

MSI-7300

Dyna-Link 2 Tension Dynamometer

Operator's Manual



MSI
Measurement Systems
International™

A RICE LAKE WEIGHING SYSTEMS COMPANY

PN 152160 Rev C

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1.0 Introduction

The *MSI-7300 Dyna-Link 2* is a combination of the sound and proven mechanical design of the industry standard Dyna-Link with today's most advanced electronics to provide a superb feature set unmatched by any dynamometer in its class or price range.

The *Dyna-Link 2* is versatile, reliable, accurate, and easy to operate. The multi-purpose tension dynamometer is ideal for situations in which headroom is at a minimum. It is designed with safety factors exceeding the industry standard and is fully sealed for outdoor use in any weather.

A remote display option is available to further enhance the safety and usability. The optional RF remote display allows tension monitoring from a distance and adds the ability to print and store data.

If you have any questions or comments, please contact

MSI Scales

Phone (toll free): 1-800-874-4320



Authorized distributors and their employees can view or download this manual from the MSI Scales distributor site at: www.msiscales.com.

1.1 Safety

Safety Symbol Definitions:



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



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 you have read and understand the instructions and warnings in this manual. Contact any Measurement Systems International dealer for replacement manuals. Proper care is your responsibility.



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 than 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 the dynamometer 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 dynamometer, rigging elements, or the lifting structure.

DO NOT allow multi-point contact with the shackles of the dynamometer unit.

DO NOT allow high torque on the dynamometer unless it is specifically designed for high torque.

DO NOT make alterations or modifications to the dynamometer or the shackles.

DO NOT use improperly rated or sized shackles. Use only MSI recommended shackles.

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.msiscscales.com).

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

There are no user serviceable parts within the Dyna-Link 2. Any repairs are to be performed by qualified service personnel only.

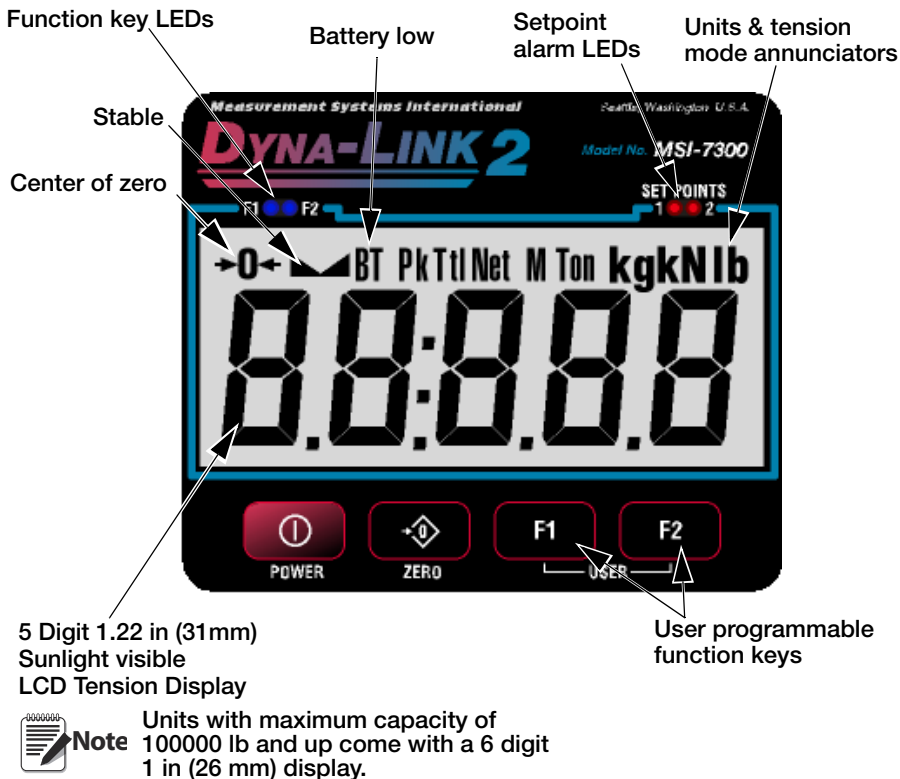





Figure 1-1. MSI-7300 Front Panel

1.2 Key Descriptions

 <p>POWER</p>	<p>Power Key - Turns the <i>Dyna-Link 2</i> on and off. Used as cancel or last menu in the menu mode.</p>
 <p>ZERO</p>	<p>Zero Key - Used to zero out residual tension on the link. Used as enter or save in the menu mode</p>
	<p>Common uses are units change or peak hold for dynamic testing.</p> <p>F1 - Programmable to user selectable functions, see Section 3.0. Default – peak hold. Functions as the ENTER/SELECT key in the menu mode.</p> <p>F2 - Programmable to user selectable functions, see Section 3.0. Default – display & function test. Functions as the scroll key in the menu mode.</p>

1.3 General Information

1. If the text is discussing a function key, the function key will be displayed as **Fx-YYYYY** with the programmed user key function in italics. F1 and F2 can both be programmed to all available user functions.
2. If a function key does not work, it is probably because the *Dyna-Link 2* is not setup to support the key. For example, if the Function key is set for TOTAL, you must also setup the TOTAL mode in the setup menu.
3. When in setup menus, the **ZERO** key drops back one menu level. At the root menu level, the **ZERO** key stores the changes and returns to the tension mode.
4. When in setup menus, the **POWER** key returns you directly to the tension display without storing the changes.



Figure 1-2. Dyna-Link 2

1.4 MSI-7300 Annunciators

The *Dyna-Link 2* uses LCD annunciators to indicate tension mode and other information.





	Stable – indicates the tension force has settled within the motion window (usually $\pm 1d$). When standstill is off, the link will not zero, tare, or totalize.
	Center-of-Zero – Indicates the tension is within 1/4 d of zero.
BT	Low Battery – Appears when approximately 10% of battery life remains. The BT symbol blinks when automatic shutdown is imminent.
Pk	PEAK- Indicates peak hold mode.
Ttl	TOTAL – Indicates the unit is displaying the total accumulated weight. This is a temporary display lasting less than five seconds.
Net	NET – Indicates the unit is in the net tension mode. A tare weight is subtracted from the gross tension.
M	Metric Ton – In conjunction with the ton annunciator, indicates the unit is displaying metric tons. When used with the total display, it is used for X1000 to allow accumulation of weight beyond the five digit display capacity. It is also used with the service counters when the number of lifts exceeds five digits.
kg	kg – Indicates tension display is in kilograms.
kN	kN – Indicates the tension display is in kilonewtons.
lb	lb – Indicates tension display is in pounds.
Ton	Ton – Illuminated alone, indicates the unit is displaying in US short tons (1 ton = 2000 lb). When illuminated along with the 'M' the unit is displaying in metric tons (1 metric ton = 1000 kg)
	SETPOINTS – User programmable setpoints for early overload warnings. Setpoints 1 and 2 are high brightness red LEDs
	F1 F2 – These blue LEDs are used to indicate various operational features of functions programmed into the F1 and F2 keys. Example: In peak hold mode the associated LED will blink whenever a new peak reading is captured.

Figure 1-3. MSI7300 Annunciators

1.5 Specifications

Accuracy	Rated accuracy: $\pm 0.1\%$ of capacity. Typical accuracy $\pm(0.1\%+1d)$ of reading. 'd' equals one displayable increment.
Resolution	Standard displayed resolution: 2000-2500 'd' . Hi-Res mode increases resolution to 5000-6250 'd'. Internal A/D resolution: 24 bits.
Overload	Safe link mechanical overload, 200% of capacity. Ultimate link overload, >500% of capacity. Typical ultimate overload is 700% or greater. Note that the Dyna-Link is designed to have a greater safety factor than the connecting shackles which have a typical ultimate safety factor of 600%
Power	Battery operated, see Table 1-2 for battery size and quantity per unit. Alkaline cells can be replaced with rechargeable NiMH cells.
Display	Five digit, 1.22 in (31 mm) numeric digits. Six digit, 1 in (26 mm) on 100000 lb units and higher
Operating Temp	- 40°F to +122°F (-40°C to +50°C), Rated accuracy range -10°C to +40°C.
Operating Time	>150 hours typical (Alkaline C cells) / >300 hours typical (Alkaline D cells).
Load Cell & Enclosure	NEMA Type 4/IP65 anodized aluminum, 2024-T351 Aircraft Quality.
Load Cell	2000 Ω Bridge
F1 and F2	Programmable multifunction buttons for use as TEST, TOTAL, UNIT, PEAK, TARE, NET/GROSS, VIEW TOTAL, PRINT AND High Res mode.
Calibration	Fully digital calibration from the front panel or through a computer interface.
Auto Zero Maintenance	Standard, can be disabled internally.
Auto-Off Mode	Prolongs battery life by turning the power off after 15, 30, 45, or 60 minutes (operator determined) of no Dyna-Link activity.
Units	kg, lb, Tons (US short ton), Metric Tons, kilonewtons (other Units available with custom calibrations).
Filtering	Selectable - OFF, Low (LO), Medium (HI-1), High (HI-2).
Totalization	Standard - Press button or automatic; TOTAL weight up to 99999 X1000 units
Peak	Uses unfiltered faster reading of A/D, (>220 readings per second).
Setpoints	Two internal standard setpoints and two ultrabright LEDs on indicator panel
Service Counter	Two independent 16 bit registers; register 1 updated each time the force exceeds 25% of capacity; register 2 updated each time the force exceeds overload; when register 1 exceeds 16383 or register 2 exceeds 1023, display reads "LCnt" for load cell counter; test function shows the two readings in order.

Table 1-1. MSI-7300 Specifications



The MSI-7300 has a safe mechanical overload of 200% of capacity. Overloads greater than 200% may result in physical damage to the link. The ultimate overload is rated to 500%-700% of capacity (see Table 1-2). At ultimate overload, structural failure and dropped loads may occur. Dropped loads may cause serious personal injury or death.

1.5.1 Standard Capacities and Resolution



Note Short ton and metric ton resolutions are the same.

Capacity	Std 'd'	Std Counts	HiRes 'd'	HiRes Counts	Ultimate Overload	Config
1000 lb 500 kg 0.5 Ton 4.9 kN	0.5 lb 0.2 kg 0.0002 T 0.002 kN	2000 2500 2500 2450	0.2 lb 0.1 kg 0.0001 T 0.001 kN	5000 5000 5000 4900	>>700%	Alum 2 C-Cells
2500 lb 1250 kg 1.25 ton 12.25 kN	1 lb 0.5 kg 0.0005 T 0.005 kN	2500 2500 2500 2450	0.5 lb 0.2 kg 0.0002 T 0.002 kN	5000 6250 5000 4900	700%	Alum 2 C-Cells
5000 lb 2500 kg 2.5 Ton 24.5 kN	2 lb 1 kg 0.001 T 0.01 kN	2500 2500 2500 2450	1 lb 0.5 kg 0.0005 T 0.005 kN	5000 5000 5000 4900	700%	Alum 2 C-Cells
10000 lb 5000 kg 5.0 Ton 4.9 kN	5 lb 2 kg 0.002 T 0.02 kN	2000 2500 2500 2450	2 lb 1 kg 0.001 T 0.01 kN	5000 5000 5000 4900	700%	Alum 2 C-Cells
25000 lb 12500 kg 12.5 Ton 122.5 kN	10 lb 5 kg 0.005 T 0.05 kN	2500 2500 2500 2450	5 lb 2 kg 0.002 T 0.02 kN	5000 6250 6250 6125	700%	Alum 2 D-Cells
50000 lb 25000 kg 25 Ton 245 kN	20 lb 10 kg 0.01 T 0.1 kN	2500 2500 2500 2450	10 lb 5 kg .005 T 0.05 kN	5000 5000 5000 4900	600%	Alum 2 D-Cells
100000 lb 50000 kg 50 Ton 490 kN	50 lb 20 kg 0.02 T 0.2 kN	2000 2500 2500 2450	20 lb 10 kg 0.01 T 0.1 kN	5000 5000 5000 4900	550%	Alum 2 D-Cells
120000 lb 60000 kg 60 Ton 588 kN	50 lb 20 kg 0.02 T 0.2 kN	2400 3000 3000 2940	20 lb 10 kg 0.01 T 0.1 kN	6000 6000 6000 5880	500%	Steel 2 D-Cells
180000 lb 90000 kg 90 Ton 882 kN	100 lb 50 kg 0.05 T 0.5 kN	1800 1800 1800 1764	50 lb 20 kg 0.02 T 0.2 kN	3600 3600 4500 4410	500%	Steel 2 D-Cells
260000 lb 130000 kg 130 Ton 1275 kN	100 lb 50 kg 0.05 T 0.5 kN	2600 2600 2600 2550	50 lb 20 kg 0.02 T 0.2 kN	5200 6500 6500 6375	500%	Steel 2 D-Cells
380000 lb 190000 kg 190 Ton 1863 kN	200 lb 100 kg 0.1 T 1 kN	1900 1900 1900 1863	100 lb 50 kg 0.05 T 0.5 kN	3800 3800 3800 3726	500%	Steel 2 D-Cells
550000 lb 225000 kg 225 Ton 2206 kN	200 lb 100 kg 0.1 T 1 kN	2750 2250 2500 2206	100 lb 50 kg 0.05 T 0.5 kN	5500 4500 5000 4412	440%	Steel 3 D-Cells

