MSI-8000

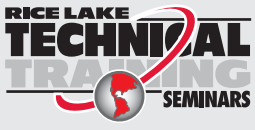
RF Remote Display

Technical Manual

RICE LAKE®
WEIGHING SYSTEMS

PN 133063 Rev E

Contents



Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at ***www.ricelake.com/training*** *or obtained by calling 715-234-9171 and asking for the training department.*

September 19, 2016

1.0 Introduction

The *MSI-8000 RF Remote Display* makes wireless control easy with the ability to operate weighing systems from a distance. The wireless remote display can be used for viewing MSI ScaleCore-based crane scales and dynamometers, including any RF compatible MSI-3460 Challenger 3, MSI-4260 Port-A-Weigh or MSI-7300 Dyna-Link 2.

It is fully sealed for outdoor use in most ambient conditions and enhances the safety and usability of Rice Lake's Dyna-Link and crane scale systems. The *MSI-8000* uses a rechargeable Lithium Polymer battery, providing up to 24 hours (typical) of continuous use between charges.

This manual is intended for use by qualified technicians responsible for setting up and operating the *MSI-8000*

Manuals can viewed or downloaded from the Rice Lake Weighing Systems website at www.ricelake.com

Warranty information can be found on the website at www.ricelake.com/warranties

1.1 Features

- Meets or exceeds all U.S./International safety and environmental standards
- No license required. Meets U.S./International RF Transmission Laws
- Rechargeable Lithium Polymer battery provides up to 24 hours operation when fully charged
- Automatic Power Off turns the unit off, after a user set time of no activity, to save battery life
- The enclosure is IP68/NEMA Type 4 for outdoor use, with shock cushioning on the corners
- Six, 1" (26 mm) LCD digits for clear load readings
- Selectable for kg/lb/Tons (US Short)/Metric Tons/kiloNewtons
- Automatic or manual weight totalization for loading operations
- Eight setpoints can be set for in-range load/weight value for operator alerts or process control
- ScaleCore technology provides quick and easy firmware updates and calibration/setup backup
- Optional hard-wired link for applications where RF is not allowed

1.2 Safety

Safety Signal Definitions:

DANGER *Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.*

WARNING *Indicates a potentially hazardous situation that, if not avoided could result in serious injury or death. Includes hazards that are exposed when guards are removed.*

CAUTION *Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.*

Important *Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.*

General Safety

Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.

WARNING

Failure to heed may result in serious injury or death.

DO NOT allow minors (children) or inexperienced persons to operate this unit.

DO NOT stand near the load being lifted as it is a potential falling hazard. Keep a safe distance.

DO NOT use for purposes other then weight taking or dynamic load monitoring.

DO NOT use any load bearing component that is worn beyond 5% of the original dimension.

DO NOT use any associated lifting product if any of the components of the load train are cracked, deformed, or show signs of fatigue.

DO NOT exceed the rated load limit of the associated Scale/Dynamometer unit, rigging elements, or the lifting structure.

DO NOT allow multi-point contact with the hook, shackle, or lifting eye of the associated Scale/Dynamometer unit.

DO NOT allow high torque on the Scale/Dynamometer unless it is specifically designed for high torque.

DO NOT make alterations or modifications to the unit or associated load bearing devices.

DO NOT remove or obscure warning labels.

For guidelines on the safe rigging and loading of overhead scales and dynamometers, read the "MSI Crane Scale Safety and Periodic Maintenance Manual" (available at www.msiscales.com).

Keep hands, feet and loose clothing away from moving parts.

There are no user serviceable parts within the MSI-8000. Any repairs are to be performed by qualified service personnel only.

1.3 Front Panel Description

The *MSI-8000* front panel, keys and annunciators, are described in Table 1-1.

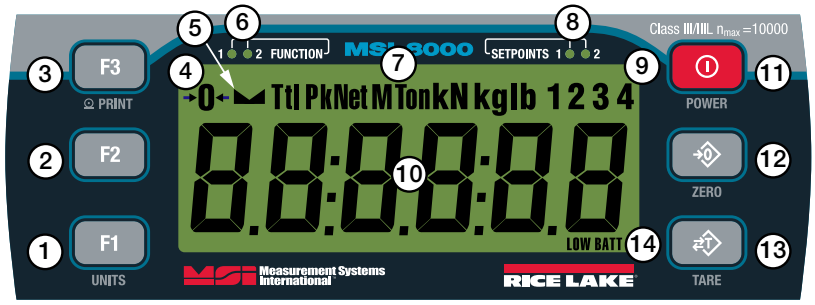


Figure 1-1. MSI-8000 Front Panel

1.3.1 Key/Annunciator Functions

Item No.	Description
1	**Function 1 Key** – programmable to user selectable functions, see Section 4.2 on page 9. Default is **Off**. Functions as the **Enter/Select** key when in the setup menus.
2	**Function 2 Key** – programmable to user selectable functions, see Section 4.2 on page 9. Default is **Off**. Functions as the **Scroll** key in the setup menus.
3	**Function 3 Key** – pre-programmed to **Print** and cannot be changed.
4	**Center of Zero** — indicates that the scale/Dyna-Link is within 1/4 d of zero
5	**Standstill** — indicates that the load has settled within the motion window (usually ± 1d). When this symbol is off, the scale/Dyna-Link will not zero, tare or totalize.
6	**LED Functions** — Indicates the current displayed function. *Example: if F1 blinks, the peak hold reading is captured. If F2 blinks, the Display and Function Test reading is captured.*
7	**Total** – indicates the RF linked device is displaying the total accumulated weight. Displays only momentarily.
	Peak – indicates the RF linked device is in the peak hold mode.
	Net – indicates the RF linked device is in Net load mode. A tare weight is subtracted from the gross load.
	Metric Ton – in conjunction with the Ton annunciator, indicates the RF linked device is displaying Metric Tons.
	Ton – illuminated, indicates the RF Linked Device is displaying in U.S. Short Tons (1 ton = 2000 lb.). When illuminated with **M** the RF Linked Device is displaying in Metric Tons (1 metric ton = 1000 kg)
	Kilonewtons – indicates load display is in kilonewtons.
	Kilograms – indicates load display is in kilograms.
	Pound – indicates load display is in pounds.
8	**Setpoints** — user programmable setpoints for overload warnings. Setpoints 1 and 2 are red high brightness LEDs
9	**Multiple sensors** — number lit indicates the sensor being displayed. If more than one number is lit, sensors are being summed. *Example: if both numbers 1 and 2 are lit, then the weight displayed equals the sum of sensor 1 and sensor 2.*
10	**Display Digits** — include six 1.22'' (31 mm) sunlight visible LCD's.
11	**Power Key** – powers the unit on and off; in setup mode, it returns the display to the weigh mode without storing changes.
12	**Zero Key** – zeros the residual load on a scale/Dyna-Link 2; In setup mode, it stores changes and returns to the prior level.
13	**Tare Key** – removes current load value and puts the system into ***Net*** weight mode
14	**Low Battery** – indicates about 10% of battery life remains; symbol flashes when automatic shutdown is eminent

Table 1-1. Keypad/Annunciator Functions

1.4 Options

Part No.	Option	Description
	Audible alarm	contact factory for further information
	RS-232 serial-output cable	with D-9 connector 13' (4m)
	Dual-purpose RS-232 serial communication and battery charging cable assembly	13' (4m) with charger pigtail Allows serial output while being powered with Charger.
	RS-232 serial-output cable	4m TPU Jacket, unterminated 13' (4m)
	RS-232 serial cable for hardwire connectivity	26' (8 m) connects 8000 to 7300 Dyna-Link
	RF Remote Modem, RS-232	for direct connection to Computers, Scoreboards, or serial printers
	RF Remote Modem, RS-485	for direct connection to 485 Serial Devices
	RF Remote Modem, USB	for direct connection to Computers USB ports
	RF Remote Gateway	for direct connection to an Ethernet LAN, use with MSI's SCCMP program
	RF or Hardwired Scoreboard Display	Various digit sizes from 1.2" to 8", Contact MSI for models available

Table 1-2. Options

2.0 Operation

2.1 Power

Power the indicator On/Off by pressing 

.

2.2 Zero

Sets the zero reading of the scale/Dyna-Link to remove small deviations in zero when the unit is unloaded. See Section 2.3 for zeroing (taring) a package, rigging or pallet weights.

Press 

. The weight must be stable within the motion window for the zero function to work.

Note

- *When using multiple scales, ensure the scale to be zeroed is displayed.*
- *The backup memory in the unit stores the tare reading, and can restore it even if power fails.*
- *Zero works in Gross or Net mode.*
- *Zeroing while in Net mode will zero the gross load causing the display to show a negative tare value.*
- *The scale/Dyna-Link must be stable within the motion window and ◣ ◢ is lit before it will zero. The scale/Dyna-Link remembers the zero request for two seconds. If a motion clears in that time, it will zero.*
- *The scale/Dyna-Link will accept a zero setting over the full range of the scale/Dyna-Link. Zero settings above 4% of full scale/Dyna-Link will subtract from the overall capacity of the scale/Dyna-Link.*

  Example:

  If 100 lb is zeroed on a 1000 lb scale/Dyna-Link, the overall capacity of the scale/Dyna-Link will reduce to 900 lb plus the allowed over-range amount.

2.3 Tare

Tare is used to zero out a known weight such as rigging, a container or pallet and display the load in ***Net*** weight.

Tare and Display the Net Load

1. Load the item that needs to be tared onto the scale/Dyna-Link.
2. Press 

. The weight display changes to 0 and ***Net*** is displayed.

Clear Tare and Revert to Gross Load

Press 

. ***Net*** turns off indicating the unit is in gross mode.

- Only positive gross load readings can be tared
- Setting or changing the tare has no effect on the gross zero setting
- Taring will reduce the apparent over range of the scale

Example:

When taring 100 lb of rigging on a 1000 lb scale, the scale will overload at a net load of 900 lb (1000-100) plus any additional allowed overload (usually about four percent or 9 d).

To view the gross load without clearing the tare value, set an **F-key** to Net/Gross.
See Section 4.2.3 on page 10.

