATORS

Anyone being trained to operate radio controlled equipment should possess as a minimum the following knowledge and skills before using the radio controlled equipment.

The operator should:

- Have knowledge of hazards pertaining to equipment operation
- Have knowledge of safety rules for radio controlled equipment
- Have the ability to judge distance of moving objects
- Know how to properly test prior to operation
- Be trained in the safe operation of the radio control system as it pertains to the equipment being operated
- Have knowledge of the use of equipment warning lights and alarms
- Have knowledge of the proper storage space for a radio control transmitter when not in use
- Be trained in transferring a radio control transmitter to another person
- Be trained how and when to report unsafe or unusual operating conditions
- Test the radio control system emergency stop and all warning devices prior to operation; testing should be done on each shift, without a load
- Be thoroughly trained and knowledgeable in proper and safe operation of the equipment that utilizes the radio control
- Know how to keep the operator and other people clear of lifted loads and to avoid “pinch” points
- Continuously watch and monitor status of lifted loads
- Know and follow cable and hook inspection procedures
- Know and follow the local lockout and tagout procedures when servicing radio controlled equipment
- Know and follow all applicable operating and maintenance manuals, safety procedures, regulatory requirements, and industry standards and codes

The operator shall not:

- Lift or move more than the rated load
- Operate the material handling equipment if the direction of travel or function engaged does not agree with what is indicated on the controller
- Use the crane, hoist or lifting device to lift, support or transport people
- Lift or carry any loads over people
- Operate the crane, hoist or lifting device unless all persons, including the operator, are and remain clear of the supported load and any potential pinch points
- Operate a crane, hoist, or lifting device when the device is not centered over the load
- Operate a crane, hoist, or lifting device if the chain or wire rope is not seated properly in the sprockets, drum or sheave
- Operate any damaged or malfunctioning crane, hoist, lifting device or other material handling equipment
- Change any settings or controls without authorization and proper training
- Remove or obscure any warning or safety labels or tags

- Leave any load unattended while lifted
- Leave power on the radio controlled equipment when the equipment is not in operation
- Operate any material handling equipment using a damaged controller because the unit may be unsafe
- Operate manual motions with other than manual power
- Operate radio controlled equipment when low battery indicator is on



WARNING

THE OPERATOR SHOULD NOT ATTEMPT TO REPAIR ANY RADIO CONTROLLER. IF ANY PRODUCT PERFORMANCE OR SAFETY CONCERNS ARE OBSERVED, THE EQUIPMENT SHOULD IMMEDIATELY BE TAKEN OUT OF SERVICE AND BE REPORTED TO THE SUPERVISOR. DAMAGED AND INOPERABLE RADIO CONTROLLER EQUIPMENT SHOULD BE RETURNED TO MAGNETEK FOR EVALUATION AND REPAIR. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

2.4 PRE-OPERATION TEST

At the start of each work shift, or when a new operator takes control of the crane, operators should do, as a minimum, the following steps before making lifts with any crane or hoist:

Test all warning devices.

Test all direction and speed controls.

Test the receiver emergency stop.

2.5 TRANSMITTER UNIT

Transmitter switches should never be mechanically blocked ON or OFF. When not in use, the operator should turn the transmitter OFF. A secure storage space should be provided for the transmitter unit, and the transmitter unit should always be placed there when not in use. This precaution will help prevent unauthorized people from operating the material handling equipment.

Spare transmitters should be stored in a secure storage space and only removed from the storage space after the current transmitter in use has been turned OFF, taken out of the service area and secured.

This manual covers two types of Flex transmitters: the Flex EM and Flex EX. Refer to Section 3.3 for the differences between these two transmitter types.

2.6 BATTERIES



KNOW AND FOLLOW PROPER BATTERY HANDLING, CHARGING AND DISPOSAL PROCEDURES. IMPROPER BATTERY PROCEDURES CAN CAUSE BATTERIES TO EXPLODE OR DO OTHER SERIOUS DAMAGE. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

2.7 BATTERY HANDLING

Use only batteries approved by Magnetek for the specific product.

Do not dispose of a battery pack in fire; it may explode.

Do not attempt to open the battery pack.

Do not short circuit the battery.

Keep the battery pack environment cool during charging operation and storage (i.e., not in direct sunlight or close to a heating source).

2.8 BATTERY CHARGING

For those transmitters equipped with battery chargers, please familiarize all users with the instructions of the charger before attempting to use.

Do not attempt to charge non-rechargeable battery packs.

