FLEX

User's Manual

ARC
ADVANCED RADIOTECH CORPORATION

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1. Introduction

The **ARC FLEX** radio remote control systems are designed for control of industrial equipment and machinery such as overhead traveling cranes, jib cranes, gantry cranes, tower cranes, electric hoists, winches, monorails, conveyor belts, mining equipment and other material handling equipment where wireless control is preferred.

Each **FLEX** system consists of a transmitter handset and receiver unit. Other standard-equipped accessories include transmitter waist belt, "AA" batteries, compass direction decal sheet and user's manual.

List of notable features include:

* 62 user-adjustable channels – no more fixed channels and fragile quartz crystals to break.
* Over one million sets of unique ID codes (20-bit) – unlike many other radio control systems on the market, the FLEX system never repeats ID codes.
* Advanced microprocessor controls with 32-bit CRC and Hamming Codes programming – ultra fast, safe, precise and error-free encoding and decoding.
* Ultra-durable transmitter push button – good for up to one million press cycles.
* Ultra power-saving transmitter – requires only two "AA" Alkaline or rechargeable batteries (2000mA or above) for more than 100 hours of continuous operating time between replacements or recharging.
* Ultra durable nylon and fiberglass composite enclosures – resist breakage from high impacts and frequent drops; no more fragile casings to replace.
* 100% water and shock resistant
* Adjustable waist belt for easy carry and operation.

2. Radio Controlled Safety

Flex radio remote control system should be operated by persons with sufficient amount of knowledge and skill in crane operation and safety. Persons being trained to operate a radio remote controlled crane should possess the knowledge of all hazards peculiar to radio remote controlled crane operation, ability to judge distance and moving objects, equipment capacity and radio remote controlled safety rules. Radio remote controlled cranes should not be operated by any person with insufficient eyesight, hearing, illness, and under influence of drugs and medications that may cause loss of crane control.

Below are some general operating safety tips that should be strictly followed when operating a radio remote controlled crane.

1. Prior to crane operation always check the transmitter handset for any damage that might inhibit proper crane operation.
2. Always check if the red emergency stop button is working properly prior to crane operation.
3. Check the battery status LED on the transmitter for any signs of low battery power.
4. Check the Status LED on the transmitter for any signs of irregularities. Please refer to the "Transmitter Status Light Indicators & Warnings" on page 24.
5. The crane limit switches should be checked prior to crane operation or at the beginning of each shift. When checking limit switches the hoist should be centered over an area free of personnel and equipment.
6. If power to the crane is removed, the operator should turn off the transmitter power immediately until the power to the crane is restored.
7. If the crane fails to respond properly to operator's command the operator should stop operation, turn the transmitter power off, and then report the condition to their supervisor.
8. The transmitter power should be turned off after each use. If the transmitter handset is not in use always turn the power off and stored it in a safe or designated location. Never leave the transmitter handset unattended in the working area.
9. Even though Flex system is capable of allowing up to four systems with same channel in use without interfering with one another, it is always a good practice not to use the same RF channel as any other Flex systems in use within a distance of 200 feet.
10. Never operate a crane or equipment with two identical channel and ID transmitter handsets at the same time within the same facility.

3. General System Information

A. TRANSMITTER HANDSET

1. External Illustration

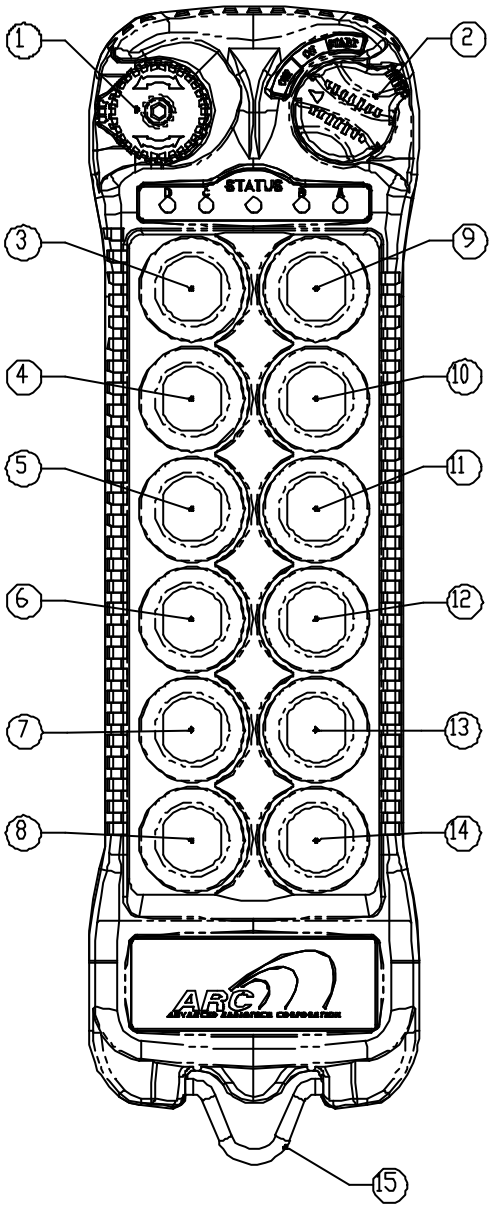


Fig. 01

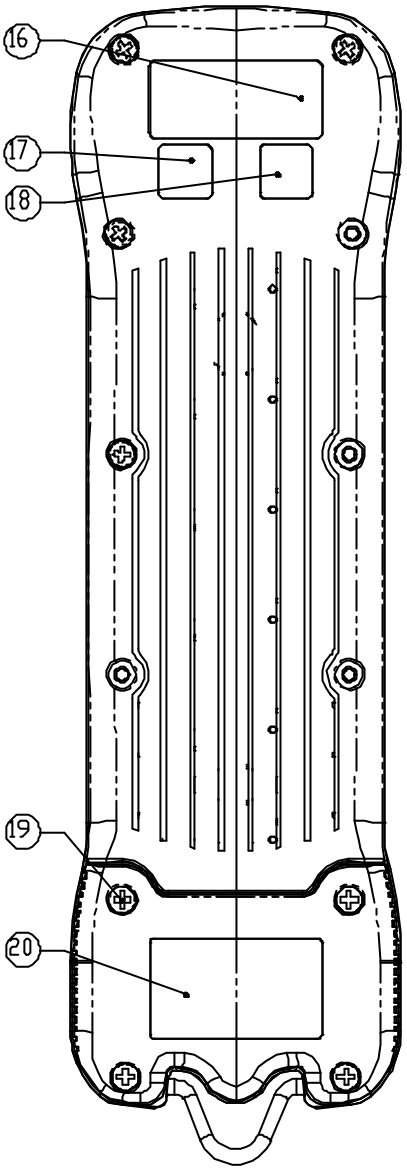


Fig. 02

1. Emergency Stop Button
2. Power Key Switch
3. Push button #2
4. Push button #4
5. Push button #6
6. Push button #8
7. Push button #10
8. Push button #12
9. Push button #1
10. Push button #3
11. Push button #5
12. Push button #7
13. Push button #9
14. Push button #11
15. Strap Holder
16. System Information
17. System Channel
18. Crane Number
19. Battery Cover
20. FCC/CE Information