3.0 Installation

3.1 Unpacking

When unpacking the *MSI-8000*, ensure that all parts are accounted for and check for any visible damage. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately. If the *MSI-8000* must be returned, it must be properly packed with sufficient packing materials. When possible, retain the original carton when shipping the unit back. A standard *MSI-8000* is shipped with a battery charger. The charger is universal and will work on AC supplies from 100VAC to 240VAC.

3.2 Getting Started

The *MSI-8000* is often shipped pre-configured with a compatible sensor unit such as an Dyna-Link 2 or one of the MSI crane scales. If the *MSI-8000* is purchased separately, or is to be used with a different system, the RF transceivers will have to be paired. Follow the RF Setup Procedure in Section 4.3 on page 15.

Once the RF setup is complete for the *MSI-8000*, the system will automatically connect with a scale/Dyna-Link. It is recommended to do a site survey to identify operating range and usability of the RF Link. Position the scale/Dyna-Link at an average operational height, and try the link at various positions and distances. The range may vary by the rotation of the scale/Dyna-Link, as well as the site and installation variables.

Fully charge the battery by plugging the charger into the Charge Port. Depending on the discharge level of the battery this can take up to 6 hours.

3.3 Battery

Power to the *MSI-8000* is supplied by an internal rechargeable lithium polymer battery, which provides up to 24 hours of continuous use between charging.

Figure 3-1. Battery Charger Plug-In

3.3.1 Charging

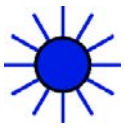
Each *MSI-8000* is shipped with a charged battery. However, before using the *MSI-8000*, it is advised to charge the battery until the Green light shows it is fully charged. When **LOW BATT** first displays, there is approximately two hours of continued operation remaining. When **LOW BATT** starts flashing the batteries are nearly completely drained. For maximum battery life, it is recommended to recharge the battery as soon as **LOW BATT** displays. It is safe to charge the battery at any point in its discharge curve.

If the blue LED is on, the charger is in fast charge mode, which puts 80% of the charge into the battery within two hours and can be used at this point. However, it is best to fully charge the battery, until the green light is displayed.

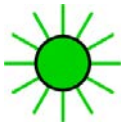
The Charge Connector is waterproof when connected and screwed in. To maintain IP65/NEMA Type 4 ratings, use the supplied plug cover when the connector is not plugged in.

Note ***The AC end of the charger is not waterproof.***

Charger LED Modes



Blue light - indicates a charge is in progress. Charging times vary from one hour to six hours depending on the charge level of the battery when the charger is applied. If the charger is attached as soon as **LOW BATT** displays, charge time will average three hours. It is OK to remove the battery charger while the blue light is on, but a complete charge is recommended.



Green light - indicates the battery is fully charged. The powered charger can be left connected to the *MSI-8000* continuously. It is recommended to leave the *MSI-8000* on the charger when not in use.

Red light - indicates a fault. Faults include over temperature, under temperature (the battery must be warmer than 14°F (-10°C)), a severely depleted cell or charge time-out. When the charge times out a trickle charge is applied to the battery. To clear a time-out fault, unplug the charger and then plug it back in. A severely discharged cell may take days on the charger to recover.

3.3.2 Battery Longevity

The Lithium Polymer Single Cell Battery used in the *MSI-8000* has a rated number of charges of $\geq$ 300 before capacity starts to degrade. The charging life can be greatly increased by charging the battery more often, and not let it reach the battery cutoff voltage of 3.0 V. The battery voltage can be seen by pressing a Function key programmed as **Test**, the battery must be replaced by an Rice Lake certified technician.

Important

When the MSI-8000 is not in use, it is recommended that the charger is left attached to keep a charge. The MSI-8000 uses a small current when powered off which has the potential to deep discharge the batteries. Never store the MSI-8000 with a depleted battery. This can cause permanent damage to the battery and require factory replacement. Shelf life of a fully charged battery is about three months.

4.0 Setup

The front panel keys will work, as shown below, when navigating through the menus during setup.

- Press F1 to enter or select a parameter.
- Press F2 to scroll through the parameters.
- To enter a decimal point, press POWER while the digit is blinking.
- Press ZERO to save and go back one level or to weigh mode. StorE displays briefly.
- If a wrong value is entered, press ZERO to step back one digit and press F2 to change the digit.
- Press POWER to exit without saving changes.

4.1 Setup Menu

To enter the setup menu, press the F2 and POWER keys at the same time.

Parameters	Choices	Description
Func 1 Func2		Function key 1 – Configurable to listed parameters, see Section 4.2 on page 9; Default OFF Function key 2 – Configurable to listed parameters, see Section 4.2 on page 9; Default OFF
	OFF	No function is assigned. The F-Key is disabled
	tESt	Test – runs an LCD test, see Section 4.2.1 on page 9
	totAL	Total – accumulates multiple weighments, see Section 4.2.2 on page 10
	u-tot	View total – activates the total weight display followed by the number of samples See Section 4.2.2 on page 10
	nEtGr	Net/Gross – toggles between Net and Gross modes, see Section 4.2.3 on page 10.
	LEArn	RF Remote Learn – used for programming a RF remote, see RF remote manual for more details
	P-HLd	Peak Hold – automatically updates the display when a higher peak weight reading is established See Section 4.2.4 on page 10.
	2Un it	2 Units – switches the force units between lb and kg. See Section 4.2.5 on page 10.
	5Un it	5 Units – scrolls through all available units: lb, kg, Tons (US Short), Metric Tons, and kiloNewtons. See Section 4.2.5 on page 10.
	HirES	Hi Res – the unit is more sensitive to motion and movement resulting in a less stable display See Section 4.2.6 on page 10.
	Pr int	Print – outputs a configured text string to the RS-232 port on the base of the Dyna-Link. See Section 4.2.7 on page 11.
	tArE	Tare – not used, *MSI-8000HD* has a dedicated tare key
	ScAn	Scan – displays RF connected channels in order
	ttL.rd	Total Remote Devices – displays the summed weight of RF connected sensors. See Section 4.2.8 on page 11.
A-OFF	OFF 15 30 45 60	Auto Off – prolongs the battery life of the scale by turning power off after the set time (in minutes) that the scale is not in use. See Section 4.3 on page 11
SEtPo ints StPt 1-8	GrEAt	Greater Than – setpoint will trigger when the tension exceeds the value.
	LESS	Less Than – setpoint will trigger when the tension is less than the value.
	OFF	Off - the setpoint parameter is disabled.

Table 4-1. Setup Menu Parameter Descriptions

Parameters	Choices	Description
OUtPUt		Relay Output – dependant on the application being used
	LAtch	Latch – if power is lost, the relay retains it's settings
	Coil	Coil – needs power to remain position
b.LIFE	StAnd LonG	Battery Life – sets the options for standard or extended battery life. See Section 4.6 on page 13
StAnd	indUS Hb-44 r-76 IUnit	Standards – sets the industry standard to be used.

Table 4-1. Setup Menu Parameter Descriptions

4.2 Function Keys

There are two programmable function keys on the *MSI-8000HD*, **F1** and **F2**.

- Function key setup is independent of the connected scale/Dyna-Link function keys.
- 

and 

are standard on the *MSI-8000HD* and do not need to be programmed.
- If a function key does not work, the connected Scale/Dyna-Link may not be set up to support the key.

  Example: If the Function key is set for TOTAL, then TOTAL mode setup in the Setup Menu must also be set up for the target scale.

To set a function key use the following steps:

1. Press 

and 

at the same time, FUnc 1 will display.
2. Press 

to scroll to the function key to be programmed.
3. Press 

. The currently saved parameter will display.
4. Press 

to scroll through the choices.
5. Press 

to select the desired choice.
6. Press 

to save and exit.

4.2.1 Test

The test feature only tests the *MSI-8000HD*. Set an **F-key** to **TEST**.

To run a test, press **Fx-TEST**, the following items scroll across the display.

- Light all LCD segments and the LEDs
- SoFt followed by the version number
- bAtt followed by the battery level in volts
- d.tESt followed by counting from 00000 to 99999

The test can be single stepped by:

1. Press **Fx-TEST**, immediately press 

to stop the auto scroll.
2. Use 

to scroll through the steps and 

to view the step value.
3. Press 

to abort the test at any time.

Internal tests are also performed, if any test fails, an error code is displayed. See Section 7.2 on page 35 for a description of all error codes.

4.2.2 Total

1. Ensure the total mode has been programmed in the setup menu. If this has not been setup the **F-Key** assigned to ***Total*** will not work.
2. Program an **F-key** to **Total**. See Section 4.2 on page 9.
3. Press **Fx-Total** to perform the total function that was set in Section 4.8.2 on page 15.

4.2.3 Net/Gross

Program an **F-key** to **NetGross**. See Section 4.2 on page 9.

Press **Fx-NetGross** to toggle between gross and net (gross minus tare). **Fx-NetGross** only functions if a tare has been established.

The operator can switch back to gross from net without clearing the tare value. Only clearing or setting a new tare will change the tare value held before switching into Gross Mode.

4.2.4 Peak Hold

Peak hold uses a high speed mode of the A/D converter allowing it to capture transient loads at a far higher rate than typical Dynameters.

- Peak Hold is cleared and enabled by pressing **Fx-P-HLd**.
- When a new peak is detected, the **Fx** LED will flash three times.
- The accuracy of the system in peak hold is slightly reduced to 0.2 percent of Capacity + 5d.
- The filter setting is turned off while in peak hold mode to ensure the fastest acquisition rate.

  Example

  The Peak Hold function is useful in Dynamic and Fall tests. Common tests include Overall Breaking Strain (OB€), Breaking Force, and Cycled Breaking Strain.

Capture Peak Force:

1. Program an **F-key** to **P-HLd**. See Section 4.2 on page 9.
2. Prepare the stand test and test sample.
3. Press 

.
4. Press **Fx-P-HLd**, confirm that **Pk** is lit on the display.

Note ***A small jump in the reading may occur depending on the stability of the test device.***

5. Apply the test weight. The **Fx** LED will blink three times when a new peak ID is detected
6. Remove the weight and the peak value is recorded.
7. To run a new test, press **Fx-P-HLd** to clear the peak value. Repeat steps 3 to 6.

4.2.5 Units

Program an **F-key** to **Unit**. See Section 4.2 on page 9.

