

ROBINSON
ENGINEERING COMPANY

Operation & Maintenance Manual

Crane Boss ®

TITAN

900 MHz
Digital Radio
Remote Control System

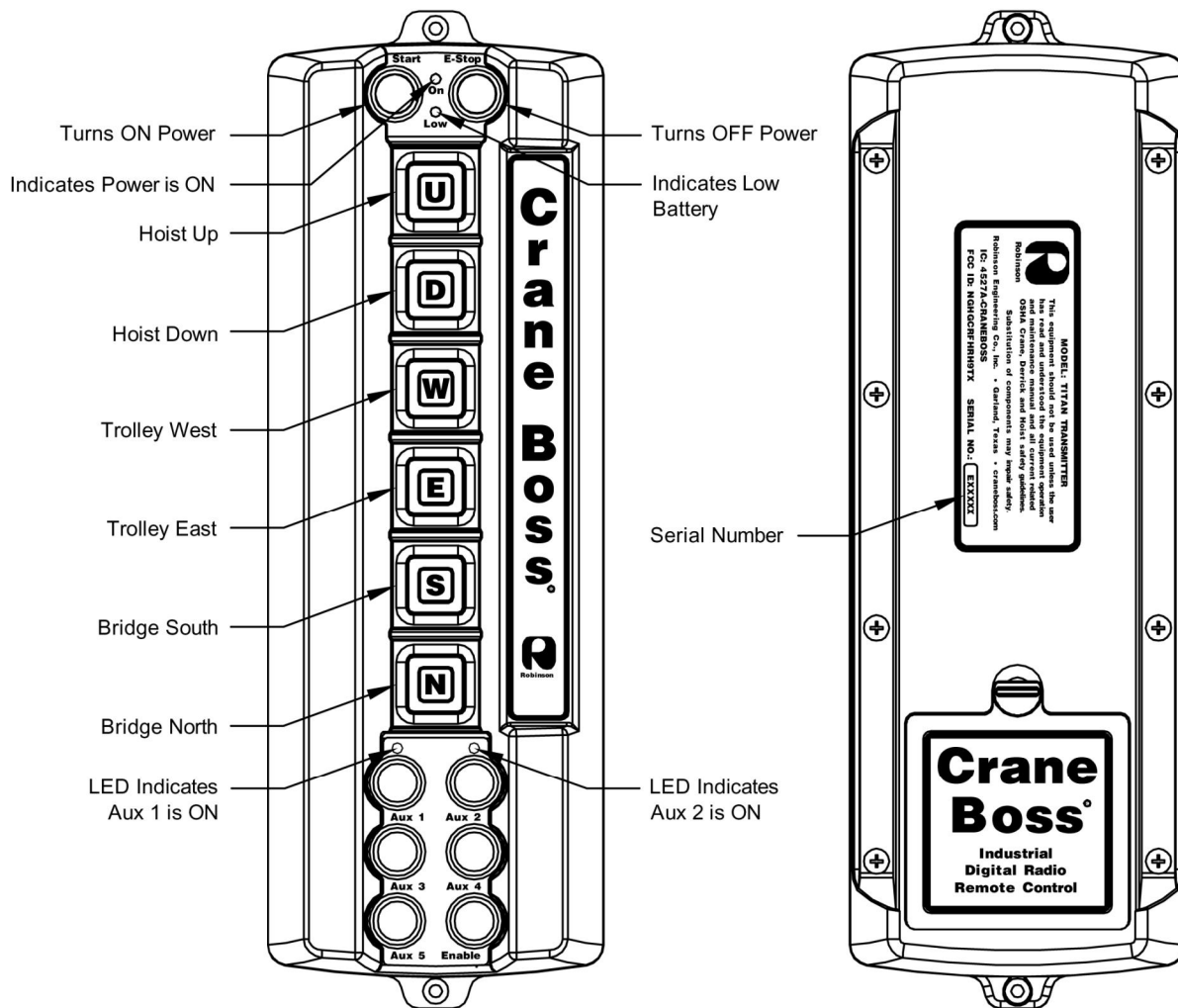
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1	GENERAL INFORMATION	- 1 -
1.1	SCOPE	- 1 -
1.2	SPECIFICATIONS	- 2 -
1.3	RECEIVING EQUIPMENT	- 2 -
1.4	IMPORTANT FEATURES	- 2 -
1.5	WARRANTY	- 3 -
2	SYSTEM OPERATION	- 4 -
2.1	RECEIVING EQUIPMENT	- 4 -
2.2	TRANSMITTER SECURITY	- 4 -
2.3	OPERATING PROCEDURE	- 4 -
2.4	MISCELLANEOUS OPERATING INFORMATION	- 5 -
3	TITAN OPERATION	- 6 -
3.1	TURNING THE TITAN ON	- 6 -
3.2	TURNING THE TITAN OFF	- 6 -
3.3	AUX1/AUX2 OPERATION	- 6 -
3.4	AUX3/AUX4 OPERATION	- 6 -
3.5	AUX5 OPERATION	- 6 -
3.6	LOW BATTERY INDICATION	- 7 -
3.7	AUTOMATIC POWER-OFF	- 7 -
4	CONFIGURATION	- 8 -
4.1	FREQUENCY SET ONE	- 8 -
4.2	FREQUENCY SET TWO	- 8 -
5	INSTALLATION	- 9 -
5.1	MOUNTING RECEIVING EQUIPMENT	- 9 -
5.2	MOUNTING ANTENNA	- 9 -
5.3	TRANSFER SWITCH	- 10 -
5.4	OUTPUT CIRCUITRY	- 11 -
5.5	INTERFACE LOGIC PANELS	- 12 -
5.5.1	<i>Required Uses</i>	- 12 -
5.5.2	<i>Upgrading Contact Rating</i>	- 12 -
5.5.3	<i>Logic Expanding</i>	- 12 -
5.6	START-UP PROCEDURE	- 12 -
5.6.1	<i>Before Power-up Check List</i>	- 12 -
5.6.2	<i>Receiving Power-up Check List: (Transmitter off)</i>	- 13 -
5.6.3	<i>Operational Check List</i>	- 13 -
5.6.4	<i>Problems</i>	- 13 -
6	MAINTENANCE	- 14 -
6.1	PREVENTIVE MAINTENANCE	- 14 -
6.2	CORRECTIVE MAINTENANCE	- 14 -

