

16000-SIII RADIO:99903609: 20040405



# 16000-SIII Radio Remote Manual

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MANUAL PART NUMBER 99903609

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## INTRODUCTION

### THE MANUAL

Before operation of unit, carefully and completely read your manuals. The contents will provide you with an understanding of safety instructions and controls during normal operation and maintenance.

### MODEL AND SERIAL NUMBERS

When contacting your dealer or IMT about service, repair or replacement parts, know the model and serial numbers of the transmitter and receiver.

The numbers are located on the label that is affixed to the unit itself. Record the serial numbers here:

Transmitter
-------------

Receiver
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## UNAUTHORIZED REPLACEMENT PARTS

Use only authorized replacement parts. The replacement of any part with anything other than an authorized replacement part may adversely affect the performance, durability, and safety of this system and may void the warranty. IMT disclaims liability for any claims or damages, whether warranty, property damage, personal injury or death arising out of the use of unauthorized replacement parts.

## BEFORE ATTEMPTING TO OPERATE THIS SYSTEM:

1. Make sure all installation has been properly completed.

2. Understand all Safety Precautions provided in the manuals.
3. Review control functions and operation of the machine and this radio remote control system.

## THEORY OF OPERATION

The BMS System includes a transmitter and a receiver. The transmitter generates the electronic signal that communicates with the receiver. IMT radio remote control systems operate in the 400-470 MHz range (70 cm band). The transmitter and receiver are set with identical address codes and frequency channels. This allows operation of multiple systems within the same area without signal interference

# SAFETY

## SAFETY ALERTS



Look for this symbol to point out important safety precautions. They mean:

**Attention!**

**Personal Safety Is Involved!**

**Become Alert!**

**Obey The Message!**

The safety alert symbol is used in decals on the unit and with proper operation procedures in this manual. Understand the safety message. It contains important information about personal safety on or near the unit.



**DANGER: IMMINENTLY HAZARDOUS SITUATION!** If not avoided, WILL RESULT in death or serious injury.



**WARNING: POTENTIALLY HAZARDOUS SITUATION!** If not avoided, COULD RESULT in death or serious injury.



**CAUTION: POTENTIALLY HAZARDOUS SITUATION!** If not avoided, MAY RESULT in minor or moderate injury. It may also be used to alert against unsafe practices.

## NOTATIONS

**NOTE:** General reference information for proper operation and maintenance practices.

**IMPORTANT:** Specific procedures or information required to prevent damage to unit or attachment.

## PRACTICES AND LAWS

Practice usual and customary safe working precautions, for the benefit of yourself and others. Understand and follow all safety messages. Be alert to unsafe conditions and the possibility of minor, moderate, or serious injury or death. Learn applicable rules and laws in your area.

## REQUIRED OPERATOR TRAINING

Original purchaser of this unit was instructed by the seller on safe and proper operation. If unit is to be used by someone other than original purchaser; loaned, rented or sold, ALWAYS provide this manual and any needed safety training before operation.

ALWAYS review the operators manual of any machine to be controlled by radio remote control.

## SAFETY RULES

This radio remote control system is equipped with electronic and mechanical safety features. Processing of control signals transmitted from other transmitters is not possible, since transmission coding is unique to each system.

## POSSIBLE SOURCES OF DANGER

This system makes remote control via radio signals possible. However, the transmission of control commands can take place around obstacles and out of the operator's direct sight. To prevent accidental start-up and possible injury or damage:

1. Always engage the E-stop button and switch "OFF" the transmitter when it is not in use. Remove the key if the unit is placed any distance away from the operator.
2. Disconnect the power supply before any assembly, maintenance or repair work is done.
3. Never remove or alter any of the safety features of this system.

## OPERATION AND WORK AREA SAFETY

The work area must be free from obstacles, debris or other tripping hazards. Avoid uneven work areas and any rough terrain. Always be sure of your footing.

Be aware of overhead obstacles that may interfere with machine operation.

Always operate the transmitter with its carrying belt.

## PROTECTIVE FEATURES

These safety features help protect the operator, as well as others within the work area. The machine functions can be stopped by pushing the emergency stop button on the transmitter control panel (EMERGENCY STOP).

**NOTE:** The e-stop command is transmitted within approximately 0.5 seconds (450 ms) after the switch is turned to the "OFF" position.

