2000

M2000

CH1 CH2 CH3 GR →0← NET lb kg

1 CH1	2 CH2	3
5 SCAN		7
9 CAL	0	

| ON OFF | →0← | →T← | PRINT SELECT |

4.00 "

* FOR SOFTWARE VERSION 1.45 *
* RELEASE DATE: FEB. 24th, 2004 *

M2000 TECHNICAL MANUAL

NTEP
NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

Fair Measure
For All

La mesure juste
pour tous

MESURES CANADA
MEASUREMENT CANADA

W&S

M2000 DIGITAL WEIGHT INDICATORS
M2000 A, M2000 A-S TECHNICAL MANUAL

Published by:

WESTERN SCALE CO. LTD.
1670 Kingsway Avenue
Port Coquitlam, B.C.
Canada
V3C 3Y9

WESTERN SCALE LOCATIONS

WESTERN SCALE CO. LTD.
1670 Kingsway Avenue
Port Coquitlam, B.C.
Canada
V3C 3Y9

Ph: (604) 941-3474
Fx: (604)-941-4020

www.westernscale.com
www.westernscale.ca
info@westernscale.ca

WESCALE INC.
DIVISION OF WESTERN SCALE
3873 Airport Way
Bellingham, WA.
USA
98227 - 9754

www.wescale.com
info@wescale.com

FOR TECHNICAL SUPPORT REGARDING THIS PRODUCT, PLEASE CALL:

(604) 941- 3474

FOR MORE INFORMATION, CONTACT info@westernscale.com

2000
INTRODUCTION

M2000 INDICATORS

Utilizing over 25 years of research and development in electronic weighing systems, Western's **M2000** high performance scale indicators are the industry standard for speed, versatility, and reliability.

M2000 weighing systems can be custom-tailored to meet the needs of any application and are ideal for new installations as well as upgrades to existing systems. The M2000 Indicator performs equally well on heavy industrial (Truck) scales and small capacity (packaging) scales. For a complete synopsis of M2000 Indicator functions and other custom weighing services, please visit www.westernscale.com or contact the Western Scale Co. Ltd. factory.

The **M2000** Indicator family includes:

- **M2000 A** – 3 Channel Analog Indicator (2 COM Ports). One of the world's best and most affordable high speed, fully featured indicators. For use with Analog loadcells.

- **M2000 A-S** – Single Channel Indicator (1 COM Port). M2000 features and quality at a low cost. For use with Analog loadcells.

- **M2000 D** - 3 Channel Digital Indicator (2 COM Ports). Digital Communication with your scale for maximum lightning protection and data integrity. Converts Analog loadcell signals to digital data at the scale via the DLC Smart Box.

This technical manual contains specific information regarding:

- **M2000 System Installations**
- **Scale Set-up**
- **Scale Calibration**
- **Enabling and Disabling M2000 functions**
- **Scale Communications**

The following information is for the exclusive use of Western Scale Dealers and Customers.

M2000 SYSTEM FEATURES

FAST.

- **100** weight samples per second on each channel
- **FASTSTEP** filtering: The industry's most advanced, algorithm-adjustable filter system

ACCURATE.

- Resolution: **520,000** internal A/D counts
- Up to **20,000** displayed divisions
- Measurement Canada & NTEP certified to **10,000** divisions

VERSATILE.

- Up to **3** independent Scale Channels
- Total Mode for summing Channels
- Fully Configurable Serial Communications
- Available Analog Output (4-20mA Option board)
- Up to 6 Setpoints available (Setpoint Option board)
- 4 Remote Inputs available (Remote Input Option board)
- Ticket Editor Interface for easy to create, custom weigh tickets (See M2000 Printing & Ticket Formatting Guide for more info)

DURABLE.

- A variety of enclosures to suit any application.

M2000 SLIMLINE

- 12 GA. Aluminum enclosure
- Powder Coated Finish
- External Power Supply
- **9" W** X **4" H** X **1 ¾" D**
- With bracket **10 ½" W** X, **4 ½" H** X **2" D**

M2000 DT (DESKTOP)

- Lightweight Stainless Steel enclosure
- No-skid foot pads
- **9 ¾" W** X **6" H** X **3 ¼" D**

M2000 LSB (LIGHTWEIGHT SWIVEL BRACKET)

- Lightweight Stainless Steel enclosure
- **7 ¼" W** X **10" H** X **2 ¾" D**
- Stainless Steel Mounting bracket

M2000 NSS (STAINLESS STEEL WASHDOWN)

- Stainless Steel enclosure with wall-mount tabs
- Suitable for damp environments
- **8" W** X **11 ½" H** X **4 ½" D**

M2000 NSS-1 (HEAVY DUTY)

- Heavy Duty Stainless Steel enclosure
- Suitable for tough, wet environments
- 6 Adjustable, Stainless Steel latches
- **8" W** X **11 ½" H** X **4 ½" D**

M2000 PRE-INSTALLATION

RECEIVING INSPECTION

It is always good practice to verify that the M2000 Indicator Kit is undamaged upon receipt.