Table 1-2. Standard Capacities and Resolutions

1.6 Features

- Designed to meet or exceed all U.S. and International safety and environmental standards.
- Greater than 150 hours operation with two standard Alkaline ‘C’ cells. Greater than 300 hours with two standard Alkaline ‘D’ Cells (25000 lb/12500 kg capacities and above). Also works with off the shelf NiMH rechargeable cells.
- Automatic power off conserves battery life by sensing no activity after 15,30,45 or 60 minutes, determined by operator, and turns power off.
- Rugged construction throughout. IP65/NEMA Type 4 for outdoor use.
- Designed for use with USA made Crosby shackles (optional).
- Shackle holes reinforced with steel sleeves (25000 lb/12500 kg capacities and above) to reduce wear.
- Shackle stops ensure ease of mounting. The stops prevent the shackles from falling to the side of the unit and are held in position for easy rigging.
- MSI’s ScaleCore technology provides precision, high resolution (2500 division standard and up to 10,000 possible) 24 bit A/D conversion coupled with an advanced RISC microcontroller.
- Five large, 1.22 inch (31 mm) LCD digits for clear tension readings from a distance. Six digits, i in (26 mm) on units 100,000 lb and over.
- Easy to maintain: Full digital calibration assures reliable, repeatable measurements. Can be calibrated without test weights using MSI C-Cal technology.
- Selectable kg/lb/tons (US Short)/metric tons/kilonewtons.
- Automatic or manual weight totalization for loading operations.
- Easily customized for special applications.
- Hi speed PEAK mode for stress and drop test analysis.
- Two setpoints can be set for any in-range tension/weight value for operator alerts or process control. Optional audible alarm output.
- ScaleCore technology provides quick and easy firmware updates and calibration/setup backup.
- Two Service counters ensure load train safety by warning the user to perform safety checks when the lift count gets high or the Dyna-Link has been overloaded repeatedly. Counter 1 (LFCnt) records the number of lifts above 25% of capacity. Counter 2 (OLCnt) records the number of times the Dyna-Link overloads.

1.7 Options

Options which you may have ordered with your Dyna-Link 2 may include the following:

- Audible alarm (triggered by setpoint 1)
- Top and bottom shackles
- Portable carry case
- Serial I/O cable (RS-232)
- RF remote display (will also operate hard-wired). See RF remote display for ScaleCore user guide.
- Hardwired cable for remote display.
- RF remote modem, RS-232, for direct connection to computers, scoreboards, or serial printers. See RF modem for ScaleCore user guide.
- RF remote modem, USB, for direct connection to computers. See RF modem for ScaleCore user guide.
- RF remote gateway for direct connection to an Ethernet LAN and for use with MSI's SCCMP program. See RF modem for ScaleCore user guide.
- RF or hardwired scoreboard display.

1.8 Unpacking

When unpacking the *Dyna-Link 2* from the shipping container, ensure that all assembly parts are accounted for.

Check for any visible damage and immediately report any damage to your shipper.

Retain the original shipping container for future shipping or transporting.

1.9 Assembly

1. Identify and locate the following:
 - Batteries, two 'C' cells or 'D' cells depending on capacity
 - Top shackle and pin (option or customer supplied)
 - Bottom shackle and pin (option or customer supplied)
 - Two cotter pins
2. Slide top shackle over load cell and insert the pin.
3. Screw the shackle nut onto the pin.



Note *It is not necessary or desirable to tighten the nut too tight. Make sure the nut is down far enough to expose the cotter pin hole.*

4. Lock the shackle pin in place with the supplied cotter pin. Bend the cotter pin.
5. Repeat steps 1-3 for the bottom shackle.
6. Remove the battery access port cover with a coin or a large screwdriver.
7. Insert the two batteries, positive end first, into the battery shaft.
8. Reinstall the battery access port cover. The *Dyna-Link 2* is now ready for use.



Note *The Dyna-Link2 will automatically start when the batteries are installed.*



WARNING *The Dyna-Link 2 load train will be unsafe for use if the shackle pins are not properly secured with cotter pins.*

1.10 Battery Replacement

Disposable Batteries

The BT annunciator will display when the is battery is beginning to get low. When the BT annunciator starts to blink, the batteries are close to being completely drained. For maximum life, use the batteries until the system shuts off.

Rechargeable Batteries

When using Nickle-Metal-Hydride (NiMH) Cells, it is recommended that the cells are recharged immediately after the BT annunciator starts to blink. Do not allow the batteries to discharge completely, it may compromise the recharge life of the battery.

NiMH Cells in C and D sizes have a lower capacity then the Alkaline C and D sizes. MSI recommends having two sets of NiMH batteries, so one set can be charging while the other is in use.



Note *NiMH 'D' cells are often repackaged 'C' cells so you don't get an increase in battery life for Dyna-Links large enough for 'D' cells.*

The use of NiCad batteries is not recommended.

If the *Dyna-Link 2* will not be used for an extended period, the batteries should be removed. A small current is used when powered off which will discharge the batteries in about six months.

2.0 Operation

2.1 Power

To turn on the Power

1. Press  .

- The LCD will show all segments for a display test.
- The software version number will display.


The *Dyna-Link 2* is ready for use.

2.2 Zero

Takes out small deviations in zero when the *Dyna-Link 2* is unloaded. See Section 3.6 for zeroing (Taring) package or pallet weights.



Note *The tension reading must be stable within the motion window for the zero function to work.*

1. Press  . The display reads 0 (or 0.0 or 0.00, etc).



Note *The backup memory stores the zero reading, and can restore it even if power fails.*

Zero - Rules for Use:

- Works in **GROSS** mode or **NET** mode. Zeroing while in **NET** mode will zero the gross tension causing the display to show the negative tare value.
- The unit must be stable within the motion window, it will not zero until the stable annunciator is on.
- The unit will “remember” that it has a zero request for two seconds. If motion clears in that time, it will zero.
- The unit will accept a zero setting over the full range of the Dyna-Link. Zero settings above 4% of full Dyna-Link will subtract from the overall capacity. For example, if you zero out 100 lb on a 1000 lb Dyna-Link, the overall capacity will reduce to 900 lb plus the allowed over-range amount.

3.0 User Key Functions (F1 and F2)

There are optional functions that can be programmed for the function keys (F1 and F2) on the front panel, as well as on the RF remote display. See Section 4.2 for setup instructions.



Note *The functions PRINT (F3), and TARE are available full time on the RF remote display.*

3.1 OFF

No **USER** key function assigned. The F-Key is disabled.

3.2 TEST

The **TEST** function provides an LCD test that lights all LCD segments and the LED at once and then counts from 00000 to 99999. Other internal tests are performed and if any test fails, an error code will display. See Section 7.2 for a description of all error codes.

3.3 TOTAL



Note *The Total Mode must be programmed from the setup menus before the **USER** key will function. See Section 4.5.*

For accumulation of multiple weighments. The accumulator always uses the displayed weight, so GROSS and NET readings can be added into the same **TOTAL**.

There are four modes of totalizing: manual and three auto modes.

The manual mode requires the **TOTAL** key be pressed with the tension on the unit. The tension will then be added to the previously accumulated value. This assures that a weight on the scale is only added to the total once. Both the manual and three auto total modes require that the tension on the Dyna-Link 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 $\geq 1\%$ of full scale above GROSS ZERO or NET ZERO before it can be totaled.

3.3.1 MANUAL TOTAL

The **Fx-TOTAL** key under the MANUAL TOTAL mode functions in this manner:

1. With the tension at more than 1% of capacity, push the **Fx-TOTAL** key to add the current tension to the TOTAL weight. The **Fx** LED blinks to indicate the tension value was accepted. The TOTAL LCD annunciator and the total weight is displayed for about five seconds, then the number of samples is displayed for about two seconds.
2. Remove the weight, when the tension is less than 1% of capacity, place next load to be accumulated on the unit.
3. Repeat until all loads to be accumulated have been added to the total.
4. To view the total weight accumulated, push the **Fx-TOTAL** key with the tension at less than 1% of capacity (no weight on unit), the total weight will display for five seconds (view total) without changing the total value. The TOTAL LCD annunciator and the total weight is displayed for about five seconds and then the number of samples is displayed for about two seconds.

3.3.2 AUTO TOTAL

The **Fx-TOTAL** key under the AUTO TOTAL mode functions as auto total on/auto total off:

The auto mode has three variations which are programmed in the setup menu:

- **AutoLoad** – Any settled tension above the ‘rise above’ threshold will be automatically totaled. Then the Dyna-Link must fall below the ‘drop below’ threshold before another total is allowed.
- **AutoNorm** – This mode 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.
- **AutoHigh** – Similar to the AutoNorm mode except the scale uses the highest settled reading. Useful for loads that can’t be removed all at once.

3.4 Clear Total

The **Fx-VIEW TOTAL** key activates the total weight display followed by the number of samples. While the display is showing the total, total is cleared by pressing **ZERO**.

3.5 Net / Gross

Switches the display between net and gross modes. Net tension is defined as gross tension minus a tare weight.

To switch between net mode and gross mode:

1. Press the **Fx-NetGross** key (setup to the net/gross function).
2. The **Fx-NetGross** key will only function if a tare value has been established.
3. Switching back to gross mode from net mode will not clear the tare value. This allows the operator to use the gross mode temporarily without having to reestablish the tare value. Only clearing the tare or setting a new tare will change the tare value held before switching into gross mode.

3.6 TARE

In force measurement applications, tare is useful as a way to display differential force. By taring out a known force, only positive and negative deviations from the tared force are displayed. This can also increase accuracy as any initial error is removed leaving only slope error. In scale applications, tare is typically used to zero out a known weight such as rigging, a packing container, or pallet and display the load in **NET** tension/weight. To use tare, one of the two function keys must be configured to the **TARE** function. A tare value is entered by pressing the **Fx-TARE** key. The **TARE** function in the *Dyna-Link 2* is defined as a tare-in/tare-out operation. The first press of the **Fx-TARE** key stores the current tension/weight as a tare value and then the Dyna-Link subtracts the tare value from the gross tension and changes the display to **NET** mode. The next press of the **Fx-TARE** key will clear the tare value and revert the display to **GROSS** mode. The optional RF remote display has a **TARE** key permanently available.

3.6.1 To Tare and Display the Net Tension

1. Press **F1** (programmed as TARE).
2. The tension reading must be stable within the motion window for the tare function to work.
3. The digits display 0 and the tension mode changes to NET.
4. The backup memory in the *Dyna-Link 2* stores the tare reading, and can restore it even if power fails.

3.6.2 To Clear the Tare and Revert to Gross Tension

1. Press **F1** (programmed as TARE).
2. The NET annunciator will turn off.
3. Absence of the NET annunciator is the only indication that you are in GROSS tension mode.



Note *To view the GROSS tension without clearing the tare value, program the remaining function key to the function NET/GROSS.*

3.6.3 Tare- Rules for Use:

1. Only positive gross tension readings can be tared.
2. The stable annunciator must be on. The tension/force reading must be stable.
3. Setting or changing the tare has no effect on the gross zero setting.
4. Taring will reduce the apparent over range of the Dyna-Link. For example, taring 100 pounds of rigging on a 1000 lb Dyna-Link, the Dyna-Link will overload at a net tension of 900 lb (1000-100) plus any additional allowed overload (usually ~4% or 9d).
5. The Dyna-Link stores the tare value in non-volatile memory is restored when power is cycled.