2. Internal Illustration

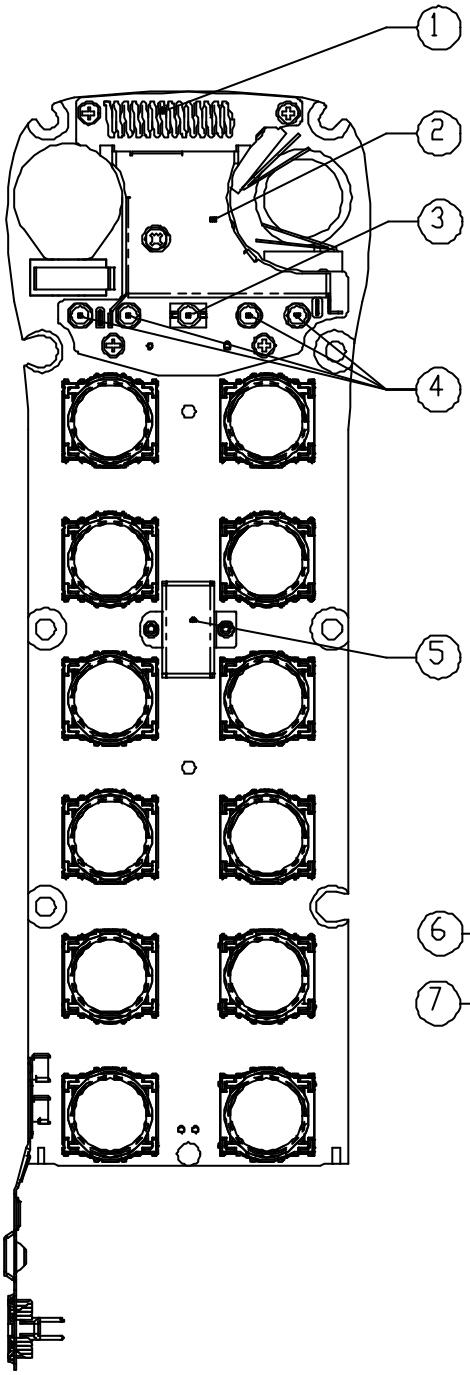


Fig. 03

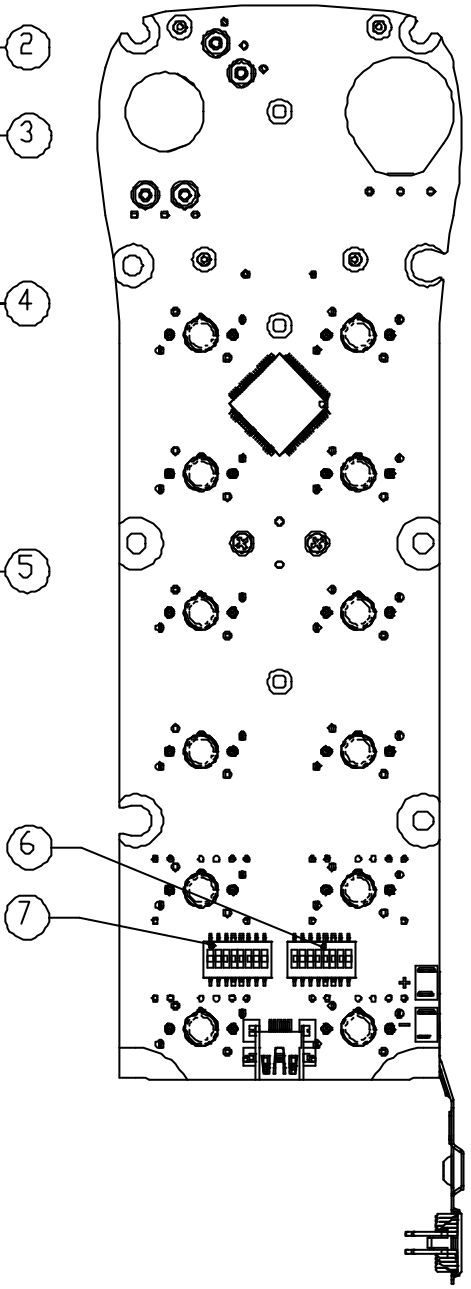


Fig. 04

1. Arial Antenna
2. Transmitting Board
3. Status LED Display
4. Function LED Display
5. I-CHIP
6. Function Dip-Switch
7. Channel Dip-Switch