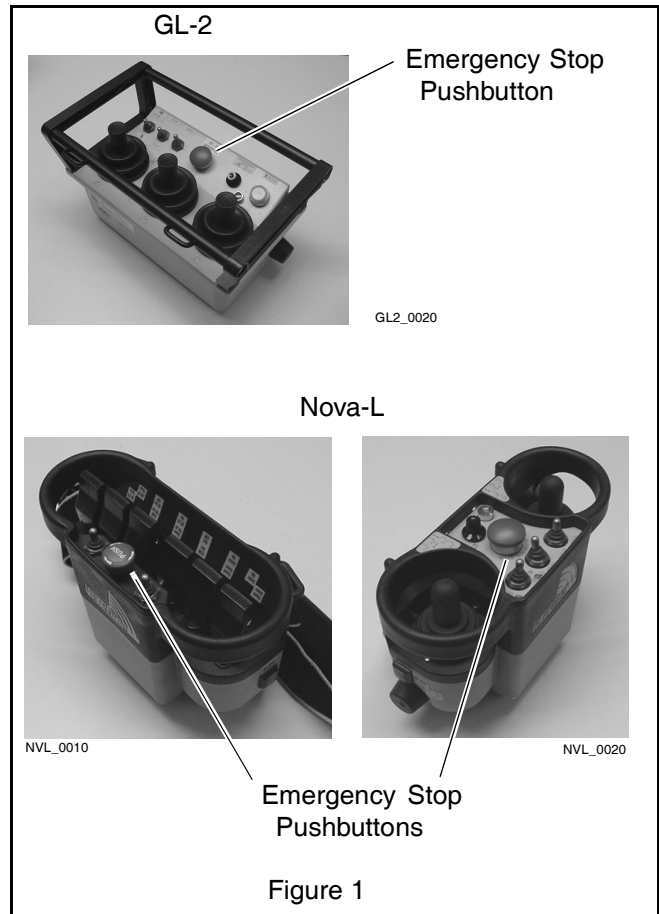
The protective guard around the upper section of the transmitter housing helps protect against accidental activation of controls and unintentional operation.



**WARNING:** Accidental start-up can cause serious injury or death. NEVER remove or modify any safety feature.

## TO STOP IN AN EMERGENCY

1. Press the red "EMERGENCY STOP" pushbutton.
2. Turn the key to "OFF".
3. Wait for all moving machine parts to stop.
4. Refer to machine's operator manual for further instructions.



## MAINTENANCE AND STORAGE

Always shut off power to the machine and the radio remote control before any assembly, maintenance or repair.

## INSTALLATION



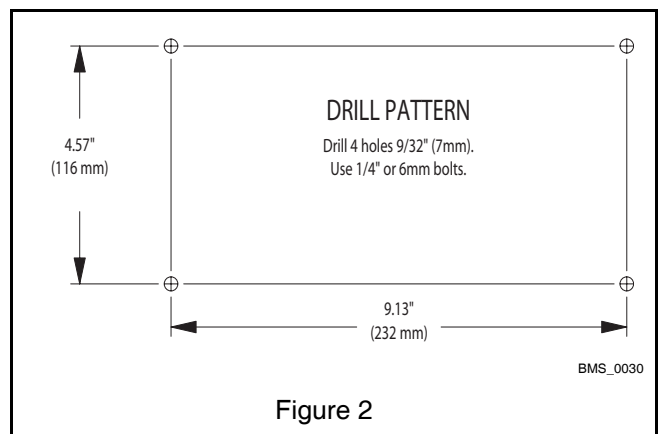
**WARNING:** FAILURE TO FOLLOW INSTRUCTIONS could result in personal injury and/or damage to equipment. Read and understand the safety instructions in all manuals provided.

