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1. INTRODUCTION

The Alpha 500 series are highly reliable industrial remote control systems. The versatile features of the Alpha 500 series permit its use in many different remote control applications. They can be used to control cranes, hoists, trolleys, mining equipment, building construction equipment, automatic control systems, and many others.

The Alpha 500 series radio control system incorporates numerous redundant safety circuits that guaranty maximum security and ensure the system is resistant to outside interference. The major features of the Alpha 500 series are as follow:

* The system uses advanced microprocessors which utilizes highly evolved software that have redundant error checking and correcting capabilities to ensure 100 % error-free transmission, decoding, and control of the output relays. These highly evolved software include CRC (**C**yclic **R**edundancy **C**heck codes) and Hamming Codes.

* To insure maximum operating safety, the Alpha 500 series incorporate many safety features. Some of these safety features include receiver self-diagnosing, transmitter pushbutton self-diagnosing, transmitter low voltage detection/warning, transmitter/receiver auto shutdown after 1 minute of transmitter low voltage warning, and receiver MAIN deactivation during transmitter non-usage (programmable from 0~30 minutes).

* The encoder/decoder system utilizes advanced microprocessor. The availability of 32,768 sets of unique ID codes 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 can not simultaneously command conflicting movements.

* Full SMT design for system stability.

The Alpha 500 series radio control system consists of a transmitter handheld, a receiver unit, and a six-foot (2-meter) output cable. The transmitter casing is molded using an industrial strength composite material which is impervious to dust, water, oil, acids, alkaline, heat, sunlight, and as well as being resistant to deformation due to long term use in harsh environments. The pushbuttons are also constructed from industrial strength composite material with a minimum of up to one million cycles. For power saving, the transmitter unit uses special high efficiency power saving circuits that requires only two "AA" alkaline batteries (UM-3).

2. SAFETY INSTRUCTION

The Alpha 500 systems are relatively simple to use. However, it is very important to observe the proper safety procedures during operation. When use properly the Alpha 500 systems 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.

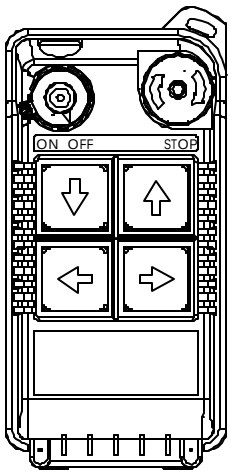
7. Ensure the wrist strap is worn at all time during operation to avoid accidental dropping.

8. Never operate a crane or equipment with two (2) transmitter units at the same time with same RF channel and ID code.

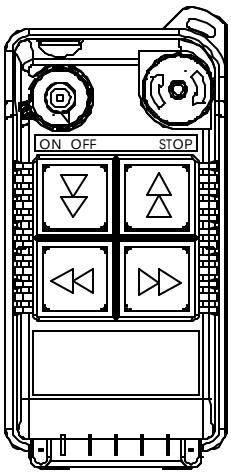
3. PUSHBUTTON CONFIGURATION

3.1 Alpha 500/520 Models

1. Alpha 500 : Up to 2 motions, single-speed pushbuttons, EMS Stop.
2. Alpha 520 : Up to 2 motions, dual-speed pushbuttons, EMS Stop.

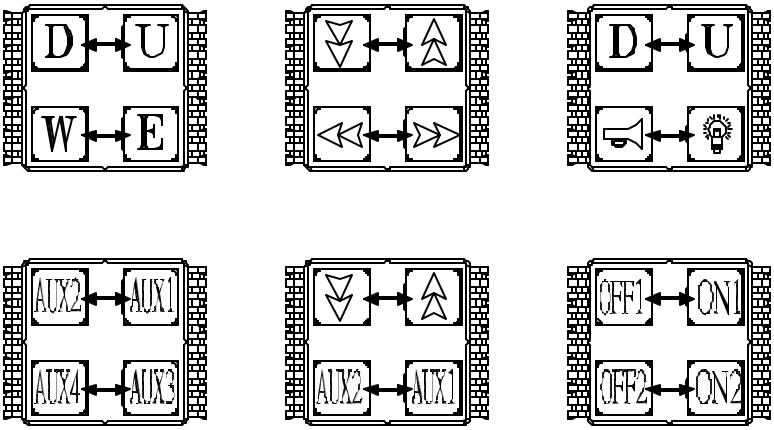


(Alpha 500)



(Alpha 520)

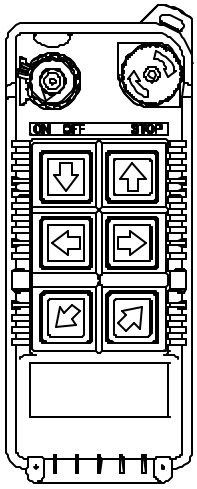
Below are many types of pushbutton configuration that are also available upon request.



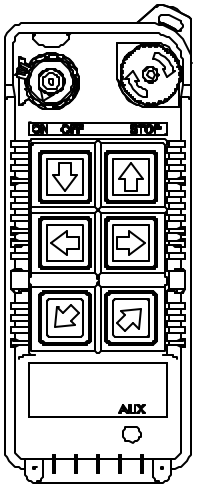
◄► Interlocked (can also be set to non-interlocked).