B. RECEIVER UNIT

1. External Illustration

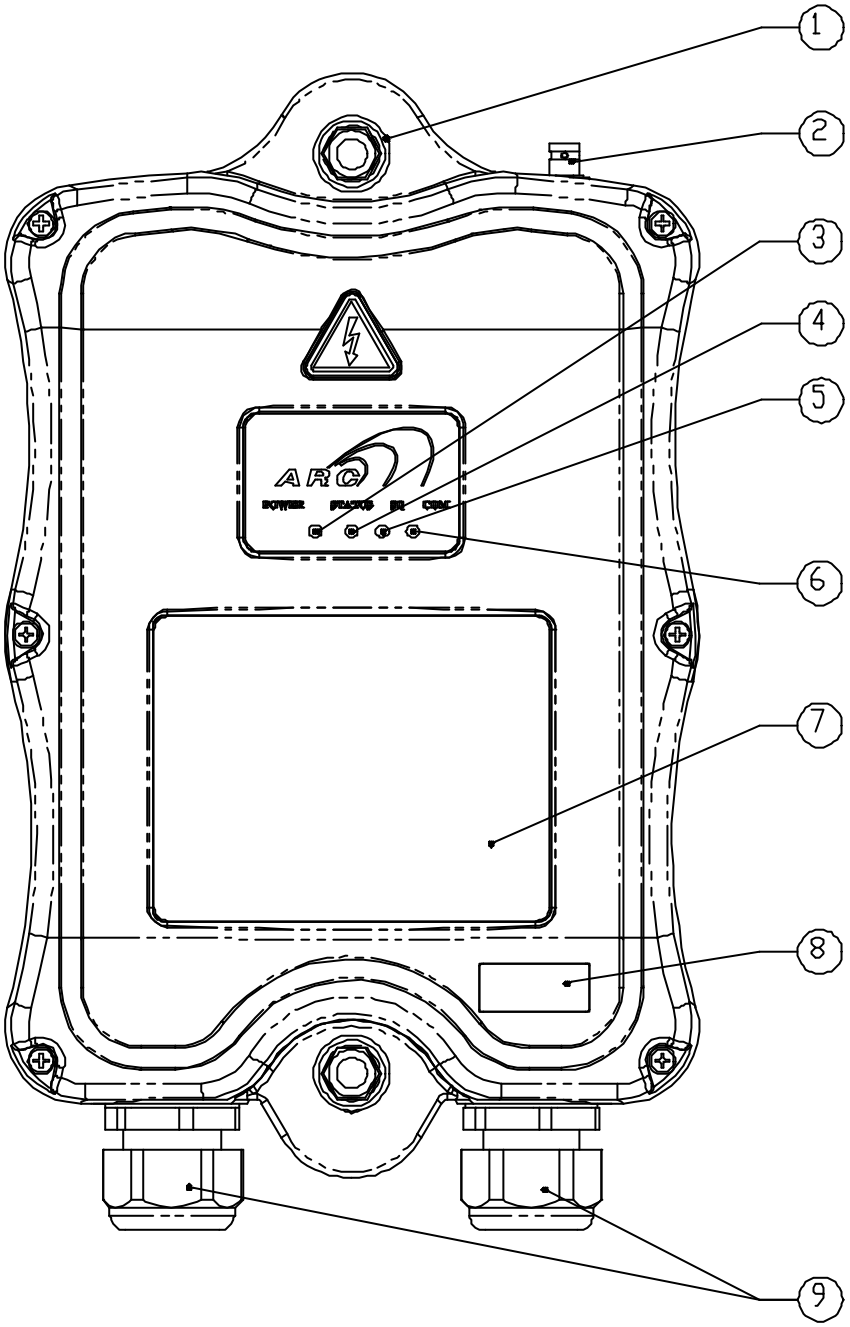


Fig. 05

1. Shock Absorber
2. External Antenna BNC Jack
3. Power LED Display
4. Status LED Display
5. SQ LED Display
6. COM LED Display
7. Output Contact Diagram
8. System Information
9. Cable Gland/ Cord Grip

2. Internal Illustration

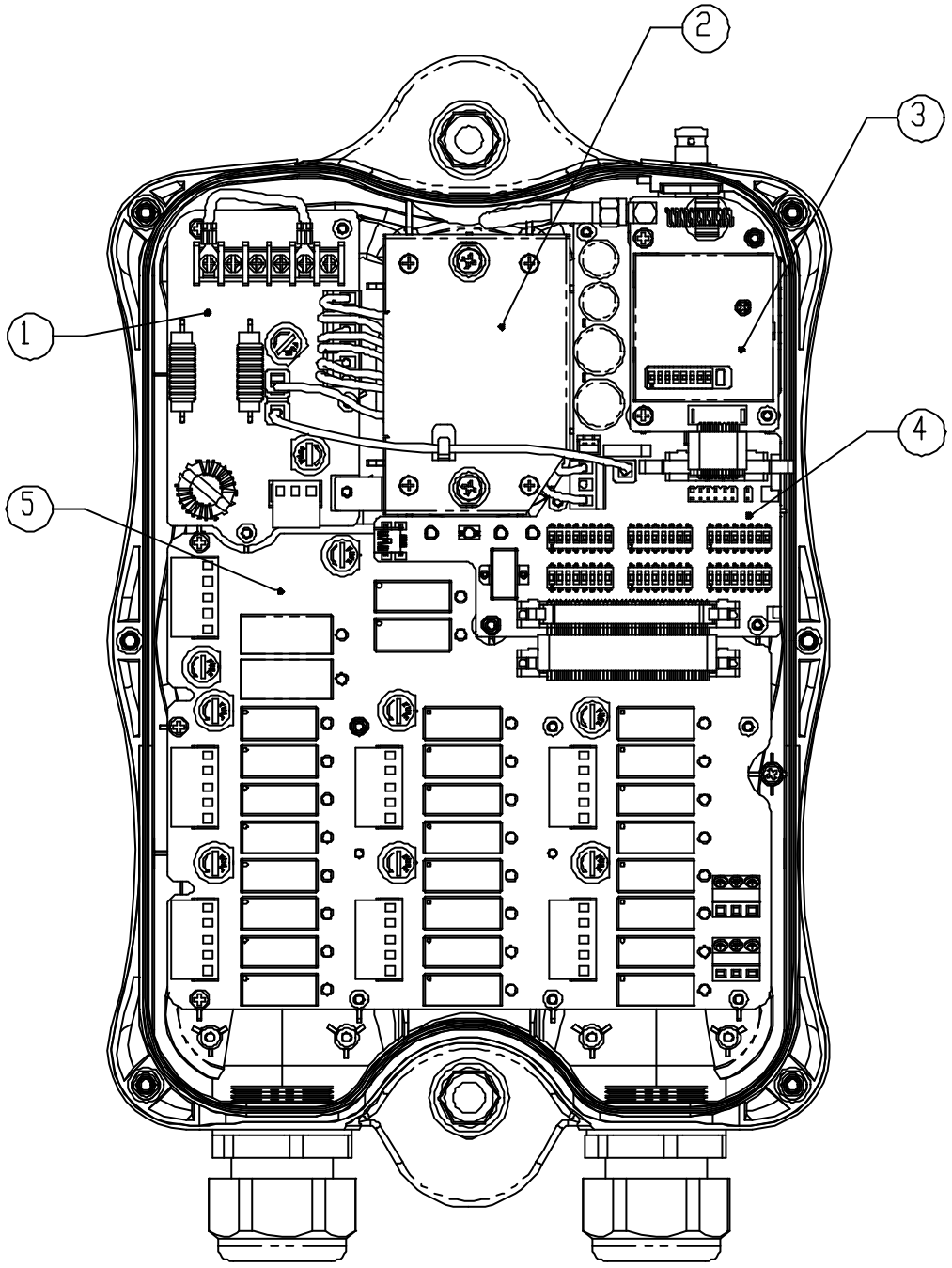


Fig. 06

1. AC Line Filter
2. Power Transformer
3. Receiving Board
4. Decoder Board
5. Relay Board

4. Function Settings

A. TRANSMITTER HANDSET

1. System Channel Settings

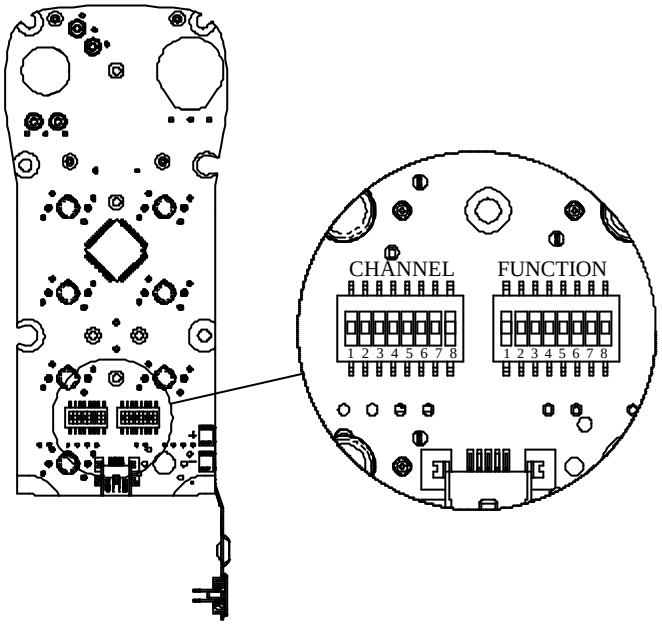
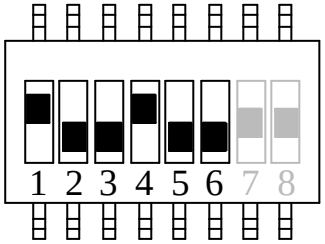


