

# ***Alpha 500 Series***

## **Operation Manual**

**Fomotech International Corp.**

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## 1. INTRODUCTION

The Alpha 500 Series is a highly reliable industrial remote control system. The versatile features of the Alpha 500 permit its use in many different remote control applications. They can be used to control hoists, trolleys, and other automatic control systems.

The Alpha 500 Series remote control system has redundant safety circuits that guaranty maximum security and ensures the system is resistant to outside interference. The major features of the Alpha 500 systems are as follow:

- \* The system uses an advanced microprocessor at both the transmitter and the receiver unit which utilizes highly evolved software that has redundant error checking and correcting to ensure 100 % error-free transmission, decoding, and control of the output relays. This highly evolved software includes CRC (Cyclic Redundancy Check codes) and Hamming Codes.
- \* To insure maximum operating safety; low voltage warning, receiver self-diagnosing, transmitter pushbutton self-diagnosing, transmitter low voltage detection and warning are some of the important standard features included with the system.
- \* The encoder/decoder system utilizes advanced microprocessor. The availability of 32,768 sets of unique ID code will ensure that only commands from the matching control transmitter can be carried out without any interference from other radio systems. A special programmable integrated circuit is used to insure the unit cannot simultaneously command conflicting movements.
- \* The RF modules are fully SMT designed for stability, combined with resistance M-type coupling and multi-impedance circuits to lower the harmonic and unnecessary radiated interference.

The Alpha 500 Series remote control system consists of a transmitter and a receiver unit. The transmitter casing is molded using industrial strength materials which are impervious to dust, water, oil, acids, alkaline, heat and sunlight as well as being resistant to heavy impact and deformation due to long term use in harsh environments. The pushbuttons are also constructed from industrial strength materials for up to one million cycles. The transmitter unit uses a special high efficiency power saving circuit that requires only two AA size batteries.

## 1. **SAFETY INSTRUCTION**

The Alpha 500 system is relatively simple to use. However, it is very important to observe the proper safety procedures during operation. When use properly the Alpha 500 will enhance productivity and efficiency in the workplace.

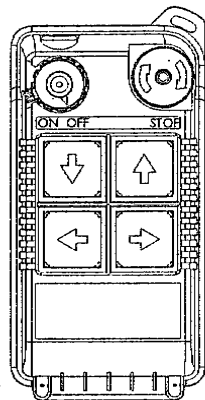
The following instructions should be strictly followed:

1. Make a daily check of the transmitter casing and pushbuttons. Should it appear that anything could inhibit the proper operation of the transmitter unit, it should be immediately removed from service.
2. The transmitter voltage should be checked on a daily basis. If the voltage is low, the two AA alkaline batteries should be replaced.
3. The emergency stop pushbutton (EMS) should be checked at the beginning of each shift to ensure they are in the proper working order.
4. In the event of an emergency, activate the emergency stop pushbutton immediately. Then turned the power "off" from the main power source of the equipment.
5. The power switch should be turned "off" after use and should never left the power "on" when the unit is unattended.
6. Do not use the same RF channel and ID code as any other unit in use at the same facility.
7. Ensure the wrist strap is worn at all time during operation to avoid accidental dropping.

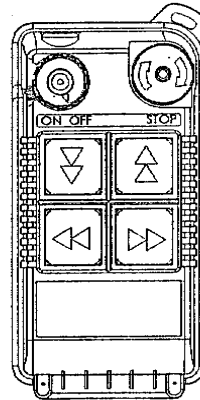
### 3. PUSHBUTTON CONFIGURATION

Alpha 500 Series with two (2) different models:

1. Alpha 500 : Single Speed (Fig. 1).
2. Alpha 520 : Dual Speed (Fig. 2).

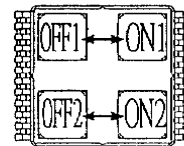
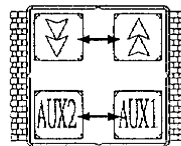
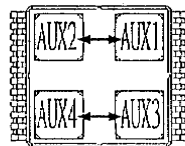
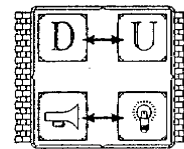
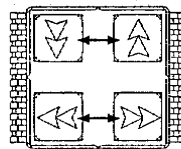
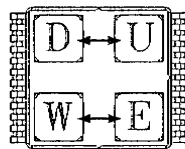


(Fig. 1)