- Check over packaging for any signs of damage.

- Remove the M2000 indicator from its protective packaging and check for damage.

Each M2000 Indicator Kit should include:

❑ M2000 Indicator

❑ External 12 Volt Power Supply & Power cord (Slimline models only)

❑ M2000 User Manual

❑ Capacity Label Set

❑ Removable Connectors for all terminals in the back of the M2000

❑ Verify that the correct number of cable strain-reliefs are included
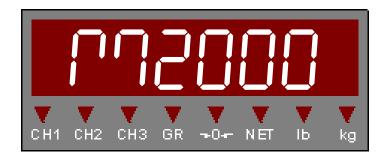
⚠ BE SURE TO CHECK THAT ALL NECESSARY OPTION BOARDS HAVE BEEN INCLUDED.

M2000 USER INTERFACE (DISPLAY & KEYPAD)
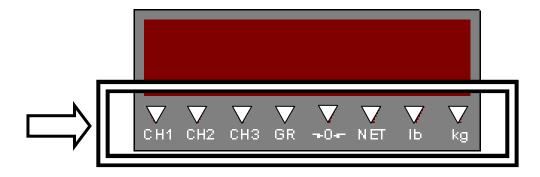
M2000 Displays are split into two components: The Alpha-Numeric Weight Display and the LED indicators.

ALPHA-NUMERIC DISPLAY

- The Alpha-Numeric Weight Display has **6** multi-character LED's. Scale weights, Error messages, and Calibration information are shown here.

- A negative weight is shown by a **(-)** minus sign on the far left LED character.

- The number of decimal points on the display is determined in Calibration Mode. (See Scale Set-Up Parameters - Page **30**)

- On power-up, a scrolling "**M2000**" will be displayed, followed by the software version number. The scale weight will then be displayed.

LED INDICATOR LAMPS

- These triangular **LED's** will illuminate to indicate certain scale conditions.

SCALE CHANNEL 1 INDICATOR

▼
CH1

Illuminated LED indicates the weight from **Scale Channel 1** is displayed. A blinking LED indicates **MOTION** on the scale.

SCALE CHANNEL 2 INDICATOR

▼
CH2

Illuminated LED indicates the weight from **Scale Channel 2** is displayed. A blinking LED indicates **MOTION** on the scale.

SCALE CHANNEL 3 INDICATOR

▼
CH3

Illuminated LED indicates the weight from **Scale Channel 3** is displayed. A blinking LED indicates **MOTION** on the scale.

GROSS WEIGHING MODE INDICATOR

▼
GR

Indicates the scale is in **GROSS** weighing mode (No tare is stored).

CENTRE ZERO INDICATOR

▼
➡ **0** ⬅

Indicates scale is within **0.2** graduations of true **ZERO**. May illuminate with a displayed weight in **NET** mode or if **Tare Offset** is being utilized.

NET WEIGHING MODE INDICATOR

▼
NET

Indicates the scale is in **NET** weighing mode (Scale has a tare weight stored).

LB INDICATOR

▼
lb

The scale is weighing in **IMPERIAL** units (Pounds or a fraction thereof).

KG INDICATOR

▼
kg

The scale is weighing in **METRIC** units (Kilograms or a fraction thereof).

SCALE MOTION INDICATOR

▼
CH3

A blinking Scale Channel LED indicates **MOTION** on that scale.

TOTAL MODE INDICATOR

▼ ▼ ▼
CH1 CH2 CH3
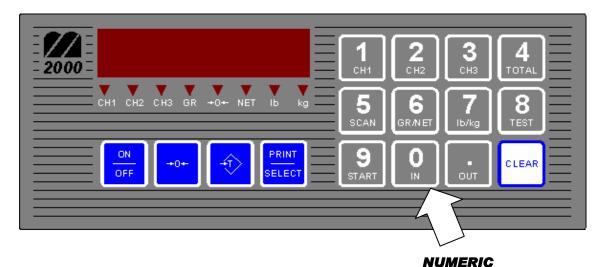
Multiple illuminated Scale Channel LED's indicate **TOTAL MODE.** Only those channels illuminated are included.

KEYPAD & KEY FUNCTIONS

NUMERIC
KEYS

ON / OFF KEY

Powers-up the M2000. The key must be pressed and held for **1 second** to turn the M2000 off.

⚠️ The **[ON/OFF]** key is not hard wired to the M2000 power supply. A Power Bypass function is available for Process Control and other applications. (See Power Switch Bypass - Page **47**)

ZERO SCALE KEY

Removes small, residual weight values to return the displayed weight to zero. The **Centre Zero** LED will be illuminated.