1 GENERAL INFORMATION

1.1 Scope

This manual contains information necessary to operate and maintain the 900 MHz TITAN Remote Control Transmitter. Read all the OSHA guidelines for your industry before operating this product. The TITAN is part of a total system package that includes the receiving, decoding, and relay equipment.



1.2 Specifications

- Operating Range: 300 feet
- Operating Temperature: -40 to 150 F
- Frequency Band: 902.62 – 927.62 MHz
- Housing: Durable ABS Plastic
- Case Size / Weight: 12 1/4" L x 3 1/8" W x 2 1/2" D / 2 lbs.
- Batteries: 4 Alkaline AA (1.5 volt each)
- Automatic Power Down after 30 minutes of non-use
- Ergonomic Spring-returned Pushbuttons
- 3-Speed or 5-Speed Switches
- FCC (Part 15.249) continuous transmission certified for the USA and Canada
 - FCC ID: NQHGCGRFHRH9TX
 - IC: 4527A-CRANEBOSS

Other options are available. Please inquire. Included are four AA batteries and one belt harness.

1.3 Receiving Equipment

The receiving equipment cabinet is mounted on the crane or machinery and contains the radio-receiving unit, decoding equipment and relays to convert the radio signal from the transmitter to signals suitable for operation of magnetic controls.

1.4 Important Features

- Fail-safe circuits are used throughout the system.
- The command link is capable of handling all motions simultaneously.
- The system uses digital pulse code frequency modulation. It was developed specifically for industrial control.
- The system utilizes fully solid-state electronic circuits, with heavy-duty relay contact output circuits.
- Maintenance requirements are greatly reduced by modular design and use of digital switching circuits. No special test equipment is required.
- Radio control of several units in the same plant without interference is entirely practical. Each transmitter transmits a unique address code, which prevents response by other than the intended unit. In addition, the operating frequencies of different units are staggered within the frequency band to prevent interference.
- Proper selection of address codes and operating frequencies with respect to physical separation provides control of multiple installations with no practical limitation on the number at one location.
- The transmitter is a portable unit, which is carried by the operator.
- Switches on the transmitter control all functions as labeled.
- The portable self-contained transmitter weighs 2 pounds. The transmitter includes an internal antenna and has four easily changeable alkaline AA batteries.