3.2 Alpha 540/560 Models

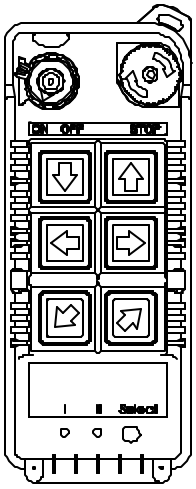
1. Alpha 540S : Up to 3 motions, single-speed pushbuttons, EMS Stop.
2. Alpha 540A : Up to 3 motions, single-speed pushbuttons, AUX, EMS Stop.
3. Alpha 540T : Up to 5 motions, single-speed pushbuttons, "Select" pushbutton for auxiliary hoist and/or trolley, EMS Stop.
4. Alpha 560S : Up to 3 motions, dual-speed pushbuttons, EMS Stop.
5. Alpha 560A : Up to 3 motions, dual-speed pushbuttons, AUX, EMS Stop.
6. Alpha 560T : Up to 5 motions, dual-speed pushbuttons, "Select" pushbutton for auxiliary hoist and/or trolley, EMS Stop.



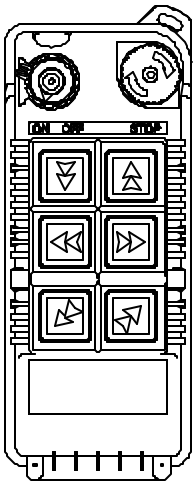
(Alpha 540S)



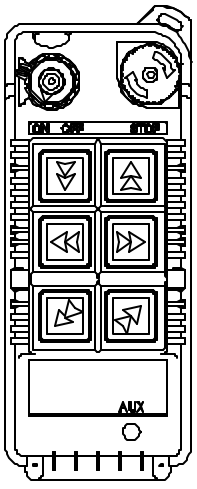
(Alpha 540A)



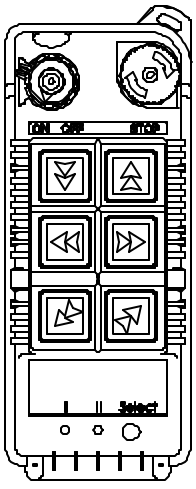
(Alpha 540T)



(Alpha 560S)



(Alpha 560A)



(Alpha 560T)

3.3 Alpha 540T/560T "Select" Pushbutton Function

For Crane system with main and auxiliary hoist, press "Select" pushbutton in sequence to choose between the two hoists.

1) Power "on" LED-I lit Main hoist active.
2) Press "Select" LED-II lit Auxiliary hoist active.
3) Press "Select" LED-I & LED-II lit Both main and auxiliary hoist active with duplicate movements.
4) Press "Select" again LED I lit Back to main hoist active.

3.4 FCC ID Labels and Numbers

FCC ID: XXXALPHA504SERIES

FOMOTECH INTERNATIONAL CORP.

This Device complies with Part 15 of the 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.

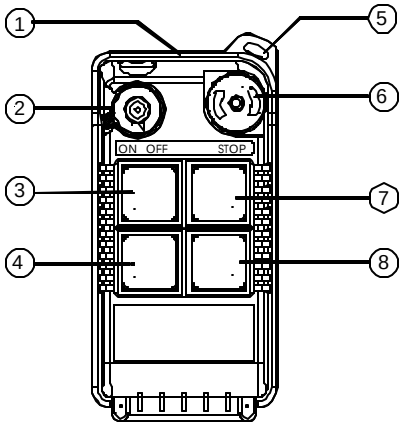
FCC ID: XXXALPHA506SERIES

FOMOTECH INTERNATIONAL CORP.

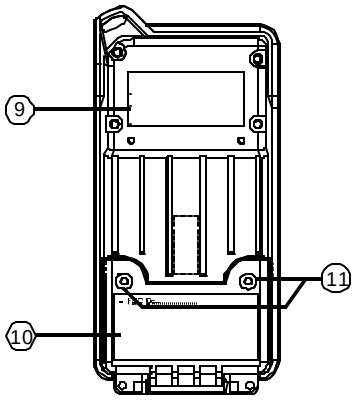
This Device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