If the **[ZERO SCALE]** button is pressed in **NET** weighing mode, the stored tare weight will appear as a negative weight on the display.

The scale **cannot** be zeroed if:

- The **[ZERO]** key has been disabled.
- The scale is in **MOTION.**
- The residual weight on the scale is too great (More than **2%** of Scale Capacity. See Push to Zero Window – Page **40**)

Three rapid beeps will sound to indicate any of these conditions!

CLEAR KEY

Press the **[CLEAR]** key to erase previously entered tare values. The **[CLEAR]** key will also function to cancel any keypad entry.

TARE KEY

There are 2 methods used to tare the scale:

Method 1: Tare a random weight on the scale.

- Place an item of unknown weight on the scale. (Container, Box, etc.)

- Press the **[TARE]** key and the displayed weight will be tared. Note that the **NET** LED will illuminate to indicate that the scale is now in **NET** mode.

Method 2: Manually enter a tare.

- With a stable weight on the scale, enter the desired tare weight using the numeric keypad, followed by the **[TARE]** key. The **NET** LED will illuminate to indicate the scale is in **NET** mode.

- If the scale was at **zero**, the tare will be displayed as a negative weight.

The scale **cannot** be tared if:

- There is a negative weight on the scale.
- The scale is in motion.
- The **[TARE]** function is disabled. (See Tare Mode - Page **42**)

PRINT | SELECT KEY

The **[PRINT/SELECT]** key has two functions:

Function 1: PRINT a Weigh Ticket to a printer.

- Press the **[PRINT/SELECT]** key. A ticket will be sent to the printer connected to an M2000 COM Port. (See the M2000 Printing & Ticket Formatting Guide for more information)

Function 2: SELECT a function.

- Enter the function number on the numeric keypad, followed by the **[PRINT/SELECT]** key.
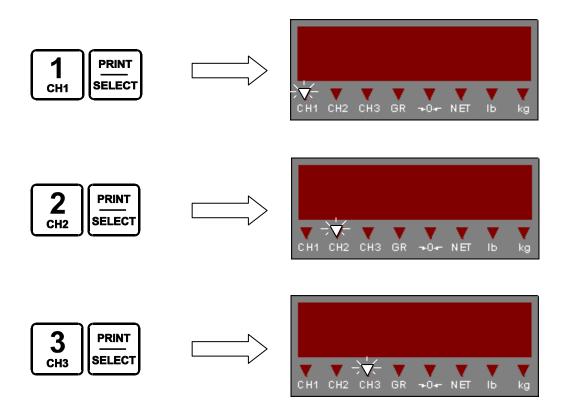
See M2000 Functions – Page 10.

M2000 USER FUNCTIONS

M2000 functions are accessible via the keypad. To prevent accidental misuse, some functions may need to be enabled upon installation. Additional fine-tuning may also be recommended to maximize a weighing systems performance. To help your customer get the most out of the M2000, discuss specific system requirements with them prior to installation.

SELECTING SCALE CHANNELS

- M2000 Indicators utilize **3** independent scale channels. **Channel 1** is the default scale channel.

- To view the weight display for the desired channel, press the channel number on the **numeric keypad** followed by the **[PRINT/SELECT]** key.

- Note the appropriate **Scale Channel LED indicator** will illuminate.

⚠ **Scale Channels 2 & 3** *must be enabled in Calibration/Set-up Mode.* (See Enable Scale Channel – Page **44)**

TOTAL MODE (SUMMING CHANNELS)

[4 TOTAL] [PRINT SELECT]
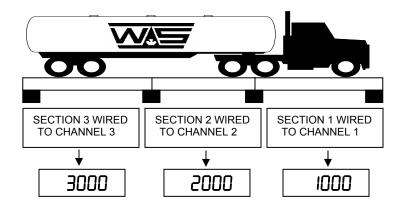
- Up to 3 channels may be summed together to display a total weight.
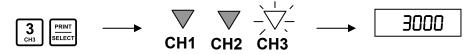
- Only channels that are enabled and calibrated with the **same** *grad size*, *decimal places*, and *units of weight* will be displayed in **TOTAL MODE**.

- **Channel 1** is always included in **TOTAL MODE**.

- **TOTAL MODE** is indicated when more than one of the Scale Channel LEDs are illuminated.

- To return the M2000 to Single Channel Mode, select a channel followed by the **[PRINT/SELECT]** key.

TOTAL MODE EXAMPLE 1:
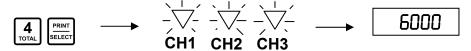
- A Truck scale with 3 sections.

- Each section is wired to a separate channel on the M2000, allowing the operator to record the total weight of the vehicle along with the individual axle weights.