3.7 PEAK HOLD

Peak hold will only update the display when a higher peak tension reading is established. The peak hold function uses a high speed mode of the A/D converter allowing it to capture transient tensions at a far higher rate than typical dynamometers.

Peak hold is cleared and re enabled with the Fx-Peak Hold key. When a new peak is detected, the Fx LED will flash three times. The accuracy of the system in peak hold mode is slightly reduced to .2% of capacity \pm 5d. The filter setting is turned off while in peak hold mode to ensure the fastest acquisition rate.

Example Peak Hold Application

The peak hold function is useful in materials and 'Fall' tests. Common tests for fiber rope include overall breaking strain (OBC), breaking force, and cycled breaking strain. The *Dyna-Link 2* combined with a force test stand, meets the speed and accuracy requirements to properly conduct these tests.

- 1) Program a function key to Peak Hold (P-Hld)

In this example we'll use F1 for Peak Hold.

- 2) Prepare the test stand and test sample.
- 3) Press **ZERO** to zero out any residual strain on the link.

- 4) Press **F1 PkHold**. Confirm that the "Pk" annunciator is on.

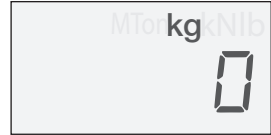
A small jump in the reading may occur depending on the stability of your test stand.

- 5) Apply the test force. The F1 LED will blink three times for every new peak it detects.
- 6) When the test force is removed, the Peak value can be recorded.
- 7) To run a new test, press **F1 PkHold** to clear the peak value. Confirm the "Pk" annunciator is off. Then repeat steps 3-6.

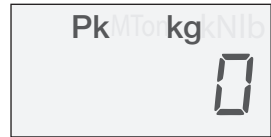
See Section 4.2 for Function Key setup



ZERO



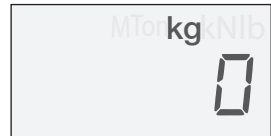
Peak Hold



Example Peak Captured Value



Peak Hold



Peak Cleared Value

Figure 3-1. Capture Peak Force

3.8 2-UNITS/ 5-UNITS

The **Fx-2.Unit** key will switch the force units between pounds force and kilograms force. Selecting the **Fx-5.Unit** setting will scroll through all available units: lb, kg, tons (U.S. short), metric tons, and kilonewtons.

3.9 HI-RES

Set a function key (**Fx**) to **Hi-Res**, see Section 4.0.

Press the **Fx** key programmed to display the high resolution mode (see Table 1-2 on page 8). The display will stay in high resolution mode until the selected **Fx** key is pressed again, or power is cycled. While in the hi-res mode the appropriate **Fx** LED will blink continuously at a slow rate.

Hi-res mode does not increase the accuracy, but allows for smaller weight increments to be displayed.

Use Tare or the **ZERO** key to zero out any initial error. Hi-res mode will make the *Dyna-Link 2* more sensitive to motion and movement resulting in a less stable display. When hi-res is 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 hi-res is turned off, the filter setting resets to the previous filter setting.

3.10 PRINT

Set a function key (**Fx**) to **Print**, see Section 4.0.

Pressing the **Fx** key outputs a configured text string to the RS-232 port on the base of the unit.

If an F-Key is programmed as print and the print setup is configured as continuous, then the **Fx** key is used for start print/stop print. See Section 6.2 for more details on data output.

The print function is always available on the optional RF remote display, so it is not necessary to program an F-Key to “print” if you intend to trigger print outputs from the remote.

However, if you program F1 or F2 to “print” then pushing F1 or F2 on the Dyna-Link will cause the comm port on the remote to output the selected data string.

If the RF remote display option is installed, the Dyna-Link cannot use its built in comm port except for hard-wire connections to the RF remote display or firmware updates.

4.0 Dyna-Link Setup

4.1 Menu Map

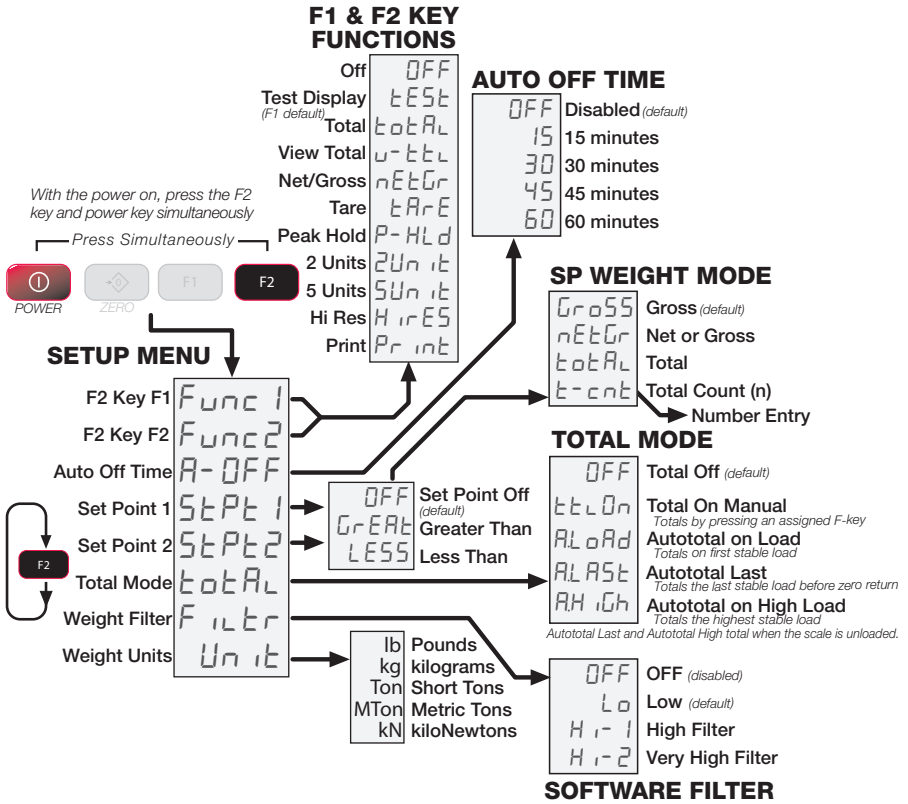


Figure 4-1 MSI-7300 Menu Map

4.2 Function Keys

The *Dyna-Link 2* has two user definable function keys on the front panel that can be programmed to several different functions. F1 is defaulted to peak hold, and F2 is defaulted to test. This procedure also assigns the F1 & F2 keys on the optional RF remote display.

- 1) With the 7300 on, press the **F2** key and the **POWER** key simultaneously.
- 2) The first item of the setup menu is **Func1**.
To setup the F2 Key scroll to the next menu item by pressing F2.
- 3) To set up the F1 key press **F1**. The current F1 key function is displayed.
- 4) Select the F1 key function by scrolling through the choices with the **F2** key. See the list of available functions on the setup menu map.
This procedure scrolls through all available choices for illustration purposes only.
In this example, we'll set F1 to the TEST function.
- 5) When the desired F1 Key function is displayed, press **F1**. The next item in the setup menu appears.
- 6) Either press **ZERO** to exit setup and store all changes, or continue to another setup menu item using the **F2** Key.

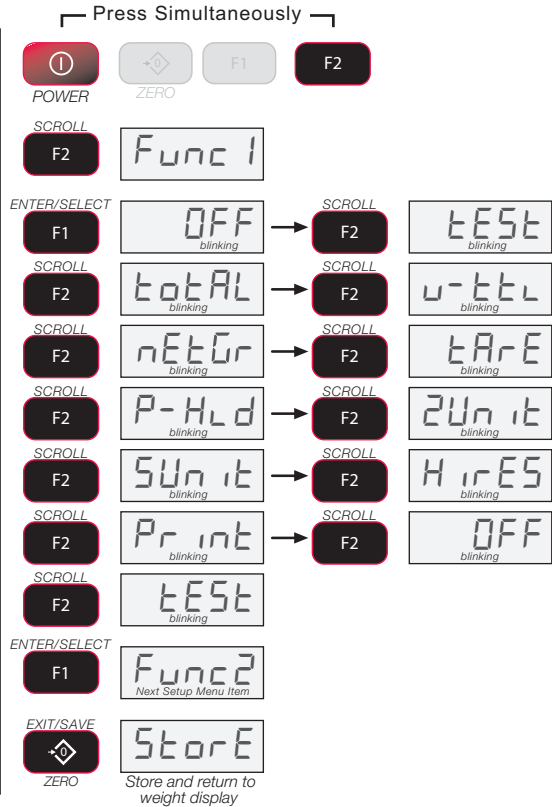


Figure 4-2 Function Keys

4.3 Auto-Off

When enabled, the Auto-Off prolongs the battery life of the unit by turning the power off when it is not in use.

Any key press or detected tension in motion exceeding 10d, resets the time limit and the unit remains on.

When disabled, the unit will only turn off by pressing the POWER key (or if the battery is depleted).

- 1) With the 7300 on, press the **F2** key and the **POWER** key simultaneously.
- 2) The first item of the Setup Menu is **Func1**. Scroll to **A-OFF** with the **F2** key.
- 3) To set up the A-Off timing, press **F1**. The current auto-off time is displayed.
- 4) Select the auto off time by scrolling through the choices with the **F2** key.
In this example, we'll set 60 minutes as the auto-off time.
- 5) When the desired time is displayed, press **F1**. The next item in the setup menu appears.
- 6) Either press **ZERO** to exit setup and store all changes, or continue to another setup menu item using the **F2** key.

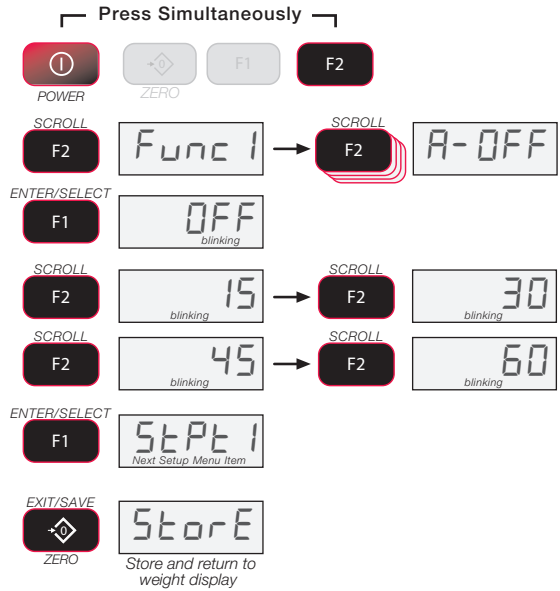


Figure 4-3 Auto-Off Setup

4.4 Setpoints

The *Dyna-Link 2* supports two setpoints. Common uses of set points are for warnings or process control. The *MSI-7300 Dyna-Link 2* comes standard with two high brightness red LED outputs for a triggered set point. The *MSI-7300 Dyna-Link 2* has an audible output option that is triggered by setpoint 1. Contact MSI for other setpoint output options.

- 1) With the 7300 on, press the **F2** and **POWER** keys simultaneously.
- 2) Scroll through the setup menu choices by pressing the **F2** key. Stop when the LED displays **StPt1** or **StPt2**.
- 3) When the desired setpoint is displayed, press **F1**. The display blinks **OFF**, or if previously programmed, the last set mode.
- 4) Select the setpoint mode by scrolling through the choices with the **F2** key. **GrEAt** (greater than) indicates the setpoint will trigger when the tension exceeds the value. **LESS** (less than) will trigger the setpoint when the tension is less than the value.
This example scrolled through all available choices for illustration purposes only.
- 5) When the desired setpoint mode is displayed, press **F1**.
- 6) Next select the type of tension or weight value the set point is assigned to. Use the **F2** key to scroll through the choices.
This example scrolled through all available choices for illustration purposes only. In this example, we'll enter Gross as the tension mode because we are going to use the set point as a safety warning.
- 7) When the desired weight mode is shown, push **F1**. Next the current setpoint value is displayed. If there was a previous value, it is displayed. If no value has been entered, a zero will appear. To keep the displayed value, press **ZERO**.