1.5 Warranty

Manufacturer Warranty's the delivered remote control system to be free of defective material and workmanship and agrees to remedy any such defect within one year of first party purchase at no charge to the purchaser upon return of defective parts to factory. Defects caused by improper installation, maintenance, misuse, tampering, neglect, accident, or use in violation of manufacturer's written instructions shall not be covered by this warranty. Manufacturer guarantees that remote control system will perform as outlined in this manual. Transferring of this warranty is acceptable and recommended. Please notify this factory of any and all transfers.

2 System Operation

2.1 Receiving Equipment

Normal operating procedure is to leave receiving equipment energized at all times. (Power switch ON, neon indicator lighted). The unit can then be readily placed in operation by means of the portable control transmitter.

2.2 Transmitter Security

The transmitter should be stored in a secure location with the batteries removed, when not in use.

2.3 Operating Procedure

To place the unit in operation, proceed as follows:

- Install (4) AA Alkaline Batteries
- Operator should position himself so as to have a clear view of the motions and actions.
- Turn the Transmitter ON: With all operating controls in the "Open" position, push the Start Pushbutton. The Green LED indicating light will illuminate. The Master relay on the radio control and main line contactor are energized.
- Move the Bridge, Trolley, and/or Hoist: Crane can now be moved by operating desired control operators. All motion controls are spring loaded to "Open".
- In the event of an emergency situation, press the E-Stop button and remove the batteries.
- Upon completion of use, turn transmitter OFF by pressing the E-Stop pushbutton and place transmitter in designated storage location with Power OFF.

NOTE: The transmitter will automatically power down (turn off) if no motions are activated within 30 minutes.

2.4 *Miscellaneous Operating Information*

Abnormal electrical conditions during operation will de-energize control circuits, stopping motion. This can be caused by any one of a number of abnormal conditions. Among these are:

- Weak or improper radio signal.
- Interruption of power to receiving equipment.
- Radio interference.
- Malfunction of radio equipment.
- Malfunction of machine electrical equipment.
- If the abnormal condition is temporary, control can be resumed by repeating the steps given in the Operating Procedure. The exact sequence of operation must be followed to accomplish operation of safety circuits in the receiving equipment.

3 TITAN Operation

The TITAN is simple to operate. While operating, the “**On**” LED will be green. It transmits continuously while on. The transmitter uses easily operated pushbuttons for each crane motion. Pressing the pushbutton moves the crane in the requested direction. All pushbuttons return to an “open” condition (dead-man action) when released, and motion stops. Fail-safe features are used throughout the circuitry. All crane motion stops in case of malfunction. The transmitter(s) in your Crane Boss system transmit unique address codes to each crane. This prevents any mix-up in crane response. Only one crane responds to one special code when transmitted. Hundreds of these address codes are available. For added protection, operating frequencies of each transmitter in the same area can be staggered within the frequency band to prevent interference. The proper selection of address codes and operating frequencies permits control of an unlimited number of cranes in the same plant, area or city.

3.1 *Turning the TITAN On*

Press the black **Start** button (until the **On LED** is green) and release it (with no other buttons being pressed) to turn the unit on. If the **On LED** is green then the unit is ready to operate. If both LEDs blink RED several times and then the unit automatically powers-off this indicates that some button was being pressed at the time of power-up. Try again being careful to not press any other buttons than the Start button. If the problem persists call the factory.

3.2 *Turning the TITAN Off*

Press the red **E-Stop** button and release to turn the unit off. While pressing the **E-Stop** button (and for a short minimum time) the **On LED** will be green and the **Low LED** will be red. During this time the **E-Stop** condition is transmitted. Note that the LEDs will remain in this condition and the **E-Stop** condition will be continually transmitted while holding the **E-Stop** button down. The LEDs will not be extinguished and the unit powered-off until the **E-Stop** button is released.