Press **Fx-Unit** to set the units parameter to units required for display.

4.2.6 Hi-Res

Note ***Only available with the MSI-7300 Dyna-Link (refer to the Dyna-Link manual PN 152160)***

When set to on, the filter is automatically set to the ***Hi-1*** setting (if ***Hi-2*** is already set, then the filter is not changed). This will have a small effect on settling time. When set to off, the filter setting resets to the previous filter setting.

Program an **F-key** to **HiRes**. See Section 4.2 on page 9.

Pressing **Fx-HiRes** places the display into a temporary high resolution mode. This mode continues until **Fx-HiRes** is pressed again, or power is cycled. In the Hi-Res mode the appropriate **Fx** LED blinks continuously at a slow rate.

Note *Hi-Res mode does not increase the accuracy, but allows for smaller weight incrementation to display.*

Use TARE *or* ZERO *to zero out any initial error.*

4.2.7 Print

The ***Print*** function is set to **F-3 key**, so there is no need to program F1 or F2 to Print. Then pushing F1 or F2 on the scale will cause the Comm Port on the Remote to output the selected data string.

If an **F-Key** is programmed as Print and the Print Setup is configured as continuous, then the **F3-Print** key is used for ***Start Print/Stop Print***.

4.2.8 Total Remote Devices

Sensor summing must be enabled in the communications setup menu. If the ***Pairs*** or ***Both*** modes are enabled in the communications setup menu, then pressing **Fx-ttl.rd** will scroll through the available combinations.

Note *It is common to program F1 for SCAN and F2 for ttl.rd (Total Remote Devices) to allow quick switching between individual channel displays (with Scan) or the summed weight (with ttL.rd).*

4.3 Auto-Off

The ***Auto-Off*** feature prolongs the battery life by powering off the unit when not in use. When a button is pressed or the detected load is in motion exceeding 10 ***d***, the time limit is reset.

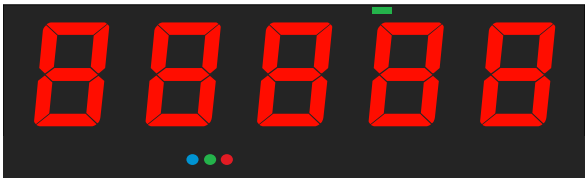
When disabled, the unit will only turn off by pressing POWER, or the battery dies.

To set the ***Auto-Off*** function:

1. Press and hold F1 and POWER. FUnc 1 displays.
2. Press F2 to scroll to A-OFF.
3. Press F1. The current auto off time displays.
4. Press F2 to scroll through the available times.
5. Press F1 when the desired time is displayed. SLEEP displays.
6. Press ZERO to exit setup and store the settings.

4.4 Setpoints

The *MSI-8000HD* supports eight setpoints. Common uses of setpoints are for warnings or process control. It comes standard with LED outputs for a triggered set point.



Setpoint 1 is Blue
Setpoint 2 is Green
Setpoint 3 is Red

Figure 4-1. Setpoint LED's

The *MSI-8000HD* has an audible output option that is triggered by Setpoint 1. Contact Rice Lake Weighing Systems for other setpoint output options.

Setpoint	Description
Setpoint Mode	
OFF	Setpoint is not activated
GrEAt	Indicates the setpoint will trigger when the weight exceeds a set value
LESS	Indicates the setpoint will trigger when the weight is less than a set value
Setpoint Weight Type	
nEtgr	responds to net or gross weight
Gross	responds to gross weight regardless of the display
totAL	responds to the totaled weight
t-cnt	responds to the total count (number of samples)
LFcnt	responds to the number of times the weight has exceeded 25% of capacity

Table 4-2. Available Setpoint Settings

To set the setpoint:

1. Press and hold F2 and POWER. FUnc 1 displays.
2. Press F2 to scroll to the desired setpoint (StPt 1 - 8).
3. Press F1. The current setpoint mode is displayed.
4. Press F2 to scroll to the setpoint mode desired.
5. Press F1. The current setpoint weight type is displayed.
6. Press F2 to scroll to the desired weight type.
7. Press F1. The desired weight type continues to display.
8. Press F1. Sn 1-4 displays.
9. Press F2 to toggle between Sn 1-4 and Sn 5.
10. With the desired setting displayed, press F1. The current weight type value is displayed.
11. Press F2 to scroll the numbers and F1 to enter each digit.
12. When the correct value is displayed, press F1. The next setup menu item is displays.

Note *To enter a decimal point, press* POWER *while the digit is blinking. To correct a digit, press* ZERO *to step back.*

13. Press ZERO to exit setup and store the settings.

4.5 Output

Relay output allows the selection of Latch or Coil relays.

- Latch relays retain position even if the power fails,
- Coil relays reset when power fails.

Important *In the event of a power failure, the Latch relay uses continuous battery power and will deplete the battery more quickly than the coil relay.*

1. Press and hold F1 and POWER. FUnc 1 displays.
2. Press F2 to scroll to the OUtPUt.
3. Press F1. The current setting is displayed.
4. Press F2 to toggle between Co iL and LAtch.

Note *The display brightness changes when each setting is displayed.*

5. Press F1 when the desired setting is displayed. b. L iFE displays.
6. Press ZERO to exit setup and store the settings.

4.6 Battery Life

Select either Standard (StAnd) or Long (LonG).

In Long battery life mode, the system is placed into a sleep state for several seconds at a time if there is no change in tension. This disables the display in order to reduce power consumption and increase battery life. After several seconds, the *MSI-8000HD* will wake up to check for any changes in tension. If there is a change in tension, the unit will stay awake. The unit will also stay awake if it is in configuration mode.

Although long battery life mode can significantly increase battery life, performance is better in Standard battery life mode.

1. Press F2 and POWER simultaneously. FUnc 1 displays.
2. Press F2 to scroll to b. L iFE.
3. Press F1. The currently saved battery life displays.
4. Press F2 to toggle between the choices.
5. With choice displayed, press F1 to select. StAnd displays.
6. Press ZERO to save and exit to weighing mode.

4.7 Standard

Selection	Description
Industrial (indUS)	This is the most common setting for the *MSI-8000HD*. With the Industrial standard, there is full range zero, access to units switching, filters, and peak hold.
Handbook 44 (Hb-44)	Enables only approved features per the NTEP HB-44 rules and regulations. Access is denied to Peak Hold, and the zero range may be limited. The Filter menu is moved to the calibration setup menu, so filters are only accessible through the calibration seal

Selection	Description
R-76 (r-76)	Sets the scale to enable only approved features per OIML R-76. Only kg weight units are available. The zero range is limited to 4% (-1 to +3% relative to calibrate zero). Net/Gross function is temporary. Once net weight is established, pushing an F key set for Net/Gross will cause a maximum 5 second display of the gross weight.Clear the Tare to display gross weight constantly. Other metrological aspects are changed to meet R-76 requirements.
1Unit (1Un it)	The 1unit standard is exactly the same as Industrial, except units switching is inhibited. Used for metric only countries or where 1Unit standard is to allow the scale to be calibrated in units other than lb or kg, since conversions are eliminated. Contact Rice Lake for more information on the standards settings.

Table 4-3. Standard Menu Selections

Use the following steps to set up standard settings.

1. Press F2 and POWER simultaneously. FUnc 1 displays.
2. Press F2 to scroll to StAnd.
3. Press F1. The currently saved standard displays.
4. Press F2 to scroll through the choices.
5. With choice displayed, press F1 to select. FUnc 1 displays.
6. Press ZERO to save and exit to weighing mode.

4.8 Remote Display Scale Setup

The *MSI-8000 RF Remote Display* can be used to operate several MSI crane scales (MSI-4260, MSI-3460 and MSI-7300). Some functions can also be set using the *MSI-8000HD*. The information in this section pertains to the setup of the scale being used with the remote.

Parameters	Choices	Description
FiLtr	OFF Lo Hi-1 Hi-2	Weight Filter – allows the scale to adjust to situations where there may be movement See Section on page 16 Hi-2 – MSI-7300 only
totAL	OFF	Total Accumulation - sets the choice for weight accumulation for a single scale. See Section 4.2.2 on page 10. When set to off, it's disabled.
	ttLOn	Total On - Is a manual choice for accummulation. See Section 4.2.2 on page 10.
	A. LoAd A. LASt H. HiGH	Auto Total - Choices for setting automatic accumulations.
StPt 1-8	GrEAt	Greater Than – setpoint triggers when the tension exceeds the value. See Section 4.4 on page 11
	LESS	Less Than – setpoint triggers when the tension is less than the value. See Section 4.4 on page 11
	OFF	Off - the setpoint parameter is disabled. See Section 4.4 on page 11
b.LiFE	StAnd LonG	Battery Life – sets the options for standard or extended battery life. See Section 4.6 on page 13

Table 4-4. Settings for the Scale using the Remote

4.8.1 Filter Setup

The filter settings are used to stabilize the weight in an unstable condition. Increasing the filter will improve the stability, however settling times will be longer. The *MSI-8000HD* employs algorithms that speed up large weight changes while still controlling vibration even with high filter settings.

Use the following steps to set up filtering.

1. Press F1 and POWER simultaneously. FUnc 1 displays.
2. Press F2 to scroll to F iLtEr.
3. Press F1. The currently saved total mode displays.
4. Press F2 to scroll through the choices.
5. With choice displayed, press F1 to select. Un it displays.
6. Press ZERO to save and exit to weighing mode.

4.8.2 Total Mode

For the accumulation of multiple weighments, the Total function uses the displayed load, so gross and net readings can be added into the same total.

There are four modes of totalizing, a manual and three auto modes.

All modes require that the weight on the scale return below 0.5% (relative to full scale) of ***Gross Zero*** or ***Net Zero*** before the next weighment can be added. Applied weight must be ≥1% of full scale above ***Gross Zero*** or ***Net Zero*** before it can be totaled.

Manual Total

Manual Total (ttL On) adds a current weight to a previously accumulated value manually. To add weight to the total it must be greater than 1% of capacity and not yet totaled. This assures that a weight on the scale is only added to the total once.

