Articulating Crane

Installation / Configuration Manual

T150 Transmitter
R160 Receiver

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99903634
Revision 6
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NOTE: These instructions are intended only for installing and operating the remote control equipment described here. This is not a complete Operator’s Manual. For complete operating instructions, please read the Operator’s Manual appropriate for your particular machine.

Safety Precautions

READ ALL INSTRUCTIONS

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

Failure to follow the SAFETY PRECAUTIONS may result in radio equipment failure and serious personal injury

Installation

PROVIDE A SAFETY CUTOFF SWITCH. If maintenance is required, the radio must be disconnected from power

USE PROPER WIRING. Loose or frayed wires can cause system failure, intermittent operation, machine damage, etc.

DO NOT INSTALL IN HOT AREAS. This apparatus can be damaged by heat in excess of 158° F (70° C)

Personal Safety

MAKE SURE MACHINERY AND SURROUNDING AREA IS CLEAR BEFORE OPERATING. Do not activate the remote system unless it is safe to do so.

TURN OFF THE RECEIVER POWER BEFORE WORKING ON MACHINERY. Always disconnect the remote system before doing any maintenance to prevent accidental operation of the machine

Care

KEEP DRY. Do not clean the transmitter / receiver under high pressure. If water of other liquids get inside the transmitter battery or receiver compartment, immediately dry the unit. Remove the case and let the unit air dry

CLEAN THE UNIT AFTER OPERATION. Remove any mud, dirt, concrete, etc. from the unit to prevent clogging of buttons, switches, etc. by using a damp cloth.

Maintenance / Welding

DISCONNECT THE RADIO RECEIVER BEFORE WELDING on this machine. Failure to disconnect will result in the destruction of the radio receiver.
The ORIGA T150 / R160 is a portable, long range, programmable radio remote control system. Designed as a compact and easy-to-use product, this member of the ORIGA family puts complete control of your crane where it’s needed most, with the operator. It’s robust, easy to install and has complete self-diagnostics. This system can be a simple cable replacement or add intelligence to make it a total crane control package. It’s a radio, a PLC and a valve driver all in one.

The ORIGA T150 / R160 system uses Frequency Hopping Spread Spectrum (FHSS) technology. FHSS devices concentrate their full power into a very narrow signal that randomly hops from frequency to frequency within a designated band. This transmission pattern, along with CRC-16 error-checking techniques, enables signals to overcome interference that commonly affects licensed radios.

The R160 receiver is designed to be powered from a 12VDC or 24VDC system. It features 19 solid state, high-side driver input / output controls and a reliable E-Stop control.

The T150 transmitter uses standard, long lasting AA batteries. Each T150 transmitter uses a unique ID code to ensure that no two systems will conflict at a job site.

Features
• FCC, ISC, CE approved
• License free
• 1200 foot range
• Hand held / weatherproof / ergonomic
• Simple “wire-and-use” installation
• Resilient to impact and shock
• Available with optional trigger for proportional control
• Available with E-Stop for ensured operator safety
• Available with an optional tether cable
• Factory configurable for all custom applications.

T150 Dimensions and Controls
Installing the Receiver

Use the Wiring Diagram and the Connector Diagram below to connect the receiver pins directly to the appropriate contacts of the machine electronics. R160 Output Cables can be provided with every system to simplify the wiring process. Tips on mounting, power connections and filtering are also provided under Installation Considerations.