3.3 *Aux1/Aux2 Operation*

The default configuration for Aux1/Aux2 is Maintained operation. The Aux1 and Aux2 buttons operate in a toggle fashion alternately maintaining both the LED and the function as active or inactive until the next push and release cycle of the button. If the TITAN has been configured for Momentary Aux1/Aux2 operation these functions and the corresponding red LED will be active only while pressing the button.

3.4 *Aux3/Aux4 Operation*

The configuration for Aux3/Aux4 is mutually exclusive, meaning that both buttons cannot be pressed at the same time.

3.5 *Aux5 Operation*

Aux5 works in conjunction with Aux3/Aux4. For example, you must press and hold Aux3 or Aux4 and then press Aux5.

3.6 Low Battery Indication

If the TITAN detects that the battery is low the Low LED will be red and the On LED will remain green. The unit will allow for about 30 minutes operation in this condition and then the unit will power itself down. This is a courtesy to the user. The batteries should be replaced. Do NOT continue using the unit without replacing the batteries.

3.7 Automatic Power-off

If no button is pressed after 30 minutes the TITAN will power down. Any button press resets the time-out back to 30 minutes, anytime before the unit has actually powered itself off. The only intentional exception to this is the 30 minute time-out due to low battery. The low battery time-out will take priority over any button presses and insist on powering the unit off 30 minutes after detecting the low battery condition.

4 Configuration

The TITAN is configured at the factory and the user should not attempt to do any modifications of that configuration.

In general, the factory will configure the unit for each customer. However, please contact the factory for any custom options. The usual options are:

- 3-Speed or 5-Speed Function Switches
- Maintained Operation for the Aux1 / Aux2 buttons (Momentary Optional)
- Transmission Frequency from one of the following two sets.

4.1 Frequency Set One

Channel #	Frequency (in MHz)
1	903.37
2	906.37
3	907.87
4	909.37
5	912.37
6	916.87
7	919.87
8	921.37
9	923.87
10	926.37

4.2 Frequency Set Two

Channel #	Frequency (in MHz)
1	904.12
2	907.12
3	908.62
4	910.12
5	913.12
6	917.62
7	920.62
8	922.12
9	924.62
10	927.12

5 Installation

This section is intended as aid to preparing for mounting and interconnection of Crane Boss to machinery, crane or monorail. The examples and suggestions made as to the mounting and interconnection are based upon typical uses and past experience; depending upon application, these may or may not be applicable or appropriate. The installer is cautioned to assure that requirements of applicable Codes and Ordinances are complied with.

5.1 Mounting Receiving Equipment

Refer to Outline Drawing for mounting dimensions and clearances required. Rigidly mount, as for any control panel, the Receiving Cabinet to the structure of the equipment to be remotely controlled. Allow access for conduit entry as noted on the Outline Drawing.

Mounting of the Indicating Light (if used) is accomplished by normal electrical wiring procedures. Be sure of visibility from operating area. Also, that it be conveniently accessible for service (changing bulb, etc.). Terminals IL and X2 are used for the Indicating Light.

5.2 Mounting Antenna

The antenna is installed by plugging into the jack on the bottom of the Radio Control cabinet.

If an antenna location other than the bottom of the cabinet is required, an optional kit for remote installation is available*

Proper mounting and location of antenna is imperative for signal to reach decoding and output circuits. (See Notes on Outline Drawing.)

Mounting of the Receiving enclosure should allow for the Antenna to be:

- Clear of large metal objects, bring greater than one foot away from bridge girders, hoist mechanism, etc;
- In view from the entire operating area, in all directions;
- And not in close proximity to crane electrification, like runway conductors, bridge cross conductors, festooning, conduit or wire way. If any of these conditions cannot be met, a Remote Antenna Kit should be used. *