SECTION 3 WIRED TO CHANNEL 3	SECTION 2 WIRED TO CHANNEL 2	SECTION 1 WIRED TO CHANNEL 1
3000	2000	1000

1. To view the rear axle weight (Section 3), select **Scale Channel 3**. (**CH3** LED will illuminate)

   [3 CH3] [PRINT SELECT] ⟶ ▽ CH1   ▽ CH2   ▽ CH3 ⟶ | 3000 |

2. To view the total weight (Sum of all sections), enter **TOTAL MODE**. Press **[4]**, followed by the **[PRINT/SELECT]** key. (**CH1**, **CH2**, & **CH3** LEDs will illuminate)

   [4 TOTAL] [PRINT SELECT] ⟶ ▽ CH1   ▽ CH2   ▽ CH3 ⟶ | 6000 |

TOTAL MODE EXAMPLE 2:

- **3** Floor scales, each using a channel on a single M2000.

- **CH1** and **CH3** are calibrated as 2000 x 2 lbs.

- **CH2** is calibrated to 500 x 0.2 lb.

As a result, **only Channels 1 and 3 will be included in Total Mode**.

1. Press **[4]**, followed by the **[PRINT/SELECT]** key.

[4 TOTAL] [PRINT SELECT]

2. The **CH1** and **CH3** LED indicators will illuminate.

CH1   CH2   CH3

3. The weight on the display is the sum of these two channels.

SCALE OPERATIONS IN TOTAL MODE

- Pressing the **[ZERO SCALE]** button will zero *all the channels* that are included in **Total Mode**.

- The **TARE** function will tare all channels included in **Total Mode** simultaneously, displaying the total NET weight.

- The **MOTION** and **SCALE ZERO** LEDs will indicate the status of all the scales included in **Total Mode**. (E.g. If Channel 1 has MOTION, Motion will be indicated for Total Mode)

⚠ **TOTAL MODE** must be enabled in Calibration before it can be used. (See Enable Total Mode - Page **45**)

⚠ **TOTAL MODE** *cannot be used in legal for trade applications in Canada*!

SCAN MODE

- **SCAN MODE** allows the indicator to cycle between the scale channels that are enabled.

[5 SCAN] [PRINT/SELECT]

- The M2000 will automatically switch the display to the next available channel and pause for **3** seconds before switching to the next channel.

- To enter **SCAN MODE**, press **[5]** followed by the **[PRINT/SELECT]** key.

- Select a specific channel to stop scanning.

GROSS / NET WEIGHING MODES

- To change the weighing mode, press **[6]** followed by the **[PRINT/SELECT]** key.

[6 GR/NET] [PRINT/SELECT]

- If the M2000 has a tare value stored, it will toggle between **GROSS** and **NET** weighing modes.

- If no tare value is stored, the M2000 will remain in **GROSS** weighing mode.

SELECTING POUNDS / KILOGRAMS

- To change the weighing units on the display, press **[7]** followed by the **[PRINT/SELECT]** key.

[7 lb/kg] [PRINT/SELECT]

- The indicator will toggle units from **lbs** to **kgs** or **kgs** to **lbs**.

- Either unit of measurement can be set up as the default. (See Power On Units – Page **46**)

TEST DISPLAY

- To test the display segments, press **[8]** followed by the **[PRINT/SELECT]** key.

[8 TEST] [PRINT/SELECT]

- All the segments in the display will light up for a short period of time.

SECURITY FEATURES

ELECTRONIC SEAL

M2000 Set-Up and Calibration settings are electronically sealed with a password. This safeguard helps prevent accidental or unauthorized alteration of important scale settings.

THE PASSWORD

Passwords are 4 digit numbers (0000 to 9999). The **factory default** for the password is **1111**, and can be changed in Calibration Mode.

If an incorrect Password is entered, the M2000 display will read:

```
┌──────────────┐
│    FA iL      │
└──────────────┘
```

⚠ **IMPORTANT:** IF THE PASSWORD IS FORGOTTEN, CALIBRATION MODE WILL BE INACCESSIBLE. CONTACT THE **WESTERN SCALE CO. LTD.** FACTORY FOR ASSISTANCE.

VIEW OR CHANGE THE PASSWORD - PARAMETER 96

The Password must be changed in the M2000's Calibration Mode.
(See Enter Calibration Mode - Page **28**)

To view the current Password:

- Enter **Parameter 96**. The current Password is displayed.

- Press the **[CLEAR]** key to exit without changing.

To change the Password:

- Enter **Parameter 96**. The current Password is displayed.

- Enter a new 4 digit Password followed by the **[PRINT/SELECT]** key.

AUDIT TRAIL

The M2000 is equipped with a Category 1 Audit Trail system. The Audit Trail has two counters:

Calibration Counter: Changing parameters that affect the calibration of weight will increment the Calibration counter by 1.