### Wiring Diagram

<table>
<thead>
<tr>
<th>Pin-Output</th>
<th>Wire Colors</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7</td>
<td>Black/Red</td>
<td>Factory Configurable Only</td>
</tr>
<tr>
<td>B8</td>
<td>White/Black</td>
<td>Factory Configurable Only</td>
</tr>
<tr>
<td>B12 - 19</td>
<td>Blue/White</td>
<td>Overload/A2B OK Input</td>
</tr>
<tr>
<td>B11 - 18</td>
<td>Blue/Black</td>
<td>OFF (Special Selected Input)</td>
</tr>
<tr>
<td>B10 - 17</td>
<td>Black/White</td>
<td>OFF (Dominator Selected Input)</td>
</tr>
<tr>
<td>A1 - 16</td>
<td>Green/Black</td>
<td>Proportional Current Control Output</td>
</tr>
<tr>
<td>A2 - 15</td>
<td>Red/White</td>
<td>Engine Stop Output</td>
</tr>
<tr>
<td>A4 - 14</td>
<td>Orange</td>
<td>Engine Start Output</td>
</tr>
<tr>
<td>B9 - 13</td>
<td>White</td>
<td>Outer Boom Up Output</td>
</tr>
<tr>
<td>B6 - 12</td>
<td>Green/Black/White</td>
<td>Outer Boom Down Output</td>
</tr>
<tr>
<td>B5 - 11</td>
<td>Green</td>
<td>Inner Boom Up Output</td>
</tr>
<tr>
<td>B4 - 10</td>
<td>White/Red/Black</td>
<td>Inner Boom Down Output</td>
</tr>
<tr>
<td>B3 - 9</td>
<td>Orange/Red</td>
<td>Rotate CW Output</td>
</tr>
<tr>
<td>B2 - 8</td>
<td>Orange/Black</td>
<td>Rotate CCW Output</td>
</tr>
<tr>
<td>B1 - 7</td>
<td>White/Red/Black</td>
<td>Extension Out Output</td>
</tr>
<tr>
<td>A12 - 6</td>
<td>Orange/Red/Black</td>
<td>Extension In Output</td>
</tr>
<tr>
<td>A10 - 5</td>
<td>White/Red/Black</td>
<td>CRN Hour Meter Output</td>
</tr>
<tr>
<td>A11 - 4</td>
<td>Orange/Red/Black</td>
<td>Switches to Power with Link</td>
</tr>
<tr>
<td>A9 - 3</td>
<td>Orange/Black/White</td>
<td>Power Input (+9V to 30VDC)</td>
</tr>
<tr>
<td>A8 - 2</td>
<td>Red/Black</td>
<td>Ground</td>
</tr>
<tr>
<td>A7 - 1</td>
<td>Red/Black/White</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>Black/White/Red</td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>Black</td>
<td></td>
</tr>
</tbody>
</table>

**Outputs:** 19 solid state, high-side driver outputs, 5A max. each, total combined current 15A

**Inputs:** All output pins can be factory configured as inputs.

### Connector Pin Assignments

Connectors as seen from under the receiver

### R160 Dimensions

- 5.13"
- 4.00"

DMAN-2491-14 (Rev 6)  www.imt.com  Call: (641) 923-3711
Special Functions

R160 Operation Notes

CRN Hour Meter is on when any proportional function is operated and will remain on for 2 seconds after the last function is released.

Installation Considerations

Mounting and Installation

The receiver can be mounted by fastening two ¼” bolts through the two mounting holes in the unit’s enclosure. When mounting, ensure that the receiver is oriented so that the text is reading right.

When selecting a mounting point for the receiver, it is recommended that the location require only a minimal length of wiring to connect it to the control panel, that it will be in a visible area where it has good exposure to the operator and that it is mounted on a surface that is protected from the weather and sustains minimal vibration. It is also recommended that the receiver have the best possible line of sight with the transmitter.

Power Connections and Wiring

Whenever a power connection is made to an electronic device, it is a good practice to make both the Power (+) and Ground (-) connections directly to the Battery and avoid connecting the power from the charging side of existing wiring or making use of existing "ACC" or other peripheral connection points.

Make sure that wire of sufficient gauge and insulator type is used when connecting the outputs of the receiver to the control panel. Observe any component manufacturer's instructions and recommendations for proper integration of their product. This includes the power ratings and requirements of such components as relays, valves, solenoids, etc.