## MOUNT THE RECEIVER

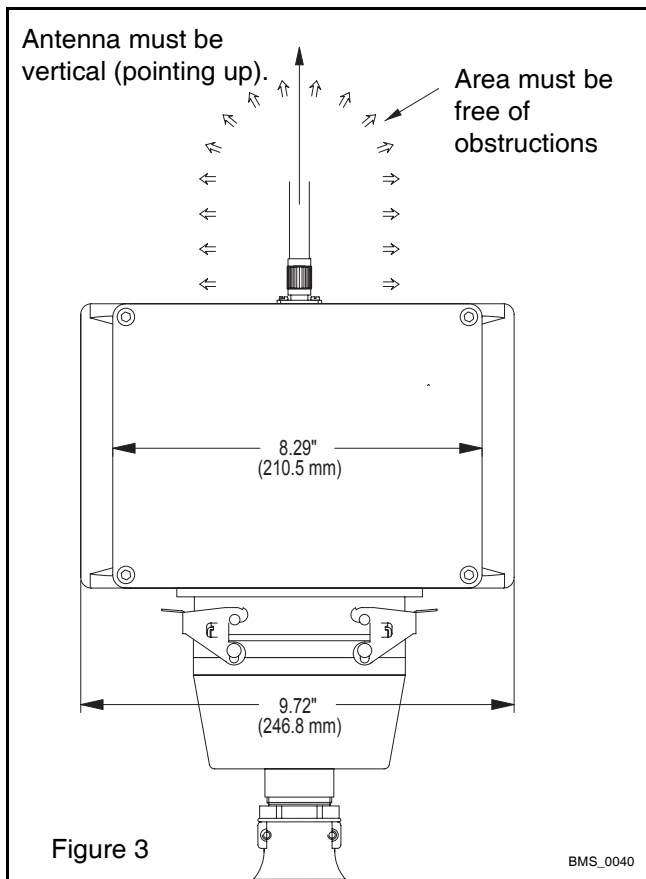
### Install Receiver and Output Wiring

Select a position for the receiver that provides protection from violent impact from debris or thrown materials and is easily accessible. The receiver housing is rated IP65 and can withstand direct water jet spray and is protected against penetration of dust. Therefore, weather and elements should not be the primary concern when installing the receiver.

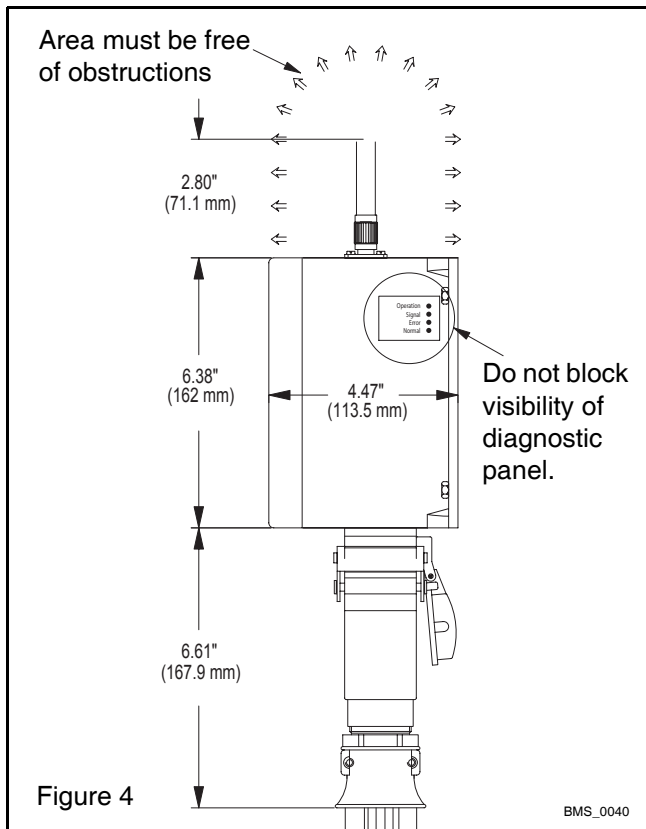
Four mounting holes are required when installing the receiver unit. The drill pattern and recommended hardware are shown in Figure 2.



If the receiver includes an attached antenna, mount the receiver so that the antenna points straight up. The area around the antenna should be free of obstructions, especially metal. See Figure 3.



Be sure that the diagnostic LED panel is clearly visible. See Figure 4.



The receiver wiring is critical for proper system operation. Make all connections with good quality contacts or solder joints to ensure proper electrical contact.

Supply voltage and ground wiring are crucial and must be connected to reliable connecting circuitry. Do not use a chassis ground for this equipment. The ground wire must be connected directly to the vehicle battery negative post.

The output control signals to the proportional control valves should be routed separately from any wiring that could produce transient voltage interference. Interference or "induced voltage spikes" could cause erratic performance of the proportional controls.