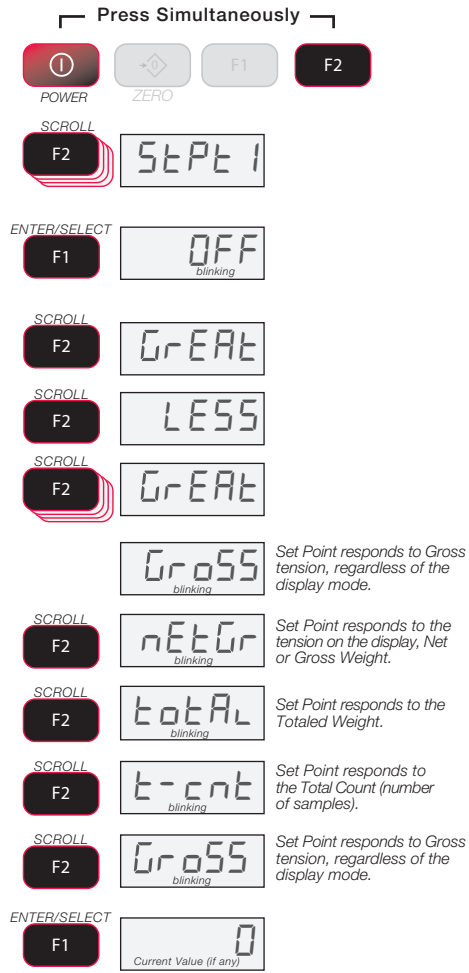


Figure 4-4 Setpoint Setup

8) Press the **F2** key. The first digit blinks at zero. Use the **F2** key to scroll through the numbers. When the desired number is shown, push **F1**. In this example, we'll enter 240 as a setpoint value.

To enter a decimal point, push **POWER** while the digit is blinking.

Error Correction: If you input a wrong value, press **ZERO** to step back one digit and change the digit with the **F2** key.

9) When the desired number is shown, push **F1** a second time to set the value. The next setup menu item is displayed.

10) Either press **ZERO** to exit setup and store all changes, or continue to another setup menu item using the **F2** key.

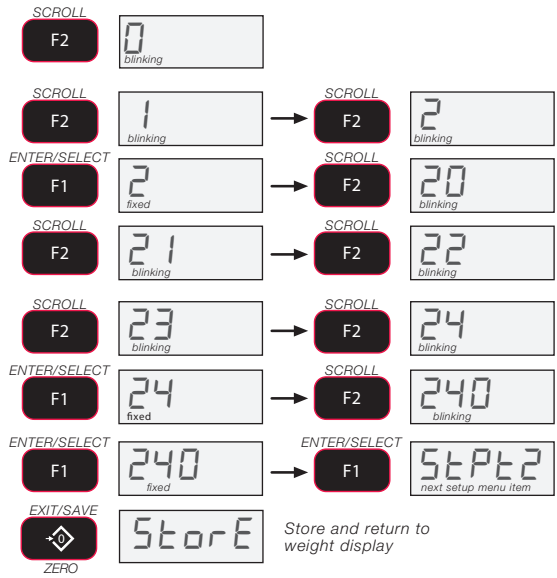


Figure 4-4 Setpoint Setup (continued)

4.5 Total Mode

The MSI-7300 Dyna-Link 2 can keep track of all weighments using the total feature. Either manual total, which totals by pushing a configured **USER** key on the front panel or the optional RF remote display, or auto-total which can be used to automatically add up each weighment. See the total mode descriptions for details on the various total modes. To use manual total, you must also program a user key. Auto total modes do not need a user key, but if a user key is setup for total, then it will function as a total on/total off.

- 1) With the 7300 on, press the **F2** key and the **POWER** key simultaneously.
- 2) The first item of the setup menu is **Func1**. Scroll to **total** with the **F2** key.
- 3) To setup the total mode, press **F1**. The current total mode setting is displayed.
- 4) Select the total mode by scrolling through the choices with the **F2** key.
In this example, we'll set the total mode to the auto-high mode. The auto high mode uses the highest stable reading as the total value, and totals when the load is removed.
- 5) When the desired total mode setting is displayed, press **F1**. The next item in the setup menu appears.
- 6) Either press **ZERO** to exit setup and store all changes, or continue to another setup menu item using the **F2** key.

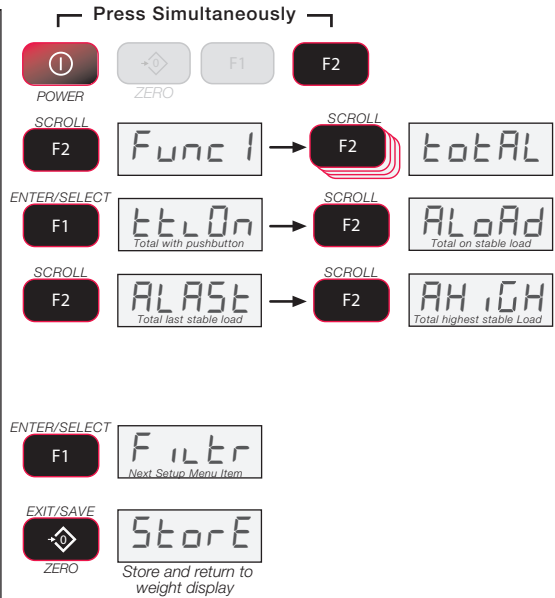


Figure 4-5 Total Mode Setup

4.6 Units

Units can be changed in two ways:

- Program a user function key to two unit or five unit
- Change the units with the setup menu using the following procedure

To set the accessible units available by a function key, set the F key either as 2Unit (lb/kg) or 5Unit (lb/kg/short tons/metric tons/kilonewton).



Note *If the Dyna-Link Calibration was originally in tons or metric tons, the “2Unit” setting will switch from tons to metric tons instead of lb/kg.*

- 1) With the 7300 on, press the **F2** key and the **POWER** key simultaneously.
- 2) The first item of the setup menu is **Func1**. Scroll to **Unit** with the **F2** key.
- 3) To set up the weight units, press **F1**. The display will blink **Unit**.
- 4) Change the weight units by pressing the **F2** key until the desired unit is displayed. The selected unit is indicated by the annunciators. *Not all units shown are available on every capacity.*
- 5) When the desired unit setting is announced, press **F1**. The next item in the setup menu appears.
- 6) Either press **ZERO** to exit setup and store all changes, or continue to another setup menu item using the **F2** key.

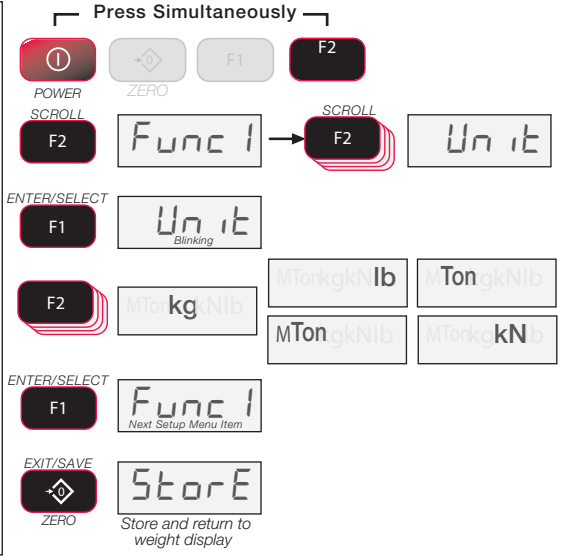


Figure 4-6 Units Select Menu

4.7 Filter Setup

Changing the filter settings allows the Dyna-Link to adjust to situations where there is a lot of movement in the lift or the crane structure. If the reading is not stable, it can often be improved by increasing the filter setting. Settling time will be longer as the filter setting is increased. However, the *MSI-7300 Dyna-Link 2* employs algorithms that speed up large tension changes while still controlling vibration even with higher filter settings.

- 1) With the 7300 off, press and hold the **F2** key, then press the **POWER** key.
...or while the 7300 is on, press F2 and POWER simultaneously.
- 2) The first item of the setup menu is **Func1**. Scroll to **Filtr** with the **F2** key.
- 3) To set up the filter, press **F1**. The display will blink the current filter setting.
- 4) Change the filter setting by pressing the **F2** key.
There are four available filter settings. Not all choices are shown in this example.
- 5) When the desired filter setting is announced, press **F1**. The next item in the setup menu appears.
- 6) Either press **ZERO** to exit setup and store all changes, or continue to another setup menu item using the **F2** key.

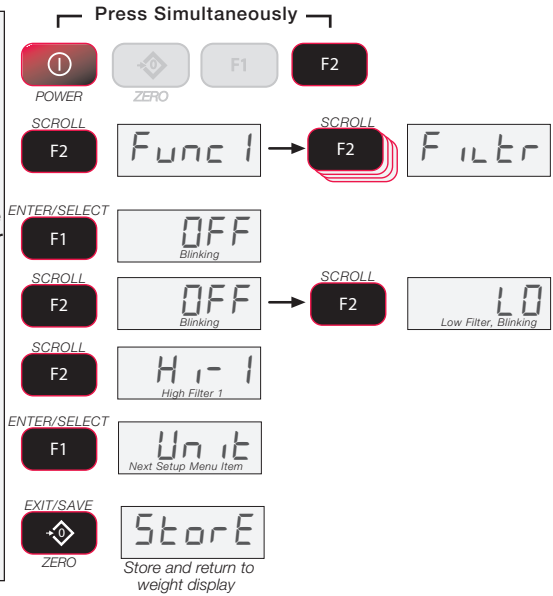


Figure 4-7 Filter Setup Menu

5.0 Calibration

The *Dyna-Link 2* is 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. For example, use at least a 500kg test weight to calibrate a 5000kg capacity unit. The *Dyna-Link 2* supports load cell linearization with up to four span points that can be calibrated in any order. Usually only one cal span point is necessary and is sufficient to reach rated accuracy.

When adequate test weights are not available, the *Dyna-Link 2* can be calibrated using a constant calibration which is referred to as C-Cal. To use C-Cal, a factory generated C-Cal number must be known. MSI supplies original and replacement load cells for the *Dyna-Link 2* with the C-Cal value stamped on the serial number label.

There are three aspects of calibration:

- Standard calibration - used for maintenance and routine calibration.
- Initial calibration - used to setup both the capacity and resolution (d) of the Dyna-Link. It differs from standard calibration only in the initial steps. Initial calibration is performed after a calibration reset which completely erases the calibration and setup memory.
- C-Cal - If C-Cal values are known, the Dyna-Link can be calibrated without weights.

5.1 Calibration Menu

The calibration menu contains three items: Cal, C-Cal, and auto zero maintenance. The following procedures start with entering into the Cal menu, or for an initial calibration, resetting the *Dyna-Link 2* and then going to the Cal menu.

Calibrate Menu

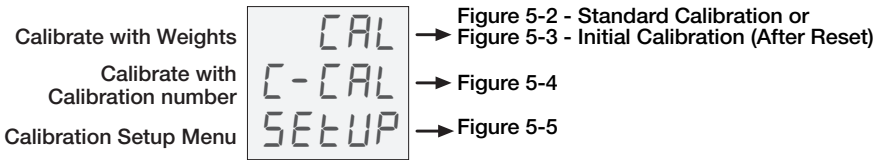


Figure 5-1 Calibration Menu

Procedure for the Routine Calibration of the MSI-7300

- 1) With the power on, initiate calibration by holding down the **F2** and **ZERO** keys until the display reads **CAL**.

The CAL setup menu appears.

- 2) Press **F1** to start the calibration procedure.

- 3) The display reads **UnLd** (unload) indicating you should remove all weight from the link. *You can choose to leave bottom fittings on the link as long as they are always part of the load train.*

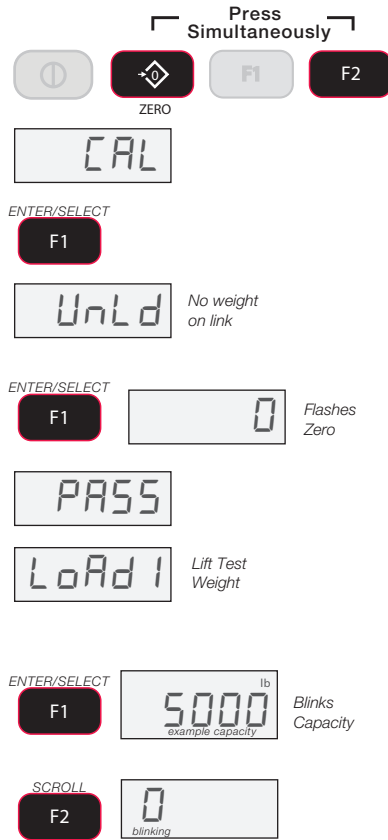
- 4) Press **F1**. The 7300 sets the zero calibration point.

