

SECTION 5: TRANSMITTER

5.1 TRANSMITTER DESCRIPTION

The 21T54 transmitter is housed in a rugged case molded from high impact resistant ABS plastic. The transmitter uses sealed push-button and toggle switches for discrete inputs, and high quality joysticks for motor control functions. It has an easy access battery compartment for the long life Alkaline batteries. Each transmitter is provided with a shoulder strap for ease of use.

All transmitter functions are controlled by a microprocessor with a special memory for configuration information. This arrangement offers a great degree of capability and versatility while at the same time providing simplicity of operation and maintenance.

The antenna is internal to the transmitter case, protecting it from damage. An indicator LED provides a quick visual check of the transmitters status.

The crane control transmitters are designed to be very efficient. Only three AA batteries are needed to provide power for the transmitter for two month's normal use. Up to 9 batteries may be used to extend the operating time much longer. An additional feature automatically shuts the transmitter off after a preset time interval of inactivity to further extend the battery life.



Figure 5.1 21T54 Transmitter

The microprocessor contains a nonvolatile memory that retains the frequency, address and particular operating parameters for the system. It is programmable by means of PC compatible computers equipped with an RS-232 serial port (RAC17) or by an independent programming unit (RAC16).

5.2 TRANSMITTER FUNCTIONS

WARNING

Do not operate the system until you are familiar with radio controlled crane operation. If you are not familiar with radio controlled crane operation, contact your supervisor before attempting to use the radio control system.

AVERTISSEMENT !

Ne pas faire fonctionner le système avant de bien connaître le fonctionnement d'une grue par téléguidage. Contacter le superviseur avant de faire toute tentative de mise en marche par téléguidage, si le fonctionnement n'est pas connu.

The 21T54 transmitter uses sealed push-buttons, toggle switches and joysticks for control of radio and command functions. The following describes the function of the switches, operational procedures and particular characteristics of the transmitter.

Refer to Figure 5.2.

ON/ALARM. Puts the system into the active mode. The transmitter will remain active until the OFF/ESTOP is pressed or the transmitter turns itself off (see Auto Off).

Sends an ALARM command to the receiver while the button is depressed.

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OFF/ESTOP. While depressed, sends an Emergency Stop command to the receiver. The transmitter does not need to be in the active mode to send this command.

After this button is released the transmitter will be turned off.

TEST LED. The Test LED provides an indication of the transmitter operation.

When the transmitter is OFF the TEST LED will be off. When the transmitter is ON, the TEST LED will flash at a low rate when no command is being sent and at a high rate when a command is being sent.

If the batteries are getting low, the TEST LED will flash on-off. (1/2 second on and 1/2 second off) while the transmitter is ON. The transmitter may still be used, however the batteries should be changed at the next convenient opportunity.

If the TEST LED remains on continuously there is either a switch activated at the time the transmitter is turned on, or a general failure that requires factory service. If the

TEST LED remains lit continuously on power-up, insure that no other switches are pressed while attempting to turn the transmitter on.

Auto Off. The transmitter will turn itself off if no commands have been sent for a predetermined time. Normally this time is set to 15 minutes, however it may be programmed for other times.

Joysticks. When in the relaxed (center) position no commands are sent. When a joystick is displaced from the relaxed position a command proportional to the amount of displacement is generated; that is, the further the joystick is pushed the faster the movement will be commanded.

PTO Switch (optional). The Push To Operate (PTO or "Dead Man Switch") is a safety device. The 21T44 is normally programmed so that the bar that activates this switch must be depressed before any motor or other critical function can be operated. Consult the configuration sheet in the receiver manual if this switch has an alternate use in your system.



Figure 5.2 21T54 Transmitter

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Selecting Cranes. On cranes that have multiple hoists or multiple trolleys, a selector switch is provided that selects crane 1, crane 2 or both crane 1 and crane 2.

On transmitters with a rotary selector switch, position the switch to the crane 1, crane 2 or crane 1 and 2 position.

Command Switches. The command switches are labeled according to their function. The switches are active only while depressed. Releasing the switch stops a motion or function. The following points apply to the use of the command switches on the transmitter:

1. If opposing commands are attempted, i.e., two commands that conflict with each other, no movement will result.
2. If more than one speed command is sent for the same function, the lower speed will predominate.
3. Maintained on or off functions require separate commands for on and off.