1. Program a **F-key** to totAL. See Section 4.2 on page 9.
2. With the weight to be added on the scale, press **F-Total**. The acknowledge LED blinks to indicate the weight was accepted and the ***TOTAL*** annunciator lights. Then the total weight is displayed for five seconds and the number of samples is displayed for two seconds.
3. Repeat steps 1 & 2 until all weight samples have been added.

Note

Total Mode will not function while the scale is in motion, ensure ◣ ◢ is on. If the system fails to achieve stable readings, increase the filter setting or increase the size of the scale division (d) in the Init Cal procedure.

The F-Total functions as View Total only until the 1% threshold is exceeded to allow the addition to the total value.

Auto Total

This mode has three variations which are programmed in the Setup menu.

Program an **F-key** to ***AUTO TOTAL***, it functions as ***Auto Total On*** / ***Auto Total Off***. See Section 4.2 on page 9.

Setpoint	Description
A. LoAd	Auto Load – ensures any settled load above the Rise Above threshold will be automatically totaled. The scale must fall below the Drop Below threshold before the next total is allowed.
A. LASt	Auto Last – takes the last settled weight to auto total with. The total occurs only once the scale goes below the threshold. This allows the load to be adjusted without a total occurring. Once the load is removed, the scale uses the last settled reading for total.
A. HiGH	Auto High – uses the highest settled reading. This is useful for loads that can't be removed all at once.

Table 4-5. Auto Load Selections

Set Total Mode

1. Press F1 and POWER simultaneously. FUnc 1 will display.
2. Press F2 to scroll to totAL.

3. Press F1. The currently saved filter mode is displayed.
4. Press F2 to scroll through the choices.
5. With choice displayed, press F1 to select. F ıLtr will be displayed.
6. Press ZERO to exit setup and store the settings.

Reset Total Load

To reset the total load to zero, press **Fx-Total** again and while the total load is being displayed, quickly press ZERO.

5.0 Calibrating a Scale/Dyna-Link 2

The *MSI-8000* remote display can be used for calibrating MSI ScaleCore-based crane scales and dynamometers, including MSI-3460 Challenger 3, MSI-4260 Port-A-Weigh or MSI-7300 Dyna-Link 2.

They can be calibrated using standard precision test weights. It is required that the weight used is at least 10% of full capacity in order to achieve rated accuracy.

When adequate test weights are not available, the scale/dynalink can be calibrated using a constant calibration (C-CAL) See Section 5.1.2.

Note ***If the linked scale/Dyna-Link is sealed for NTEP approval, the seal will need to be broken and the calibration switch on the linked scale/Dyna-Link will need to be pressed for the MSI-8000 to perform the calibration.***

5.1 Initial Calibration

Initial calibration is used to setup units, capacity and resolution (d) required for the load cell.

Initial calibration is also performed after a calibration reset which deletes all calibration.

1. Press ZERO and F2 simultaneously. CAL displays.
2. Press the programmed ***F-Key*** to scroll to the load cell to be calibrated.
3. Press F1, Un it displays.
4. Press F1. The default units are displayed.
5. Press F2 to scroll through the available units.
6. With desired unit displayed, press F1 to select. CAP is displayed.
7. Press F1. The default capacity is displayed.
8. To enter a different capacity, press F2.
9. Press F2 to scroll through numbers and F1 to save the selected numbers.
10. When all numbers have been selected, press F1 to store the number. d displays.
11. Press F1. The default display divisions are displayed.
12. Press F2 to scroll through the available display divisions.
13. With desired display division displayed, press F1 to select. UnLd displays.
14. Proceed with the routine calibration, starting with step 2 of Section 5.1.1.

5.1.1 Routine Calibration

For maintenance and routine calibration use the following steps.

1. Press the configuration switch. CAL is displayed.
2. Press F1, UnLd displays.
3. Remove all weight from the scale.

4. Press F1, 0 flashes.
5. Press F1, PASS displays momentarily, then LoAd 1 displays.
6. Load the scale with a precision test weight, for best accuracy a test weight of 10% of capacity or more is recommended.
7. Press F1, the capacity of the scale flashes.
8. To enter a test weight other than the capacity, press F2.
9. Press F2 to scroll through numbers and F1 to save the selected numbers.
10. When the correct weight is displayed, press F1 to store the number. If cal value is within limits, PASS displays momentarily, then LoAd2 displays.
11. Press F1 to enter the second load.
12. Add load to scale and press F1.
13. Press F1, the current weight on the scale flashes.
14. Repeat steps 3 through 10, up to four loads.
15. When all loads are complete, press ZERO to store the calibrations. CAL'd displays.
16. Press F1 to view the cal number. C-CAL flashes momentarily followed by the C-CAL number, record the value, this number will be required if calibrating with C-CAL, see Section 5.1.2.
17. Press ZERO. StorE displays momentarily, then SEtUP displays.
18. Press ZERO to exit calibration. StorE displays momentarily, then the unit returns to weigh mode.

Repeat this procedure to calibrate all load cells connected to the *MSI-8000*.

5.1.2 C-Cal Calibration

When adequate test weights are not available, the scale can be calibrated using a cal number calibration which is referred to as C-Cal. To use C-Cal, a factory generated C-Cal number must be known. Rice Lake supplies replacement load cells with the C-Cal value stamped on the serial number label. When a calibration is preformed with test weights, a new C-Cal is generated.

The C-Cal number must be known prior to starting this procedure. Rice Lake prints this number on the serial number label. C-Cal reduces slightly the accuracy of the system and is intended for non-critical use only. For highest accuracy, calibrate with precision test weights.

1. Press the configuration switch, see Section . CAL is displayed.
2. Press F2 to scroll to C-CAL.
3. Press F1, UnLd is displayed.
4. Remove all weight from the scale.
5. Press F1, 0 flashes and PASS will display momentarily. Then C-CAL is displayed.
6. Press F1, the last known C-CAL is displayed.
7. To except the number displayed press F1. Skip to Step 10.

   To enter a different C-CAL number, press F2.
8. Press F2 to scroll through numbers and F1 to save the selected numbers.
9. When the correct number is displayed, press F1 to store the number. PASS displays momentarily, then CAL'd.
10. Press ZERO. StorE displays momentarily, then SEtUP displays.
11. Press ZERO to exit calibration. StorE displays momentarily, then the unit returns to weigh mode.

5.2 Setup

Setup is used to set the desired Industry Standard and Auto Zero Maintenance (AZM).

1. Press the configuration switch, see Section . CAL is displayed.
2. Press F2 to scroll to SEtUP.
3. Press F1, StAnd displays.
4. Press F1, the current standard setting displays.
5. Press F2 to scroll through calibration standards selections. See Section 5.2.1 for details of the standards.
6. When desired option is displayed press F1. AUtoO displays.
7. Press F1 to enter Auto Zero Maintenance.
8. Press F2 to toggle between On/OFF.
9. Press F1 to set on or off. 0. P-UP displays.
10. Press F1 to enter zero on power-up.

11. Press F2 to toggle between On/OFF.
12. Press F1 to set on or off. StAnd displays.
13. Press ZERO to return to cAL.
14. Press ZERO again to exit calibration. StorE displays momentarily, then the unit returns to weigh mode.

5.2.1 Standard Settings

Below are the four selections in the standards menu.

Standard Type	Description
Industrial Indus	The common setting for the *MSI-8000 RF Remote Display*. With the Industrial standard, you have full range zero, access to units switching, filters, and peak hold.
Handbook 44 HbYY	Sets the scale to enable only approved features per the NTEP HB-44 rules and regulations. Access is denied to Peak Hold, and the zero range may be limited. The Filter menu is moved to the Cal Setup Menu, so filters are only accessible through the Cal Seal.
R-76 r-76	Sets the scale to enable only approved features per OIML R-76. Only kg weight units are available. The zero range is limited to 5% (-2 +3% relative to Calibrate zero). Net/Gross function is temporary. once Net weight is established, pushing an F key set for Net/Gross will cause a maximum 5 second display of the Gross weight. The Tare must be cleared to display Gross weight constantly. Other meteorological aspects are changed to meet R-76 requirements.
One Unit 1 Unit	The one unit standard is exactly the same as Industrial, except unit switching is inhibited. This is useful for Metric only countries. Another use of the One Unit standard is to allow the scale to be calibrated in units other than lb or kg, since conversions are eliminated.

Table 5-1. Standard Settings Parameter

Contact Rice Lake Weighing Systems for more information on the standards settings.

5.3 Reset the Load Cell Calibration

To completely remove current calibration, a calibration reset must be performed.

1. Press the ***F-Key*** set to scan to scroll to load cell to reset.
2. Press and hold the calibration switch, then press POWER. rESEt flashes.
3. Press F2, SurE flashes.
4. Press F2 to reset the calibration for current load cell. CAL displays.
5. Proceed with the Initial Calibration, Section 5.1.

Important ***Pressing F1 resets all indicator settings to the original factory settings.***

Note ***Press the POWER to cancel reset and return to the previous menu.***

6.0 Communications Setup

The *MSI-8000HD* uses 802.15.4 transceivers to communicate.

802.15.4 operates in the 2.4GHz systems if:

- Antennas are isolated at least 10' (3 m) from the equipment.
- *MSI-8000HD* based RF systems are peer to peer. For multiple scale connections, the *MSI-8000HD* acts as the network coordinator.

The *MSI-8000HD* uses three numbers to establish a piconet. A piconet is a network that is created using a wireless Bluetooth connection. Table 6-1 lists out the three elements used in setting up a piconet. The *MSI-8000HD* ID is recommended to be in the range of 20-30.

Name	Description	Recommended Number Range
ScaleCore ID	Used to identify each device in a piconet, its range is 0-254 and cannot be duplicated within the same RF channel	20-30
RF Channel	Establishes the base network that all interconnected devices must match	12-23
Network ID	A 64 bit number that all interconnected devices must match, do not use a small number to avoid other 802.15.4 transeivers that default to a network ID of 0	Maximum of six digits with a range of 0-99999.
Note	***For all devices that must interconnect, the RF channel and network ID must match. The ScaleCore ID must be unique. The Dyna-Link or crane scale that is the weight source should be set to a ScaleCore ID of 0. If other source devices are added, they can be added in sequence.***	

Table 6-1. Piconet Setup Ranges

6.1 Communications Menu

To enter the Communications menu, press F1 and F3 (Ω PRINT) at the same time. 6459 flashes momentarily before entering the communications menu.