4. TRANSMITTER OUTLINE

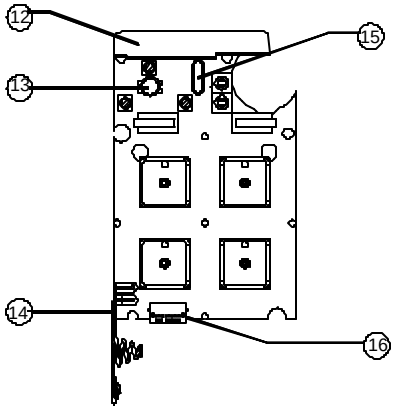
4.1 Alpha 500/520



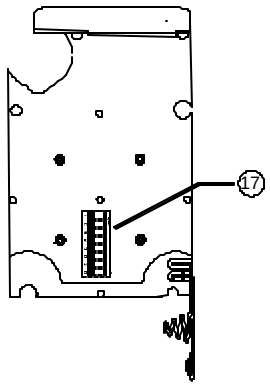
(Fig. 1) Front View



(Fig. 2) Back View



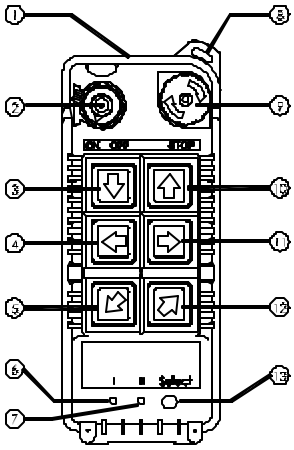
(Fig. 3) Front View



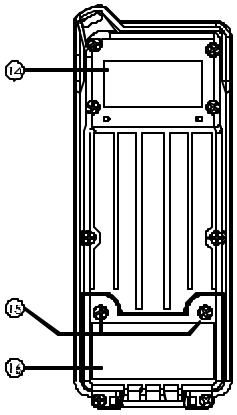
(Fig. 4) Back view

1) Transmitter enclosure
2) Power switch (ON/OFF)
3) Pushbutton #2
4) Pushbutton #4
5) Strap ring
6) Emergency stop (EMS)
7) Pushbutton #1
8) Pushbutton # 3
9) System information
10) Battery cover/FCC ID
11) Battery screws
12) Antenna
13) Status LED display
14) Battery contact
15) TX quartz crystal
16) Programming port
17) ID code dip-switch

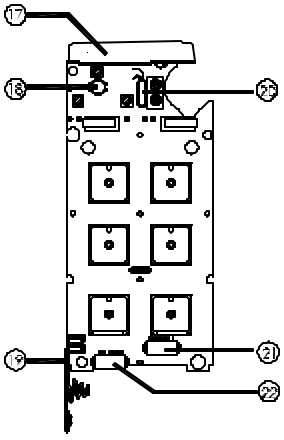
4.2 Alpha 540/560



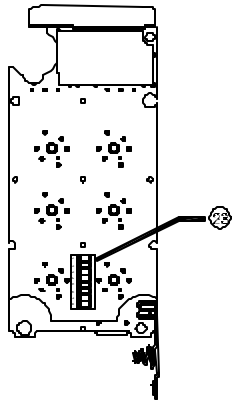
(Fig. 5) Front View



(Fig. 6) Back View



(Fig. 7) Front View



(Fig. 8) Back View

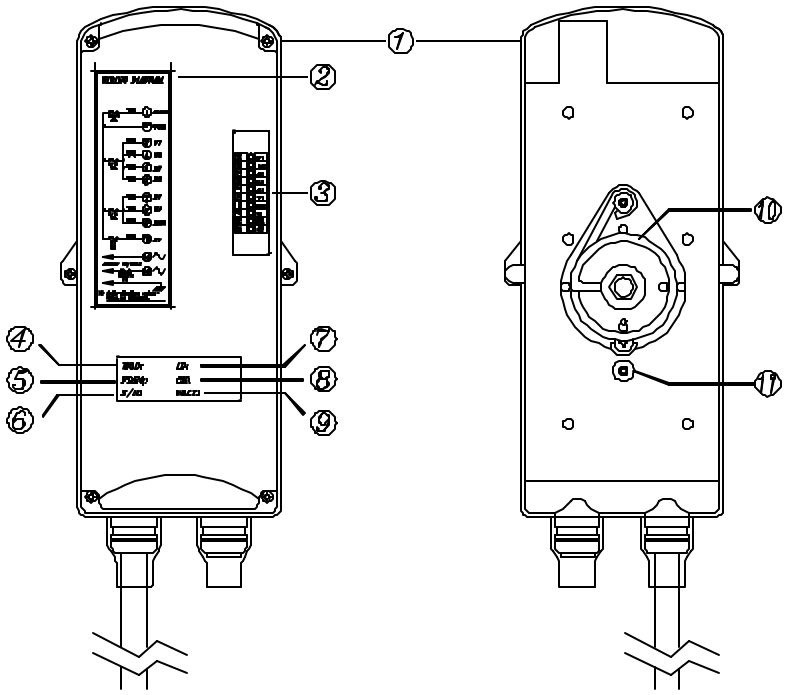
1) Transmitter enclosure
2) Power switch (ON/OFF)
3) Pushbutton #2
4) Pushbutton #4
5) Pushbutton #6
6) Main hoist and/or trolley*
7) Auxiliary hoist and/or trolley*
8) Strap ring
9) Emergency stop (EMS)
10) Pushbutton #1
11) Pushbutton #3
12) Pushbutton #5
13) Select/AUX pushbutton**
14) System information
15) Battery screws
16) Battery cover/FCC ID
17) Antenna
18) Status LED display
19) Battery contact
20) TX quartz crystals
21) Select/AUX connector port**
22) Programming port
23) ID code dip-switch

** For Alpha 540T/560T models only.*

*** For Alpha 540/560 A and T models only.*

5. RECEIVER OUTLINE

5.1 All Models



(Fig. 9) Front View (Fig. 10) Back View

1) Receiver enclosure
2) Wiring diagram
3) Contact relay LED displays*
4) Model (MOD)
5) Frequency (FREQ)
6) Serial number (S/N)
7) Security code (ID)
8) Frequency channel (CH)
9) Supplied voltage (VOLT)
10) Anti-vibration spring
11) Grounding (GND)