Shoulder Strap. The transmitter comes with an adjustable strap for carrying and ease of operation.

5.3 TRANSMITTER OPERATION

IMPORTANT

The EMERGENCY STOP button for the system is the “OFF/ESTOP” button. Press and hold this button to stop all functions.

IMPORTANT !

Le bouton d'arrêt d'urgence (EMERGENCY STOP) pour ce système est le bouton OFF/ESTOP. Appuyer et maintenir le bouton pour arrêter toutes les fonctions.

1. Press and release the ON/ALARM button. Verify that the test LED starts flashing at a low rate. If equipped, the Alarm on the crane should sound.

2. For functions that do not require the PTO switch, press a switch or operate the joystick to activate the function.
3. For switches that require the use of the PTO switch, hold the PTO switch down while pressing a command switch to activate the function.
4. To stop any function, release the function and/or PTO switch.
5. To turn the transmitter off, press the OFF/ESTOP button. Note that the transmitter will turn itself off if no commands are changed for a predetermined time.

5.4 OPTIONS

Harness. An optional full harness is available for the transmitter which makes long shift operation less tiring.

First Come-First Serve (FCFS). The FCFS option allows one receiver to be controlled by more than one transmitter, but only one at a time.

When all the transmitters in the system are off, the receiver will scan (look for) the frequency of each of the transmitters in the system. When the receiver detects the signal of a valid transmitter, it will stop scanning and lock on to that transmitter. So long as it continues to receive signals from that transmitter, it will not scan. If another transmitter or transmitters are turned on, their signals will not be detected by the receiver.

If your transmitter is the first one turned on, it will take control of the receiver. If another transmitter was turned on prior to yours, your transmitter will have no effect on the system until the other transmitter is turned off. When the other transmitter is turned off, the receiver will automatically resume scanning and lock on to the frequency of the next transmitter that comes on. If it's yours, then you will then have control until you turn your transmitter off.

Pitch and Catch. Pitch and Catch is similar to First Come-First Serve. There are two significant differences between the two. First, with Pitch and Catch when the transmitter that has control is turned off, the receiver will

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NOT scan, looking for another transmitter. It will remain locked on to that transmitter. Second, when a transmitter wishes to give up control of the receiver, it must send a Release command to the receiver. This tells the receiver to begin scanning and immediately lock on to the next transmitter whose frequency it detects. If another transmitter is on, or is turned on, it will assume control. If no other transmitters are on, the receiver will wait 10 seconds from the time it received the Release command then revert to the FCFS mode.

A-BOTH-B SWITCH. Selector switches can be provided to control more than one similar function with the same controls, i.e., controlling trolley/hoist A, trolley/hoist B or both simultaneously.

KEY SWITCH. A key switch can be provided to secure the transmitter from use by unauthorized personnel. The key switch is electrically connected between the battery and the electronics so that all power is removed when the switch is in the off position.

Magnet Control. Additional safety is built into systems that use a lifting magnet.

The **two button** design uses one button marked MAG LIFT and the second button marked MAG DROP. Pressing the MAG LIFT energizes the magnet. To de-energize the magnet and drop the load, MAG LIFT and MAG DROP must be pressed at the same time. A time delay is built into the circuit so that the buttons must be held for nearly a second before the magnetic controls are activated.

An additional switch may be provided for fan drop of the load. Labeled FAN, or MAG FAN, pressing this switch along with MAG LIFT will activate the fan drop function. Again, a time delay is built into the circuit so that the buttons must be held for nearly a second before the magnetic controls are activated.

5.5 TROUBLESHOOTING

The transmitter has a TEST LED to aid in troubleshooting.

Due to the rough treatment it may be subjected to, most problems are likely to occur in the transmitter. The

transmitter should be thoroughly diagnosed before proceeding to the receiver.

WARNING !

When testing the transmitter, the receiver may become active resulting in system operation. Always assume the system is working and will respond when testing a transmitter.

AVERTISSEMENT !