Be sure to test each of the outputs with a multi-meter prior to connecting the outputs to your end devices. This will ensure that each output has been programmed to operate in the manner required by each end device.

Filtering and Noise Suppression

Whenever a solenoid or electromagnetic switch is controlled by the receiver, it is a good practice to install a Diode across its terminals to ensure that surges and spikes do not continue back into the circuit. Appropriate 36V Bi-directional Diodes kits can be ordered under the IMT part number 77441121.
Power the Transmitter

When the receiver has been installed, install batteries into the transmitter and turn it on as explained below.

1. Install Batteries

Remove the battery cover on the back of the transmitter using a slotted screwdriver and insert 4 “AA” alkaline batteries. Orientation of the batteries is embossed inside the battery housing. No batteries are required when the transmitter is connected to the receiver by a Tether Cable.

**NOTE:** For operation at temperatures below –10° C to –40° C, lithium batteries are recommended. Low temperatures reduce battery performance for both alkaline and lithium types. Refer to the battery manufacturer's specifications for detailed information on low temperature performance.

2. Turn on the Transmitter

Refer to the **Light Legend** below for diagram details.

**WARNING:** do not install backwards, charge, put in fire, or mix with other battery types. May explode or leak causing injury. Replace all batteries at the same time as a fresh set and do not mix and match battery types.

![Light Legend Diagram](image)

If the transmitter's (Active) light does not flash, check the battery orientation.

To turn off the transmitter, press the [E-Stop] button.

Test the Transmitter / Receiver Link

Follow these steps to ensure that there is a radio link between the transmitter and receiver. Refer to the **Light Legend** below for diagram details.

![Light Legend Diagram](image)

If the (Active) light on the transmitter is flashing and the (Link) light on the receiver is flashing GREEN, a link between the two exists.

If the receiver's (Link) light does not flash GREEN, follow the steps under **Download ID Code** below.

The ORIGA system is now ready for use.
**Download ID Code (Use in case of Link Test failure)**

Follow these steps to download the transmitter’s unique ID Code into the receiver. This will allow the receiver to establish a radio link with that transmitter.

Refer to the **Light Legend** below for diagram details.

**NOTE:** It is necessary to download the ID Code when replacing either the transmitter or the receiver.

**NOTE:** If the transmitter is connected to the receiver with a Tether Cable, completing only steps 3 and 5 is necessary (it is not necessary to open the R160 case and press the Setup button).

### 1. Opening the R160 Case

The cap is held on by two plastic tabs at opposing sides, which can be unlatched as shown using a screwdriver. Once the cap is free, the R160 can slide open.

Use a small slotted screwdriver to press the Side Tabs inward.

### 2. Prepare T150, Power R160

A. Press [E-Stop]
B. Twist Clockwise & release [E-Stop]
C. Supply power to the receiver

### 3. Power T150 into Configuration Mode

A. Hold [SW-5] switch UP
B. Press [E-Stop]
C. Twist Clockwise & release [E-Stop]
D. Release [SW-5] Switch

### 4. Put R160 into Setup Mode

A. Press & hold [Setup] button until (Status) light goes from slow flash to fast flash
B. Release [Setup] button. (Status) light goes to solid GREEN, (Link) light turns off

**NOTE:** If left idle in Setup Mode for over 30 seconds, the receiver will time out. The (Link) light and (Status) light will flash RED rapidly. To return to Setup Mode, repeat step 5.

### 5. Download ID Code

A. Press [SW-5] switch UP
B. (Link) light goes to GREEN. Once complete, (Link) light goes to RED as the transmitter turns off

**NOTE:** When replacing the receiver cover, ensure the cover snaps completely into place to create a weather proof seal around the base of the receiver.

---

**Light Legend**

- Solid
- Slow Flash
- Fast Flash
- Red Light
- Green Light
- Yellow Light
- Alternating Red & Green Light

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The transmitter’s trigger controls the receiver’s proportional output. The trigger is used in conjunction with any of the transmitter’s switches. The proportional output can be activated when a switch is held UP or DOWN; it will become active at an increasingly high level as the trigger is pulled. The minimum and maximum levels of the proportional output can be calibrated by following these steps.