Fig. 07

Set the transmitter channel simply by adjusting the channel dip-switch located on the backside of the transmitter encoder board. The system channel table located on page 19 will tell you which dip setting correspond to which channel. Do make sure that when you change the channel of the transmitter you must also change the channel of the receiver as well. The channel on both transmitter and receiver must be identical in order for the system to work.

Example:

(Fig. 08)



Top slot ? "1"

Bottom slot ? "0"

The above dip setting would be "100100", which corresponds to "channel 36" in the system channels table on page 19.

2. Push Button Functions with LED Display Settings

A. 1-Stage Toggle Switch with LED Display

Below are settings for toggle or latching functions. You can set each and every push button on the transmitter with toggled (latching) relay contact. The number (1 to 4) below the push button tells you which LED on the transmitter will light up when the push button is pressed.

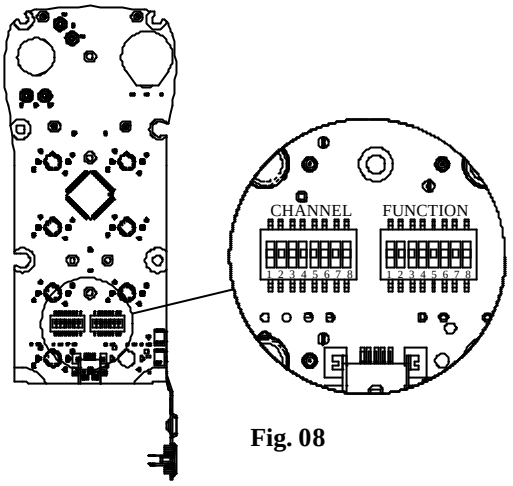


Fig. 08

	DIP	PB1	PB2	PB3	PB4	PB5	PB6	PB7	PB8	PB9	PB10	PB11	PB12
1	00000001				4								
2	00000010			3	4								
3	00000011		2	3	4								
4	00000100	1	2	3	4								
5	00000101								4				
6	00000110							3	4				
7	00000111						2	3	4				
8	00001000					1	2	3	4				
9	00001001										4		
10	00001010									3	4		
11	00001011								2	3	4		
12	00001100							1	2	3	4		
13	00001101												4
14	00001110											3	4
15	00001111										2	3	4
16	00010000									1	2	3	4

1 ? LED #1 will light up when the push button is pressed

2 ? LED #2 will light up when the push button is pressed

3 ? LED #3 will light up when the push button is pressed

4 ? LED #4 will light up when the push button is pressed

B. 3-Stage Selector Switch

	DIP	PB1	PB2	PB3	PB4	PB5	PB6	PB7	PB8	PB9	PB10	PB11	PB12
17	00010001			A/1&2									
18	00010010			B/1&2									
19	00010011			C/1&2									
20	00010100			D/1&2									
21	00010101				A/3&4								
22	00010110				B/3&4								
23	00010111				C/3&4								
24	00011000				D/3&4								
25	00011001			A/1&2	A/3&4								
26	00011010			A/1&2	B/3&4								
27	00011011			A/1&2	C/3&4								
28	00011100			A/1&2	D/3&4								
29	00011101			B/1&2	B/3&4								
30	00011110			B/1&2	C/3&4								
31	00011111			B/1&2	D/3&4								
32	00100000			C/1&2	C/3&4								
33	00100001			C/1&2	D/3&4								
34	00100010			D/1&2	D/3&4								
35	00100011							A/1&2					
36	00100100							B/1&2					
37	00100101							C/1&2					
38	00100110							D/1&2					
39	00100111								A/3&4				
40	00101000								B/3&4				
41	00101001								C/3&4				
42	00101010								D/3&4				

A ? Select A/B

B ? Select 0/A/B

C ? Select A/B/A+B

D ? Select 0/A/B/A+B

3-Stage Selector Switch - Continued

43	00101011							A/1&2	A/3&4				
44	00101100							A/1&2	B/3&4				
45	00101101							A/1&2	C/3&4				
46	00101110							A/1&2	D/3&4				
47	00101111							B/1&2	B/3&4				
48	00110000							B/1&2	C/3&4				
49	00110001							B/1&2	D/3&4				
50	00110010							C/1&2	C/3&4				
51	00110011							C/1&2	D/3&4				
52	00110100							D/1&2	D/3&4				
53	00110101									A/1&2			
54	00110110									B/1&2			
55	00110111									C/1&2			
56	00111000									D/1&2			
57	00111001										A/3&4		
58	00111010										B/3&4		
59	00111011										C/3&4		
60	00111100										D/3&4		
61	00111101									A/1&2	A/3&4		
62	00111110									A/1&2	B/3&4		
63	00111111									A/1&2	C/3&4		
64	01000000									A/1&2	D/3&4		
65	01000001									B/1&2	B/3&4		
66	01000010									B/1&2	C/3&4		
67	01000011									B/1&2	D/3&4		
68	01000100									C/1&2	C/3&4		
69	01000101									C/1&2	D/3&4		
70	01000110									D/1&2	D/3&4		
71	01000111											A/1&2	
72	01001000											B/1&2	
73	01001001											C/1&2	
74	01001010											D/1&2	
75	01001011												A/3&4
76	01001100												B/3&4
77	01001101												C/3&4

3-Stage Selector Switch - Continued

78	01001110												D/3&4
79	01001111											A/1&2	A/3&4
80	01010000											A/1&2	B/3&4
81	01010001											A/1&2	C/3&4
82	01010010											A/1&2	D/3&4
83	01010011											B/1&2	B/3&4
84	01010100											B/1&2	C/3&4
85	01010101											B/1&2	D/3&4
86	01010110											C/1&2	C/3&4
87	01010111											C/1&2	D/3&4
88	01011000											D/1&2	D/3&4