Config. Counter: Changes to all other parameters (Configuration parameters) will increment the Parameter counter by 1.

The counters will count from **000** to **999** before rolling over again. Changing one or more parameters will increment the counter by 1 (One Counter tick per Calibration session). Only an actual change of value to the Calibration or Set-Up parameters will register to the Audit Trail.

> *Important Note: Because the Audit Trail becomes active at the factory, the counters may not initially show 0, even when the M2000 is new out of the box.*

> IT IS **EXTREMELY IMPORTANT** THAT THE CORRECT TIME AND DATE BE SET FOR THE AUDIT TRAIL TO BE ACCURATE. THE AUDIT TRAIL IS PERMANENT AND CANNOT BE DISABLED OR ERASED BY REMOVING THE INTERNAL BATTERY.

ACCESSING THE AUDIT TRAIL

The Audit Trail can only be accessed from **Normal Weighing Mode**.

1. Enter **1000** followed by the **[PRINT/SELECT]**. The message "Aud it" will briefly be displayed.

| 1 CH1 | 0 IN | 0 IN | 0 IN | PRINT SELECT | ⟶ | Aud it |

2. Shortly after, the M2000 will display (in order) the date of the last change made to the M2000's calibration parameters, the Calibration (CAL) counter, and the Configuration (CFG) counter.

| 03. 10.3 1 | ⟶ | CAL.00 1 | ⟶ | CFG.00 1 |

You may press the **[CLEAR]** key at any time to cancel this operation.

BATTERY REPLACEMENT ON THE M2000

The M2000 uses a 3 Volt Lithium Battery to run the real-time clock and backup the indicator's memory. Power is drawn from the battery only when the indicator is disconnected from the 12 Volt power supply. So, if the indicator is in regular use, the battery should have a long lifespan.

TESTING THE BATTERY - PARAMETER 244

Description: Used to take a measurement of the 3 Volt lithium battery. Voltage levels are in mV and can be interpreted below.

In Calibration Mode, enter **Parameter 244**.

PARAMETER VALUE	SETPOINT FUNCTION
3000 (3.0V)	3 Volts and above is considered good.
2700 (2.7V)	2.7 Volts and above is considered acceptable.
2600 (2.6V)	2.6 Volts or less is considered as low. Replace battery.

REPLACING THE BATTERY

1. Remove the M2000's back cover.

2. A coin-sized battery is located in a battery holder. (Upper left corner of the M2000 PCB).

3. Use your fingers to grab each edge of the battery.

4. Gently pull on an angle removing the battery from the holder.

Replace the battery with a type **RENATA CR2450N 3V 540mAh lithium battery** or equivalent. This battery should be available at most electronics stores.

NEVER USE METAL OBJECTS SUCH AS SCREWDRIVERS TO REMOVE THE BATTERY. THIS CAN RESULT IN PERSONAL INJURY AND/OR A SHORT-CIRCUITING OF THE BATTERY CAUSING DAMAGE TO THE INDICATOR.

//2000

INSTALLATION

POWER REQUIREMENTS

M2000 Indicators are precise electronic instruments that require clean, quality power. Most M2000 models plug into **120 VAC** external power. Inside the enclosure, a **12 VDC** power supply adaptor is utilized to run the indicator.

Slimline models connect to this power supply (included) externally.

> ⚠ It is important to note that in very noisy industrial environments, power-conditioning filters would be a requirement to ensure fail-safe operation under all conditions. Indicators should not share AC power with electrical motors and switchgear. Consult with the site engineer for clean AC power.

POWER AIDS

The following items may prove useful for some installations:

- Line Filters and Surge Protectors: For installations in minor static environments.

- Constant Voltage Transformers: For installations where the power circuit is shared.

- True Uninterrupted Power Supply (UPS): For installations with highly unstable power sources.

BATTERY POWER

A **12 Volt** battery may be used to power the M2000.

The M2000 draws **200 mA**, which will allow the indicator to run from a full 12 Volt car battery for a long time. However, **the M2000 provides no "Low Power" indication.**

> ⚠ USE OF A BATTERY TO POWER THE M2000 IS NOT RECOMMENDED. IF POSSIBLE, THE 12 VDC POWER SUPPLY INCLUDED WITH THE INDICATOR SHOULD BE USED AT ALL TIMES.

> ⚠ IN CASES WHERE THE M2000 IS INSTALLED IN A VEHICLE, POWER CONDITIONING MUST BE PROVIDED. CONTACT THE WESTERN SCALE CO. LTD. FACTORY FOR DETAILS.

GROUNDING REQUIREMENTS

Proper grounding of weighing system components is essential to avoid problems with static, transmission line "noise", and voltage surges that may damage the equipment. It is essential that M2000 Indicators have a good ground connection.