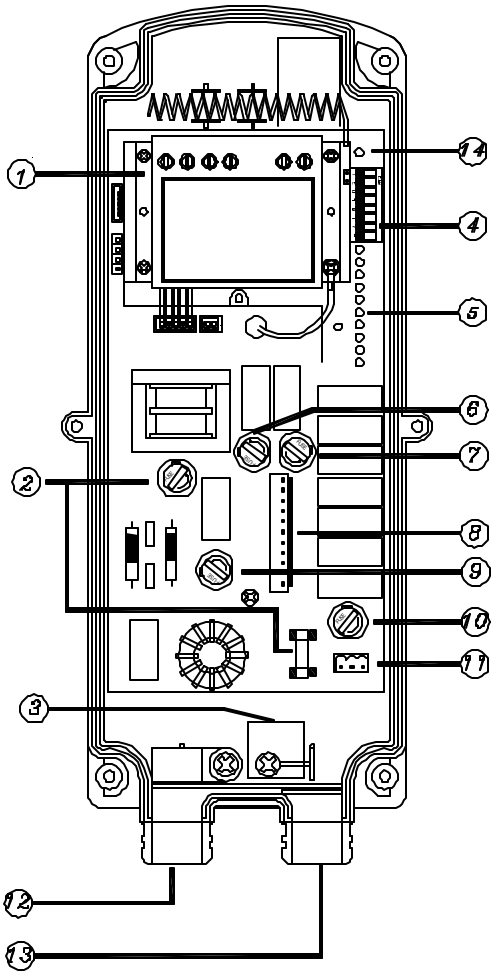
* A ~ AUX (Alpha 540A/560A) and "Select" (Alpha 540T/560T) Indicator.

* M ~ MAIN and 2nd Speed Indicator.
Green "ON" MAIN activated.
Red "ON" 2nd speed activated (Alpha 560 models only).

* SQ ~ RF Frequency Signal Indicator (Red).
"ON" Signals received (ON 0.1 second and OFF 0.1 second).
"OFF" No frequency signals received.

* AC ~ Power Source Indicator.

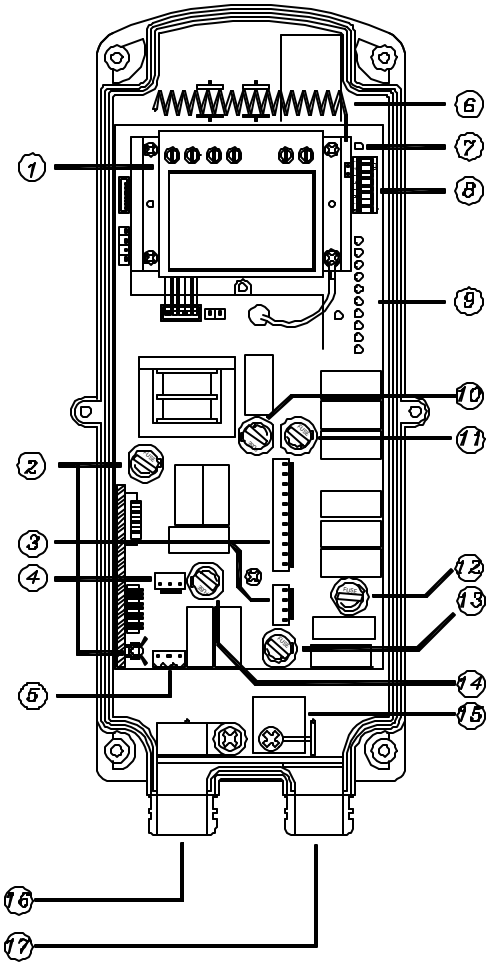
5.2 Alpha 500/520 Internal Assembly



(Fig. 11) Internal Parts Assembly

1) RX module
2) Power fuse (AC)
3) Spare fuses & jumpers
4) ID code dip-switch
5) Contact relay LED displays
6) MAIN fuse
7) Pushbutton #1 and #2 fuse
8) Contact output seat (CN3)
9) Low voltage warning fuse (LV)
10) Pushbutton #3 and #4 fuse
11) AC power input seat (CN2)
12) Output cable mouth
13) Reserved output cable mouth
14) System status LED display