Refer to the **Light Legend** below for diagram details.

**NOTE:** Calibration settings can be reset to factory default in steps 4 & 5 by holding the [SW-5] switch UP or DOWN for 5 seconds.

### 1. Prepare T150, Power R160

A. Press [E-Stop]  
B. Twist Clockwise & Release [E-Stop]  
C. Supply power to the receiver

### 2. Power T150 into Configuration Mode

A. Hold [SW-5] switch DOWN  
B. Press [E-Stop]  
C. Twist Clockwise & release [E-Stop]  
D. Release [SW-5] Switch

### 3. Set T150 in Calibration Mode

A. Press [SW-5] switch DOWN

### 4. Set Minimum Level

A. Keep Trigger released to set minimum level  
B. Press [SW-5] switch UP to increase minimum level or DOWN to decrease it

**NOTE:** All switches, except the [SW-5] switch, remain active in Calibration Mode.

A switch can be activated during calibration to help determine the desired levels.

### 5. Set Maximum Level

A. Keep Trigger fully engaged to set maximum level  
B. Press [SW-5] switch UP to increase maximum level or DOWN to decrease it

To reset the MIN and MAX settings to factory default, hold the [SW5] switch either UP or DOWN for 5 seconds

### 6. Power Off

A. Press [E-Stop]
# Diagnostics—T150 Transmitter

## Light Legend

<table>
<thead>
<tr>
<th>Light Legend</th>
<th>Solid</th>
<th>Slow Flash</th>
<th>Fast Flash</th>
<th>Red Light</th>
<th>Green Light</th>
<th>Yellow Light</th>
<th>Alternating Red &amp; Green Light</th>
</tr>
</thead>
</table>

## Tether connection detected

Tether connection detected.

## Low battery. Unit will run approximately 10 hours after Battery light starts flashing.

Low battery. Unit will run approximately 10 hours after Battery light starts flashing.

## Flashing rapidly for 10 seconds indicates a transmitter failure.

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## Normal Operation

The Active light will flash several times per second, indicating that the transmitter is sending signals to the receiver. The Active light will remain on momentarily whenever a function changes.

## On Power Up

Release the E-Stop button within 10 seconds to power up the transmitter, or the unit will power down.

## Normal Operation

The transmitter is in Download Mode.

## On Power Up

Press and release the E-Stop button within 10 seconds to power up the transmitter, or the unit will power down.

## Stuck switch detected. Ensure that all switches are in a centered position. The transmitter will not power up when a function is ON.

Stuck switch detected. Ensure that all switches are in a centered position. The transmitter will not power up when a function is ON.

## On Power Down

Unit is still powered. Check for stuck switches, as the transmitter will not power down when a function is ON. Alternating flash means that the transmitter is in Calibration Mode.
Normal Operation

- **Transmitter is OFF**
  - If the transmitter is off, the receiver is operating properly.

- **Transmitter is ON**
  - When the transmitter is turned on, the Link light (fast flashing) and E-Stop (GREEN) indicates the receiver is operating properly.

- **Transmitter is in Operation**
  - When a function is activated on the transmitter, the Fault light will turn on GREEN. This indicates the receiver is operating properly.

- **Transmitter is OFF**
  - When a latched function is activated then the transmitter is turned off, the Fault light will stay on GREEN. If the system was intentionally designed this way, the receiver is operating properly, if not call for service.

Trouble Indicators

**Note:** In some cases, the indicator lights will be different depending on whether the transmitter is on or off. Please note the transmitter status in the “Description” column for each case.