- 5) If the zero is in range, the scale will display **PASS**. Then **LoAd1** is displayed.

- 6) Load the link with a precision test weight. *For highest accuracy, a test weight of 10% of capacity or more is recommended.*

- 7) Press **F1**. The 7300 flashes the capacity and calibration units. If you are loading the scale with the capacity weight, skip to step 10.

- 8) To enter a calibration weight other than capacity, press **F2**. The displays far left digit will flash zero indicating that a number should be entered.



Error Correction: If you input a wrong value, press ZERO to step back one digit and reenter.

Figure 5-2 Standard Calibration Procedure

- 9) Press the **F2** key to scroll the number and the **F1** key to enter each digit of the calibration weight.

*In this example, we'll enter 2500 kg on a 5000 kg capacity scale. Do not push the **F1** key two times in a row.*

*To add a decimal point, push the **POWER** key while the number is blinking.*

- 10) When the entire value of the test weight is displayed and the weight and link are stable, press **F1** to finish off the weight entry. If the resultant cal value is within limits, the display will read **PASS**.

- 11) The display now reads **LoAd2**. The Dyna-Link allows multi-point calibration. If more cal points are desired (up to three additional) press **F2** and repeat steps 8-10. If finished with span points, go to step 12.

- 12) Press **ZERO** to store the calibration constants. The LCD will read **CAL 'd** to indicate the calibration is acceptable.

- 13) Skip to step 14, or press **F1** to observe the CAL number. The C-CAL number appears. Make a note of the value.

- 14) Press **ZERO** to exit calibration. The next menu item **Setup** appears.

- 15) Press **ZERO** to store the calibration and return to standard link operation, or press **F1** if you want to adjust additional cal setup parameters (Standard, AZM, etc.)

You can cancel calibration by pressing Power and the scale will reset to the previous calibration constants.

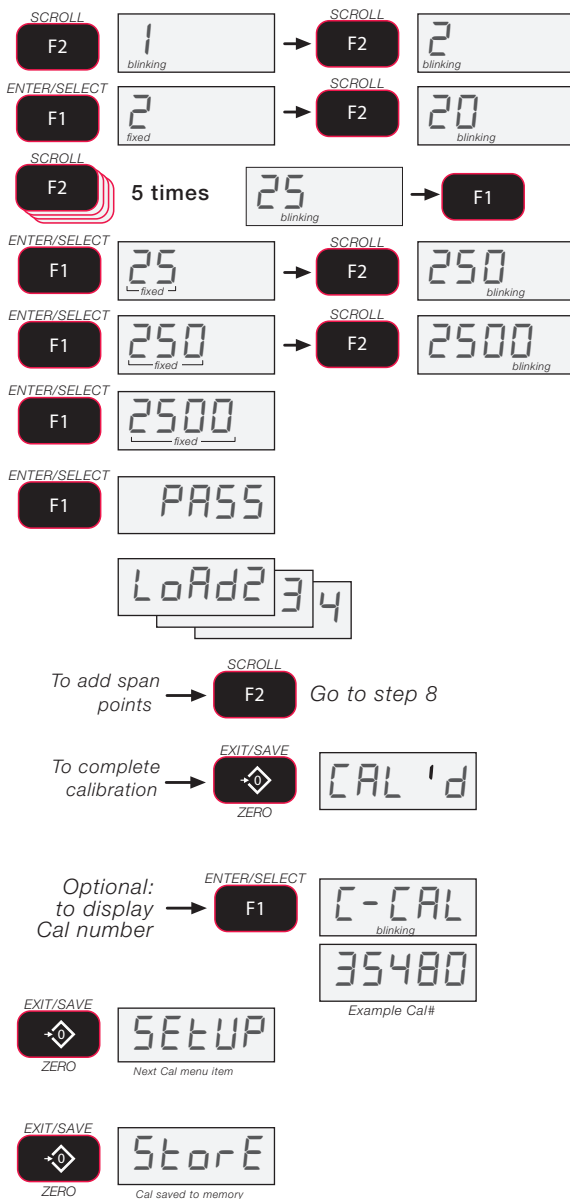


Figure 5-2 Standard Calibration Procedure (continued)

5.2 Initial Calibration

Use this procedure only if the capacity and count-by (d) needs to be modified. The initial steps of this procedure will totally erase user setups as well as any previous calibration.

Resetting Capacity and Country (d)

- 1) Turn the 7300 on.
- 2) Press the **ZERO** switch and the **F1** switch simultaneously.
- 3) The display blinks **rESET**.
- 4) To reset all calibration constants and setup parameters, press **F1**.
- 5) The 7300 requests a confirmation by displaying **Sure?**. To cancel the Reset press the **POWER** or the **ZERO** key.
- 6) To complete the reset, press **F1**. The Calibrate menu appears. You must now recalibrate the system.
- 7) Press **F1** to start the initial calibration procedure. The display shows **Unit**. You select the force units you wish to calibrate in.
- 8) Press **F1** to select the calibration unit.
- 9) Use the **F2** key to scroll through the available calibration units.
- 10) When the desired unit is shown, press **F1**.
- 11) Next, set the capacity in the selected units. Capacity must be set no higher than the load cell rated capacity.
- 12) Press **F1** to enter the capacity setting screen. A capacity of 10000 is the initial value.
If 10000 is the desired capacity in the selected Calibration Unit, press F1 and skip to step 16.
- 13) To change the capacity, press **F2**.

Press & Hold

ZERO **F1** **F2**

rESET
blinking

ENTER/SELECT
F1 **Sure?**

EXIT/CANCEL
POWER To cancel Reset

ENTER/SELECT
F1 **CAL**

ENTER/SELECT
F1 **Unit**

ENTER/SELECT
F1 **Unit**
blinking lb

SCROLL
F2 **MTon kg Nlb**
kilograms

ENTER/SELECT
F1 **MTon kg Nlb**
pounds **lb** **Ton** *(US Short)*

ENTER/SELECT
F1 **MTon kg Nlb**
Metric Tons (kg X 1000) **MTon kg Nlb** **MTon kg Nlb**
kiloNewtons

CAP

ENTER/SELECT
F1 **10000**
blinking

SCROLL
F2 **0**
blinking

Error correction: if you input a wrong value, press ZERO to step back one digit and reenter.

To enter a decimal point, push POWER while the digit is blinking.

For very large capacity Dyna-Links Enter the capacity in weight X1000 and push the POWER key twice (X1000 mode is indicated by the M annunciator during data entry).

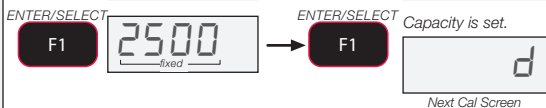
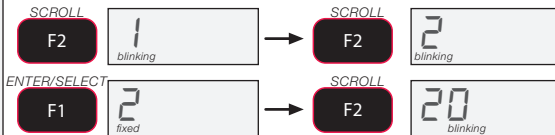
e.g. For a 100,000 lb 7300, enter 100, then press the POWER key twice so the M indicator is on.

Figure 5-3 Initial Calibration

- 14) The first digit blinks. Use the **F2** key to scroll through the numbers. When the desired number is shown, push **F1**.

In this example, we'll enter 2500 as a capacity.

Continue inputting the desired capacity using the **F2** key for scrolling the number and the **F1** key to store the number.



- 15) Finalize the capacity value by pressing the **F1** key on an unblinking display. In our example, once the number 2500 is fixed on the display, press **F1** to store the capacity value.

- 16) Next the scale division size **d** is set. Press **F1** to begin. In this example we'll set the **d** to 2.



- 17) Use the **F2** key to scroll through the recommended scale divisions. The first **d** offered is the standard division for the given capacity. Setting a 'd' size that results in total resolution higher than 1:5000 is not recommended for stability reasons.



- 18) When the desired scale **d** is displayed, press **F1**. The **UnLd** display appears and the scale is ready for calibration. Follow the standard calibration procedure starting at step 3.



Proceed to Standard Calibration starting at Step 3.

Figure 5-3 Initial Calibration (continued)

5.3 Guidelines for Capacity and Resolution

Dyna-Links are subject to forces that static scales do not experience. Many bridge cranes, hoist cranes, and mobile cranes lack rigidity and tend to bounce or swing when loads are lifted. For this reason, MSI recommends that resolution is kept in the 1:2000 to 1:3000 range. Some improvement in stability can be achieved by increasing the filtering. However, you should never program resolution that is far greater than you need. If the *MSI-7300 Dyna-Link 2* display is never stable, it is recommended that the resolution is reduced as well as filtering increased. In any circumstance, the resolution should never be set higher than 1:15000 due to temperature and noise considerations common to all strain gage based load cells.

The tension must be stable for certain features to work: ZERO tension must be stable to be zeroed. TARE tension must be stable to be tared. TOTAL tension must be stable to be added to the total registers. One way to improve the stability is to increase the filtering, at the risk of increasing settling time. The other is to increase the 'd' (reduce resolution). The third way is to increase the motion window. The *MSI-7300 Dyna-Link 2* defaults to $\pm 1d$ as a motion window. It can be changed at MSI to a higher value if desired. Often $\pm 3d$ is chosen for bridge cranes as these tend to have a lot of bounce to them. This of course carries an accuracy penalty adding $\pm 3d$ to the total accuracy of the Dyna-Link if the zero or tare operation happens to capture the tension in a valley or peak.

Setting capacity is dictated primarily by the capability of the load cell. MSI supplies the *MSI-7300 Dyna-Link 2* in many capacities. **Never set the capacity of the Dyna-Link higher than the rating of the load cell.** Due to the excellent linearity of the MSI Link load cell, it is acceptable to set lower capacities to better match the crane the *MSI-7300 Dyna-Link 2* is used on. For example, if the hoist is rated for 9000lb, you can use a 10000 lb capacity Dyna-Link and reset the capacity to 9000 lb so that the Dyna-Link will indicate overload at 9000 lb instead of 10000 lb. Derating as much as 50% of the capacity is usually acceptable, but the Dyna-Link may be less stable if the 'd' is decreased (resolution increased).



Note *The capacity of all the MSI-7300 systems is rated approximately 20% higher than the rated capacity in pounds. This is to allow the kg capacity to be exactly 1/2 the number of the pounds capacity.*

5.4 C-Cal Calibration

When adequate test weights are not available, the *MSI-7300 Dyna-Link 2* 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. MSI supplies replacement load cells for the *MSI-7300 Dyna-Link 2* with the C-Cal value stamped on the serial number label. When a calibration is performed with test weights, a new C-Cal is generated.



Important

The C-Cal number must be known prior to starting this procedure. For a MSI-7300 with its original load cell, MSI prints this number on the Calibration Record, the serial number tag. C-Calibration reduces slightly the absolute accuracy of the system and is intended for non-critical use only. For highest accuracy, calibrate the MSI-7300 with precision test weights.

- 1) With the power on, initiate calibration by holding down the **F2** and **ZERO** keys until the display reads **CAL**.
The CAL setup menu appears.
- 2) Press **F2** to scroll to the C-Cal selection.
- 3) Press **F1** to start the C-Cal calibration procedure.
- 3) The display reads **UnLd** (unload) indicating you should remove all weight from the link. *You can choose to leave bottom fittings on the Link as long as they are always part of the load train.*
- 4) Press **F1**. The 7300 sets the zero calibration point.
- 5) If the zero is in range, the scale will display **PASS**. Then **C-CAL** is displayed.
- 6) Press **F1**. The last known C-Cal value is displayed.
If the offered C-Cal value is correct, push F1 and jump to step 10.
In this example we'll enter 15200 as an C-Cal value. You must use your known C-Cal value, not 15200.