Parameters	Choices	Description
Pr int	--	Print – prints a ticket if connected to a printer
rF	--	Radio Frequency, see
cF.nEt	tNo.rd	Load Totaling – The total number of Remote Sensor Devices (RD's) – Range 1-4 (Default is 1)
	ttL.rd	Total Remote Displays ALL – sum of all remote devices Pr irS – sum in pairs (requires four remotes) both – sum in pairs plus grand total uSEdEF – programmed using a computer program such as Scope oFF – summing is disabled
ScAnLS	L iSt id	–
	Sc id	ScaleCore ID – number must match
	Sn. id	Sensor ID

Table 6-2. Communications Menu Parameters

String No.	Format	Prints
1	Wt-Unit-Mode ↵	Current wieght
2	Wt-Unit-Net ↵	Net weight
3	Wt-Unit-Grs ↵	Gross weight
4	Wt-Unit-Tare ↵	Tare weight
5	Wt-Unit-Total ↵	Total weight
6	#Samples-TCNT ↵	Total count
7	no units or mode ↵	Current wieght
8	—	Reserved
9	↵	CR-LF

Table 6-3. Print Strings

Note: ***Transmission strength should be set to the lowest setting possible to achieve the transmission required. Both the scale/Dyna-Link and the 8000 should be set at the same transmission strength setting.***

Setting	RF Power Level	Transmit Current	Note
0	10dBm	137mA	Lowest Transmission Power
1	12dBm	155mA	(default on 7300s and 8000s)
2	14dBm	170mA	—
3	16dBm	188mA	—
4	18dBm	215mA	—

Table 6-4. Transmission Strength Settings

6.2 Printer Setup

The RS-232 communications port is capable of outputting load data. All of the RF linked weight device weight modes are available in user formatted form. The control mode program is what controls the *MSI-8000HD* to print and is described in Section 6.2.1.

The communications port settings are independent of any print settings in connected scales. They reside only in the *MSI-8000HD*.

Choices	Description
L iStnr	Print setup – select the channel the port will be used with. Options: 0, 1, 2
OUtPUt	Port selection. Select the port to use for communication with the printer; Options Port 0. rF. Port 2
StrnG	String Setup – print string format number entry screen. See Table 6-3
CntrL	Print Control Options: USEr, LoAd, Cont, OFF See Table 6-6.
rAtE	Output Rate – print string output rate number entry screen. (0-65536 seconds)

Table 6-5. Print Setup Parameters

6.2.1 Control Modes

The user can select four control modes. They are described in Table 6-6.

Mode	Description
User	Printing is controlled by pressing F3 (PRINT)
Load	One print occurs when a stable load is read, the scale must then return to near zero before another print will occur. ***Note: Other configurations of load are available using the ScaleCore Connect. It can be downloaded from the Rice Lake Website***
Continuous	The unit will continously output the data at a rate specified in the rate parameter (up to 65,535 seconds). Setting the interval to 0 will set an interval as fast as the system can go.
Off	Printing is disabled. Power consumption is lower with the print off.

Table 6-6. Control Modes

6.2.2 Standard Print Strings

Commands that can be used to format gross, net and print strings are shown below.

Command	Description
<T>	Load data
<U>	Units
<M>	Load mode (lb/kg)
<CRLF>	Carriage return line feed
<SP>	Space

Table 6-7. Standard Print Strings

1	**Current load**	Fixed output length: 16. Leading zeros suppressed except for the least significant digit (LSD). <TTTTTTT><SP><UU**><**SP><MMMMM**><**CRLF>
2	**Net load**	Fixed output length:16. Leading zeros suppressed except for the LSD. <TTTTTTT><SP><UU><SP>NET><SP><SP><CRLF>
3	**Gross load**	Fixed output length: 16. Leading zeros suppressed except for the LSD. <TTTTTTT><SP><UU><SP>GROSS><CRLF>
4	**Tare Weight**	Fixed output length:16. Leading zeros suppressed except for the LSD. <TTTTTTT><SP><UU><SP>TARE><CRLF>
5	**Total Weight**	Fixed output length: 16. Leading zeros suppressed except for the LSD. <TTTTTTT><SP><UU><SP>TTL><CRLF>
6	**Number of Samples Totaled**	Fixed output length: 16. Leading zeros suppressed except for the LSD. <SP><SP><SP><SP><SP><SP><SSSSSSS><SP><T-CNT>SP>CRLF>
7	**Current Weight Mode**	Net, Gross, Peak, etc <SP><MMMMM>CRLF>
8/9	**Carriage Return/ Line Feed**	Used to add a space between print records. <CRLF>

Figure 6-1. Standard Print Strings

Combinations of the standard print strings can be entered in the string number entry screen.

Example: To get a Net, Gross, Tare printout with a space between records, enter 2349.

The ScaleCore Connect application can also be used for custom output strings, it can be downloaded from the Rice Lake website.

The serial output is configured as 9600 baud, Xon/Xoff handshaking, no hardware handshaking, 1 stop bit, no parity. Other baud rates are possible by special order only.

6.2.3 Printer Output Setup

Use the following steps to set up the printer output.

1. Press F1 and F3 (PRINT) at the same time. Pr int displays.
2. Press F1. L iStnr displays.
3. Press F2 to scroll to StrnG.
4. Press F1. The current print string number is blinking.
5. Press F2 to scroll through the numbers and press F1 to save and move to the next number.

   Example:
   If Net, Gross and Tare are to be used for the print format, the entry required would be 2349.
   The 2 is net, 3 is Gross, 4 is tare and 9 inserts a space before the next print output.
6. Once all numbers are set, press F1 to save the print mode. CntrL displays.
7. Press F1. The current control mode displays.
8. Press F2 to scroll through the options.
9. When the desired control mode is displayed, press F1. rAtE displays.

Note *If control mode has been set to continuous, press* F1 *then proceed to Step 13.*

10. Press F1. The current print rate displays.

11. Press F2 to scroll through the numbers and press F1 to save and move to the next number.
12. When number is correct, press F1. L iStnr displays.
13. Press F1. The current listener value displays.
14. Press F2 to scroll through the numbers and press F1 to save and move to the next number.
15. Once the desired value is displayed, press F1 to save. OUtPUt displays.
16. Press F1. The current output displays.
17. Press F2 to scroll through the options.
18. Once the desired output is displayed, press F1 to save. StrnG displays.
19. Press ZERO three times to exit, StorE displays briefly, then the unit returns to weigh mode.

6.3 RF Setup

Allows the setup of the Radio Frequency.

Mode	Description
On. OFF	Enable RF – On/Off, affects continuous mode only.
Sc id	ScaleCore ID – range 1-254, (20-30)
Chnl	RF Channel – Range 12-23
nEt id	Network ID – Range 0-999999
StrEn	Transmission Strength – Range 0-4 See Table 6-4
tYPE	Allows the selection of radio card that is being used. For cards other than ZXee us the other selection. OthEr, 2bEE
Hold	When set to On, the radio continues to use power. This will use the battery power faster. Default is set to OFF.

Table 6-8. RF Setup Parameters

Use the following steps to set up the RF menu parameters.

1. Press F1 and F3 PRINT at the same time, Pr int displays.
2. Press F2 to scroll to rF.
3. Press F1. On. OFF displays.
4. Press F1. The currently saved parameter is displayed.
5. Press F2 to toggle between on and off.
6. With On displayed, press F1 to select. OFF is only used when the 8000 is hardwired to a Dyna-Link. Sc id displays.
7. Press F1. The current ScaleCore ID displays.
8. Press F2 to scroll through numbers and F1 to save the selected numbers.

9. When number is correct, press F1 to store the number. CHnL displays.
10. Press F1. The current channel setting displays.
11. Press F2 to scroll through numbers and F1 to save the selected numbers.
12. When number is correct, press F1 to store the number. nEt id displays.
13. Press F1. The current Network ID displays.
14. Press F2 to scroll through numbers and F1 to save the selected numbers.

Note

Rice Lake Weighing Systems recommends at least a four digit for the Network ID, to ensure there are no conflicts with any other 802.15.4 networks.

15. When number is correct, press F1 to store the number. StrEn displays.
16. Press F1. The current Strength setting displays.
17. Press F2 to scroll through 0-4.
18. When the number is correct, press F1. tYPE is displayed.
19. Press F1. The current type displays.
20. Press F2 to scroll through values.
21. With selected value displayed, press F1. Hold displays.
22. Press F1. The current setting displays.
23. Press F2 to toggle between on and off.
24. When the selection is correct, press F1 to store the number. On. OFF displays.
25. Press ZERO to save and exit the RF menu.
26. Press ZERO to exit to the communication menu.

6.4 Setup Multiple Sensor Network

The *MSI-8000* can monitor up to four load sensors. The sensors can be read individually, in pairs or summed. Dyna-Link 2 is shown for illustration purposes only. The Challenger 3 or Port-A-Weigh can also be used.

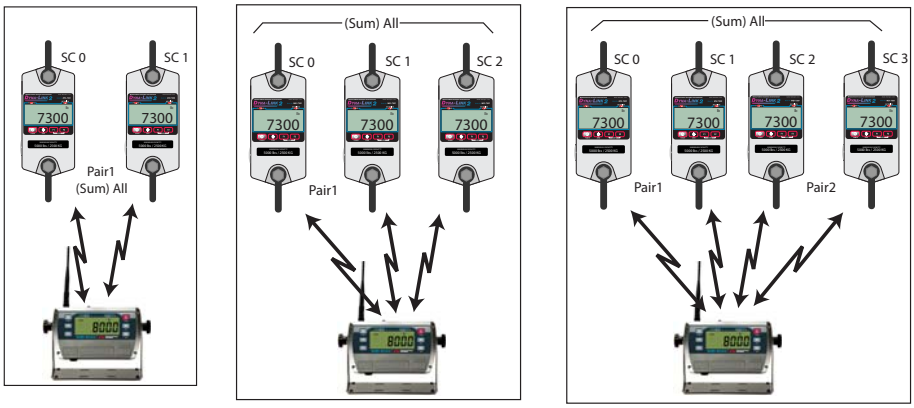


Figure 6-2. Multiple Sensor Network

Each sensor has a unique ScaleCore ID (SCID). The IDs must be consecutive, starting with 0. This is set in the sensor setup, not in the *MSI-8000*. See the scale/Dyna-Link 2 operation manual, available at www.ricelake.com

6.4.1 Set the Total Number of Load Cells

1. Press F1 and F3 (PRINT) at the same time. Pr int is displayed.
2. Press F2 to scroll to cF. nEt.
3. Press F1 tno. Ld is displayed.
4. Press F1. The Load Totaling setting displays.
5. Press F2 to scroll through numbers and F1 to save the selected numbers.
6. When correct number of scales/Dyna-Link 2 attached (2-4) is displayed, press F1. This number does not include the *MSI-8000* or any modems. ttL. rd displays.
7. Press F1. The Load Totaling setting displays.
8. Press F2 to scroll through numbers and F1 to save the selected numbers.
9. Press F1. tnord displays.
10. Press → 0 ← (ZERO) twice to exit to the weighing mode.