<table>
<thead>
<tr>
<th>Indicator Lights</th>
<th>Description</th>
<th>Solution</th>
</tr>
</thead>
</table>
| **Transmitter is ON**
  - The reason is the transmitter is not communicating with the receiver. | Refer to Trouble Shooting Chart #3 for solutions | |
| **Transmitter is ON**
  - A low battery condition has been detected. | To detect intermittent conditions caused by poor or corroded ground or power circuits, the GREEN light will continue to flash for 30 seconds after the condition has been removed. | |
| **Transmitter is ON**
  - An internal fault with the E-Stop has been detected. | Inspect E-Stop wiring for short circuit. Disconnect E-Stop wire as close to the receiver output as possible. If the Status light changes to:  
  - GREEN, a short occurs after disconnection point.  
  - Stays flashing RED, send it in for service. | |
| **Transmitter is ON**
  - A setup failure has occurred. | Either hold the Setup button for 5 seconds to return to Setup mode or cycle power to return to the normal operating mode. | |
| **Transmitter is OFF**
  - A wiring short to the battery has been detected. | Refer to Trouble Shooting Chart #1 for solutions | |
| **Transmitter is OFF**
  - The receiver has detected an internal fault. | Refer to Trouble Shooting Chart #1 for solutions | |
| **Transmitter is OFF**
  - Blown fuse detected. | Refer to Page 8 for instructions on how to open the receiver case to access fuse. Check wiring for shorts or bare spots. If fuses continue to blow, call for service. | |
| **Transmitter is ON**
  - A setup failure has occurred. | Either hold the Setup button for 5 seconds to return to Setup mode or cycle power to return to the normal operating mode. | |
| **Transmitter is OFF**
  - The receiver is powered incorrectly. | Most likely cause of this condition is that an output wire or the E-Stop wire has been connected to the power supply while the power wire is disconnected from the power supply. | |

**Light Legend**

- Solid 
- Slow Flash 
- Fast Flash 
- Red Light 
- Green Light 
- Yellow Light 
- Alternating Red & Green Light
Trouble Shooting Guide

Test the Receiver—R160

Start
Initial Condition:
Turn transmitter off (all lights are off—press the E-Stop button)
Cycle power to receiver (turn off and back on)

What is the state of the lights on the receiver?

OK state:
Status—GREEN
Link—RED
Fault—OFF
E-Stop—RED

Note: If there is a short to ground on an output, it is not indicated at this stage. To test for short to ground, refer to the “Fault Light is RED” procedure at the bottom of this page and follow the instructions.

Problem state:
Status—RED

The system is wired incorrectly. Most likely cause is one of the input/output wires has been connected to the power source.

Go to Chart 2

Is the Status light flashing RED?

YES

Fuse is blown, change fuse
1. Inspect wiring looking for short circuits (e.g. bare wires)
2. If problem re-occurs, call for service.

Problem state:
Status—flashing GREEN & RED

Inspect E-Stop wiring looking for short circuits (e.g. bare wires)
Disconnect the E-Stop output as close to the receiver output as possible.
If the Status light changes to:
• GREEN, there is a short in the wiring after the disconnection point.
• Stays flashing RED, call for service.

NO

Problem state:
Status—RED

Problem state:
Status—flashing GREEN & RED

Fault Light is OFF

What is the state of the E-Stop light?

OK state:
E-Stop—RED

What is the state of the E-Stop light?

Problem state:
E-Stop—Flashing RED

Fault Light is Flashing RED

Fault Light is OFF

What is the state of the Fault light?

Call for service.

Call for service.

There is a short to supply.
1. Disconnect A & B connectors from receiver and check all outputs for power (e.g. bare wires, improper connections) make the correct adjustments
2. Call for service.

There is a short to ground.
Note: This should only occur when the transmitter is on and a function button is pressed. In this case the Status light will be GREEN and will turn RED at the same time as the Fault light.

Go to Chart 2 to test the transmitter. If the transmitter is functioning properly, proceed to check the status of each of the output connections:
Press each of the function buttons and observe the Fault Light. If the light turn GREEN, everything is OK.
If the Light turns RED, there is a short in that connection.