C. 1-Stage Toggle + 3-Stage Selector Switch Combination

89	01011001			1	A/3&4								
90	01011010			1	B/3&4								
91	01011011			1	C/3&4								
92	01011100			1	D/3&4								
93	01011101		1	2	A/3&4								
94	01011110		1	2	B/3&4								
95	01011111		1	2	C/3&4								
96	01100000		1	2	D/3&4								
97	01100001							1	A/3&4				
98	01100010							1	B/3&4				
99	01100011							1	C/3&4				
100	01100100							1	D/3&4				
101	01100101						1	2	A/3&4				
102	01100110						1	2	B/3&4				
103	01100111						1	2	C/3&4				
104	01101000						1	2	D/3&4				
105	01101001									1	A/3&4		
106	01101010									1	B/3&4		

1-Stage Toggle + 3-Stage Selector Switch Combination - Continued

107	01101011									1	C/3&4		
108	01101100									1	D/3&4		
109	01101101								1	2	A/3&4		
110	01101110								1	2	B/3&4		
111	01101111								1	2	C/3&4		
112	01110000								1	2	D/3&4		
113	01110001											1	A/3&4
114	01110010											1	B/3&4
115	01110011											1	C/3&4
116	01110100											1	D/3&4
117	01110101										1	2	A/3&4
118	01110110										1	2	B/3&4
119	01110111										1	2	C/3&4
120	01111000										1	2	D/3&4

B. RECEIVER UNIT

1. System Channel Setting

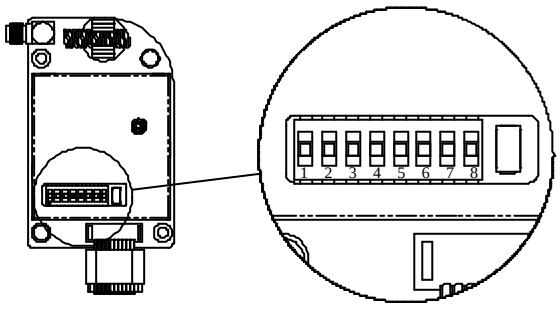


Fig. 09

Set the receiver channel simply by adjusting the channel dip-switch located on the receiving board located inside the receiver unit. The system channel table located on page 19 will tell you which dip setting correspond to which channel. Do make sure that when you change the channel of the receiver you must also change the channel of the transmitter as well. The channel on both transmitter and receiver must be identical in order for the system to work.

2. Output Relay Configurations

1. 3 Relays per Motion – Shared 2nd Speed Rely

For connections with output relay configuration as Forward 1st speed (F1), Reverse 1st speed (R1) and Forward/Reverse 2nd speed (F/R2). Forward and Reverse 2nd speed (F/R2) shared the same output.

2. 4 Relays per Motion (Type A) – Separate 1st and 2nd Speed Relay

For connections with output relay configuration as Forward 1st speed (F1), Reverse 1st speed (R1), Forward 2nd speed (F2) and Reverse 2nd speed (R2). Forward and Reverse 2nd speed its own output.

3. 4 Relays per Motion (Type B) – Shared 1st and 2nd Speed Relay

For connections with output relay configuration as Forward motion (F), Reverse motion (R), Forward/Reverse 1st speed (F/R1) and Forward/Reverse 2nd speed (F/R2).

4. 3-Relay Configuration with Close/Close Contact at 2nd Speed

At 2nd speed, both 1st and 2nd speed output relays are activated or closed (F+FR2 or R+FR2 relays activated).

5. 4-Relay (Type-A) Configuration with Open/Close Contact at 2nd Speed

At 2nd speed, only 2nd speed output relay is activated or closed (F2 or R2 relay activated)

6. 4-Relay (Type-A) Configuration with Close/Close Contact at 2nd Speed

At 2nd speed, both 1st and 2nd speed relays are activated or closed (F+F2 or R+R2 relays activated)

7. 4-relay (Type-B) Configuration with F/FR2 Contact at 2nd Speed

At 2nd speed, both forward/reverse motion and 2nd speed relays are closed (F+FR2 or R+FR2 relays activated)

8. 4-Relay Configuration with F/FR1/FR2 Contact at 2nd Speed

At 2nd speed, forward motion, forward/reverse 1st speed and forward/reverse 2nd speed relays are close (F+FR1+FR2 relays activated)

9. ON/OFF Function

The user can set the two adjacent push buttons to act as an ON & OFF power switch. Pressing the OFF button will activates the OFF output relay and deactivates the ON output relay.

10. Magnet ON/OFF Function

The user can set the two adjacent push buttons to control a magnet. To activate the magnet just press the button with the Magnet symbol. To deactivate the magnet, for safety purpose, you must press and hold the button with the Magnet symbol and press the OFF button. Pressing the OFF button alone can and will not deactivate the magnet.

11. Brake Function

When the transmitter push button is released from 2nd speed down to 1st speed, electronically, both 1st and 2nd speed output relays will be deactivated for up to 1.0 second and then with 1st speed output relay reactivated thereafter.

12. External Warning Function

The user can install an external warning device (rotating lights, horn, etc…) to a special "function relay" located inside the receiver. The user can choose which push button pairs or crane motion he wants to have external warnings when push button is pressed. If the programmed push button is pressed it will activate the function relay thus activating the external warning device.

13. Momentary Contact

When push button is released the output relay corresponds to that push button will be deactivated.

14. Toggled (Latching) Contact

When push button is released the output relay corresponds to that push button will remained activated until next time the user presses the same push button again.

15. 3rd Speed Function

This function allows the crane to travel additional step beyond 2nd speed. At second speed, pressing the 3rd speed push button will toggle between 2nd and 3rd speed.

16. Auxiliary Stop Function

The special stop function acts as a 2nd emergency stop button. The receiver MAIN will also be deactivated when this Stop push button is pressed.

3. Dip-Switch Settings

There are six dip-switches located on the decoder board, which is one dip-switch per motion or push button pair (1 dip-switch per left and right push button).

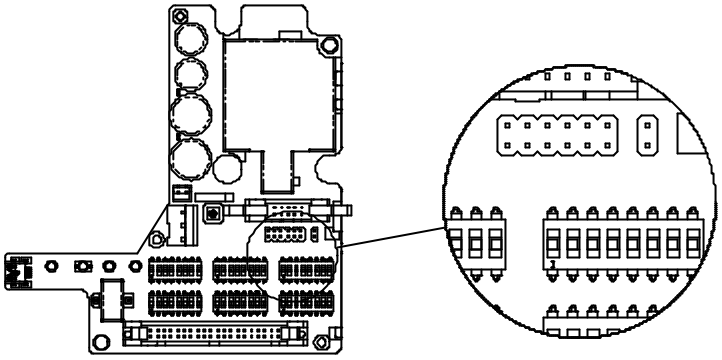


Fig. 10

Dip Settings	Relay Functions	# of Relays Used
0000001	Closed/Closed Relay Action at 2nd Speed	4
0000010	Closed/Closed Relay Action at 2nd Speed	3
0000011	Opened/Closed Relay Action at 2nd Speed	4
0000100	F/FR2 Relay Action at 2nd Speed	4
0000101	F/FR1/FR2 Relay Action at 2nd Speed	4
0000110	On/Off	2
0000111	Magnet On/Off	2
0010001	Closed/Closed Relay Action + External Warning	4
0010010	Closed / Closed Relay Action + External Warning	3
0010011	Opened/Closed Relay Action + External Warning	4
0010100	F/FR2 Relay Action + External Warning	4
0010101	F/FR1/FR2 Relay Action + External Warning	4
0100001	Closed/Closed + Brake	4
0100010	Closed/Closed Relay Action + Brake	3
0100011	Opened/Closed Relay Action + Brake	4
0100100	F/FR2 Relay Action + Brake	4
0100101	F/FR1/FR2 Relay Action + Brake	4
0110001	Closed/Closed Relay Action + Brake + External Warning	4
0110010	Closed/Closed Relay Action + Brake + External Warning	3
0110011	Opened/Closed Relay Action + Brake + External Warning	4
0110100	F/FR2 Relay Action + Brake + External Warning	4
0110101	F/FR1/FR2 Relay Action + Brake + External Warning	4