### Mount the Actuators (Optional)

Mount and attach the actuators to the hydraulic valves or to the mechanical linkage with the brackets supplied.

### Attach Wiring Harness (Optional)

Plug the wiring harness into the receiver and into the corresponding actuators.

### Connect Electrical Wiring

Connect all remaining wires (power supply, engine start-stop, etc.) according to the wiring diagram of the crane and the radio remote control.

### ME-3 Module Calibration (Optional)

Determine the maximum stroke of the actuator and set the ME-3 module accordingly. See the ME-3 Module Instruction Sheet in the Technical Data Sheet section for detailed instructions.

## INSTALL BATTERY CHARGER

The battery charger unit should be installed in the vehicle and connected to the vehicle battery with a fuse. The charger must be operational even when the vehicle ignition is turned off. The battery charger's energy consumption impact is minimal. The charging system is protected against polarity reversal. Install and operate the charger in a dry, protected location inside the vehicle. Optional battery chargers may be powered by an AC wall plug or a DC cigarette lighter adapter.

## BATTERY HANDLING

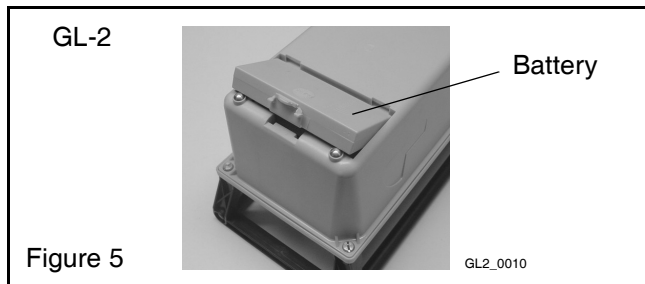
Each radio remote control system is delivered with two fully charged batteries. One is inserted in the battery compartment located on the bottom of the transmitter. The operating time of the 3.6 V charged battery is approximately 25-30 hours.

## INSERT THE BATTERY

Be sure the battery compartment is clean. Dirt or debris can cause contact problems.

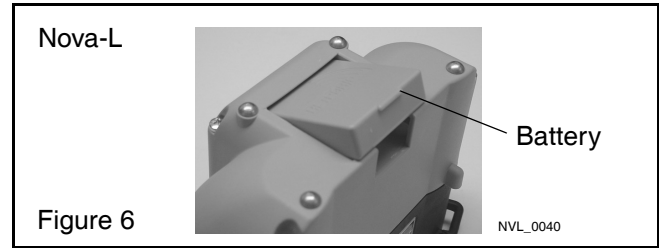
## GL

1. Insert the battery with both guide pins in the corresponding guide bars of the battery compartment.
2. Press the battery on the marked spot until it latches into place.



## Nova

1. Insert the battery with both guide bars on the lower side of the battery in the corresponding guide slots of the battery compartment.
2. Press the battery until it latches into place.



# ADJUSTMENTS

## QUICK-SET SYSTEM

The Quick-Set System provides easier installation, adjustment and service of the radio remote control system. Quick-Set allows adjustment of all proportional function speeds (valve travel) from the transmitter. A red Program Key is provided to control the programming mode. When adjustments are complete, remove the Program Key and store it in a secure location. Function speeds can be readjusted at any time.

The system includes a base board, or mother board, which includes all of the common function circuitry found in most receivers. These functions include power regulation, decoding the received signal, 12 digital output functions, and the Quick-Set function. The base board also contains diagnostic LEDs that are visible on the outside of the transmitter housing to help quickly diagnose problems.

## FUNCTION SPEED ADJUSTMENT

This procedure requires that the receiver is connected to the machine, all necessary wiring is complete and a fully charged battery is in the transmitter.

**IMPORTANT:** The crane must be located in an open area so that sudden or unexpected crane movements will not damage buildings or property. All power lines must be out of reach of the boom. Set the outriggers in the "out and down" position as recommended by the crane manufacturer and be sure the crane is stable. For specific instructions, refer to the crane manufacturer's operator manual. Allow the truck engine to run at "Idle".