Avoid charging partially discharged rechargeable batteries to help prolong battery cycle life.

Avoid charging the battery pack for more than 24 hours at a time.

Do not charge batteries in a hazardous environment.

Do not short circuit the charger.

Do not attempt to charge a damaged battery.

Use only Magnetek Enrange approved chargers for the appropriate battery pack.

Do not attempt to use a battery that is leaking, swollen or corroded.

Charger units are not intended for outdoor use. Use only indoors.

2.9 BATTERY DISPOSAL

Before disposing of batteries consult local and governmental regulatory requirements for proper disposal procedure.

3. GENERAL TRANSMITTER INFORMATION

3.1 EXTERNAL ILLUSTRATION (12 BUTTON CONFIGURATION)

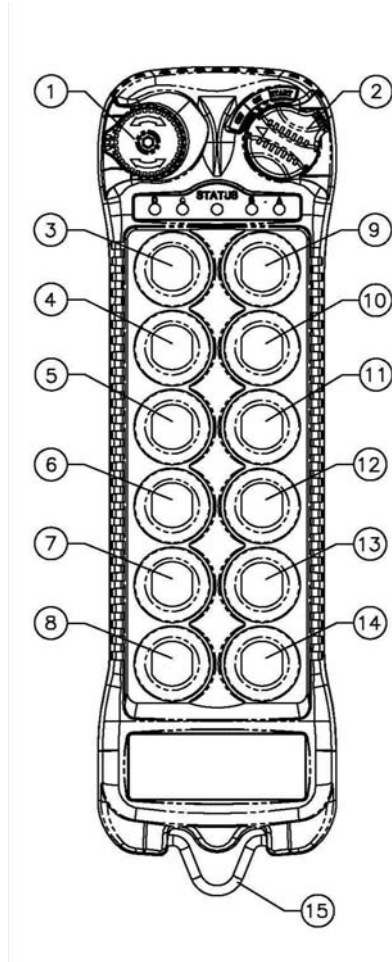


Figure 1

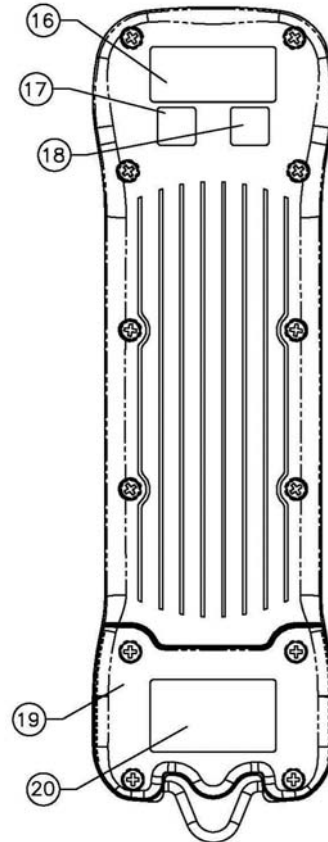


Figure 2

- | | |
|--------------------------|---------------------|
| 1. Emergency Stop Button | 8. Push Button #11 |
| 2. Removable Power Key | 9. Push Button #2 |
| 3. Push Button #1 | 10. Push Button #4 |
| 4. Push Button #3 | 11. Push Button #6 |
| 5. Push Button #5 | 12. Push Button #8 |
| 6. Push Button #7 | 13. Push Button #10 |
| 7. Push Button #9 | 14. Push Button #12 |

- | |
|------------------------|
| 15. Strap Ring |
| 16. System Information |
| 17. System Channel |
| 18. Unit Number |
| 19. Battery Cover |
| 20. FCC Information |

NOTE: Push Buttons #9-#12 are not present on the Flex 8 EM or EX.

NOTE: Push Buttons #5-#12 are not present on the Flex 4 EM or EX.