Dip-Switch Settings - Continued

Dip Settings	Relay Function for the Left Push Button	Relay Function for the Right Push Button	# of Relays Used
1000000	Momentary Contact	Momentary Contact	2
1001000	Toggled Contact	Momentary Contact	2
1000001	Momentary Contact	Toggled Contact	2
1001001	Toggled Contact	Toggled Contact	2
1000010	Momentary Contact	3rd Speed	2
1001010	Toggled	3rd Speed	2
1010000	3rd Speed	Momentary Contact	2
1010001	3rd Speed	Toggle Contact	2
1000111	Momentary Contact	Auxiliary Stop	2
1001111	Toggled Contact	Auxiliary Stop	2
1010111	3rd Speed	Auxiliary Stop	2
1111000	Auxiliary Stop	Momentary Contact	2
1111001	Auxiliary Stop	Toggled Contact	2
1111010	Auxiliary Stop	3rd Speed	2

4. Jumper Settings

Jumper settings are applied to functions such as MAIN cutoff time, system startup and transmitter push button layout. The jumpers are located on top of the dip-switches.

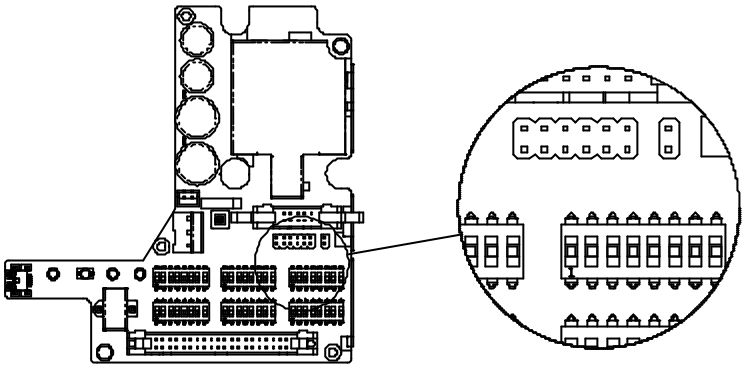


Fig. 11

Jumper Settings		Function
JP1 (Blank)	JP2 (Blank)	Receiver MAIN never deactivates unless transmitter power is turned off or emergency stop command is initiated
JP1 (Inserted)	JP2 (Blank)	Receiver MAIN deactivates automatically after 5 minutes of inactivity.
JP1 (Blank)	JP2 (Inserted)	Receiver MAIN deactivates automatically after 30 minutes of inactivity.
JP1 (Inserted)	JP2 (Inserted)	Receiver MAIN deactivates automatically after 60 minutes of inactivity.
JP4 (Blank)	JP5 (Blank)	Normal right-to-left push button configuration
JP4 (Blank)	JP5 (Inserted)	In-line push button configuration (top to bottom)

5. System Channel Table

Channel	Dip Setting	Channel	Dip Setting
I-CHIP	000000 *note A*	32	100000
01	000001	33	100001
02	000010	34	100010
03	000011	35	100011
04	000100	36	100100
05	000101	37	100101
06	000110	38	100110
07	000111	39	100111
08	001000	40	101000
09	001001	41	101001
10	001010	42	101010
11	001011	43	101011
12	001100	44	101100
13	001101	45	101101
14	001110	46	101110
15	001111	47	101111
16	010000	48	110000
17	010001	49	110001
18	010010	50	110010
19	010011	51	110011
20	010100	52	110100
21	010101	53	110101
22	010110	54	110110
23	010111	55	110111
24	011000	56	111000
25	011001	57	111001
26	011010	58	111010
27	011011	59	111011
28	011100	60	111100
29	011101	61	111101
30	011110	62	111110
31	011111	Reserved	111111

Note A: When set to all "0" the priority goes to the channel assigned inside the I-CHIP

Note B: Use only dip position #1 through position #6 for system channel setting.