5.3 Alpha 540/560 Internal Assembly

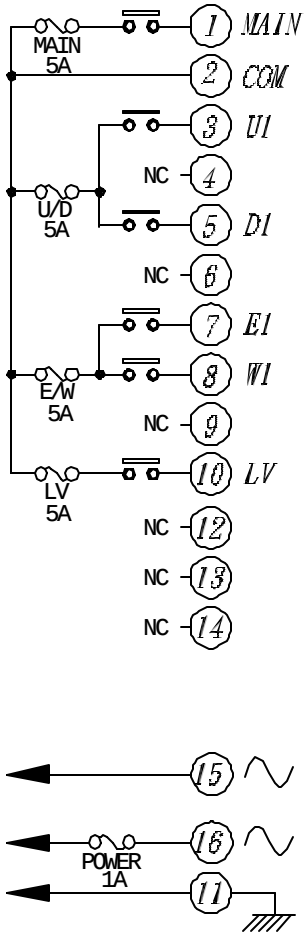


(Fig. 12) Internal Parts Assembly

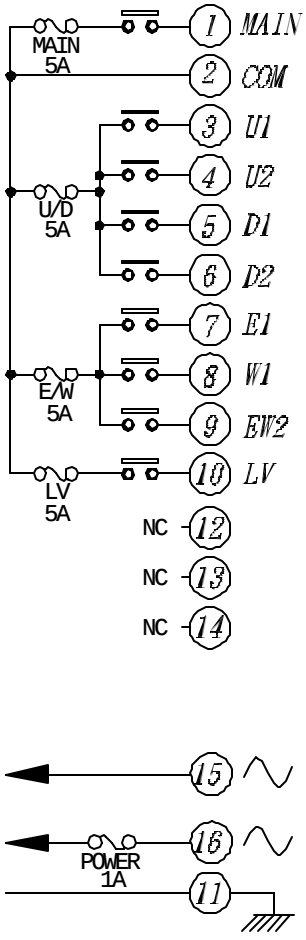
1) RX module
2) Power fuse (AC)
3) Contact output (CN3, CN4)
4) Reserved contact output (CN5)
5) AC power connector (CN2)
6) Antenna
7) System status LED display
8) ID code dip-switch
9) Contact relay LED displays
10) MAIN contact fuse
11) Pushbutton #1 and #2 fuse
12) Pushbutton #3 and #4 fuse
13) Pushbutton #5 and #6 fuse
14) Low voltage fuse (Alpha 540S/560S)
    LV/AUX fuse (Alpha 540A/560A)
    SELECT fuse (Alpha 540T/560T)
15) Spare fuse & jumpers
16) Output cable mouth
17) Reserved output cable mouth

6. OUTPUT CONTACT DIAGRAM

6.1 Alpha 500/520 Wiring Diagram



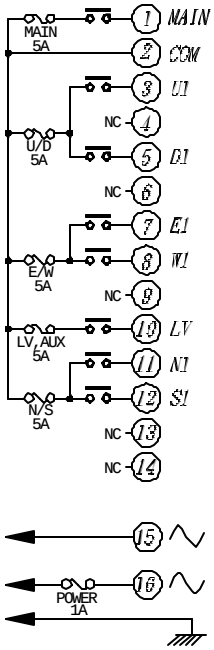
(Alpha 500)



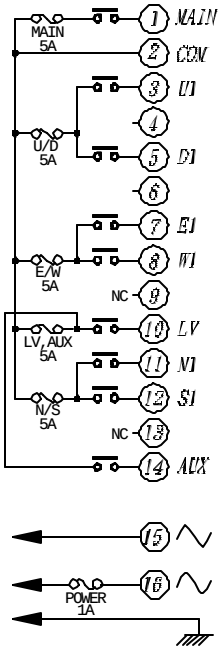
(Alpha 520)

NC No connection

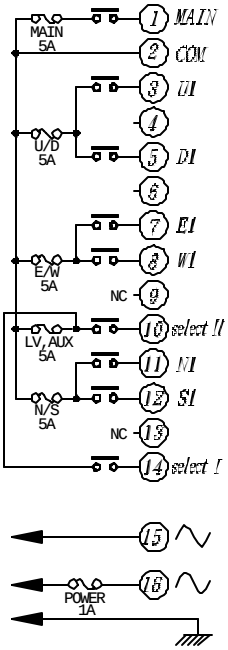
6.2 Alpha 540 Wiring Diagrams



(Alpha 540S)



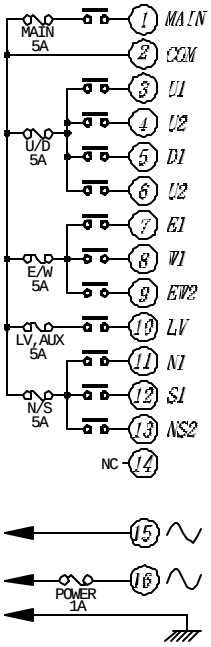
(Alpha 540A)



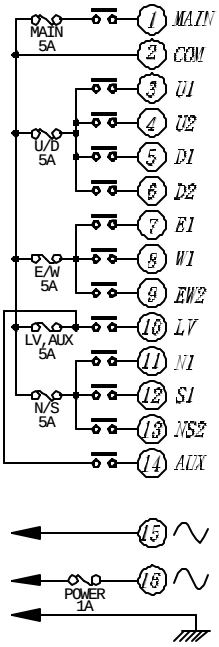
(Alpha 540T)

NC No connection

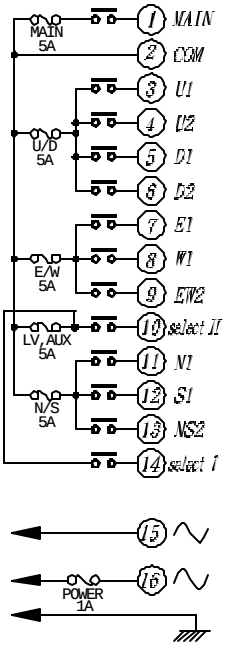
6.3 Alpha 560 Wiring Diagrams



(Alpha 560S)