STATIC ENVIRONMENTS

To reduce static interference, some weighing systems should have a solid connection from the **scale base** to Earth Ground.

This includes:

- Systems incorporating conveyors

- Systems incorporating Shrink-wrappers

- Other devices that produce a lot of static

- Devices used to weigh static-charged materials (such as plastics) should also be grounded in this fashion.

LINE NOISE

To reduce line noise, connect the Loadcell shield wire to the Ground terminal, labeled "**GND**", on the back of the M2000.
(See M2000A Wiring Terminals – Page **21**)

> PLEASE NOTE THAT THE GROUNDING REQUIREMENTS FOR THE **M2000D DIGITAL SYSTEM** ARE MUCH MORE STRINGENT! FOR MORE INFORMATION ABOUT THE M2000D AND LIGHTNING PROTECTION, SEE THE M2000D TECHNICAL MANUAL OR CONTACT THE WESTERN SCALE FACTORY.

ACCESSING THE M2000 TERMINALS

⚠	DISCONNECT POWER TO THE M2000 BEFORE OPENING THE ENCLOSURE FOR INSTALLATION OR SERVICING.

M2000 SLIMLINE

- Remove the Terminal Access Cover (2 small Phillips screws on back of indicator).

M2000 DT (DESKTOP)

- Remove 4 small Phillips screws on side of indicator enclosure.

- Carefully lift top portion of stainless steel enclosure.

M2000 LSB (LIGHTWEIGHT SWIVEL BRACKET)

- Remove 8 medium Phillips screws on the back of the stainless steel enclosure.

- Lift back plate away.

M2000 NSS (STAINLESS STEEL WASHDOWN)

- Remove 8 medium Phillips screws from the front of the stainless steel enclosure.

- Carefully lift the front plate.

M2000 NSS (STAINLESS STEEL WASHDOWN)
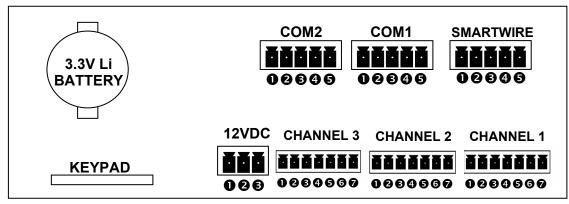
- Release the 6 adjustable enclosure latches.

- Carefully lift the front plate.

⚠	TO AVOID THE RISK OF DAMAGE TO EQUIPMENT, DO NOT CONNECT OR DISCONNECT ANY TERMINAL CONNECTORS WHEN POWER IS BEING SUPPLIED TO THE M2000.

M2000A WIRING TERMINALS

All wiring to M2000 indicators terminate at the main circuit board. If possible, all wiring to the M2000 motherboard should be done before power is applied to the unit.

BACK OF M2000 PCB

COM1 RS 232/422 PORT	❶	CTS	Clear To Send (Input – M2000 checks if communication is available)
	❷	RX	Receive Data (Input – Data received by the M2000)
	❸	TX	Transmit Data (Output – Data transmitted by the M2000)
	❹	RTS	Request To Send (Output – Signals M2000 ready to receive data)
	❺	COM	Common (Ground)

COM2 RS 232/422 PORT	❶	CTS	Clear To Send (Input – M2000 checks if communication is available)
	❷	RX	Receive Data (Input – Data received by the M2000)
	❸	TX	Transmit Data (Output – Data transmitted by the M2000)
	❹	RTS	Request To Send (Output – Signals M2000 ready to receive data)
	❺	COM	Common (Ground)

MAIN POWER CONNECTOR 12VDC	❶	V-	(Negative)
	❷	GND	(Earth ground)
	❸	V+	(Positive power)

SMARTWIRE FOR PERIPHERAL INTERFACE	❶	NC	(No connection)
	❷	B	(RS485 differential signal)
	❸	A	(RS485 differential signal)
	❹	V+	(SMARTWIRE Power supply)
	❺	V-	(SMARTWIRE Power supply)

SCALE CHANNEL 1,2,3 FOR LOADCELL CONNECTION	❶	- EXC	(Negative Excitation)
	❷	- SNS	(Negative Sense)
	❸	+ SNS	(Positive Sense)
	❹	+ EXC	(Positive Excitation)
	❺	SHLD	(Loadcell cable Shield)
	❻	- SIG	(Negative Signal)
	❼	+ SIG	(Positive Signal)

M2000A ANALOG LOADCELL WIRING

Loadcell connections are labeled as follows:

LABEL	CONNECTION
- EXC	Negative Excitation
- SNS	Negative Sense
+ SNS	Positive Sense
+ EXC	Positive Excitation
SHLD	Loadcell Shield
- SIG	Negative Signal
+ SIG	Positive Signal
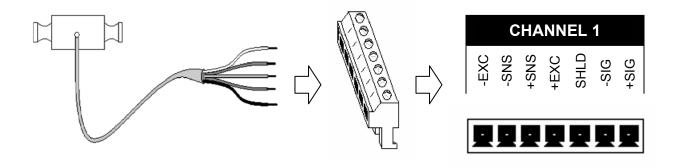
⚠ BE SURE TO CHECK THE LOADCELL MANUFACTURER'S INSTRUCTIONS FOR THE CORRECT WIRE COLOUR CODE.