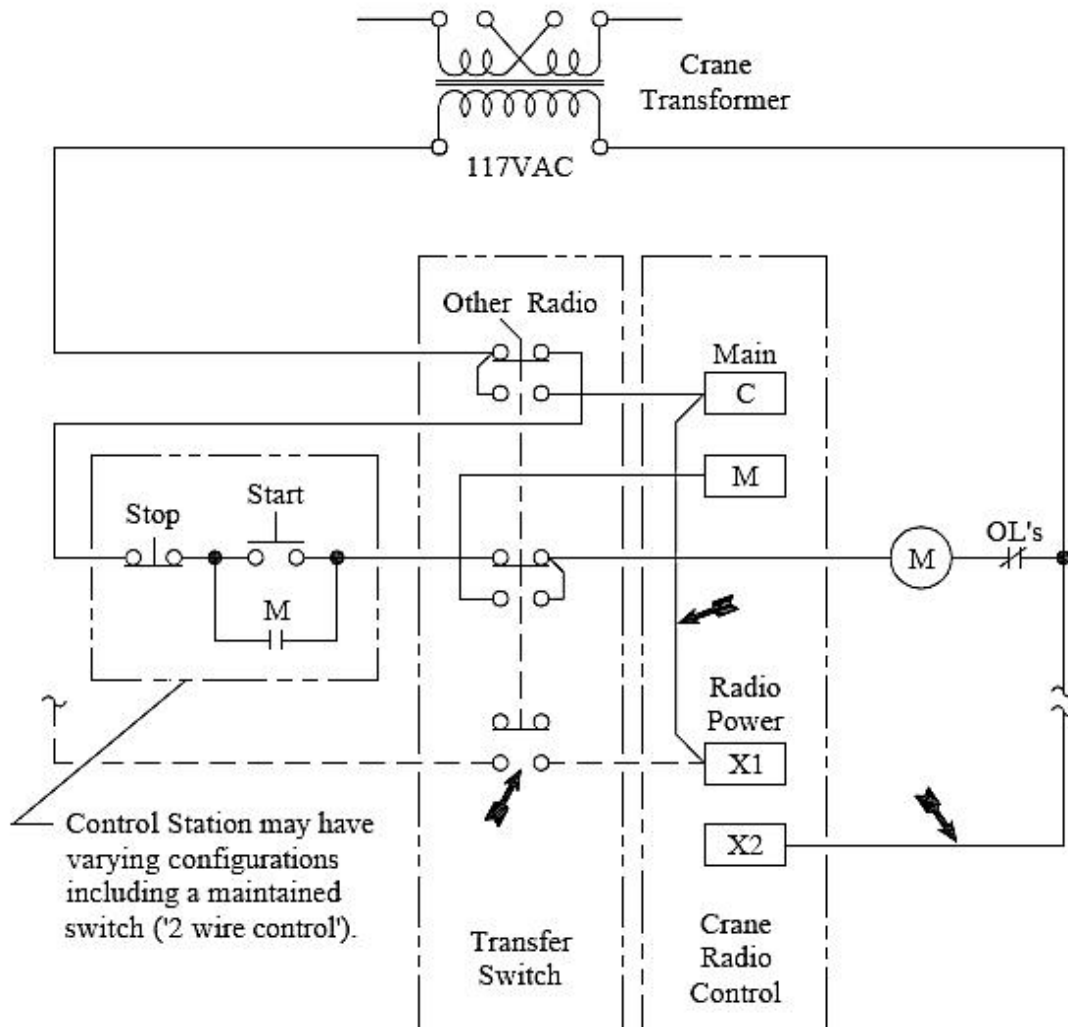
Wherever the “other” means of control (console, pendant, etc.) is located (trolley, bridge) is probably the simplest wiring location for the radio control cabinet. The only distinct difference between pushbutton and radio control is that 117 VAC must be available for radio power supply. Pushbuttons will have as a common the “hot” lead. The other leg of the transformer (X2) must often be added by conductor bar, festooning, or by other means.

5.3 Transfer Switch

Mutually exclusive transferring of control modes is often used:

Pendant-Radio, Cab-Radio, TITAN-Radio, Radio On/Off, etc.

The mutual exclusivity is most simply obtained by appropriately defeating the other modes power feed, as well as, opening any normally closed circuits. See 5.4



➡ If Radio Power is to be separate from Main Power, omit jumper from C (Main) to X1 and add Transfer Switch contact with dashed line connection as shown. X2 must be connected to the same power source as X1.