*Fault Light is RED*
Test the Transmitter—T150

Turn off the receiver
Ensure there are good batteries in the transmitter
Turn on the transmitter

What is the state of the lights?

OK state:
Active light—steady for about 3 seconds then goes to fast flash.
Battery light—OFF
E-Stop light—OFF

Activate a function

Go to Chart 3

Does the Active light go to solid YELLOW?

NO

Either the switch/trigger is defective or the switch/trigger connection to the circuit board is broken.
Call for service

YES

Complete the following steps in order:
1. Check battery orientation
2. Clean battery contacts
3. Check or Replace batteries
4. Call for service

No light comes on at any time

Stuck switch:
1. Return all switches to neutral (OFF) position
2. Toggle the switch a few times
3. Call for service

Both the Active light and the Battery light flash at the same time

Low Battery—Change Batteries
Note: Low batteries will last approximately 10 hours once the Low Battery light begins to flash.
Replace batteries by next shift.

Active light is flashing rapidly and Battery light flashing slowly

Press and release E-Stop if the condition persists, then either there is a faulty E-Stop or transmitter failure—call for service

Battery light flashes for 10 seconds then all lights are OFF

The transmitter is in Calibration mode
1. Turn unit OFF, then turn back ON
2. If condition persists, call for service

Battery light and Active light flash alternately.
Trouble Shooting Guide (con’t)  

Chart #3

Testing the Transmitter / Receiver Communication

Transmitter:
Active light is flashing

Receiver:
Status—GREEN
Link—RED
Fault—OFF
E-Stop—RED

What is the status of
the lights of both the
transmitter and
receiver?

Transmitter:
Active light is flashing
Receiver:
Status—GREEN
Link—Flashing GREEN
Fault—OFF
E-Stop—GREEN

Transmitter and receiver
should be working properly.
The problem may rest with
the machine instead of the
radio system

Call for service.

There is no link between the
transmitter and receiver

Do you have a
matched set? (i.e. the
transmitter and re-
ceiver should have
identical ID codes)

YES

NO

Call for service.

Was the transmitter
accidentally swapped
with another one on
the job site?

POSSIBLY

Search the job site for
the correct transmitter.

NO

Was it found?

YES

Turn on the transmitter
to check if the units
function correctly. If
not, proceed to Chart 1

NO

The transmitter
code may need to
be re-downloaded
to the receiver

!!Caution!!

Note: Before you proceed with the Download ID procedure located on Page 8, great
care and caution must be adhered to.

If by accident, the transmitters have been switched with another unit, by downloading the
ID code to a new receiver, it is possible for the transmitter to operate 2 units at the same
time (if the original receiver unit is still on the job site). Therefore it must be
certain that the transmitter / receiver pair are the correct set.

Secondly, once the download procedure is completed, ensure all other units on the job
site are stopped. Test the operation of the newly configured set to ensure no other
machines on the site work with the same transmitter.

Once you are certain that the transmitter / receiver pair are a unique set, continue
normal operations.
Considerations for Reprogramming the System

Potential reprogramming issues

If testing of the receiver and transmitter both yield positive results (Chart 1 & 2), then the transmitter and receiver will both go into Download/Calibration mode.

Possible issues will arise during Step 4, the download phase of reprogramming. In this case there are 2 symptoms to look for:
1. The Link light on the receiver will not turn GREEN when the power switch is toggled on the transmitter to download
2. The receiver will “time out” indicating that it didn’t receive a signal from the transmitter within the 30 seconds from the time the receiver was put into Setup Mode.

If all indications appear normal during the download phase, test the link by turning on the transmitter (note: the transmitter shuts off after transmitting the ID code in Step 4)
1. If the Link light on the receiver doesn’t turn GREEN, the receiver didn’t receive all of the information that was sent from the transmitter.

Possible Solutions

1. Try the Reprogramming steps again
2. If this doesn’t correct the problem, send both the transmitter and receiver in for service.