(Alpha 560A)

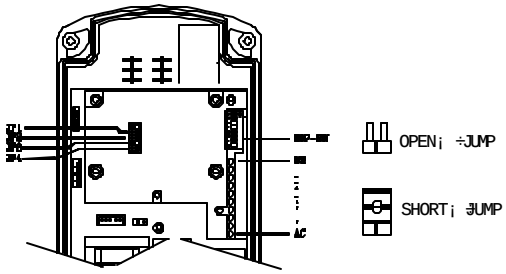


(Alpha 560T)

NC No connection

7. SYSTEM SETTING CONFIGURATION

How To Set Jumper Functions



☐ Manufacture settings. **** T models do not have LV relay output for external connection.***

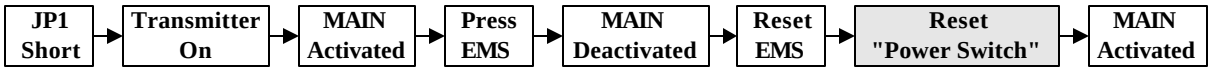
JP1	**Open**	**Manufacture preset for all Alpha 540A/T and 560A/T models** Press the AUX/SELECT button to activate all transmitter key functions and the receiver MAIN after transmitter power "on" and After EMS reset
	Short	**Manufacture preset for all Alpha 500/520/540S/560S models** Turn "on" the power switch to activate all transmitter key functions and the receiver MAIN. After EMS reset, turn the transmitter power switch "off" and then "on" again to activate all transmitter key functions and the receiver MAIN.
JP2	**Open**	Receiver MAIN stays "on" constantly.
	Short	After 5 minutes of transmitter non-usage (pushbuttons not pressed), receiver MAIN will be deactivated. (see note A)
JP3	**Open**	After 1 minute of low voltage warning, only the transmitter power will be deactivated.
	Short	After 1 minute of low voltage warning, both the transmitter power and the receiver MAIN will be deactivated. (see note B)
JP4	**Open**	AUX in normal key function (for Alpha 540A/560A only).
	Short	AUX in toggled key function (for Alpha 540A/560A only).

Note A MAIN shut-off time during system non-operation can be set from 0~30 minutes via external programmer; manufacture preset at five (5) minutes. To resume operation after five minutes, just press any pushbutton to reactivate the receiver MAIN.

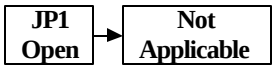
Note B: If transmitter lo w voltage occurs during operation, other than transmitter itself will display visual warnings, it will also send out a low voltage signal to the receiver to activate its external low voltage warning device. By connecting a horn, buzzer, or siren to the LV-relay output will ensure that the operator will clearly notice the low voltage warning even in hard to see or hear environments. After one minute of low voltage warning, to insure maximum safety, both the transmitter power and the receiver MAIN will be deactivated.

For proper battery replacement, you must first turn "off" the transmitter power, replace the batteries, and then turn the power switch back "on" again to reactivate the transmitter and the receiver unit.

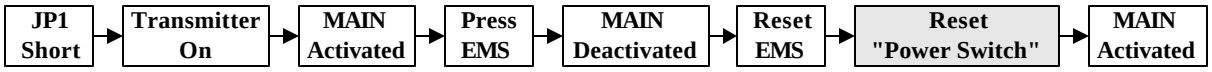
JP1 (Manufacture preset for the Alpha 500/520/540S/540A/560S/560A models)



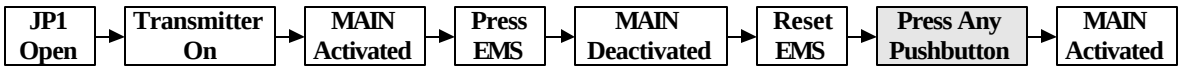
** Reset Power Switch* *Turn the transmitter power switch "off" and then "on" again.*



JP1 (For the Alpha 540T/560T models - Manufacture preset at JP1-Open)



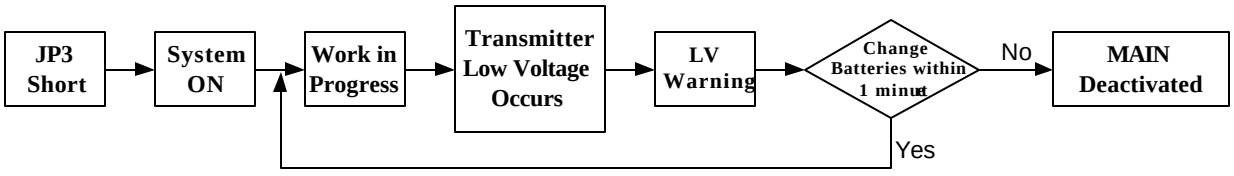
** Reset Power Switch* *Turn the transmitter power switch "off" and then "on" again.*



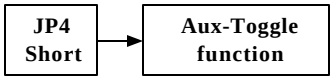
JP2

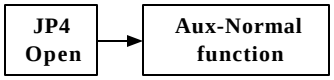
** Programmable from 1~30 minutes via external programmer.*