**CAUTION: AVOID INJURY AND PROPERTY DAMAGE** - The crane may respond differently with radio remote controls than with manual controls. During the adjustment procedure, use extreme caution with joystick/lever movements. Avoid sudden movements and observe crane motions carefully. The operator must be standing on dry, level, stable ground that is free of oil and debris.

1. Use the crane's manual controls to raise the boom from its rest. Extend the boom to a safe starting point.
2. The transmitter must be attached to the operator with the belt adjusted to a firm fit.
3. Turn the receiver power "ON".
4. Remove the black key from the transmitter keyswitch.
5. Insert the red programming key into the keyswitch.
6. Turn the transmitter "ON".
7. Wait approximately 3 seconds until the second buzzing sound has finished.
8. Twist the key one quarter turn further to the program position. (This is only possible with the red programming key.) Press the "Start/horn" button for at least one second.
9. To set minimum speed - Deflect the requested joystick slowly until you hear the vehicle's horn. If the horn is connected to the receiver, it will sound for a brief moment when the joystick reaches the minimum movement position. Keep the joystick in this position.

- Adjust the speed of this function by using the program "T-O-T" toggle switch (momentary - zero - momentary). Push the toggle switch toward "+" to increase speed, toward "-" to decrease speed.

Adjust the function speed to move as slowly as possible. This helps to achieve a smooth start when this function is activated.

- To set maximum speed - Deflect the joystick to its maximum position. Push the program toggle switch toward "+" to increase speed, toward "-" to decrease speed.

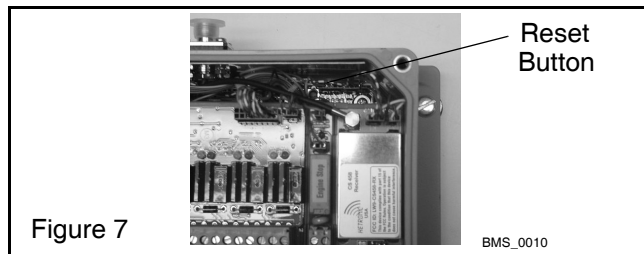


**WARNING: AVOID INJURY** - The crane is moving during the adjustment of the functions. Be sure the work area is clear of obstacles and bystanders.

The receiver can program only one function at a time. Make sure that only one axis is deflected at a time. When function adjustment is complete in one direction, repeat the procedure above for the other directions and functions. Remember to set values for both high and low ranges.

After all adjustments are complete, wait at least 10 seconds before turning the transmitter off. The new values will be automatically stored into the system's memory.

If problems occur during the adjustment procedure, you can revert to the default values of the system. Remove the receiver lid and press the reset button on the board. Reinstall the receiver lid.



## ADDRESS SETTINGS

The address settings are pre-set at the factory in the ADMO module. However, if the transmitter coder board, the BMS-1 Base Board, or if the entire transmitter or receiver are replaced, the ADMO address must match the system.

**IMPORTANT:** If the ADMO settings of the transmitter and receiver do not match, the system will not function.

## OPERATION



**WARNING: FAILURE TO FOLLOW INSTRUCTIONS** could result in personal injury and/or damage to equipment. Read and understand the safety instructions in all manuals provided.

The safety checks as described in the following paragraphs must be completed before the radio remote control system is activated. These checks must be performed at least once a day, before the start of any operation and at all shift changes.

**IMPORTANT:** A transmitter drawing is included with each system. Transmitter layout and inscriptions may vary according to customer requests. In most cases, however, the inscriptions are identical to that of the present control. The only difference is that the machine is controlled without a cable control. Consult the machine manufacturer's operator manual and the transmitter drawing for additional information on the arrangement of the transmitter's operating elements and their corresponding functions. The following description refers to the control elements and specific functions of the radio remote control.



**WARNING: FAILURE TO FOLLOW INSTRUCTIONS** could result in personal injury and/or damage to equipment. Test the "EMERGENCY STOP" function as described in the machine manufacturer's operator manual before beginning any operation.

## VISUAL CHECK

Always check the transmitter for any physical damaged before any operation.

- Always keep safety features, guards and controls in good repair, in place and securely fastened.
- Check equipment for wear or damage.
- Check rubber cuffs and pushbutton caps for wear or damage.

**IMPORTANT:** Never operate a transmitter with worn or damaged parts. Replace immediately with only authorized parts. Contact IMT or your Dealer.