6. Receiver Installation

A. OUTPUT RELAY CONTACT DIAGRAM

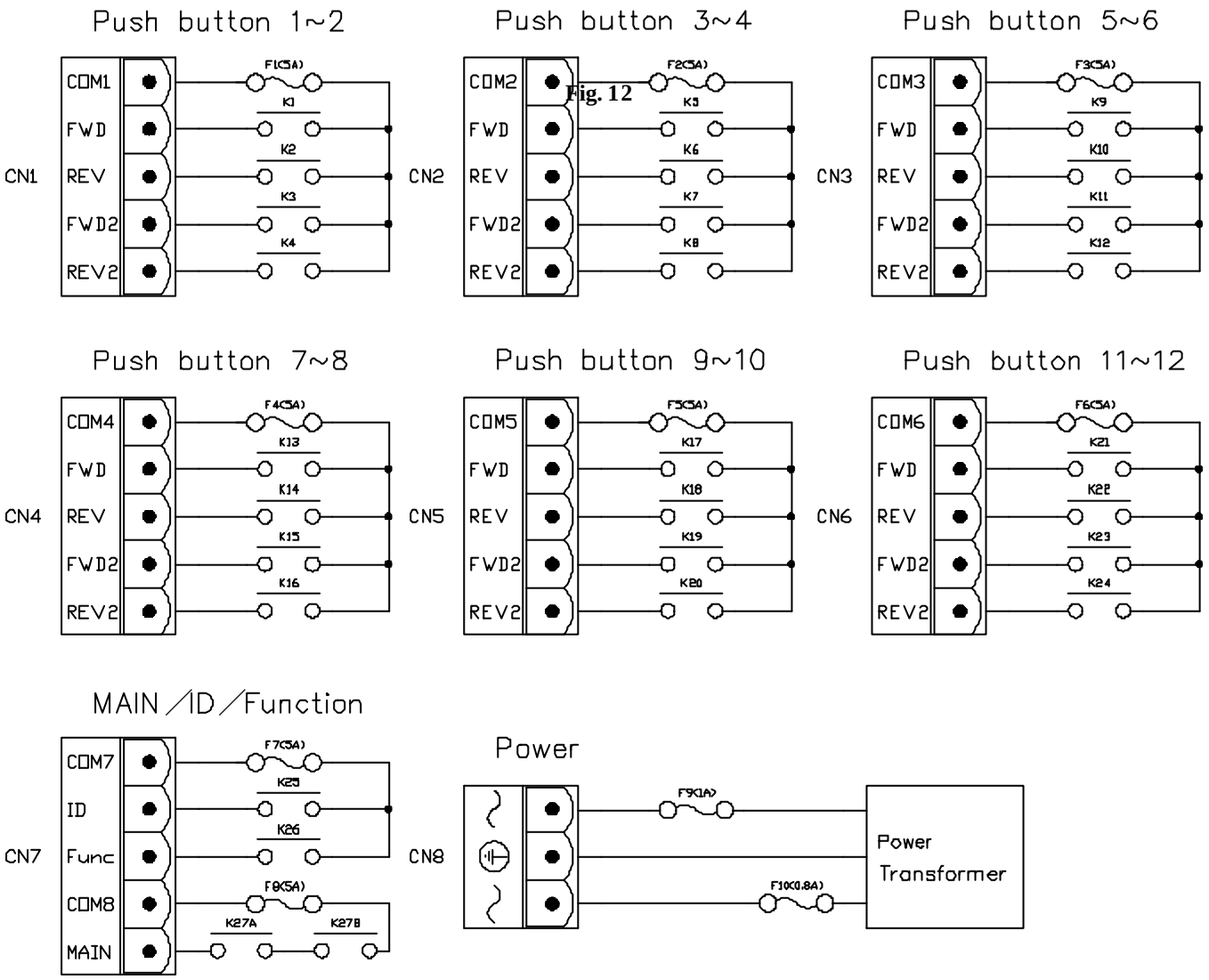


Fig. 12

B. RECEIVER MOUNTING

1. Pre-installation Precautions

1. Make sure that the transmitter and receiver are with identical serial number, channel and ID code.
2. Make sure the receiver is not set to the same channel as any other systems in use in the surrounding area.
3. Prior to installation, make sure that the crane or equipment is working properly prior to installation.
4. Make sure the power source to the receiver is set correctly.
5. Prior to installation, switch off the main power source to the crane or equipment.

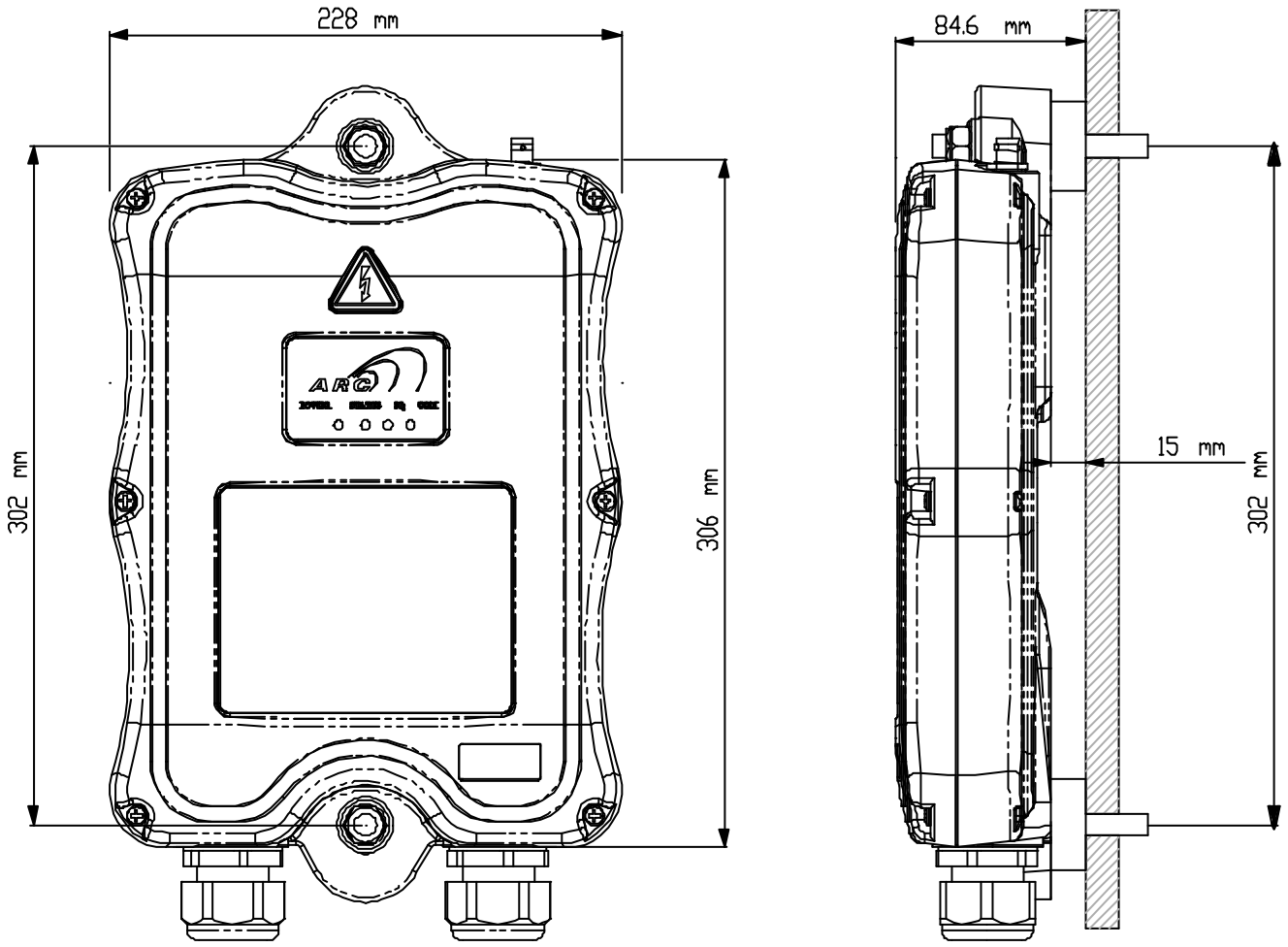


Fig. 13

2. Step-By-Step Installation

1. For better reception, the location of the receiver should be visible to the operator at all time.
2. The location selected should not be exposed to high levels of electric noise. Mounting the receiver next to an unshielded variable frequency drive may cause minor interference. Always locate the receiver as far away from variable frequency drive as possible.
3. Ensure the selected location has adequate space to accommodate the receiver.
4. Make sure the receiver is in upright position.
5. Drill two holes (10mm in diameter) on the control panel or location where the receiver is to be installed (Refer to Fig. 13 on page 21).
6. Make sure the bolts are tightened after installation.
7. For system wiring please refer to Fig.12 on page 20.