Figure 5-1

If Radio Power is to be separate from Main Power, omit jumper from C (Main) to X1 and add Transfer Switch contact with dashed line connection as shown.

X2 must be connected to the same power source as X1.

NOTE: This diagram, Figure 5-1 is an example only. Equipment control circuits may vary greatly. Control connections should be carefully considered to provide proper operation and avoid feedback circuits.

5.4 Output Circuitry

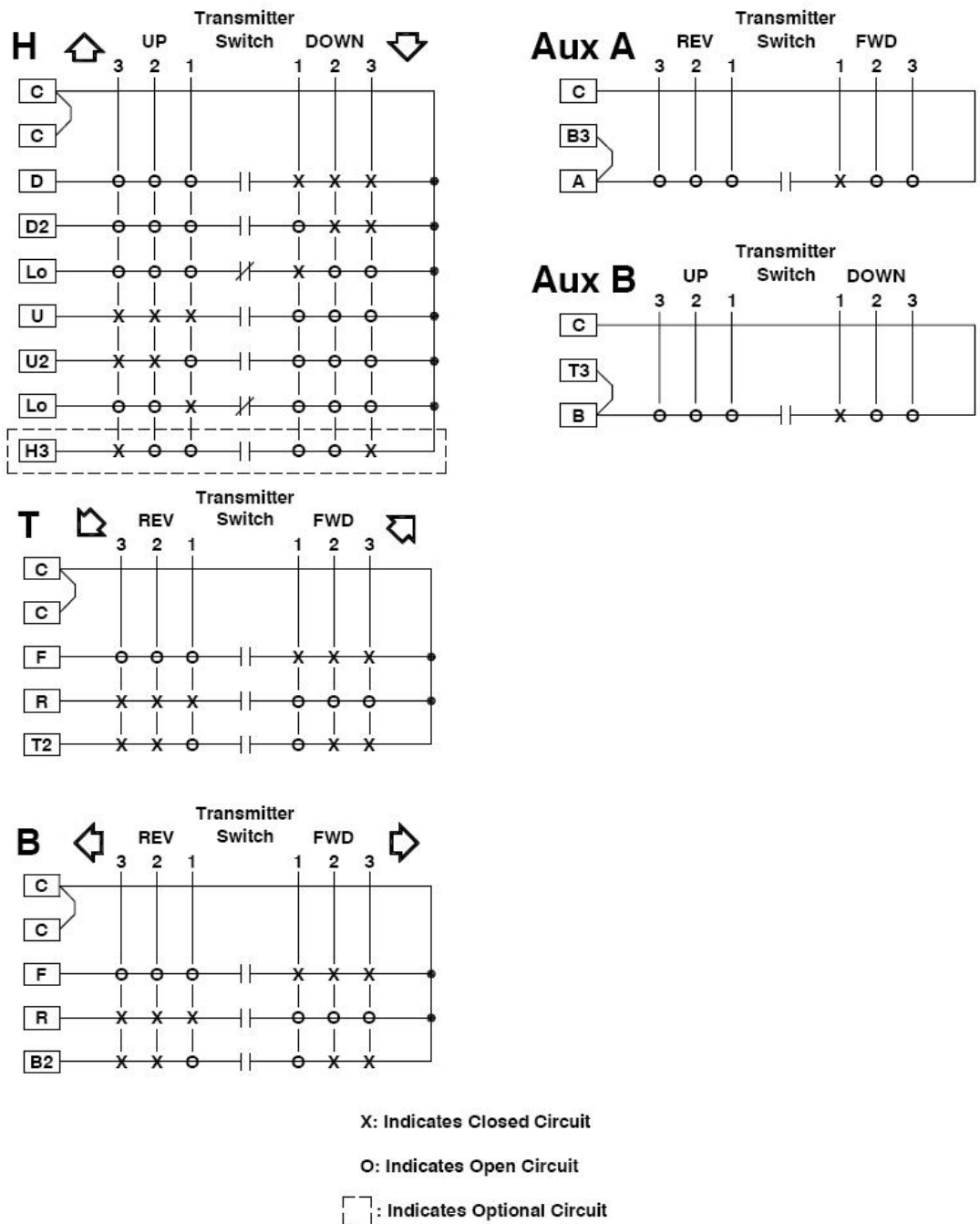


Figure 5-2 Example of Radio Control Output Circuit

5.5 Interface Logic Panels

5.5.1 Required Uses

- Contactor control voltage exceeds 120 VAC (cab masters are often full voltage)
- Contactors larger than size NEMA 4, or multiple contactor coils are simultaneously operated.
- Contactors with DC coils are used.

5.5.2 Upgrading Contact Rating

When voltage or current rating of output contacts is insufficient to operate a contactor directly, an interposing relay must be used.

The coil of the interposing relay used should be operable within the output contact ratings: **120 VAC, maximum size NEMA 4 contactor.**

5.5.3 Logic Expanding

When more than one contact closure per output is required or additional logic through combinations requires more output contacts than available at the terminal strip, additional contacts must be made available through the use of interposing relays.

The addition of a logic panel can also simplify pendant, pushbutton, or cab master wiring. Assure isolation of all operating modes by the application of the Transfer Switch. Equipment control circuits may vary greatly. Control connections should be carefully considered to provide proper operation and avoid feedback circuits.

5.6 Start-up Procedure

5.6.1 Before Power-up Check List

- Cabinet mounted per Outline Drawing.
- All conduit entry thru bottom of cabinet, away from Antenna.
- Receiving Antenna must be visible from operating area, in all directions and over entire range of operation.
- Internal components and connections are tight and secure.
- Channel(s) for transmitter(s) to operate unit are selected on the Scanning Control Receiver. See tag(s) on transmitter(s) for frequency & channel.
- Transfer Switch, if used is in "Radio".

5.6.2 Receiving Power-up Check List: (Transmitter off)

- With .On/Off. Rocker Switch on Controller in “Off” position, turn on supply-power to radio (and control voltages of crane). Measure 100 to 140 VAC between radio terminals X1 & X2.