6.4.2 Scan Weight Inputs

1. Program **F1** to the *ScAn* function, and **F2** to the Add. Ld function for summed sensor readings. See Section 6.4.3.
2. The current channel is displayed, press F1 to change to the next channel. The scan channel number is displayed briefly, then the scan channel weight is displayed.
3. Press F1. In a two sensor system the scan returns to the first channel (0).

6.4.3 Load Totaling Settings

There are four different types of load totaling modes and are explained below.

All

All channels are added together, press **Fx-Add.Ld** to view the sum of all sensors connected. Pressing **Fx-Add.Ld** again confirms that the summed channels are being displayed, by briefly displaying Add. Ld (total remote sensor devices).

Note ***If the sum is the only thing to be observed, disable the Scan function key using the function key setup menu (Section 4.2 on page 9).***

Pairs

Used with four sensor systems, scrolling through the channels with **Fx-**Add. Ld, they will be presented as separate weights first and then as pairs. This display is proceeded by the LCD message PA ir 1 and PA ir2.

Both

This mode displays both the pair totals and the overall total. Each press of **Fx-**Add. Ld scrolls through the summed combinations. First PA ir 1, then PA ir2 then the sum of all connected sensors is displayed.

Off

Sensor summing disabled. A function key set to ttL. rd is unnecessary.

1. Program an ***F-key*** to the ttL. rd function. See Section 4.2 on page 9. The current channel is displayed.
2. Press **Fx-**ttL. rd. Ad. ALL is displayed briefly, then the summed total.
3. Continue pressing **Fx-**ttL. rd to view all enabled sum types.

6.5 Scanless ID

The scanless ID specifies the load cell/sensor that scale one through four will use for summing totals. It allows up to four devices to be summed together on the remote display.

1. Press F1 and F3 (PRINT) at the same time. Pr int displays.
2. Press F2 to scroll to ScAnLS.
3. Press F1. L ISt id displays.
4. Press F1. Current L ISt id flashes.
5. Set the ID number of the LC/Sensor that will be assigned to Scale.1
   (0-3 are used to represent 1-4, ie 0=1, 1=2, 2=3, 3=4).
6. Press F1 to store the number. Sc id displays.
7. Press F1. The scale ID must match the ID of the LC/Sensor being connected to.
8. Press F1 to store the number. Sn. id displays.
9. Press F1, The sensor number is used to select a LC connect to the Scale being addressed in L ISt id.
10. Press F1 to store the number. L ISt id displays.
11. Press → 0 (ZERO) twice to exit to the weighing mode.

The sum will now reflect the total of all LC/Sensors specified.

6.6 Zero and Tare in Multiple Load Cell Systems

The channel that is displayed is considered the ***Focus Channel***. Pressing 

or 

will only affect the displayed channel. When displaying summed channels, **ZERO** or **TARE** commands will be sent to all devices that contribute to the displayed weight.

Example:

*If in the **Both** modes, and displaying pair 1 (sum of SC0 and SC1), pressing **ZERO** will zero only SC0 and SC1.*

*If displaying the grand total using the **ALL** mode, then pressing **ZERO** will zero all connected sensors.*

Using the Tare function:

If one device is tared in the individual display mode, the summed weight will be the sum of a Net and a Gross weight.

*If **TARE** is pressed when displaying any of the summed modes, all devices that add to the current display are tared and placed in **Net** mode.*

6.7 Communications Port Hardware

The *MSI-8000 RF Remote Display* RS-232 communication port is used for software updates, connecting to a remote display and for connecting to any RS-232 device.

Connector: M12 industrial IP67 rated. An adapter cable (PN 150964) is required to connect the *MSI-8000 RF Remote Display* to a computer. This adapter cable converts the 8000 connector to a standard D9 serial connector. The 503489 cable can be converted to DTE by using a Null Modem adapter.

Data Configuration: The data output is fixed at 8-1-N.

Baud Rate: Programmable for 300 to 230.4 k baud in 8 steps. The bootloader for updating software is always 38.4 k baud

Handshaking: No hardware handshaking is supported. Xon/Xoff software handshaking is always on.

This configuration plugged into a standard DTE connector disables Comm Port 2. Turn Comm Port 2 off using the Comm Port menu.

An unterminated cable is available (PN 143348) for wiring a connector to the M12 connector found on the *MSI-8000 RF Remote Display*.

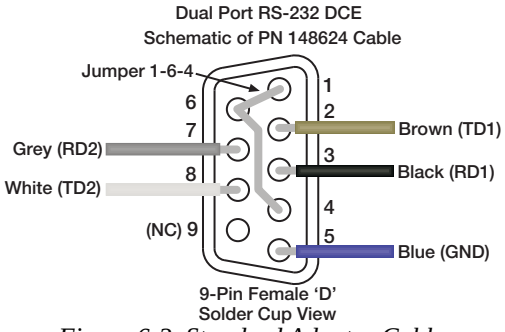


Figure 6-3. Standard Adapter Cable (PN 148624)

The following diagrams show how to wire standard D9 connectors to access Communications Port 1 or Communications Port 2.

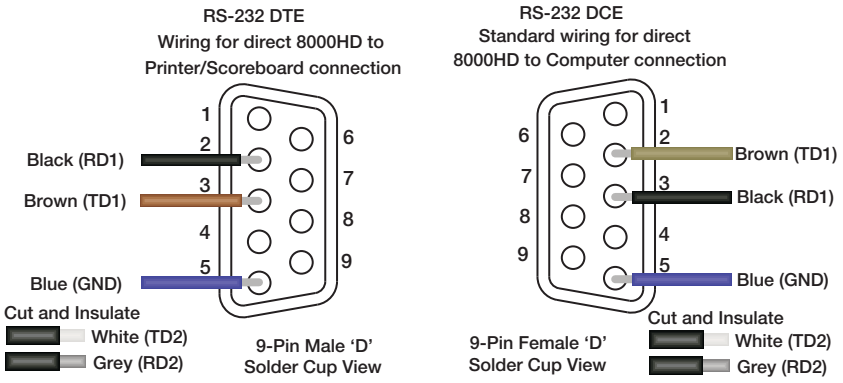


Figure 6-4. Communications Port 1 Wiring

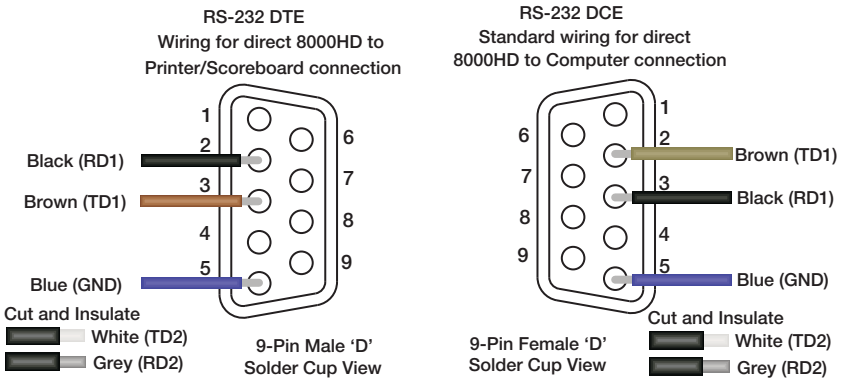


Figure 6-5. Communications Port 2 Wiring

Wiring the shield drain to the metal shell of the connector is recommended, however, in some circumstances it may be necessary to disconnect the shield drain wire at the connector frame to prevent ground loops which can cause unstable readings. In extreme cases it may be necessary to use an isolated RS-232 interface.