3. System Testing

1. Turn on the power source to the receiver and test the MAIN relay output by pressing the red emergency stop button and observe that it properly opens and closes the main line disconnect contactor.
2. Test the operation of each function to ensure it corresponds to the transmitter direction labels or the pendent it is replacing.
3. Test the limit switches to see if they are working properly.
4. If your new remote control is replacing an existing pendant, make sure it is completely disconnected and placed in a safe location to prevent unwanted control command.

7. Operation Procedure

A. TRANSMITTER OPERATION

a. Reset the 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.

b. Turn on the transmitter power by inserting the black-colored key onto the power key slot located on the top right hand side of the transmitter handset and rotate it clockwise to "On" position.

c. After turning on the transmitter power, the green light on the transmitter status LED will light up for up to 2 seconds, which means that the system is ok. If the green light did not appear on the Status LED, then please refer to "Status Light Indicators & Warnings" on page 24.

d. If there are no signs of any system irregularities, then rotate the power key further clockwise to "Start" position for up to 1 second, this will activate the receiver MAIN. The power key will retract back to "On" position automatically after release.

e. Now press any push button on the transmitter handset to operate the crane or equipment.

f. In case of an emergency press down the red emergency stop button will immediately disconnect the receiver mainline. The transmitter status LED will blink red (refer to page 24). To reset the emergency stop button just rotate the red button either direction, it will pop up. Then rotate the power key to "start" to resume operation (MAIN activated).

g. To turn off the transmitter handset, just rotate the power key to "Off" position, it will disconnect the transmitter power and the receiver MAIN altogether.

h. Change batteries simply by unscrew the battery cover located on the back side of the transmitter handset.

B. STATUS LIGHT INDICATORS & WARNINGS

1. Transmitter STATUS Light Indication

Type	Display Type	Indication
1	Constant red	Voltage below 2.3V at initial power on, transmitter shuts off, change batteries
		Voltage below 1.8V during operation, transmitter shuts off, change batteries
2	Blinking red "on" → 0.15 second "off" → 1.85 seconds	Voltage below 2.2V during operation, warning, change batteries suggested
3	2 red blinks followed by a 1.85-second pause (off)	The pushbutton jammed or defective
4	3 red blinks followed by a 1.85-second pause (off)	EEPROM error
5	4 red blinks followed by a 1.85-second pause (off)	Transmitting error, system can not locked on to the designated channel
6	Constant green for 2 seconds	Transmitter power on prior to initiating the START function
7	Blinking green at every 2-second interval	When pushbutton is pressed, signal transmitted
8	Blinking red "on" → 1.0 second "off" → 1.0 second	Stop command initiated with MAIN disconnected

2. Receiver STATUS Light Indication

Type	Display Type	Indication
1	Blinking red	Stop command initiated with MAIN disconnected
2	Blinking green (fast)	Decoding in process
3	Blinking green (slow)	Decoding on standby

3. Receiver SQ Light Indication

Type	Display Type (Red)	Indication
1	On	Transmission received
2	Off	No transmission
3	Blinks intermittently (fast)	Other radio interference

4. Receiver POWER Light Indication

Type	Display Type (Red)	Indication
1	On	Power to receiver
2	Off	No power to receiver

5. Receiver COM Light Indication

Type	Display Type (Red)	Indication
1	On	Power to relay board
2	Off	No power to relay board

C. TROUBLE SHOOTING TIPS

Problems	Possible Causes	Recommendation
No responds 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 1.0 second and then release
	Incorrect system RF channel	Check and make sure that the transmitter handset and receiver unit both have the same system RF channel
	Incorrect system ID code	Check and make sure that the transmitter handset and receiver unit both have the same system ID code
	System out of range	Make sure that the startup procedure must be done within 150 feet from the receiver location
No responds when transmitter push button is pressed (Damaged hardware)	Defective transmitter and receiver RF board	Check the SQ display on the face of the receiver unit. If it does not light up when push button is pressed then either the transmitter or receiver RF board is defective. First replace the transmitter RF board. If SQ display still not lid when push button is pressed then the go ahead and replace the receiver RF board.
	Defective transmitter encoder board	If still no responds, then replace the transmitter encoder board.
No AC power to the receiver	Incorrect input voltage	Make sure the source voltage is set correctly
	Blown fuse	Check for any blown fuse
	Incorrect wiring	Check input voltage connection
Outputs do not correspond to transmitter	Incorrect output connection	Check the entire system wiring again. Please refer to the output diagram on the face of the receiver unit

8. System Specifications

Frequency Range	:	433~434 MHz
Number of Channels	:	62 channels adjustable
Channel Spacing	:	25 KHz
Modulation	:	Digital Frequency Modulation based on Manchester Code, 20bit address, 32bit CRC Parity Check and Hamming Code.
Decoder	:	Microprocessor-controlled
Hamming Distance	:	4
Frequency Control	:	Synthesized PLL (Phase Lock Loop)
Receiver Sensitivity	:	-112dBm
Spurious Emission	:	-50dB
Antenna Impedance	:	50 ohms
Transmitting Power	:	0.25mW
Enclosure Rating	:	IP-66
Output Contact Rating	:	250V @ 10 Amps
Transmitter Operating Voltage	:	3.0V
Receiver Power Consumption	:	11.0 VA
Operating Temperature	:	-13°F ~ 167°F
Transmitter Dimension	:	23.cm (L) x 6.9cm (W) x 3.5cm (H)
Receiver Dimension (All Models)	:	36.3cm (L) x 22.8cm (W) x 7.0cm (H)
Transmitter Weight	:	12.5 ounce (include batteries)
Receiver Weight (All Models)	:	5.5 pound
Number of Motions	:	Up to 6 Motions (12 pushbuttons)

9. Spare Parts

1.	Transmitting Board (433/434MHz)	TRB 01
2.	Encoder Board (complete with push buttons)	ENB 06
3.	I-CHIP (complete)	ICP 01
4.	Receiver Board	RVB 01
5.	Decoder Board	DEB 01
6.	Receiver Relay Board	RLB 06
7.	AC Line Filter Board	LFB 01
8.	Power Transformer	PTF 01
9.	Transmitter Top Casing	TTC 03
10.	Transmitter Bottom Casing	TBC 03
11.	Transmitter Battery Cover	TBC 04
12.	Receiver Top Casing	RTC 01
13.	Receiver Bottom Casing	RBC 01
14.	Cord Grip / Cable Gland	CGR 01
15.	Shock Absorber	SAB 01
16.	2-Speed Push Button	PBN 02
17.	3-Stage Selector Switch	SWT 01
18.	Push Button Rubber Boot	PRB 01
19.	Emergency Stop Button	EMS 01
20.	Transmitter Power Keys Switch	PWK 01
21.	Waist Belt	WBT 01
22.	Waist Belt Ring	WBR 01
23.	Safety MAIN relay	SMR 01
24.	Regular Output Relay	RLY 01
25.	Dust Cover	CVR 03