JP3



JP4 (For Alpha 540A/560A models only)





8. RECEIVER INSTALLATION

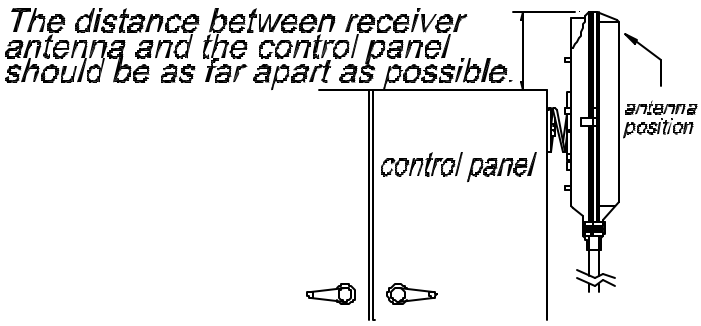
8.1 Preparation For Installation

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 the equipment 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. Make sure the receiver unit is in upright position (vertical).
5. The distance between the antenna and the control panel should be as far apart as possible (see diagram next page).
6. Drill a hole on the control panel (10.5mm)
7. Tightened the two bolt nuts provided.
8. If the control panel has a plastic surface, extended grounding wire should be used.
9. For system wiring, please refer to the output contact diagram on page 12~14 or on the receiver enclosure.
10. Ensure all wiring is correct and safely secured and all screws are fastened.



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 receiver MAIN can be properly controlled by the remote control.
3. Ensure the limit switches on the equipment that limit all travels are 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 (2) alkaline batteries are installed correctly. Do make sure to use alkaline type batteries for longer operating time between battery replacements.

2. Turn “on” the power switch located on the top left hand corner of the transmitter unit (see diagram next page). Immediately after turning “on” the transmitter unit, the status LED indicator located at the center of the power switch will display a green light for up to 1.5 seconds, do make sure that the red EMS pushbutton is in its elevated position.

   If the status LED displays a red blinking light (ON 0.1 second and OFF 2.0 seconds) or no light at all, then you must replace a set of new batteries before operation. If the red blinking light is ON 2.0 seconds and OFF 0.1 second, the transmitter unit will deactivates itself (locked) due to a jammed or defected pushbutton contact. This important safety feature is designed to prevent unexpected crane movement at system start up caused by a defected pushbutton contact.

   After transmitter self-diagnosing procedure is completed without any problems detected (within 1 second), all transmitter key functions and the receiver MAIN will be activated.

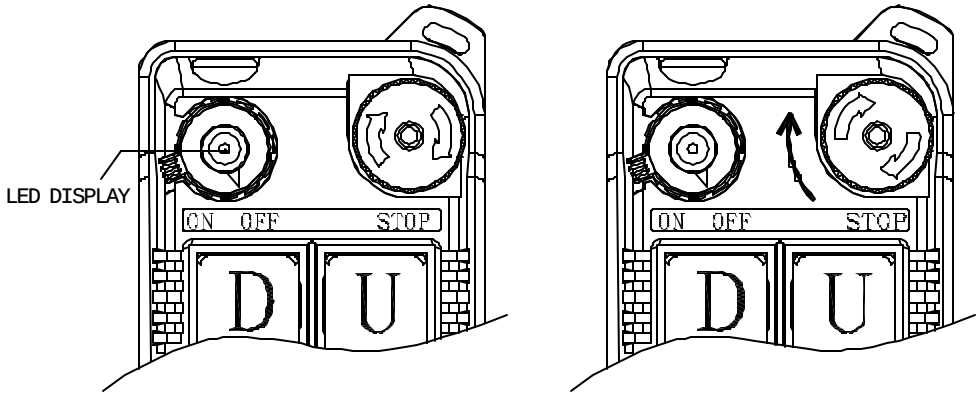
3. **Alpha 540T/560T model** When the transmitter unit is turned “on” to begin work, the LED-I will light up to indicate only the main hoist and/or trolley is activated. If you want to activate the auxiliary hoist and/or trolley, press the "Select" pushbutton, and the LED display will now switched from LED-I to LED-II to indicate that only the auxiliary hoist and/or trolley is activated. Press "Select" again to have both main and auxiliary hoist and/or trolley activated at the same time (both LED-I and LED-II lit). To switch back to the main hoist and/or trolley activation, just press the "Select" pushbutton once again. (please refer to section 3.3 on page 6)

   Every time when the transmitter unit is turned “off” and then “on” again, the "Select " setting will resets itself to LED-I (back to main hoist and/or trolley active)

4. **Alpha 540T/560T model** "Select" setting can not be changed while other command pushbuttons are in use (command pushbuttons pressed). To insure maximum safety, "select" settings (I, II, I&II) can only be changed when all command pushbuttons are in their neutral position (command pushbuttons not pressed).

5. In case of an emergency, press down the red EMS pushbutton will immediately deactivates the receiver MAIN. When the EMS pushbutton is activated, the status LED on the transmitter unit will display a red blinking light to indicate EMS activation (ON 0.5 second and OFF 0.5 second). To reactivate the system again, turn the EMS pushbutton clockwise so that the red cap will elevate to its non-active position. Then turn the transmitter power switch "off" and then "on" again to activate all transmitte r key functions and the receiver MAIN. As for the Alpha 540T and 560T models, to reactivate the system after EMS reset, just press any command pushbutton (please refer to JP1 setting on page 15 and 16).