3.2 INTERNAL ILLUSTRATION (12 BUTTON CONFIGURATION)

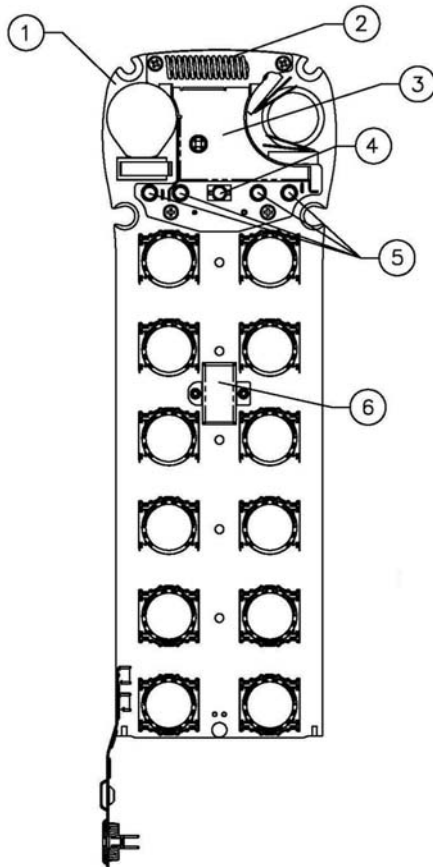


Figure 3

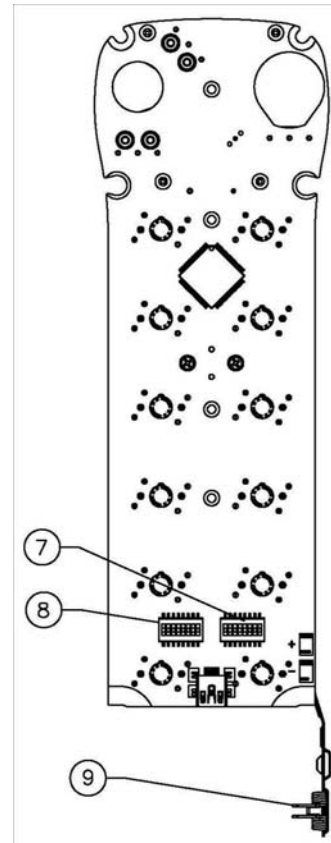


Figure 4

1. Encoder Board
2. Aerial Antenna
3. Transmitting Module
4. Status LED Display
5. Function LED Displays

6. I-CHIP
7. Dip-Switch Bank 1
8. Dip-Switch Bank 2
9. Battery Contact Mechanism

NOTE: The Flex 8 EM or EX will differ slightly.

NOTE: The Flex 4 EM or EX will differ slightly.

3.3 TYPES OF BUTTONS

Both the Flex EM and EX are offered in a number of button configurations. They can be in four button, eight button, or twelve button configurations. The illustrations within this manual show the twelve button configurations. The difference between the Flex EM and Flex EX transmitters are the type of buttons: the Flex EM transmitter has single step (speed) push buttons while the Flex EX has two-step (speed) buttons. For additional information on how these buttons operate your system, consult the drawings provided with the system.

4. DIP-SWITCH SETTINGS

4.1 SYSTEM CHANNEL SETTINGS

Set the transmitter channel by adjusting the dip-switch bank 2 located on the backside of the transmitter encoder board (refer to Figure 4). Only the first five positions of the dip-switch are used for channel programming (refer to Figure 5). The system channels table (Section 6.2) illustrates which dip-switch setting corresponds to which channel. Once the transmitter channel is altered, the receiver must be set up to recognize the transmitter on its new channel.

Top slot → “1”
Bottom slot → “0”

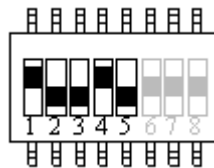


Figure 5

The above dip-switch setting “1 0 0 1 0” corresponds to “channel 19” in the system channels table (Section **Error! Reference source not found.**).

4.2 INACTIVITY TIME-OUT TIMER

Bits 6 and 7 on dip-switch bank 2 (refer to Figure 4) allow the user to define a time after which, if no buttons on the transmitter are pressed, the Flex transmitter will send an OFF command to the receiver and power down. To restart, the user must turn the On/Off/Start switch to the OFF position, then back to ON again to resume operation.

| Time Out | Dip-switch Setting |
|----------------|--------------------|
| 5 minutes | 01 |
| 10 minutes | 10 |
| 15 minutes | 11 |
| Never shut off | 00 |

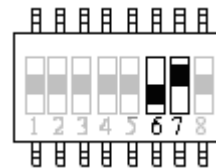


Figure 6

5. OPERATING PROCEDURE

5.1 GENERAL OPERATING PROCEDURE

1. Reset the red emergency stop button located on the top left hand side of the transmitter handset by rotating it either clockwise or counter clockwise. The red button will pop up.

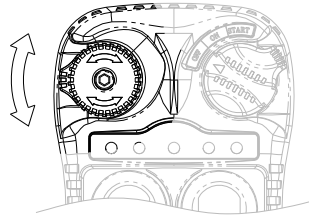


Figure 7

2. Turn on the transmitter power by inserting the black-colored key into the power key slot located on the top right hand side of the transmitter handset and rotate it clockwise to the “On” position.