- **Smoke Test:** Press Rocker Switch to “On” position Neon Indicator, next to Rocker Switch, lights and Control Receiver scans thru all selected channels continuously.
- **Airwave Check:** Plug an external speaker into the Control Receiver. Perform this test with the Transmitter turned OFF. Listen for any signals present on selected operating channels. Pure “hissing” is normal. Any other noise indicates possible competition on that frequency.

5.6.3 Operational Check List

- Perform system functional test on ALL functions using Operating Procedure in paragraph 2.3.
- Range Test: Employing proper safety precautions operate from the extreme locations in the area (300 Feet Maximum).
- Leave the Operation & Maintenance Manual on-site, since it will be what is needed when it is needed and where it is needed!

5.6.4 Problems

See Section 5 in the Operation & Maintenance Manual. Please do not hesitate to call the Robinson Engineering factory from the jobsite with any questions. Have serial number of unit and Manual ready!

6 Maintenance

The system is of modular design, with plug-in type electronic sub-assemblies and readily replaceable electrical components. Trouble can be corrected by locating and replacing the defective part, using the substitution method. It is suggested that spare parts be obtained for replacement purposes. Field repair of electronic sub-assemblies is not recommended. Improper techniques can result in damage to components and voiding of warranty. The factory will provide prompt test and repair or replacement of returned defective or questionable parts, including the complete transmitter, at nominal costs; or at no cost under warranty. Federal Communications Commission Rules and Regulations require that tuning adjustments on the radio frequency (RF) portion of the transmitter be made only by a properly licensed person.

6.1 Preventive Maintenance

No preventive maintenance is required except for periodic inspection for security of hardware, harnessed internal wiring and to check for intrusion of dirt or foreign matter. Relay contacts may be checked for excessive arcing by cycling through all motions. Replace parts as necessary.

6.2 Corrective Maintenance

In case of suspected Radio Remote Control System trouble, activate the back-up controls and check for normal machine operation. If back-up system operation is not normal, locate and correct trouble in basic equipment before proceeding to radio equipment.