## START-UP PROCEDURE

This procedure must be carefully followed before beginning any operation.

1. Be sure that all safety measures required by the equipment manufacturer have been followed. (i.e. crane level, stabilizers down, etc.)
2. Push in the transmitter E-stop pushbutton.
3. Switch the transmitter "ON". A short buzzer signal will sound.
4. Wait for the second buzzer signal (approx. 3 seconds).
5. The green LED on the transmitter control panel will flash. This indicates that the transmitter is working and is ready to use.
6. Pull out the E-stop pushbutton.
7. Push the green pushbutton "Start/horn" on the transmitter.
8. Check that the machine functions correspond with the transmitter functions.

**IMPORTANT:** The machine functions will operate during this check. Be certain that there are no obstacles near the machine.

9. Push the "EMERGENCY STOP" pushbutton on the transmitter. Be sure that no functions can be activated with the "EMERGENCY STOP" pushbutton depressed.

**IMPORTANT:** If any function of the radio remote control activates with the "EMERGENCY STOP" engaged, the radio remote control must not be used until it is repaired.

10. Pull out the "EMERGENCY STOP" pushbutton.
11. Push the green pushbutton "Start/horn" on the transmitter.
12. Both the radio remote control and the machine are now ready for operation.

**IMPORTANT:** To avoid accidental start-up, always engage the E-stop pushbutton and switch the transmitter "OFF" when not in use. When the transmitter is not attached to the operator, the key switch should be removed and stored in a secure place.

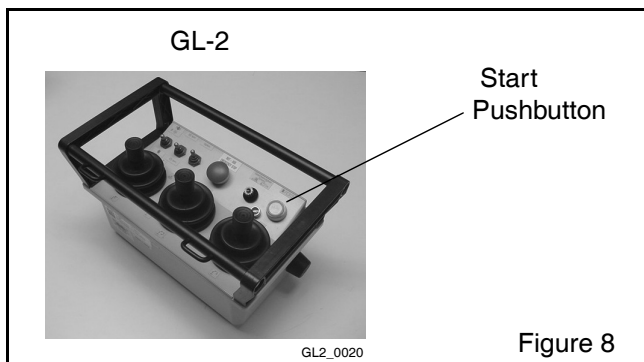


Figure 8

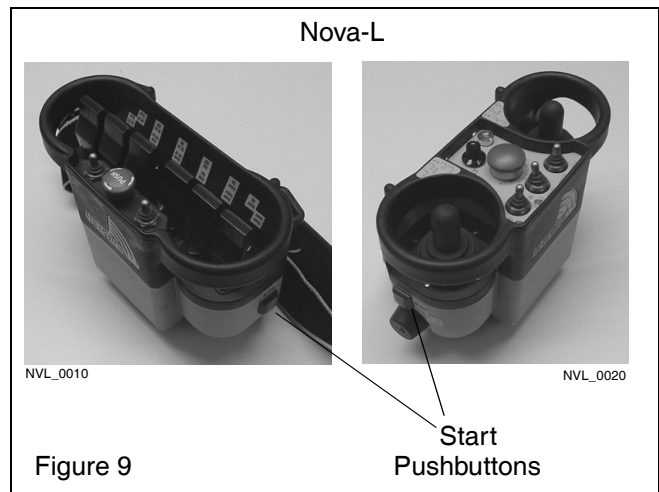


Figure 9



**WARNING: TO AVOID SERIOUS INJURY OR DEATH.** Switch the machine "OFF" if there is a fault or any problems with the safety check. Contact IMT or your dealer immediately to repair the system. NEVER operate the machine when the "EMERGENCY STOP" function does not operate properly.

Improper operation, maintenance or adjustment may cause serious injury or damage to equipment and may void the warranty.

## SPEED CONTROL

This radio remote control system is equipped with a dual range speed control. The switch allows selection between high range (rabbit) and low range (snail). The low range provides <70% of full speed.

## PROPORTIONAL FUNCTIONS

The proportional functions and speed ranges are pre-set by IMT according to the valve types. Your dealer can refer to the basic adjustments at any time. Only the crane manufacturer, dealer or authorized service representative is allowed to adjust individual functions, direction and speed range.



**CAUTION: DO NOT OPEN THE RECEIVER.** All relay and proportional outputs are accessible on the connection plug. Unauthorized entry into the receiver could result in damage to equipment and may void the warranty.