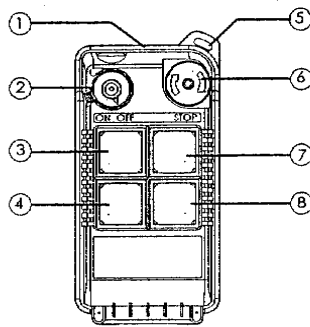


(Fig. 2)

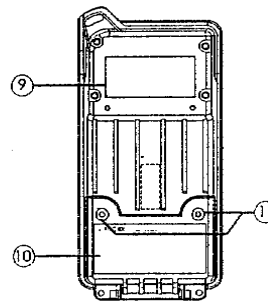
3. Standard pushbutton configurations are U&D, E&W, or arrow symbol (Fig. 1 & 2) interlocked to one another; they can also be set at non-interlocked state. Other types of pushbutton configuration are also available:



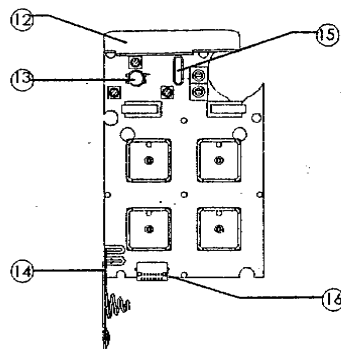
#### 4. TRANSMITTER OUTLINE



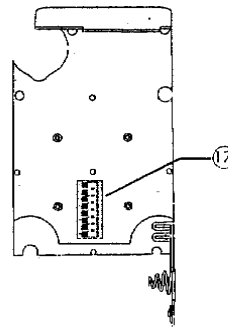
(Fig. 3) Front View



(Fig. 4) Back View



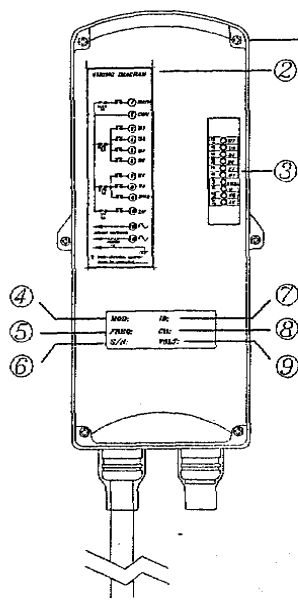
(Fig. 5) PCB Front View



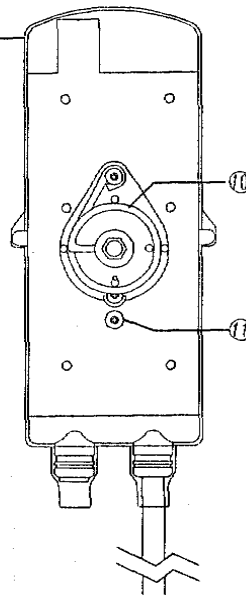
(Fig. 6) PCB back view

- |                          |                            |                               |
|--------------------------|----------------------------|-------------------------------|
| 1) Transmitter Enclosure | 8) Pushbutton # 3          | 15) TX Quartz Crystal         |
| 2) Power Switch (ON/OFF) | 9) System Information      | 16) External Programming Port |
| 3) Pushbutton #2         | 10) Battery Cover          |                               |
| 4) Pushbutton #4         | 11) Battery Screws         | 17) ID Code Dip-Switch        |
| 5) Strap Ring            | 12) Antenna (Aerial)       |                               |
| 6) Emergency Stop (EMS)  | 13) Status LED Indicator   |                               |
| 7) Pushbutton #1         | 14) Battery Contact Spring |                               |

## 5. RECEIVER OUTLINE



(Fig. 7) Front View



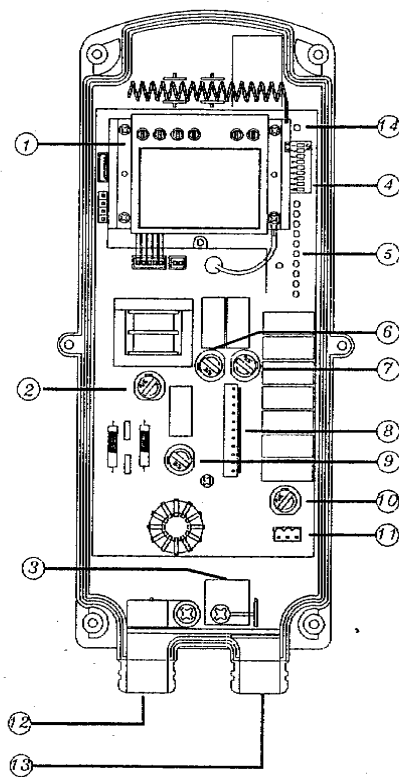
(Fig. 8) Back View

- |                               |                            |
|-------------------------------|----------------------------|
| 1) Receiver Enclosure         | 6) Serial Number (S/N)     |
| 2) Wiring Diagram             | 7) Security Code (ID)      |
| 3) Contact Relay LED Display* | 8) Frequency Channel (CH)  |
| 4) Model (MOD)                | 9) Supplied Voltage (VOLT) |
| 5) Frequency (FREQ)           | 10) Anti-Shock Spring      |
|                               | 11) Grounding (GND)        |

\* M ~ Main Contact Relay.