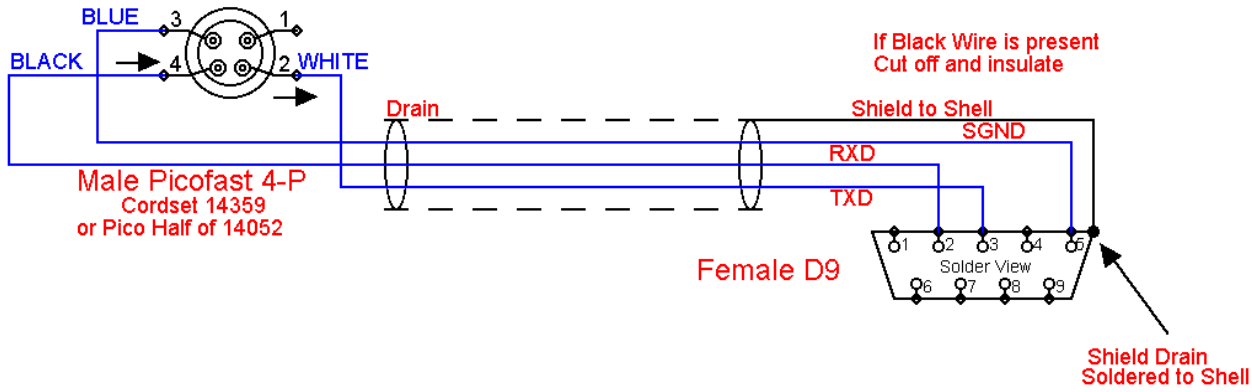


Figure 6-6. DCE Configuration for Computer Connection

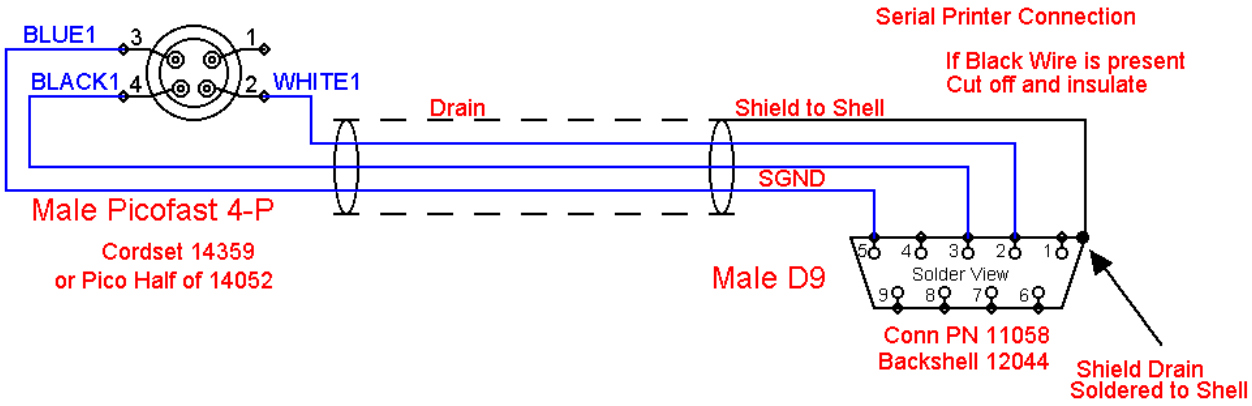


Figure 6-7. DTE Configuration for Direct Connection to a DCE Printer

6.8 Relays

The *MSI-8000* can be equipped with up to two relays for process control or safety systems.

Two independent relays are factory installed and are wired out to 4 pins on a M12 connector. The connecting cables are shown in the table below.

Part No.	Description
144440	PVC 4 m, rated to 250 VRMS, 4 A
	PVC 10 m, rated to 250 VRMS, 4 A
Alternately use a field wireable connector	
156256	Straight for cable 4-6 mm OD
	Right angle for 4-6 mm
	Straight for cable 6-8 mm OD
	Right angle 6-8 mm OD

Table 6-9. Relay Connector Cable Part Numbers

6.8.1 Relay Options

Relays are normally open (1 Form A). Specifications are listed below.

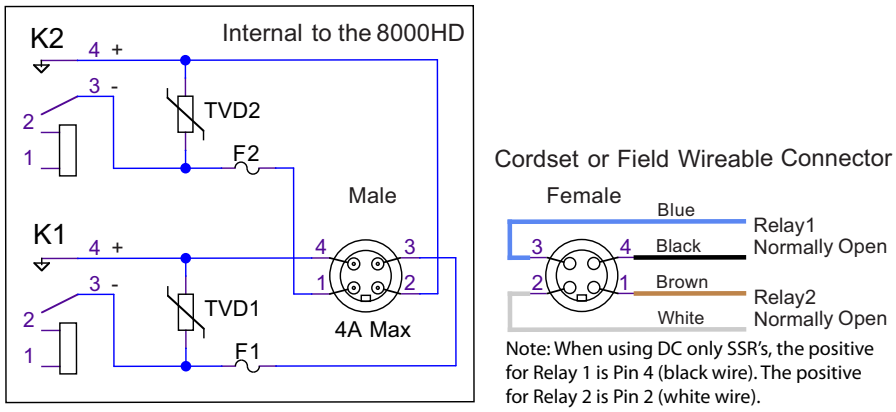
Relay Type	Description
AC/DC coil relay	• AC/DC Coil Relay: 144520 PA1a-5V. 4 A Fuse: 144307 • AC Rating: 250 VAC @ 4 A.(limited by connector/cordset rating to 4 A continuous) • DC Rating: 4 A @ 30 VDC, 0.4 A @ 100 VDC • Best choice for 90% of applications.
AC/DC SSR (solid state relay) - 60 V	• Better for battery powered units and mates well with 24VDC industrial power supplies • AC/DC SSR 60 VPK, 2.7 A: 13178 AQZ202D. 2 A Fuse: 144319
AC/DC SSR - 120 V	• For 115VAC operation when SSRs are preferred. • AC/DC SSR 200 VPK. 0.9 A: 13180 AQZ207D. 0.75 A Fuse: 155221
Other available relays	• AC/DC SSR 100 VPK, 2 A: 13179 AQZ205D. 1.5 A Fuse: 155220 • AC/DC SSR 400 VPK, 0.45 A: 13181 AQZ204D. 0.375 A Fuse: 155222 (Use limited to 250 VRMS due to connector and Cordset limitations) • DC Only SSRs • DC SSR 60 VPK, 4 A: 13182 AQZ102D. 3 A Fuse: 155223 • DC SSR 200 VPK, 1.3 A: 14566 AQZ107D. 1 A Fuse: 160448 Note ***Normally open relays (1 Form A) can be made to function as normally closed (1 Form B) by programming the setpoint as a less than type. If the MSI-8000 is turned off or loses power, they will open.***
One 1 Form B closed SSR	• AC/DC SSR 400 VPK, 0.5 A: 14628 AQZ404. 0.5 A Fuse 144583 (Use limited to 250 VRMS due to connector and Cordset limitations). Requires a minor modification on the Relay board and can only be ordered by contacting Rice Lake Weighing Systems. 

Table 6-10. Relay Options

6.9 FCC Statement

Contains FCC ID: OUR-XBEEPRO

The *MSI-8000* complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

6.10 International RF Certifications

Canada Radio Certificate Number: IC 4214A-XBEEPRO
Australia & New Zealand: AS4268:3000
Japan: Certificate of Radio Equipment in Japan Number: 08215111/AA/02
Europe and much of **Asia**:

The product is compliant with the following standards and/or other normative documents:

Safety (article 3.1A) EN60950-1:2001

EMC (article 3.1b) ETSI EN 301 489-1 v1.7.1 (2007-04) In accordance with the specific requirements of ETSI EN 301 489-17 v1.2.1 (2002-08)

Spectrum (article 3.2) ETSI EN 300 328 v1.7.1 (2006-10)

6.11 Antenna Options

Note *To meet FCC licensing rules, use only antennas supplied or recommended by Rice Lake Weighing Systems.*

Antenna placement is critical to problem-free use of the system.

- Ensure a relatively clear transmission path exists between the devices to be connected. Radio signals travel primarily by line of sight (LOS), obstructions between stations may degrade the system performance.
- When using the long range antenna, mount the antenna on an elevated structure to ensure that you have a clear LOS transmission path. This will ensure the antenna will clear surrounding obstructions. Do not provide a ground plane for the antenna.
- Fixed station locations often benefit from directional antennas when the location of the other components of the RF network are fixed and/or in the same direction. Never use a directional antenna on a mobile system.
- If using the standard antenna, ensure the antenna is not blocked by any metal. Transmission is good through most kinds of glass so mounting a meter next to a window will work fine. If there is no clear line of sight place to mount the receiving device, consider switching to the long range antenna so the antenna can be set up remotely.
- The standard and long range antennas are vertical plane devices. They should be vertical, pointing up or down, when high off the ground (like the underside of a large bridge crane). Do not mount them sideways. The long range 9 dBi antenna is particularly sensitive to off axis mounting. Use a level to ensure the antenna is exactly 90° perpendicular to the earth.
- Do not mount an omni-directional antenna next to metallic or concrete surfaces. This can result in reflections and undesired RF characteristics. Use a corner reflector instead.
- After installation, seal the antenna connection with an adhesive heat shrink boot. Failure to seal the antenna may result in liquid destroying the antenna and device it's connected to.

Note *Rice Lake Weighing Systems does not recommend extending the coaxial cable beyond three meters. At 2.4 GHz more loss will result from coax losses than are gained by raising the antenna. If the antenna must be extended, use a very low loss 50 ohm coax such as RG-214, RF-195, or other low loss varieties.*

For very short extensions (<1m), cables made with RG-316 are suitable.

FCC STATEMENT

FCC ID: HSW-2450M

Note: This unit has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense.

6.11.1 Antennas Available for a MSI-8000HD

Standard Antenna

The standard antenna is an articulated 1/2 wave 2 dBi gain design with a standard TNC connector that mounts directly on the 8000HD enclosure.

This antenna and coax connector, though resistant to water, is not water-proof. Seal the TNC base with an adhesive heat shrink boot if this antenna might be exposed to rain.

This antenna should be vertically oriented and is suitable for most short to medium range applications.

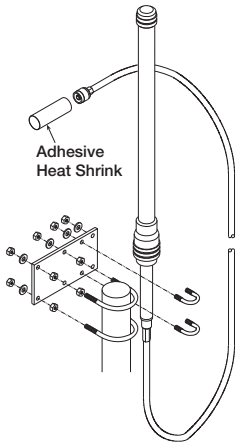
Long Range OMNI 9 dBi Antenna

This omni-directional high gain antenna is remotely mounted from the 8000HD with a low loss coaxial cable. It increases the range up to four times.

The antenna must be vertically mounted. The vertical Beamwidth (-3dB point) is 14 degrees.

This antenna is supplied with a 10 foot (3m) coax cable pre-attached. The 10-foot cable allows placement of the antenna above the unit for ease of clearing possible obstacles to data transmission.

It is also available with an N connector for applications requiring longer coax cable lengths.



Vehicle Mount Whip Antenna

The vehicle mount whip antenna mounts directly to the roof of mobile vehicles and is weatherproof.

This 5 dBi gain whip mounts in a 3/4" hole on the roof of mobile vehicles.

The mount includes 17' of low loss coax terminated in a TNC connector.

YAGI Antenna

For maximum range, a 14 dBi gain Yagi Antenna is available by special order. Please contact Rice Lake Weighing Systems for details.

Corner Reflector Antenna

Corner reflector antennas are often the best choice for a wall mounted antenna. Rice Lake Weighing Systems offers a 14 dBi and a 9 dBi corner reflector.

14 dBi Corner Reflector

9 dBi Corner Reflector

Patch Antenna

The patch antenna is for applications where the standard antenna is vulnerable to physical use or outdoor applications.