## OPTICAL DISPLAYS AND ACOUSTIC SIGNALS

The radio remote control system uses optical displays and acoustic signals to show current working status.



## Transmitter

1. Turn keyswitch to "ON".
2. Two short acoustic pulses sound.
3. After a self-test routine, the green Signal-LED on the transmitter control panel starts to flash. This indicates that the system is ready to operate.

An acoustic interval signal indicates when the battery is nearly discharged (See Maintenance Section - Changing the Battery). The transmitter will operate for another 30 seconds before going into E-Stop. Use this time to place the crane in a safe position.

## Receiver

There are four LEDs on the right side of the receiver. They indicate proper system operation and malfunctions.

- The green "Signal" LED
  - Off: No data reception (no communication with transmitter).
  - Flashing in a continuous rhythm: The transmitter is turned "ON" and valid data are received.
  - Flashing at increased rate: E-Stop signal is being received.
  - Flashing, out of rhythm: Indicates RF interference, transmitter out of range or bad receiver reception.
- The yellow "Normal" LED
  - Off: Indicates E-Stop condition.
  - On: Normal operating condition.
- The yellow "Operation" LED
  - Off: Indicates no power to the base board.
  - Flashing: Indicates power to the base board.
- The red "Error" LED
  - Off: Normal operating condition.
  - Flashing: Failure in the system circuitry. The transmitter will initialize a self-test routine which may re-initialize the system. If not, the failure must be diagnosed.



**CAUTION:** After pressing the start pushbutton for approximately 1 second, the red "Error" LED should stop flashing or go off. If the LED stays lit, there is a malfunction in the system. Contact your Dealer or IMT for repairs. Unauthorized entry into the receiver could result in damage to equipment and may void the warranty.

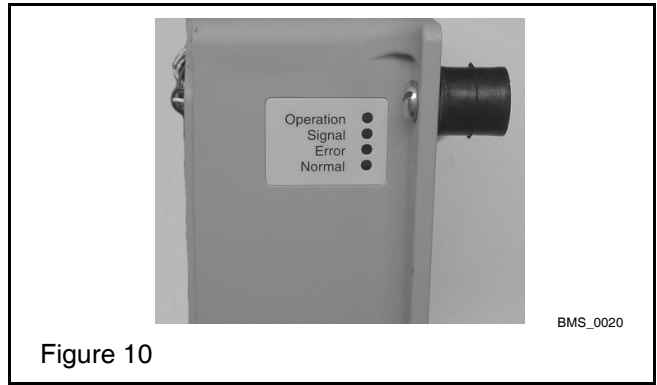


Figure 10

## FREQUENCIES AND ADDRESSES

Each radio remote control system contains a registration-free radio frequency unit, CS 434 or CS 458. Each system consists of a transmitter RF unit and a receiver RF unit.



**CAUTION: AVOID INJURY OR DAMAGE -** Operating the transmitter without its antenna could destroy the final stage of the RF module. DO NOT attempt to change the pre-set frequency or the 16-bit address. Personal injury and property damage could result from transmission interference and may void the warranty.

## MAINTENANCE

The owner of this radio remote control system must have the system inspected by a qualified technician at least once every year.

A qualified technician has professional training, experience and extensive knowledge in wireless transmission of control signals. This includes familiarity with normal regulations for safe working conditions, accident prevention, guidelines and general regulations of technology for the respective countries (CE).

### BATTERY



**WARNING: EXPLOSIVE GASES AND FLYING DEBRIS** can cause death or serious injury. Use only authorized replacement batteries. Use of unauthorized replacement batteries could cause a battery explosion, resulting in injury or death of the operator or other people in the work area.

This radio remote control is delivered with fully charged batteries and is ready for operation.

#### Changing the Battery

The battery voltage is monitored continuously by the transmitter.

An acoustic interval signal is heard in the transmitter when the battery is nearly discharged. When the transmitter signals the battery must be changed immediately.

1. Position the machine into a safe place or safe condition within 30 seconds after hearing the signal.



**WARNING:** The transmitter will switch to the **EMERGENCY STOP** condition after 30 seconds.

2. Press the E-stop pushbutton.
3. Switch the transmitter "OFF".
4. Push the discharged battery slightly forward and lift it out of the battery compartment.
5. Insert a fully charged battery.