\* SQ ~ Display of red light upon receiving frequency signals from the transmitter unit.

\* AC ~ Power Source (Should be "on" at all time during remote operation).

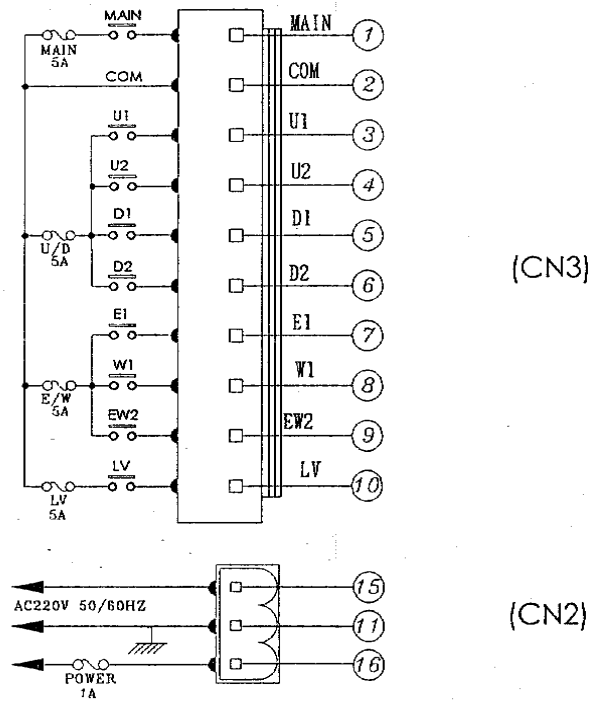


(Fig. 9) Internal Parts Assembly

- |                              |                                  |
|------------------------------|----------------------------------|
| 1) RX Module                 | 8) Contact Output Seat (CN3)     |
| 2) Power Fuse (AC)           | 9) Low Voltage Warning Fuse (LV) |
| 3) Spare Fuse & Jumpers      | 10) East/West Fuse               |
| 4) ID Code Dip-Switch        | 11) AC Power Input Seat (CN2)    |
| 5) Contact Relay LED Display | 12) Output Mouth                 |
| 6) MAIN Fuse                 | 13) Output Mouth (Reserved Wire) |
| 7) Up/Down Fuse              | 14) System Status LED Display    |

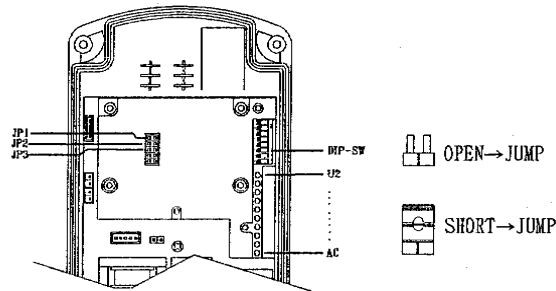


## 6. OUTPUT CONTACT DIAGRAM



## 7. SYSTEM SETTING CONFIGURATION

### 7.1 How To Set Jumper Functions



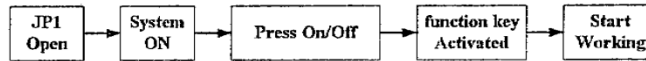
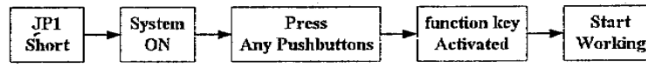
#### Manufacture settings.

JP1	Open	Use transmitter power switch for key function and MAIN contact relay activation at power "on" or after EMS reset.
	Short	Use transmitter pushbutton for key function and MAIN contact relay activation after power "on" or after EMS reset.
JP2	Open	MAIN contact relay "on" constantly
	Short	After 5 minutes of non-transmitted signal from the transmitter unit, the MAIN contact relay will be deactivated (see note A)
JP3	Open	LV warning only, MAIN will not be deactivated.
	Short	TX Low battery for period of one minute, MAIN and LV will be deactivated (see note B)

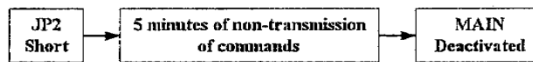
Note A: The MAIN contact relay cut-off time can be set from 1~30 minutes via external programming unit; manufacture preset at 5 minutes.