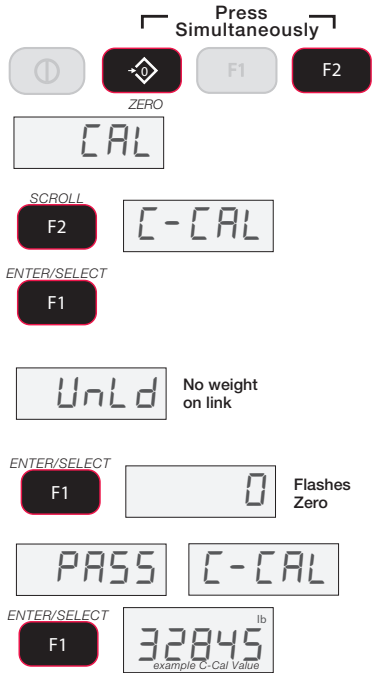


Figure 5-4 C-Cal Calibration Procedure

5.5 Auto Zero Maintenance (AZM)

The *Dyna-Link 2* employs an auto zeroing maintenance mechanism to adjust the zero reading to the center-of-zero (COZ). COZ is defined as the tension reading is within $\frac{1}{4}$ 'd' of zero. AZM continuously adjusts zero to maintain COZ. It is recommended that AZM is on to maintain the highest accuracy. However, there are circumstances when it should be turned off. This can happen when minor variations of tension occur while picking up Dyna-Link attachments and the variations fall within the AZM capture window. The AZM capture window (usually 1 'd') and capture time (usually eight seconds) can be adjusted by MSI to meet custom requirements.

- 1) With the power on, initiate calibration by holding down the **F2** and **ZERO** keys until the display reads **CAL**.

The CAL setup menu appears.

- 2) Press **F2** to go to the **SetUP** screen.

- 3) Press **F1**. The **StAnd** menu appears.

- 4) Press **F2** to scroll to the **Auto0** screen.

- 5) Press **F1**. The AutoZero mode shows On or OFF.

In this example, we will turn off AZM (not recommended for typical operations)

- 6) Press **F2** to change to AZM between on and off.

- 7) When the desired mode is displayed, press **F1**.

- 8) The next cal setup menu item appears.

- 9) Press **ZERO** twice to exit cal setup and store all changes, or continue to another cal setup menu item using the **F2** Key.

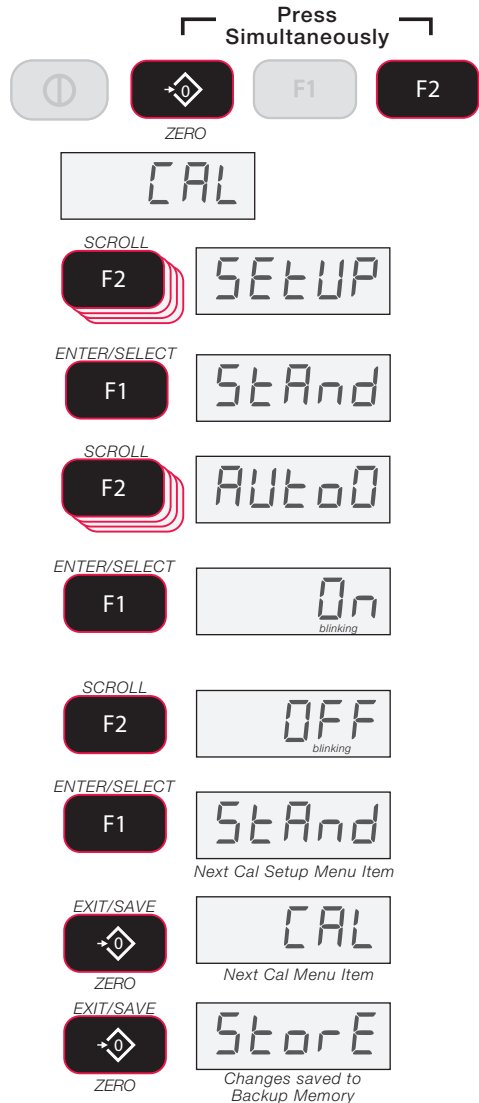


Figure 5-5 Auto Zero Maintenance Setup

5.6 Service Counters

The *MSI-7300* maintains two service counters for safety.

- The first counter counts the number of times the scale has been overloaded.
- The second counter counts lifts above 25% of capacity.

These counters serve to warn the user to inspect the load train after a number of overloads, also when there is a chance of fatigue failure. The power up routine will be interrupted when the lift counter exceeds 16383 lifts or the overload counter exceeds 1023 overloads. If the screen displays LFCnt when unit is powered on :

1. Push TARE to display the 25% lift counter.
2. Push TARE again to see the overload lift counter.
3. Push the ZERO key to acknowledge the warning and return to standard scale operation.



Note The power up warning message won't appear again for another 16383 lifts (or 1023 overloads).

- 1) Program a user function key to be TEST (see function key setup)
For this example, **F1** is programmed as TEST.
- 2) Press **F1- TEST**.
- 3) Within two seconds of pressing the **F1-TEST** key, press **F1** again
(must be F1 regardless of which key is programmed as TEST).
The test will sequence through steps 4 to 7 automatically unless you stop it by pressing F2 immediately, then using F1 and F2 each parameter can be observed statically.
- 4) The display flashes **LFCnt** (for lift counter) followed by the number of times the weight has exceeded 25% of capacity.
- 5) Next, the display flashes **OLCnt** (for overload counter) followed by the number of times the weight has exceeded capacity.
- 6) Next, the display flashes the C-Cal value.
- 7) The Dyna-Link returns to standard weighing mode. If you interrupted the auto sequence, press **ZERO** to return to tension link mode.

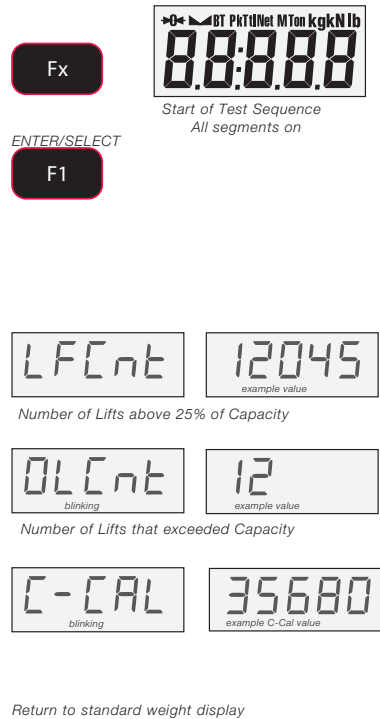


Figure 5-6 Access the Service Counters



Only a MSI factory representative can reset the service counters, as these are important safety warning features. Depending on the circumstances, a thorough load train inspection might be necessary to ensure user safety.

Reference MSI's "Crane Scale Safety and Periodic Maintenance manual" (Pub. 243-08-94D) for proper loading techniques to improve the safety and longevity of your *MSI-7300* crane scale. This publication is available at www.msiscalcs.com and is included in the CD shipped with your crane scale.

6.0 Communication Setup

The *Dyna-Link 2* can communicate with peripheral devices using RS-232 or 802.15.4 wireless. Only one communications type can exist at a time. The RS-232 port located on the bottom side of the *Dyna-Link 2* is useful for setup and calibration using a computer and MSI's SCCMP Software (SCCMP operation is detailed in the SCCMP User Guide).

6.1 RF Option

Since the RF options are easily connected they are commonly used for gathering weight data after the initial setup of the unit. For RF operation, the *Dyna-Link 2* uses an 802.15.4 transceiver to communicate with the *MSI-8000* RF Remote Display.

802.15.4 wireless:

- operates in the 2.4GHz ISM band and does not require the end user to obtain a license.
- can coexist with other 2.4GHz systems if caution is taken to isolate antennas at least 10 feet or 3 meters from the Crane Scales and *MSI-8000* equipment.

MSI-8000 based RF systems are peer to peer. However, for multiple scale connections, the *MSI-8000* acts as the network coordinator.

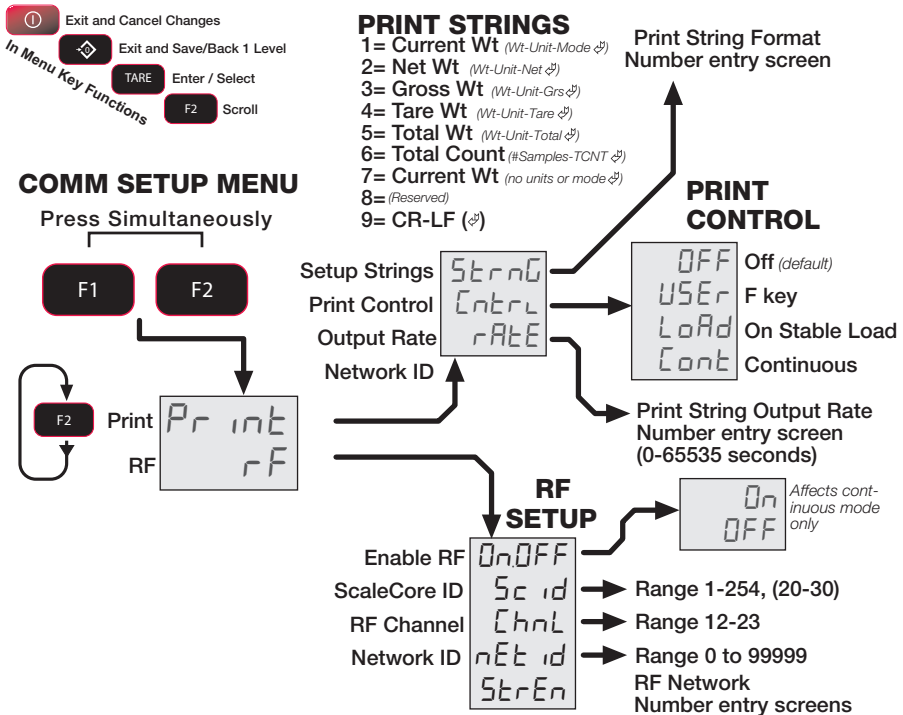


Figure 6-1 COMM Setup Menu

6.2 Printer Setup

The RS-232 comm port is capable of outputting tension data. All the weight modes the Dyna-Link can measure are available in user formatted form. The control mode program is what causes the *Dyna-Link 2* to print.

- USER – the assigned F-Key is pressed, then one transmission of the selected string type is output.
- On Load – when the tension on the link is stable, one transmission will output, then the tension must return to zero to enable another print to output.
- Continuous – program the interval in seconds up to 65,535 seconds.

Setting the interval to 0 will set an interval as fast as the system can go. To disable printing, simply don't program an F-Key to print and set the control to "USER" or turn the control mode to "OFF."

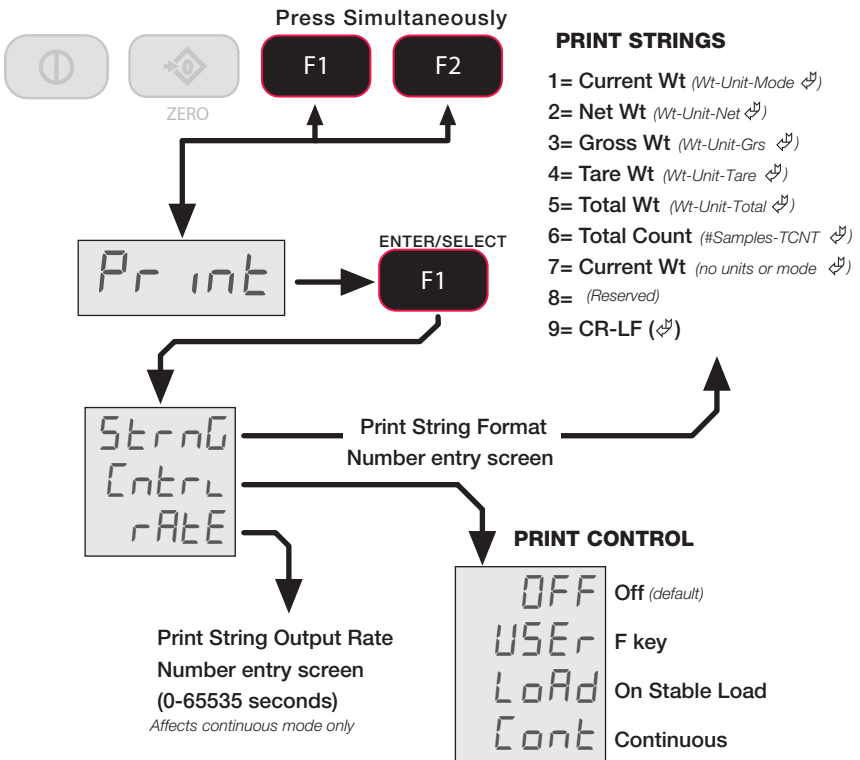


Figure 6-2 Print Output Setup Menu

6.2.1 Standard Print Strings

1	Current Tension	Fixed output length: 16. Leading zeros suppressed except for the LSD. TTTTTTTspUUspMMMMMcrf TTTTTTT – tension data with -sign if necessary. UU – units MMMMM – tension mode which for “1” is either NET or GROSS
2	Net Tension	Fixed output length: 16. Leading zeros suppressed except for the LSD. TTTTTTTspUUspNETspspcrf
3	Gross Tension	Fixed output length: 16. Leading zeros suppressed except for the LSD. TTTTTTTspUUspGROSScrf
4	Tare Weight	Fixed output length: 16. Leading zeros suppressed except for the LSD. TTTTTTTspUUspTAREcrf
5	Total Weight	Fixed output length: 16. Leading zeros suppressed except for the LSD. TTTTTTTTTspUUspTTLcrf
6	Number of Samples Totalled	Fixed output length: 16. Leading zeros suppressed except for the LSD. spspspspspspSSSSSSspT-CNTspcrf
7	Current Weight Mode	Net, Gross, Peak, etc spMMMMMcrf
8/9	Carriage Return/ Line Feed	Used to add a space between print records. crf

Table 6-1. Standard Print Strings

In the string number entry screen, you can enter combinations of the standard print strings. For example, to get a NET GROSS TARE printout with a space between records, simply enter “2349.”