SCALE SYSTEMS WITH ONE LOADCELL ONLY

The Loadcell is wired directly to the M2000A using a 7 pin terminal connector. The connector can be unplugged from the M2000 to make wiring easier.

- Pass the loadcell cable through the strain-relief, into the enclosure (Not required for Slimline models).

- Terminate the loadcell wires, according to the Loadcell Connection table above. Make sure each wire is securely fastened in the appropriate position.

- Plug the connector into the appropriate terminal (Scale Channel).

- Re-assemble the M2000 enclosure as necessary.

IMPORTANT WIRING NOTE!
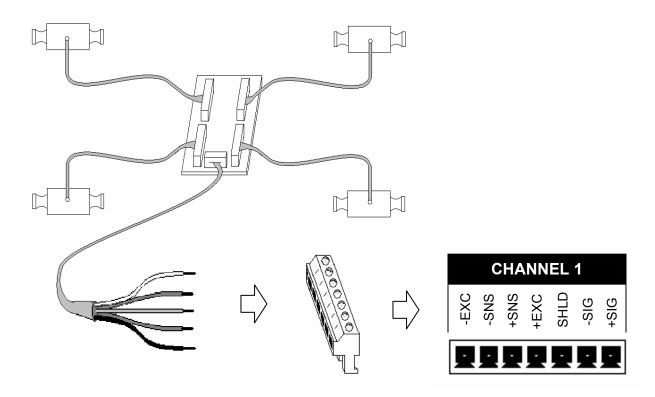
> ⚠ When connecting loadcells without SENSE wires, the **+EXC** wire **must** be jumpered to the **+SNS** terminal and the **–EXC** wire **must** be jumpered to the **–SNS** terminal.

SCALE SYSTEMS WITH MULTIPLE LOADCELLS
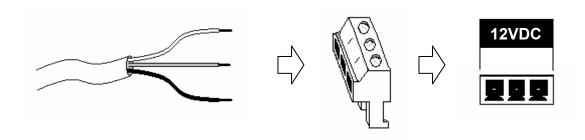
These systems typically utilize a Summation board that is wired to the M2000A using 7 pin terminal connectors. The connectors can be unplugged from the M2000 to make wiring easier.

- Terminate the loadcell wires at the Sum board, making sure each wire is securely fastened in the appropriate position.

- Pass the cable from the Sum board through the strain-relief, into the enclosure (Not required for Slimline models).

- Terminate the wires from the Sum board to the connector. Make sure each wire is securely fastened in the appropriate position.

- Plug the connector into the appropriate terminal (Scale Channel).

- Re-assemble the M2000 enclosure as necessary.

WIRING POWER TO M2000 INDICATORS

1.   Pass the power cable through the strain-relief, into the enclosure (Not required for Slimline models).

2.   Terminate the power wires to the connector in the terminal labeled "**12VDC**", making sure each wire is securely fastened in the appropriate position.

- The "HOT" wire from the 12 VDC Power Supply connects to the **"+"** terminal.

- The "NEGATIVE" wire from the 12 VDC Power Supply connects to the **"-"** terminal.

- Make sure the Earth Ground wire is securely connected to the **"GND"** terminal.
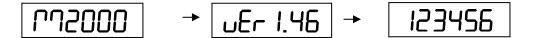
| | PLEASE PAY CLOSE ATTENTION TO THE **POLARITY** OF THE POWER CORD! WIRING POWER INCORRECTLY MAY DAMAGE THE M2000! |

M2000 POWER UP

- On power up, M2000 Indicators should display a scrolling "M2000" followed by the software version number.

- If the scale system has been installed correctly, a weight should then be displayed.

M2000	→	uEr 1.46	→	123456

TROUBLE SHOOTING

IF THE M2000 DOES NOT POWER UP:

- Check External power source and Circuit Breaker.

- Check 12V Power Supply and replace if necessary.

IF THE ALPHA-NUMERIC DISPLAY SHOWS:

UUUUUU

- There is no Signal Input. The loadcell cable to the M2000 may have been disconnected, wired incorrectly, or severed. The loadcell could be defective.

- **Sense** lines from the loadcell have not been terminated. Connect Sense wires or jumper **+EXC** to **+SNS** and **–EXC** to **–SNS**.