Note: you could try to determine whether the fault lies with the transmitter or receiver by completing the Reprogramming procedure with a different transmitter. If this step works, then the fault lies with the original transmitter. If not, the fault may lie with the receiver.

!!Caution!!

Note: Before attempting reprogramming with another transmitter, understand that reprogramming the receiver with another transmitter, could result in two receivers on the job site responding to the one transmitter. If the original transmitter was sent in for repair, disconnect the receiver (disconnect connector A) to continue using the machine without remote capability and without fear of inadvertently operating the machine with the other transmitter.

Reprogramming Tips:

1. Use a pointy instrument to depress the Setup button on the receiver (i.e. a pen) as the button is relatively small
2. Follow each step as laid out in the procedure
3. Never lay the receiver circuit board down on anything metallic (there are contact points on the back which could contact the metal and damage the receiver)
### Parts & Accessories

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<th>Part</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries</td>
<td>T48014</td>
<td>4 x AA alkaline</td>
</tr>
<tr>
<td>T150 Tether Cable (8 m. / 25 ft.)</td>
<td>70733889</td>
<td>see illustration</td>
</tr>
<tr>
<td>Toggle Switch</td>
<td>77041682</td>
<td>Honeywell 1TL1-7</td>
</tr>
<tr>
<td>Fuse</td>
<td>77041433</td>
<td>Bussman ATC-15</td>
</tr>
<tr>
<td>Bipolar Diode Kit</td>
<td>77441121</td>
<td>36V, Bi-directional, Motorols P6KE36CA</td>
</tr>
<tr>
<td>Magnet Back</td>
<td>AKIT-2498-02</td>
<td>see illustration</td>
</tr>
<tr>
<td>Socket Connectors</td>
<td>J0418</td>
<td>Grey, 12-pin, Deutsch DTM06-12SA</td>
</tr>
<tr>
<td>Wedge</td>
<td>J0419</td>
<td>Black, 12-pin, Deutsch DTM06-12SB</td>
</tr>
<tr>
<td>Pin</td>
<td>J0417</td>
<td>Female, Size 20, Deutsch 0462-201-20141</td>
</tr>
<tr>
<td>Sealing Plug</td>
<td>J0421</td>
<td>Size 20, Deutsch 0413-204-2005</td>
</tr>
<tr>
<td>R160 Connector Kit</td>
<td>AKIT-2337-01</td>
<td>Includes Deutsch socket connectors, wedges, pins and sealing plugs.</td>
</tr>
</tbody>
</table>

### Specifications

<table>
<thead>
<tr>
<th></th>
<th>R160 Receiver</th>
<th>T150 Transmitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>5.1” x 4.7” x 1.4” (130mm x 119mm x 36mm)</td>
<td>7.9” x 4.2” x 4.1” (200mm x 125mm x 105mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.65lbs (0.295kg)</td>
<td>1.8lbs (0.817kg)</td>
</tr>
<tr>
<td>Construction</td>
<td>High impact plastic, weatherproof</td>
<td>High impact, low temperature plastic, weatherproof</td>
</tr>
<tr>
<td>Input Power</td>
<td>+9V to 30VDC</td>
<td>4AA alkaline batteries</td>
</tr>
<tr>
<td>Battery Life</td>
<td>N/A</td>
<td>160 hours (continuous use)</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-40F to 158F (-40C to 70C)</td>
<td>-40F to 158F (-40C to 70C)</td>
</tr>
<tr>
<td>Outputs</td>
<td>3A (max) each (sourcing), 10A (max) each (combined)</td>
<td>N/A</td>
</tr>
<tr>
<td>Antenna</td>
<td>Internal</td>
<td>Internal</td>
</tr>
<tr>
<td>Approvals</td>
<td>USA- FCC part 15.247 Canada- ISC RSS 2210</td>
<td></td>
</tr>
</tbody>
</table>

### FCC Rules and Compliance

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