Using SCCMP application (ScaleCore configuration management program), custom output strings are possible. See the ScCMP programming guide for details.



Note *ScCMP programming can be found on the CD included with the product or can be downloaded from the MSI 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.

6.2.2 Printer Output Setup

- 1) With the 7300 on, press the **F1** and **F2** key simultaneously.
- 2) The LCD shows **Print**. Press **F1**.
- 3) The submenu item **Strng** appears. Press **F1**.
- 4) The current print mode format number is displayed.
- 5) Set up a print format with one or more digits representing the data type required for the print output.
In this example, we'll set the print format for a net, gross, tare output with a carriage return/line feed between each print output. The number entry required will be 2349. The 2 is for net weight, the 3 for gross weight, the 4 for tare weight, and the 9 inserts a space before the next print output.
- 6) Using the **F2** Key, scroll through the digits until the desired digit is shown, then press **F1** to enter the digit value. Repeat for the remaining digits.
- 7) When the entire number is displayed press **F1**. The next item in the print menu appears, **Cntrl**.
- 8) Press **F1** to enter the print control menu. The last set control mode will appear.
- 9) To change the print control mode, press **F2**.
In this example, we'll set the print control mode to continuous.
- 10) Press **F2** key until the desired print control mode is shown.
- 11) When the desired print mode is shown, push **F1** to save. The next print setup item, **rAtE** appears. If you have set continuous (cont) as your print control, proceed to step 12). For any other control mode jump to step 15

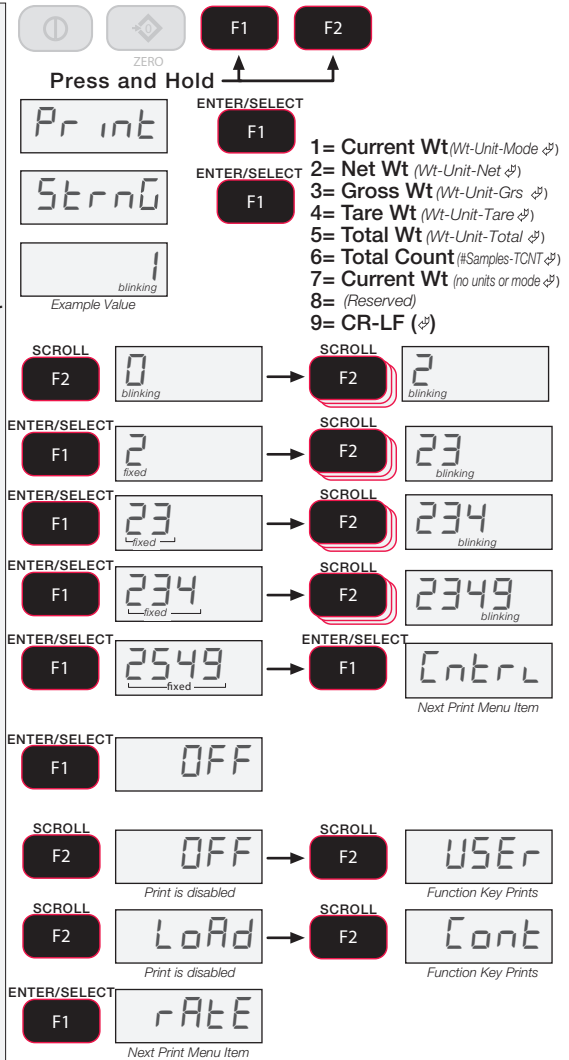
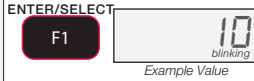


Figure 6-3 Printer Output Setup

- 12) Press **F1** to enter the print rate number entry screen. The current print rate appears on the LCD.

In this example, we'll set the print rate to an output rate of once every two seconds.



The number represents the print interval rate in seconds. Use 0 for the fastest the Dyna-Link can go (~5 times per second). To set a once a minute transmission, set the rate to 60. To set once per hour, set the rate to 3600, etc. Largest possible entry is 65535 which is >18 hours.

- 13) Press **F2** to change the print rate. Use F2 to scroll the number, enter each number with the F1 key.



- 14) When the entire number is displayed, press **F1** again to finalize the seconds entry. The next print menu item appears, **String**.



- 15) Exit the print setup menu by pressing **ZERO** twice. The message **Store** appears briefly then normal link operation starts.



Figure 6-3 Print Output Setup (continued)

6.3 Comm Port Hardware

The *Dyna-Link 2* RS-232 comm 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 (P/N 503363) is required to connect the <i>Dyna-Link 2</i> to a computer. This adapter cable converts the <i>Dyna-Link 2</i> connector to a standard D9 serial connector.
Data Configuration	The data output is fixed at 8-1-N.
Baud Rate	Programmable for 300 to 230.4k baud in eight steps. The bootloader for updating software is always 38.4k baud.
Handshaking	No hardware handshaking is supported XON/XOFF software handshaking is always on.

Table 6-2. Comm Port Hardware



Note It may be necessary to disconnect the shield drain wire at the D-9 connector frame to prevent ground loops. Ground loops can cause unstable readings. In extreme cases it may be necessary to use an opto-isolated RS-232 interface.

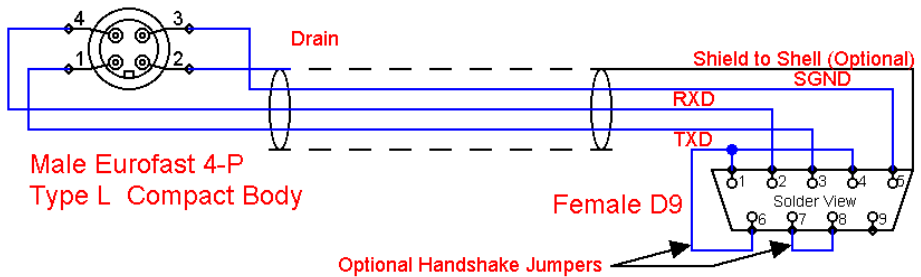


Figure 6-4 Serial Cable Schematic, DCE Configuration for Connecting to a Computer

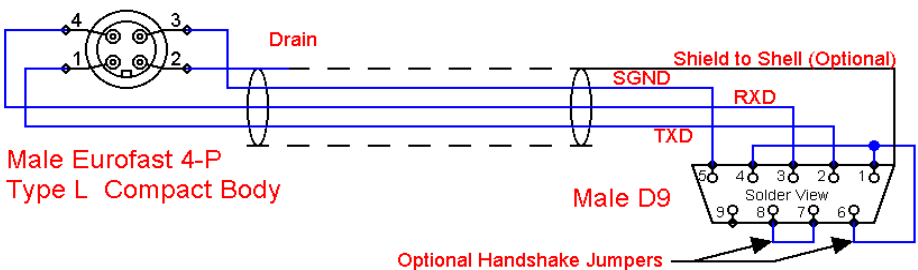


Figure 6-5 Serial Cable Schematic, DTE Configuration for Connecting Directly to a DCE Printer

6.4 802.15.4 RF Network Setup

When equipped with the 802.15.4 option, the *Dyna-Link 2* can connect with an *MSI-8000* Remote Display or an 802.15.4 modem. The unit uses three numbers to connect to an 802.15.4 piconet:

1. ScaleCore ID – uniquely identifies each ScaleCore device in a piconet. It has a range of 0-254 and must not be duplicated within the same RF channel. For the *MSI-8000* as network coordinator, MSI recommends a number for the *Dyna-Link 2* from 0-3 if multiple units will be connected to the *MSI-8000*. If a single *Dyna-Link 2* is all that's needed than any number up to 254 is acceptable.
2. RF Channel – establishes the base network, all interconnected devices must match. This number must be in the range of 12-23.
3. Network ID – this is a 64-bit number that all interconnected devices must match. The *Dyna-Link 2* limits this number to a max of 5 digits for a range of 0 - 99999. Do not use a small number here to help avoid other 802.15.4 networks that default to a network ID of 0.
4. RF Strength – Transmission strength can be set from 0 to 4, default is 1. The settings effect the transmission range with zero is lowest power level and four is the highest. Power 4 will use the battery life quicker, so use the lowest number possible for reliable transmission. If maximum range is needed set the strength to four.



Note For all devices that interconnect, the RF channel and network ID must match. The ScaleCore ID must be unique. The *Dyna-Link 2* or other *MSI RF* equipment that is a weight data source should be set to a ScaleCore ID of 0, then if other slave devices are added, they can be added in sequence.

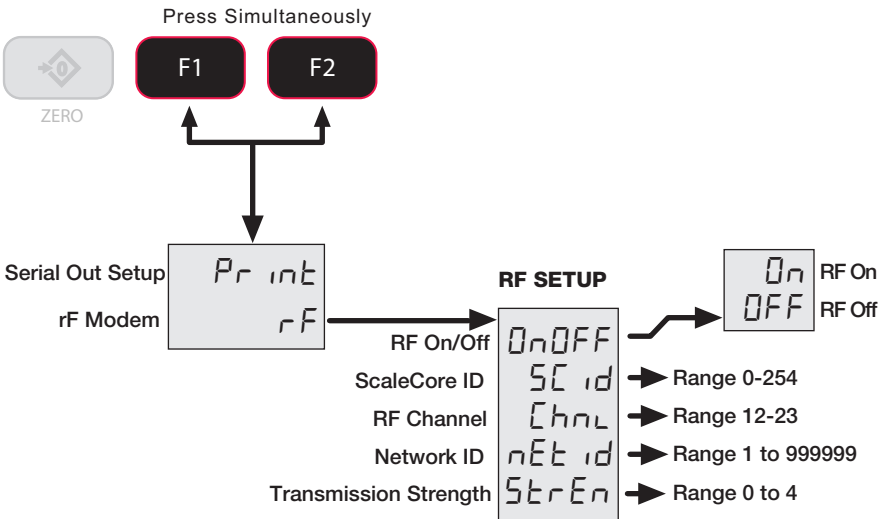


Figure 6-6 RF Menu

- 1) With the power on, open the COMM setup menu by pressing the **F1** and **F2** keys simultaneously.

The COMM setup menu appears. The first menu choice is **Print**.

- 2) Press **F2** to scroll to the RF setup menus.

- 3) Press **F1** to enter the RF setup menu.

- 4) The display reads **OnOff**. Confirm the 8000 RF is on by pressing **F1**. If it is off, use the **F2** key to change it to on. Then push **F1**.

Off is only used when the 8000 is hardwired to a Dyna-Link.

- 5) Press **F1**. Next the **Scid** (ScaleCore ID) screen is shown

- 6) Press **F1**. The current SCID number is shown.

*If the offered SCID value is correct, push **F1** and jump to step 10.*

In this example we'll enter 3 as an SCID number. Any value from 1-254 is acceptable. However, MSI recommends a value from 20 - 30.

- 7) To input the SCID value, press **F2** to start the number entry process.

- 8) Use **F2** to change the number, and **F1** to enter the number. Add the next digit by pushing **F2** and scrolling as required. Repeat this sequence until the entire SCID number is entered.

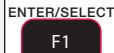
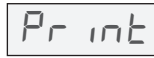
- 9) Once the entire SCID value is entered, press **F1** to finalize the number.

- 10) The next RF setup parameter is "ChnL" (Channel). Press **F1** to start the number entry process.

- 11) The current RF channel number is displayed.