Note B: In case of transmitter low voltage, the transmitter will send a low voltage signal (LV) to the decoder unit. After one minute of LV warning, the MAIN and LV relays from the receiver unit will be deactivated (system "off" temporarily). Within that one minute of LV warning, the LV contact relay from the receiver unit will open and close at every one-second interval. By connecting a horn, light, or siren to the LV contact relay will ensure that the operator will definitely notice the transmitter low-voltage even in hard to see or hear environments. After changing a set of new batteries, press any pushbuttons to reactivate the MAIN and LV again.

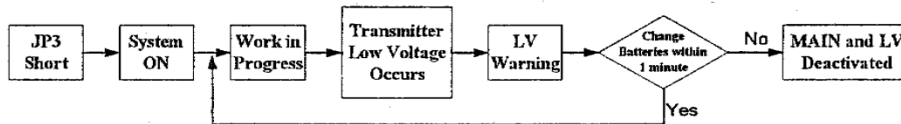
### JP1



### JP2



### JP3



## **8. RECEIVER INSTALLATION**

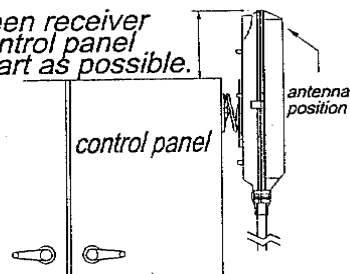
### **8.1 Preparation For Installation**

1. Required Tools:
  - (1) Flat Head Screwdriver (-)
  - (2) Phillips Head Screwdriver (+)
  - (3) Multi-Meter
  - (4) 14mm Wrench x 2
  - (5) 10.5mm Drill-Bit
2. Ensure receiver is not set to the same channel and ID code as any other units in operation at the same facility.
3. Prior to installation, make sure that the crane system itself is working properly.
4. Use the multi-meter to check the voltage source available and ensure receiver voltage setting is correct for this voltage.
5. Prior to installation, switch off the main power source to the equipment.

### **8.2 Step By Step Installation**

1. The location selected should have the antenna visible from all areas where the transmitter is to be used.
2. The location selected should not be exposed to high levels of electrical noise.
3. Ensure the selected location has adequate space to accommodate the receiver enclosure.
4. The distance between the antenna and the control panel should be as far apart as possible (see diagram next page).
5. Drill a hole on the control panel (10.5mm)
6. Tightened the two screws provided.
7. If the control panel has a plastic surface, extended grounding wire should be used.
8. For system wiring, please refer to the output contact diagram on page 8 or on the receiver enclosure.
9. Ensure all wiring is correct and safely secured and all screws are tight.

*The distance between receiver antenna and the control panel should be as far apart as possible.*



### 8.3 System Testing

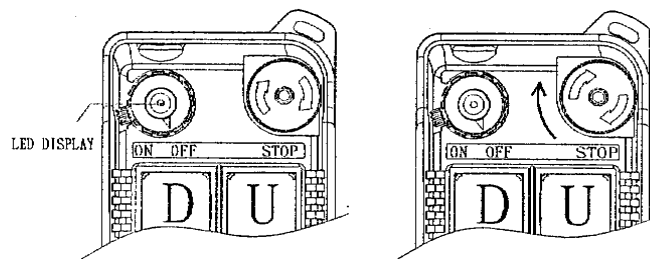
1. Connect the power source to the receiver and test the operation of each function to ensure it operates in the same manner as the pendant controller.
2. Ensure the MAIN contact can be properly controlled by the remote control.
3. Ensure the limit switches on the hoist/trolley that limit the travel of the hoist/trolley is working properly.
4. Ensure the pendant controller is located in a safe location where it would not interfere with remote operation.

## 9. TRANSMITTER OPERATION

1. Make sure the two (2) alkaline batteries are installed correctly.
2. Turn "on" the power switch located on the top left hand corner of the transmitter unit (see diagram below). Immediately after turning "on" the transmitter unit, the status LED indicator at the center of the power switch will display a green light for up to two (2) seconds, do make sure that the red EMS pushbutton is in "up" position. If the status LED displays a red blinking light or no light at all, then the batteries used are not in good condition. You must replace a set of new batteries before operation.

**Note:** Transmitter key functions are activated automatically after turn "on" the power switch (see Jumper Settings on page 9).