6. Please note that conflicted movements are inte rlocked to one another for safety purpose. Pressing conflicted commands at the same time will result in a non-transmission.



10. TROUBLE SHOOTING

Should the operator find the equipment not operating normally, please check the chart belbw 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 transmitter and with EMS in its elevated position. If the status LED shows blinking red 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 fuse.
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 (please refer to Fig. 11 on page 10).

TYPE	LED INDICATION (Red)	REASON
1	Constant red light.	EEPROM error, manufacture reprogramming required.
2	ON 1.0 second OFF 1.0 second	Incorrect ID code, please readjust accordingly.
3	Dim or no light.	Under-voltage, check the main power supply.
4	ON 2.0 seconds OFF 0.1 second	System error, manufacture reprogramming required.
5	ON 0.1 second OFF 2.0 seconds	System normal with transmitter pushbutton either in neutral or in transmitter power "off" position.
6.	ON 0.1 second OFF 0.1second	System normal with transmitter pushbutton in non-neutral position (pressed).

11. SYSTEM SPECIFICATION

Transmitter Unit

Frequency Range	:	301 MHz
Transmitting Range	:	150 feet
Hamming Distance	:	4
Channel Spacing	:	25KHz
Frequency Control	:	Quartz Crystals
Frequency Drift	:	< 5ppm @ -20 ~ +70
Frequency Deviation	:	< 1ppm @ 25
Spurious Emission	:	- 50dB
Transmitting Power	:	~1mW
Emission	:	F1D
Antenna Impedance	:	50 ohms
Enclosure	:	IP-66
Source Voltage	:	3.0 VDC ("AA" alkaline batteries X 2)
Current Drain	:	10 ~ 20 mA
Operating Temp.	:	-20 ~ +70
Dimension (Alpha 500/520)	:	134mm X 68mm X 30.5mm
Dimension (Alpha 540/560)	:	166mm X 67.5mm X 30mm
Weight (Alpha 500/520)	:	7.05oz. (include batteries)
Weight (Alpha 540/560)	:	8.82oz. (include batteries)

Receiver Unit

Frequency Range	:	301 MHz
Channel Spacing	:	25KHz
Hamming Distance	:	4
Frequency Control	:	Quartz Crystals
Frequency Drift	:	< 5ppm @ -20 ~ +70
Frequency Deviation	:	< 1ppm @ 25
Sensitivity	:	0.4ìV
Antenna Impedance	:	50 ohms
Data Decoder Reference	:	Quartz Crystals
Responding Time	:	40mS (Normal)
Enclosure	:	IP-65
Source Voltage	:	48~380 VAC, 50/60 Hz.
Power Consumption	:	11VA
Operating Temp.	:	-20 ~ +70
Output Contact Rating	:	250V @ 10A
Dimension	:	310mm X 134mm X 72mm
Weight (Alpha 500/520)	:	57.3oz. (include output cable)
Weight (Alpha 540/560)	:	60oz. (include output cable)

12. PARTS LIST

1.	TX Module/Encoder Board (Alpha 500)	BEN50
	TX Module/Encoder Board (Alpha 520)	BEN52
	TX Module/Encoder Board (Alpha 540S)	BEN54S
	TX Module/Encoder Board (Alpha 540A)	BEN54A
	TX Module/Encoder Board (Alpha 540T)	BEN54T
	TX Module/Encoder Board (Alpha 560S)	BEN56S
	TX Module/Encoder Board (Alpha 560A)	BEN56A
	TX Module/Encoder Board (Alpha 560T)	BEN56T
2.	RX Module (All models)	BRX10S
3.	Decoder/Relay Board (Alpha 500)	BDR50
	Decoder/Relay Board (Alpha 520)	BDR52
	Decoder/Relay Board (Alpha 540S)	BDR54S
	Decoder/Relay Board (Alpha 540A)	BDR54A
	Decoder/Relay Board (Alpha 540T)	BDR54T
	Decoder/Relay Board (Alpha 560S)	BDR56S
	Decoder/Relay Board (Alpha 560A)	BDR56A
	Decoder/Relay Board (Alpha 560T)	BDR56T
4.	Transmitter Enclosure (Alpha 500/520)	BCT50
	Transmitter Enclosure (Alpha 540S/560S)	BCT54S
	Transmitter Enclosure (Alpha 540A/560A)	BCT54A
	Transmitter Enclosure (Alpha 540T/560T)	BCT54T
5.	Receiver Enclosure (All models)	BCR50
6.	Pushbutton (Dual speed)	B50001
	Pushbutton (Single speed)	B50002
7.	EMS Red Cap	EMS01
8.	Wrist Strap	WS01
9.	Pushbutton Rubber Boot	PRB01
10.	Direction labels (All types)	DL01
11.	Transformer (48 VAC)	T48V
	Transformer (110~120 VAC)	T120V
	Transformer (220~230 VAC)	T230V
	Transformer (380 VAC)	T380V
12.	Contact Relay	RLY01