*If the offered RF Channel value is correct, push **F1** and jump to step 14.*

Press Simultaneously



example SCID Value



*Error Correction: If you input a wrong value, press **ZERO** to step back one digit and reenter.*



Figure 6-7 RF Setup Procedure

- 12) Press **F2** and using the previous process, enter the RF channel number.

Recommended RF Channel numbers range from 12 to 23. In this example we'll use 21 as the RF Channel.

- 13) When the desired RF channel number is shown and fixed, press **F1**.

- 14) The next RF setup menu item is the **nEtId** (Network ID). Press **F1** to see the current net ID number.

*If the offered network ID value is correct, push **F1** and jump to step 17.*

- 15) Using the numeric entry process as before, input a network ID number. Press **F2** to start a new number.

Allowed network ID numbers range from 0 to 99999. MSI recommends a random number of at least four digits to ensure that the 8000 system won't conflict with any other 802.11.4 networks (Zigbee).

- 16) When the final number is shown and fixed, press **F1** to store the network ID.

- 17) The menu displays StrEn. Press the **F1** to enter.

- 18) Press **F2**, using the numeric entry process, input a transmission strength number.

- 16) When the desired number is displayed, press **F1** to store the number.

- 17) The RF setup menu goes to the first menu, **OnOff**. Press the **ZERO** key to exit out of the RF setup menus.

- 18) Press **ZERO** again to exit the COMM setup menu and store the new RF network numbers.

SCROLL F2 0 (blinking) → SCROLL F2 2 (blinking)

ENTER/SELECT F1 2 (fixed) → SCROLL F2 20 (blinking)

SCROLL F2 21 (blinking) → ENTER/SELECT F1 21 (fixed)

ENTER/SELECT F1 nEt id

ENTER/SELECT F1 6749 (current Net ID blinking)

SCROLL F2 0 (blinking) *Repeat number entry procedure*

5925 (example value only)

ENTER/SELECT F1 StrEn

ENTER/SELECT F1 1 (blinking)

ENTER/SELECT F1 OnOff

EXIT/SAVE ZERO Pr int

EXIT/SAVE ZERO StorE

Note When setting StrEn, use 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.

RF Setup Procedure (continued)

6.5 FCC Statement (For 802.15.4 Option)

Contains FCC ID: OUR-XBEEPRO

The enclosed device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

6.6 International RF CERTS (For 802.15.4 Option)

Canada Radio Cert. No.: IC: 4214A-XBEEPRO

Australia & New Zealand: AS4268:3000

Japan: Certificate of Radio Equipment in Japan No.: 08215111/AA/02

Europe and much of Asia:

This 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)

7.0 Appendix

7.1 Troubleshooting

Problem	Possible Cause	Solution
Display is blank when POWER key is pressed	Discharged battery	Replace cells, or if using NiMH, recharge
	Defective battery	Replace
	Corroded battery or battery contacts	Clean contacts
	Defective switch or circuit board	Requires authorized service
Display does not function properly or front panel keys do not function normally or Dyna-Link will not turn off	Improperly loaded software	Reinstall software
	Faulty circuit board	Requires authorized service
	Loose connectors	Requires authorized service
Dyna-Link does not respond to tension changes	Out of calibration	Calibrate
	Faulty load cell	Replace
	Load cell connector	Check connector and wires
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 Dyna-Link
	Too much tension/load has been zeroed	Rezero the Dyna-Link
Display drifts	AZM (Auto0) is turned off	Turn AZM on
	Rapid temperature changes such as moving the Dyna-Link from indoors to outdoors	Wait until the Dyna-Link temperature has stabilized
Displayed tension shows larger error	Dyna-Link not zeroed before load is lifted	Zero the Dyna-Link with no load attached
	lb/kg units causing confusion	Select proper units
	Requires recalibration	Recalibrate
Display reading not stable	Excessive vibration in crane system	Increase filtering or increase 'd' in Cal
	Excessive side loading	Improve load train symmetry
	Load cell faulty	Check LC connections
Display toggles between "Error" and "Load"	Tension exceeds capacity	Immediately reduce tension
	Faulty load cell or wiring	Check LC and LC wiring.

Table 7-1. Troubleshooting

Problem	Possible Cause	Solution
Display toggles between “Error” and “buttn”	A key is stuck or is being held down	Check switches for damage
		Ensure that a remote is not continuously transmitting
Optional RF Remote display does not work	Units not mated	See “Setting the Transmitter and Receiver Address” procedures.
Lo Batt is blinking	Battery is low	Replace (alkaline) or recharge batteries
Unit turns on, then immediately off	Battery is low	Replace (alkaline) or recharge batteries
Tension will not zero	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
Tension will not tare or total	System is not stable	Wait for stable symbol to turn on, or if in a mechanically noisy crane, increase the filtering or reduce the size of the Dyna-Link increment “d.” It is also possible to increase the motion window. Contact MSI if you have a problem getting the MSI-7300 to zero, tare, or total due to stability issues.
Setpoint lights blink	Setpoint is enabled and the trigger point has been reached	Disable setpoints if they are not needed
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
Auto total does not work	Tension must be stable	Wait for stable symbol to turn on, or increase filtering for more stability
	Tension thresholds not reached	You must exceed 1% of capacity for autototal to work. Then you must drop below 0.5% of capacity for additional weighments to register.

Table 7-1. Troubleshooting

7.2 Error Codes

The ScaleCore processor that is the heart of the *MSI-7300* Dyna-Link2 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
		Load Cell damaged or disconnected
 Error UnLd	Underload	Tension/Weight is more than 20% negative
		Load cell damaged or disconnected

Table 7-2. Error Codes

7.3 Mechanical Dimensions

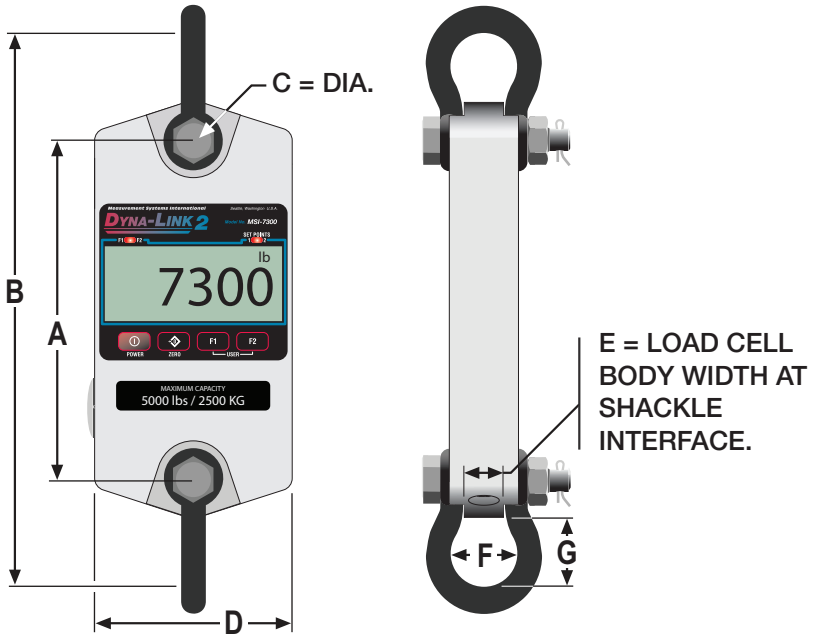


Figure 7-1. Mechanical Dimensions

Capacity	A	B	C	D	E	F	G	Approx Shipping Wt	Shackle
1000 lb	8.0 in	13.53 in	.75 in	5 in	.99 in	1.69 in	1.75 in	4.4 lb	G-2130 3.25T
500 kg	203 mm	344 mm	19 mm	127 mm	25 mm	43 mm	44.4 mm	2.0 kg	
2500 lb	8.5 in	14.03 in	.75 in	5 in	.99 in	1.69 in	1.75 in	4.9 lb	G-2130 3.25T
1250 kg	216 mm	356 mm	19 mm	127 mm	25 mm	43 mm	44.4 mm	2.2 kg	
5000 lb	8.5 in	14.03 in	.75 in	5 in	.99 in	1.69 in	1.75 in	4.9 lb	G-2130 3.25T
2500 kg	216 mm	356 mm	19 mm	127 mm	25 mm	43 mm	44.4 mm	2.2 kg	
10,000 lb	8.5 in	16.14 in	1 in	5.50 in	1.35 in	2.28 in	2.34 in	7.3 lb	G-2130 6.5T
5000 kg	216 mm	410 mm	25 mm	140 mm	34 mm	58 mm	59.4 mm	3.3 kg	
25,000 lb	9.5 in	22.66 in	1.63 in	6.38 in	2.24 in	3.88 in	4.69 in	13 lb	G-2130 17T
12,500 kg	241 mm	576 mm	41 mm	162 mm	57 mm	99 mm	119 mm	5.9 kg	
50,000 lb	9.63 in	25.67 in	2 in	7.50 in	2.74 in	5.00 in	5.75 in	23 lb	G-2130 25T
25,000 kg	245 mm	652 mm	51 mm	191 mm	70 mm	127 mm	146 mm	10 kg	
100,000 lb	12 in	29.75 in	2.25 in	8.13 in	3.11 in	5.75 in	4.81 in	53 lb	G-2140 55T
50,000 kg	305 mm	756 mm	57 mm	207 mm	79 mm	146 mm	122 mm	24 kg	

Table 7-3. Mechanical Dimensions

7.4 Firmware Update Procedure

Updating firmware in the *MSI-7300* requires the following: a DCE serial cable (MSI 503363-001, or build per DCE cable schematic on page 22), 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-7300* is turned on in the form of “01-04” (your version will vary). Most firmware updates do not require a recallibration. Consult the version release notes for confirmation.

1. Setup the terminal serial port to 8 data bits, no parity, 1 stop bit, 9600 BAUD, XON/XOFF (flow control).
2. Connect to the Dyna-Link serial port using the DCE cable. Connect the D9 connector to your PC or USB adapter.
3. (Optional) Test that you have a connection by typing {00FF01?}. If the connection is good the Dyna-Link will respond with {000001r2;0;01E02;2011-07-08;11:05} or something similar.
4. On the terminal keyboard, type {ff0009=0199}
5. Change the terminal serial port to 38400 BAUD. Hit the ‘q’ key to refresh the display. Cycle Power on MSI-7300 by removing and reinstalling batteries. The following menu should appear

MSI-7300 SCALECORE 1 BOOT LOADER Ver. 02-04(c) 2011-09-02 17:06

- (u) Download and program application code
- (q) query app code info
- (g) execute app code
- (r) refresh



Note *Your bootloader version may vary.*

6. Type **u**

Terminal should display:

Send File NOW, or press ^ to abort:

7. 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
```

8. After the file is received, terminal should display “Completed.” Then the boot menu appears again.

MSI8000 SCALECORE2 BOOT LOADER Ver. 02-04 (c) 2011-09-02 16:06

- (u) Download and program application code
- (q) query app code info
- (g) execute app code
- (r) refresh

9. 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 BOB742D  32b CRC must match
Received Signature BOB742D 
Product ID 07 *Dyna-Link 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.

10. Send an “**r**” to restore the boot menu.

MSI8000 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

11. Send a “**g**.” The *MSI-7300* should start.

The MSI Limited Warranty

MEASUREMENT SYSTEMS INTERNATIONAL, INC., WARRANTS load sensing elements and meters against defects in workmanship and materials for a period of one year from date of purchase and warrants electrical cables and batteries against the same defects for a period of ninety (90) days from date of purchase.

Any device which proves defective during the warranty period will be replaced or repaired at no charge; provided that the defective device is returned to the Company freight pre-paid.

In no event shall the Company be liable for the cost of any repairs or alterations made by others except those repairs or alterations made with its specific written consent, nor shall the Company be liable for any damages or delays whether caused by defective workmanship, materials or otherwise.

The Company shall not be liable for any personal injury or property damage resulting from the handling, possession or use of the equipment by the customer.

The warranty set forth herein is exclusive and is expressly in lieu of all other warranties, express or implied, including without limitation any implied warranties of merchantability or fitness, or of any other obligations or liability on the part of the Company.

The liability of the Company under this warranty is limited solely to repairing or replacing its products during the warranty periods; and the final judgment and disposition of all claims will be made by MEASUREMENT SYSTEMS INTERNATIONAL, INC.

Notes

Notes



Measurement Systems International™

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