Lors d'essais de fonctionnement du transmetteur, le récepteur peut être activé et provoquer la mise en marche du système. Toujours considérer que le système fonctionne et qu'il répondra aux essais du transmetteur.

When the transmitter is OFF the LED should be off.

Press and release the ON/ALARM button. The LED should flash at a low rate. Press a command switch. The LED should flash at a high rate.

If the batteries are getting low, the LED will flash on-off. (1/2 second on and 1/2 second off) while the transmitter is ON. The batteries should be changed at the next convenient opportunity.

If the LED remains on continuously there is either a switch activated at the time the transmitter is turned on, or a general failure that requires factory service. If the LED remains lit continuously on power-up, insure that no other switches are pressed while attempting to turn the transmitter on.

If the test LED does not light at all, replace the batteries. If this does not fix the problem, the transmitter is inoperable and must be repaired.

5.6 TRANSMITTER REPAIRS**CAUTION !**

The transmitter electronic components are exposed when the back of the case is removed. Take caution to prevent dirt or other contaminants from entering the case. Do not allow the circuit to be scraped or damaged in any way.

AVERTISSEMENT !

Lorsque l'endos du boîtier est enlevé, les composants électroniques sont à découvert. Prendre soin d'éviter de laisser la saleté ou tout autre contaminant entrer dans le boîtier. Éviter d'érafler ou d'endommager le circuit de quelque façon que ce soit.

Battery Replacement.

1. Open the battery compartment and remove all of the batteries.
2. Replace the batteries with Alkaline AA type. Orient the batteries as shown. Note that each set of three batteries are in parallel. Either three, six or nine batteries may be used to power the transmitter. When using six or nine batteries it is important to use the same type and age to achieve the longest battery life.
3. Close the battery compartment.

Changing Transmitter Switches.**CAUTION !**

The transmitter contains electronic components that can be damaged by static electricity. Use appropriate handling procedures when handling the circuit board to prevent damage from static electricity.

ATTENTION !

L'électricité statique peut endommager les composants électroniques situés à l'intérieur du transmetteur. Afin d'éviter tout dommage causé par l'électricité statique, respecter les procédures lors de la manipulation de la carte circuit.

1. Remove the batteries from the transmitter.
2. Loosen the four screws from the bottom of the transmitter and carefully pry off the bottom of the transmitter.
3. Remove the 4 screws securing the circuit board to the brackets inside the case.
4. Locate the wires from the switch to be replaced and note the exact position of the plug on the board.
5. Replace the switch and plug the new switch into the circuit board in place of the old switch.
6. Replace the circuit board using care to make sure all connectors are firmly seated in the encoder board and the wires are dressed neatly.
7. Reinstall the case bottom.

Changing the Transmitter Identity Code

1. Open the battery compartment door and locate the mini din connector.
2. Using the adapter, attach the programming plug to the mini din connector.
3. Load the Identity Code (see section 4.3, PROGRAMMING).

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5.7 TRANSMITTER SPECIFICATIONS

Operating frequency band	902 - 928 MHz
Channel spacing	300 KHz
Modulation	Digital Frequency Modulation based on Manchester Code. Contains 16 bit address plus 16 bit CRC check
Command functions	Up to 8 Lever plus 24 discrete
Power, input	9 AA cell batteries. Alkaline or Lithium recommended
Output power	Meets FCC part 15 requirements for license free operation
Antenna	Front mounted circuit board
Switch Type	continuous action levers plus auxiliary controls
Indicators	Self test LED indicator
Transmitter case dimensions	7.5" x 9.5" x

Table 5.1 21T54 Transmitter Spare Parts List

<u>ITEM</u>	<u>PART NUMBER</u>
Spare transmitter (complete)	21T54
Shoulder strap	600008
Toggle Switch (on/off/on)	920056
Toggle Switch ((on)/off/(on))	920057
Toggle Switch (on/off/on) locking	920058
Push-button Switch (red)	920059
Push-button Switch (black)	920060
Push-button Switch (ESTOP)	920061
Rotary Switch (2 pos)	920062
Rotary Switch (3 pos)	920067
Rotary Switch (4 pos)	920069
Rotary Switch (6 pos)	920070
Test LED	920071
Harness	RAC11
Lever, stepless	920065