The patch antenna is mildly directional which requires more care in antenna placement for long range applications. Patch antennas are available by special order only. Please contact Rice Lake Weighing Systems for details.

7.0 Troubleshooting and Maintenance

7.1 Troubleshooting

Problem	Possible Cause	Solution
The display is blank when the power button is pressed	Discharged battery	Recharge the battery
	Defective battery	Replace the battery (factory replacement only)
	Defective switch or circuit board	Requires authorized service
The display does not function properly/ Front panel buttons do not function normally/ scale/Dyna-Link will not turn off.	Improperly loaded software	Reinstall the software
	Faulty circuit board	Requires authorized service
	Loose connectors	Requires authorized service
Scale/Dyna-Link does not respond to tension changes	Out of calibration	Calibrate the unit
	Faulty load cell	Replace the load cell
	Load cell connector	Check connectors and wires
The display over ranges below 100% of capacity	Tared tension is added to load to determine overload point	Return to gross tension mode
	Zero requires adjustment	Rezero the scale
	Too much tension/load has been zeroed	Rezero the scale
The display drifts	AZM (Auto 0) is turned off	Turn AZM on
	Rapid temperature changes such as moving the scale from indoors to outdoors	Wait until the scale temperature has stabilized
The displayed tension shows a large error	Scale not zeroed before load is lifted	Zero the scale with no load attached
	lb/kg units causing confusion	Select proper units
	Requires recalibration	Recalibrate the unit
The display reading is not stable	Excessive vibration	Increase filtering or increase ***d*** in Cal
	Excessive side loading	Improve load train symmetry
	Load cell faulty	Check load cell connections
The display toggles between ***Error*** and ***Load***	Load exceeds capacity	Reduce tension immediately
	Faulty load cell or wiring	Check load cell and load cell wiring
The display toggles between ***Error*** and ***Button***	A key is stuck or is being held down	Check switches for damage
Weight is on the scale/Dyna-Link and RF Remote Display does not match	Units are not paired	See setting the RF Network address procedures
Lo Batt is blinking	The battery is low	Recharge the battery
The unit turns on, then immediately off	The battery is low	Recharge the battery
The load will not zero	The system not stable	Wait for stable symbol ◣ ◢ to turn on
		Increase filtering for more stability
	Zero out of range	Zero range might be limited. Reduce the tension or use Tare instead
The load will not tare or total	The system not stable	Wait for the stable symbol ◣ ◢ to turn on, or if in a mechanically noisy crane, increase the filtering or reduce the size of the scale increment d. It is also possible to increase the motion window. Contact Rice Lake Weighing Systems if there is a problem getting the MSI-8000HD to zero, tare or total due to stability issues
Setpoint lights blink	Set point is enabled and the trigger point has been reached	Disable set points if they are not needed

Table 7-1. Troubleshooting

Problem	Possible Cause	Solution
The manual total does not work	A function key is not set to ***total***	Set up Func1 or Func2 for ***total***
	Tension must be stable	Increase filtering for more stability
The auto total does not work	Load must be stable	Wait for stable symbol ◣ ◢ to turn on or increase filtering for more stability
	Load thresholds are not reached	Weight must exceed one percent of capacity for autototal to work. Weight must drop below 0.5% of capacity for additional weighments to register

Table 7-1. Troubleshooting (Continued)

7.2 Error Codes

The ScaleCore Processor that is the heart of the *MSI-8000 RF Remote Display* detects errors and generates error codes to aid in troubleshooting.

Error Code	Definition	Comment
LcOFF	LC Disabled	A Load cell was not enabled
2CAL	In Cal	The system is in calibration mode. Do not send commands unrelated to calibration
UnCAL	Not Calibrated	System has not been calibrated
Error ↔ LoAd	Overload	Tension/Weight exceeds Set capacity +9d, or load cell is damaged or disconnected.
Error ↔ UndLd	Underloaded	Tension/weight is more than 20% negative, or load cell is damaged or disconnected.

Table 7-2. Error Codes

7.3 Service Counters

WARNING ***Only a Rice Lake Weighing Systems factory representative can reset the service counters, as these are an important safety warning feature. A thorough load train inspection is necessary to ensure product safety.***

All Rice Lake RF linked scales/Dyna-Link 2 maintain two service counters for safety.

- The first counter (LFCnt) counts lifts above 25% of capacity.
- The second counter (OLCnt) counts the number of times the RF linked scale has been overloaded.

These counters warn the user to inspect the load train after a number of overloads or a long term frequency of high capacity lifts. Power up will be interrupted when the lift counter exceeds 16383 lifts or the overload counter exceeds 1023 overloads. Inspect the load train, then push any key to continue operation.

This feature is only available on *MSI-8000* Software release 2.00 and above. Service counters are available on the Scale/Dyna-Link front panel test function.

7.3.1 Access the Service Counters

Use the following steps to access the service counters.

1. Program an **F-key** to tESt. See Section 4.2 on page 9.
2. Press **Fx-Test** and then immediately press **F1** again. The following items display:
   - LFCnt will display briefly, followed by the number of lifts.
   - OLCnt displays briefly, followed by the number of times the weight has exceeded capacity.
   - C-CAL and its value is displayed.
   - The unit returns to the weighing mode.

Note ***F1 must be pressed, if the Test function is set to F1, it will need to be pressed twice.***

Reference the Crane Scale Safety and Periodic Maintenance Manual, PN 153105, for proper loading techniques to improve the safety and longevity of the crane scale or Dyna-Link. This publication is available at www.ricelake.com and is included on the CD shipped with the *MSI-8000*.

7.4 Mechanical Dimensions

Figure 7-1. Mechanical Dimensions

7.5 Firmware Update Procedure

Updating firmware in the *MSI-8000 RF Remote Display* requires the following: a DCE serial cable (MSI 503489-0001, or build per DCE cable schematic on page 28), a PC with a terminal program (“Teraterm Pro” recommended), and if the PC does not have standard RS-232 serial ports, then a USB to serial converter. Make sure the driver for the USB converter is properly installed, and that the Terminal program is set up for the proper comm port.

The latest firmware code is available from the MSI Service Department and can be emailed on request. Your firmware version is displayed when the *MSI-8000 RF Remote Display* is turned on in form “01-04” (your version will vary). *MSI-8000 RF Remote Display* firmware updates do not require a recalibration of the connected scale. Consult the version release notes for information regarding the updated code.

3. Setup the terminal serial port to 8 data bits, No Parity, 1 stop bit, 9600 BAUD, XON/XOFF (flow control).
4. Connect to the Dyna-Link serial port using the DCE cable. Connect the D9 connector to your PC or USB adapter.
5. (Optional) Test that you have a connection by typing {00FF01?}. If the connection is good the *MSI-8000 RF Remote Display* will respond with {000001r2;0;01E02;2011-07-08;11:05} or something similar.
6. On the terminal keyboard, type {**ffff09=0199**}
7. Change the terminal serial port to 38400 BAUD. Hit the ‘r’ key to refresh the display. The following menu

should appear

MSI-8000 RF Remote Display SCALECORE2 BOOT LOADER Ver. 00-05 (c) 2012-05-02 10:55

(u) Download and program application code
(your bootloader version may vary)
(q) query app code info
(g) execute app code
(r) refresh

Your bootloader version may vary

8. Type **u**

Terminal should display:

Send File NOW, or press ^ to abort:

9. Send the .prg file using the file send feature of your terminal program. The character "#" will tick away as the ScaleCore programs.

Send File NOW, or press ^to abort:####################################
##
##
##
Completed

10. After file is received terminal should display "Completed." Then the boot menu appears again.

MSI-8000 SCALECORE2 BOOT LOADER Ver. 00-05 (c) 2012-05-02 17:06

(u) Download and program application code
(your bootloader version may vary)
(q) query app code info
(g) execute app code
(r) refresh

11. Optional step: send **q** to check the program. The ScaleCore will respond with a message that details the 32b checksum, the product ID and version, and the Application Code version number in the following form:

Computed Signature 76F481D8 ——— *32b CRC must match (76F481D8 is an example only)*
Received Signature 76F481D8
Product ID 07 *MSI-8000 product family*
Product Version ID 00 *Optional features code*
App Code Version 01-04 *Firmware version number*

If the CRC Signature does not match, go back to step 4 and try again.

12. Send an "**r**" to restore the boot menu.

MSI-8000 SCALECORE2 BOOT LOADER Ver. 00-05 (c) 2012-05-02 10:55

(u) Download and program application code
(your bootloader version may vary)
(q) query app code info
(g) execute app code
(r) refresh

13. Send a "**g**." The *MSI-8000 RF Remote Display* should start.

7.6 Reset the Remote Control

Resetting the unit will change all settings back to the default factory settings.

1. Press the calibration switch and 

simultaneously. SUrEP displays.
2. Press 

to reset the current indicator settings to the default factory settings. CAL will display.
3. An initial calibration will need to be performed on the current load cell. See Section 5.1 on page 17.

Important *Pressing* 

will reset only the current load cell calibration settings. See Section 5.3 on page 20.

Note *Press the* 

to cancel reset and return to the previous menu.

8.0 Specifications

Power	Battery operated by a custom Lithium Polymer cell. Not user replaceable. Estimated number of charges is >300. Life is prolonged with frequent recharging and not allowing deep discharging of the battery.
Display	6 large, 1'' (26 mm) numeric digits
Operating Temp	- 40°F to +122°F (-40°C to +50°C), Rated accuracy range -10°C to +40°C.
Operating Time	>24 hours typical.
Enclosure	NEMA Type 4/IP65 with charger port plug installed.
Calibration	No Calibration parameters are stored in the *MSI-8000 RF Remote Display*. However, it can be used to calibrate an RF connected scale
Auto-Off Mode	Prolongs battery life by turning the power off after 15, 30, 45, or 60 minutes (operator determined) of no weight activity
Units	kg, lb., Tons (US short ton), Metric Tons, kiloNewtons (other Units available with custom calibrations). Available units are determined by the RF Linked Scale/Dyna-Link
Totalization	Standard: Press button or Automatic; TOTAL weight up to 999999 X 1000 units
Set Points	Two internal Set Points with open drain outputs, and two ultrabright LEDs on indicator panel.

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September 19, 2016 *PN 133063 Rev E*