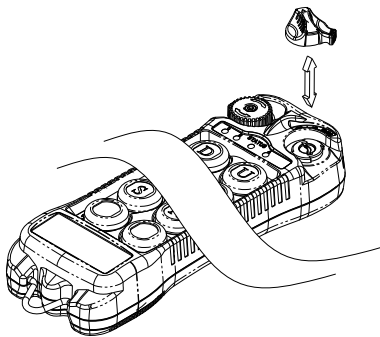


Figure 8

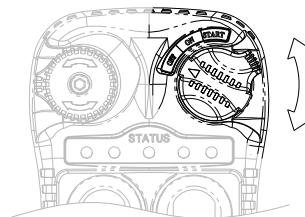


Figure 9

3. After turning on the transmitter power, check the Status LED on the transmitter handset for any sign of system irregularities (refer to Section 5.3). If the system is normal the Status LED will light up green for two (2) seconds, then slowly flash green.
4. If there are no signs of any system irregularities, then rotate the power key further clockwise to the “Start” position for up to two (2) seconds. This will activate the receiver E-Stop. Thereafter, the same “Start” position will become an auxiliary function with momentary contact.



Figure 10

5. Now press any push button on the transmitter handset to operate the equipment. When a button is pressed, the Status LED will flash orange with a variable speed dependent on how far the button is pressed. The further a button is pressed, the faster the LED will flash. When no buttons are pressed, the Status LED will slowly blink green.
6. In case of an emergency, pressing down on the red emergency stop button will immediately disconnect the receiver E-Stop and turn off the unit. To reset the emergency stop button just rotate the red button either clockwise or counter-clockwise and then cycle power to the unit.
7. After a period of inactivity (push button not pressed) defined by the dip-switch, the receiver E-Stop will be disconnected and the unit must cycle power before turning on again.
8. Turn off the transmitter power by rotating the power key counter-clockwise to the "Off" position (the Status LED becomes a solid red for 4 seconds). This will disconnect the transmitter power and the receiver E-Stop altogether. Turn it further counter-clockwise to release the key.

5.2 CHANGING TRANSMITTER BATTERIES

Change the transmitter batteries by unscrewing the battery cover located on the backside of the transmitter (refer to Figure 11 and Figure 12 below). During battery installation make sure that the ribbon is centered between the two batteries. After changing the batteries also make sure that all screws are tightened to avoid water, moisture, dirt, grease, or other liquid penetration.

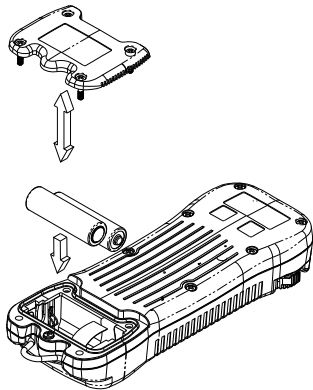


Figure 11

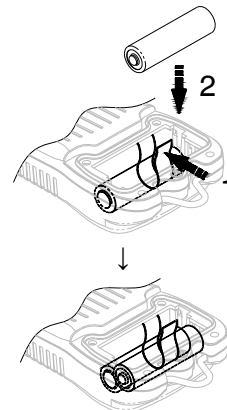


Figure 12

5.3 STATUS LIGHTS INDICATORS & WARNINGS

| Type | Display Type | Indication |
|------|---|---|
| 1 | Slow green blink (Normal Operation) | Transmitter on and in standby. |
| 2 | Blinking orange | Button has been pressed and the unit is transmitting. The speed at which the orange LED blinks is directly related to how far down the button is pressed. |
| 3 | 1 red blink followed by a 2-second pause | Voltage goes below 1.9V during operation - change batteries immediately. |
| 4 | 2 red blinks followed by a 2-second pause | A push button is active while turning on the transmitter. The button that is active will be designated by the (D, C, B, A) LEDs. See Section 5.4 |
| 5 | 3 red blinks followed by a 2-second pause | I-CHIP error. |
| 6 | 4 red blinks followed by a 2-second pause | Transmitting error, system cannot lock on to the designated channel. |
| 7 | Constant green for up to 2 seconds | Transmitter power on with no faults detected (prior to initiating the START function). |
| 8 | Solid Red | Stop command initiated with receiver E-Stop deactivated. |
| 9 | Solid Red | Voltage goes below 1.9V at initial power on - transmitter power shuts off. |