Follow "Start-up Procedure" to begin operation.

#### Charging the Battery

1. Insert the battery with both guide pins in the corresponding guide bars into the battery compartment of the battery charger.



BCH\_0010

Figure 11

2. Press the battery on the marked spot until it latches into its compartment. The green LED stays lit during the charging process.
3. The green LED flashes when the battery is fully charged. (The battery cannot "over-charge".)
4. Remove the charged battery from the battery charger.
5. Insert another discharged battery into the charger to ensure that a fully charged battery is always available.

#### The Battery Charger

The battery charger generates an operating voltage of 12 VDC / 24 VDC. A green LED indicates the beginning of the charging process. After a charging time of approximately 6 hours the charging process is complete and the green LED flashes. The charger recognizes when the battery is fully charged and switches to "trickle" mode. The battery charger automatically regulates the charging process.

To prolong battery life, charge the battery only when the acoustic interval signal is heard from the transmitter. This indicates that the transmitter battery is nearly discharged.

### BATTERY DISPOSAL

**IMPORTANT: AVOID ENVIRONMENTAL POLLUTION.** Electronic equipment and components are considered to be hazardous waste. Discarded rechargeable batteries are hazardous waste and must not be disposed of with typical refuse. Contact a professional hazardous waste disposal service.

## TROUBLESHOOTING

If the system does not operate after normal start-up as described in Operation Section of this manual, follow the recommended troubleshooting sequence to help isolate the cause and determine corrective action.

If the system will not respond to the steps below or the LEDs indicate a failure, contact the IMT Service Department or your authorized dealer.

PROBLEM	PROBABLE CAUSE	CORRECTION
<b>System will not initialize after normal start-up procedure</b>	E-Stop reset	Push the Start button again. If the system is being initialized from an E-Stop condition, the Start button must be pressed twice - first to clear the E-Stop, then to start the system.
	Joystick not in center position	Ensure that all joysticks are in center position when the Start button is activated.
	E-Stop switch engaged	Pull out E-Stop switch. Restart system by pressing Start twice.
	Battery fully discharged	Check battery to ensure a full charge. Replace with fully charged battery if necessary.
	No power to the receiver	Check the diagnostic LEDs on the side of the receiver to be sure power is applied. Ensure that the system is grounded to the negative battery terminal. The LEDs also indicate normal transmitter communication, interference, and E-Stop conditions.

## SPECIFICATIONS

Model	BMS (Baseboard Module System)
System	GA 610
<b>General Data</b>	
Frequency	70 cm Band (Selectable 458.800 Mhz to 459.175 Mhz) or CS434
Range	approx. 100 m ( 328 ft.)
Address	20-bit - 1,000,000 possible
Operating temperature	-30° to +70° C (-22° F to 158° F)
Data Format	2400/4800 Baud, even parity, 8 data bits, 2 stop bits, hamming distance 4
<b>Receiver</b>	
Protective System	IP 65
System	Synthesizer Technology
Voltage Supply	12 to 24 VDC (-50% - +20%)
Decoding	Multiple bit scanning, self-monitoring
Fuses	7.5 amp. / 80 V car fuse
Output	Intrinsically safe emergency stop with two MOS - FET - transistors, 12 digital outputs, potential free 250 V / 8 A, 6 analog outputs, 2 speed ranges
Static current	260 mA, Stand-by
Antenna connection	TNC - socket
Dimensions (approx. with rubber buffer) L x B x H	265 mm x 161 mm x 111 mm
Weight - Kg (lbs)	2,5 ( )
<b>Transmitter</b>	
Protection type	9.0 (23)
Battery Pack	3.6 V / 1200 mAh (NiMh)
Operating time	approx 20 h
Transmitting power	< 10 mW
Current rating, Self test	approx. 75 mA

Current rating, Transmission	approx. 83 mA
GL - Dimensions (with protection frame)	300 mm x 180 mm x 180 mm
GL - Weight (including battery and belt)	2.4 Kg
Nova - Dimensions (with protection frame)	230 mm x 170 mm x 106 mm
Nova - Weight (including battery and belt)	1.8 Kg
<b>Battery Charger</b>	
Operating voltage	12/24 VDC
Charging current	300 mA
Open-circuit voltage	15 - 22V





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