3. When command pushbuttons are pressed, the status LED indicator on the transmitter unit will display a short blinking green light to indicate signal transmitted.
4. In case of an emergency, press down the red EMS pushbutton will immediately deactivates the MAIN contact relay from the receiver unit and the key functions of the transmitter unit. The status LED indicator on the transmitter unit will show a continuous blinking red light when EMS is activated. To resume back to operational status, turn the red EMS pushbutton clockwise, it will pop up to its non-active state, and then turn the transmitter power switch "off" and then "on" again to reactivate the MAIN contact relay and the transmitter key functions (see Jumper Settings on page 9).
5. Please note that the conflicted movements are interlocked to one another for safety purpose, it can also be set at a non-interlocked state via external programmer. Pressing conflicted commands at the same time will result in a non-transmission. (i.e. Press "U" & "D" at the same time, no action will be carried out)



## 10. TROUBLE SHOOTING

Should the operator find the equipment not operating normally, please check the chart below for simple trouble shooting steps:

SYMPTOM	REASON	SOLUTION
Transmitter does not communicate to receiver.	Transmitter and the receiver are not on the same RF channel (SQ lamp not lit) or ID code.	Ensure the correct transmitter is in use. The labels on the receiver and the transmitter will identify the RF channel and ID code in use.
Transmitter does not communicate to receiver.	Low or no transmitting power from the transmitter unit.	Turn "on" the power of the transmitter unit and EMS in "up" position. If the status LED only shows red blinking light or no light at all, then turn the power "off" and replace the two alkaline AA batteries.
No power to the receiver (AC power indicator on the receiver unit not lit).	Blown fuse or no input power connection.	Ensure power input to the receiver unit is correct. If power indicator (AC) is still not lit, please check the receiver for any burned fuses.
Outputs do not operate correctly.	Receiver configuration is not set properly or output wiring is incorrect.	Please refer to section 6 and 7 to ensure receiver is correctly wired and configured for your application.

Receiver System Status LED Display (Fig. 9):

TYPE	LED INDICATION (Red)	REASON
1	Constant red light without flashes	EEPROM error, manufacture reprogramming required.
2	ON → 1 second OFF → 1 second	Incorrect ID code, please readjust accordingly.
3	No lights at all.	Under-voltage, check the main power supply.
4	ON → 2 seconds OFF → 0.1 second	System error, manufacture reprogramming required.

## 11. SYSTEM SPECIFICATION

### 11.1 Radio Transmitter

Frequency Range	:	301 - 480 MHz
Transmitting Range	:	50 meters (150 feet) 100 meters (optional)
Hamming Distance	:	4
Channel Spacing	:	25KHz
Frequency Control	:	Quartz Crystals
Frequency Drift	:	< 5ppm @ -20°C ~ +70°C
Frequency Deviation	:	< 1ppm @ 25°C
Spurious Emission	:	- 50dB
Transmitting Power	:	~1mW
Emission	:	F1D
Antenna Impedance	:	50 ohms
Enclosure	:	IP-65
Source Voltage	:	3.0VDC (AA Alkaline Batteries X 2)
Current Drain	:	10 ~ 20 mA
Operating Temp.	:	-20°C ~ +70°C
Dimension	:	141mm X 68mm X 31mm
Weight	:	200g (include batteries)
Impact Durability	:	50G



## 11.2 Receiver

Frequency Range	:	301 ~ 480 MHz
Channel Spacing	:	25KHz
Hamming Distance	:	4
Frequency Control	:	Quartz Crystals
Frequency Drift	:	< 5ppm @ -20°C ~ +70°C
Frequency Deviation	:	< 1ppm @ 25°C
Sensitivity	:	0.4 $\mu$ V
Antenna Impedance	:	50 ohms
Data Decoder Reference	:	Quartz Crystals
Responding Time	:	40mS (Normal)
Enclosure	:	IP-65
Source Voltage	:	48V ~ 230VAC, 50/60 Hz.
Power Consumption	:	11VA
Operating Temp.	:	-20°C ~ +70°C
Output Contact Rating	:	250V @ 10A
Dimension	:	310mm X 134mm X 72mm
Weight	:	1625g (including cable)

## 12. SPARE PARTS LIST

- |                            |        |
|----------------------------|--------|
| 1. TX Module/Encoder Board | BEN50  |
| 2. RX Module               | BRX10S |
| 3. Decoder/Relay Board     | BDR50  |
| 4. Transmitter Enclosure   | BCT50  |
| 5. Receiver Enclosure      | BCR50  |