5.4 PUSH BUTTON ERROR TABLE

| D | C | B | A | Push Button |
|-----|-----|-----|-----|-------------|
| OFF | OFF | OFF | ON | 1 |
| OFF | OFF | ON | OFF | 2 |
| OFF | OFF | ON | ON | 3 |
| OFF | ON | OFF | OFF | 4 |
| OFF | ON | OFF | ON | 5 |
| OFF | ON | ON | OFF | 6 |
| OFF | ON | ON | ON | 7 |
| ON | OFF | OFF | OFF | 8 |
| ON | OFF | OFF | ON | 9 |
| ON | OFF | ON | OFF | 10 |
| ON | OFF | ON | ON | 11 |
| ON | ON | OFF | OFF | 12 |

6. CHANNEL CONFIGURATION SETTINGS

6.1 FCC STATEMENTS

Compliance Statement (Part 15.19)

This device complies with Part 15 of 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.

Warning (Part 15.21)

Changes or modifications not expressly approved by the party responsible for compliance should void the user's authority to operate the equipment.

This portable transmitter with its antenna complies with FCC's RF exposure limits for general population/uncontrolled exposure.

6.2 CHANNEL TABLE

| Channel | Frequency | Dip-switch Setting | Channel | Frequency | Dip-switch Setting |
|-----------|------------|--------------------|-----------|------------|--------------------|
| 01 | 433.000MHZ | 00000 | 17 | 433.800MHZ | 10000 |
| 02 | 433.050MHZ | 00001 | 18 | 433.850MHZ | 10001 |
| 03 | 433.100MHZ | 00010 | 19 | 433.900MHZ | 10010 |
| 04 | 433.150MHZ | 00011 | 20 | 433.950MHZ | 10011 |
| 05 | 433.200MHZ | 00100 | 21 | 434.000MHZ | 10100 |
| 06 | 433.250MHZ | 00101 | 22 | 434.050MHZ | 10101 |
| 07 | 433.300MHZ | 00110 | 23 | 434.100MHZ | 10110 |
| 08 | 433.350MHZ | 00111 | 24 | 434.150MHZ | 10111 |
| 09 | 433.400MHZ | 01000 | 25 | 434.200MHZ | 11000 |
| 10 | 433.450MHZ | 01001 | 26 | 434.250MHZ | 11001 |
| 11 | 433.500MHZ | 01010 | 27 | 434.300MHZ | 11010 |
| 12 | 433.550MHZ | 01011 | 28 | 434.350MHZ | 11011 |
| 13 | 433.600MHZ | 01100 | 29 | 434.400MHZ | 11100 |
| 14 | 433.650MHZ | 01101 | 30 | 434.450MHZ | 11101 |
| 15 | 433.700MHZ | 01110 | 31 | 434.500MHZ | 11110 |
| 16 | 433.750MHZ | 01111 | 32 | 434.550MHZ | 11111 |

7. TROUBLESHOOTING



WARNING

THE OPERATOR SHOULD NOT ATTEMPT TO REPAIR ANY RADIO CONTROLLER. IF ANY PRODUCT PERFORMANCE OR SAFETY CONCERNS ARE OBSERVED, THE EQUIPMENT SHOULD IMMEDIATELY BE TAKEN OUT OF SERVICE AND BE REPORTED TO THE SUPERVISOR. DAMAGED AND INOPERABLE RADIO CONTROLLER EQUIPMENT SHOULD BE RETURNED TO MAGNETEK FOR EVALUATION AND REPAIR. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

7.1 TROUBLESHOOTING TABLE

| Problems | Possible Reasons | Suggestions |
|--|--|---|
| No response when transmitter push button is pressed (Improper startup & settings) | Transmitter low battery power | Check the transmitter battery level. |
| | Emergency stop button activated prior to startup | Prior to turning on the transmitter power switch make sure that the red emergency stop button is elevated. |
| | Improper startup procedure | Redo the startup procedure by holding the power key at "START" position for up to 2.0 seconds and then release. |
| | Incorrect system RF channel | Make sure that the transmitter handset and the receiver unit both have the same channel. |
| | Incorrect Receiver Access Code | Make sure that the transmitter handset and receiver unit both have the same Receiver Access Code. |
| | System out of range | Make sure that the startup procedure is initiated within 100 meters (300 feet) from the receiver location. |

8. NOTES