AAAAAA

- The loadcell's output is beyond the M2000's Input Voltage Range. (See Parameter 11 - Page **47** to adjust this range)

888888

- The scale is overloaded at the M2000's default settings. Remove any weights that may be on the scale and Deadload the scale. (See Parameter 12 – Page **32**)

EEEEEE

NOTES:

M2000

STANDARD
CALIBRATION & SET-UP

CALIBRATION MODE

All **Calibration** and **Set-up** functions are executed via the keypad in Calibration Mode. Each function or parameter has a unique code with which to access and edit values. For a complete listing of all parameters, see **Appendix A**.

ENTERING INTO CALIBRATION MODE

TO ENTER CALIBRATION MODE FOR SCALE CHANNEL 1:

1 CH1	9 START	PRINT SELECT

1. Enter **19** followed by the **[PRINT/SELECT]** key.

2. The display will flash " *PASS* ". At this point, a four-digit password is required.

`C 12320`

3. Enter **1111** (factory default password). A blinking "**C**" should appear on the left hand side of the display, indicating Calibration Mode has been entered. (For more information on passwords, see Security Features - Page **14**)

⚠ Note: To enter Calibration Mode for Channels 2 & 3, use Parameters **29** & **39** respectively and follow the exact same steps as for Channel 1.

ENTERING COMMANDS IN CALIBRATION MODE

SELECT A PARAMETER

- Calibration & Set-up parameters are selected by entering their **unique numeric code** followed by the **[PRINT/SELECT]** key. This method is similar to selecting a function in Normal Weighing Mode.

EDIT A PARAMETER

- After a parameter is selected, its current value will be displayed. There is a **6 second** window to edit the parameter. Parameter values are entered using the **numeric keys** followed by the **[PRINT/SELECT]** key.

- In some cases, the **[TARE]** key must be used to enter a parameter value. Specific Parameter Descriptions will address the use of the **[TARE]** key.

KEY FUNCTIONS IN CALIBRATION MODE

ON / OFF	Cycles the display between Graduated Counts (Displayed weight prefixed by a blinking letter "C") and Raw Internal Counts (Prefixed by a blinking letter "A").
→0←	Continues to function as in normal **Weighing Mode.**
→T	Confirms entry of new Parameter Values (in certain cases only).
PRINT / SELECT	Select Parameters and confirms entry of most Parameter Values.
CLEAR	Aborts any parameter change without saving.
0 IN	Used to **increase** some parameter values. Specific Parameter Descriptions will address the exact function of this key.
. OUT	Used to **decrease** some parameter values. Specific Parameter Descriptions will address the exact function of this key.

EXIT CALIBRATION MODE - PARAMETER 99

Description: Exits Calibration Mode and restarts the M2000. All calibration changes are **saved** to flash memory and the Audit Trail is updated.

1.   Enter **99** followed by the **[PRINT/SELECT]** key.

[9 START] [9 START] [PRINT SELECT]

2.   The display will flash, run through a save series, and return to Normal Weighing Mode.

CAL	→	SAvE	→	WAit	→	0.0

STANDARD SCALE SET-UP PARAMETERS

The following parameters are standard for getting a scale up and running.

DECIMAL POINT POSITION - PARAMETER 2

Description: Sets the number of decimal places to correspond with Grad Size.

PARAMETER VALUE	DISPLAY EXAMPLE
0 (default)	123456.
1	12345.6
2	1234.56
3	123.456
4	12.3456

GRADUATION SIZE - PARAMETER 3

Description: The number the scale will count by.

PARAMETER VALUE	DISPLAY EXAMPLE
1 (default)	1, 2, 3, etc.
2	2, 4, 6, etc.
5	5, 10, 15, etc.
10	10, 20, 30, etc.
20	20, 40, 60, etc.
50	50, 100, 150, etc.
100	100, 200, 300, etc.

SCALE CAPACITY - PARAMETER 4

Description: True Scale Capacity. The Zero Range is calculated from this value.
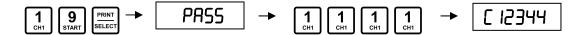
Accepted Parameter Values: **Any number (weight) up to 999999**.

⚠ For "Scale Over" above True Scale Capacity, see **Parameter 8 – Page 46**.

EXAMPLE: **SET UP A 5,000 LB. CAPACITY SCALE WITH A GRADUATION SIZE OF 0.5 LB. ON CHANNEL 1.**

1. Enter Calibration Mode for Channel 1.

[1 CH1] [9 START] [PRINT SELECT] → PASS → [1 CH1] [1 CH1] [1 CH1] [1 CH1] → C 12344
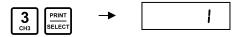
2. Select the weighing units for Set-Up by pressing **7** followed by the **[PRINT/SELECT]** key. Either the **lb** or **kg** LED indicator LED will illuminate.

3. To select Decimal Point Position, press **2** on the keypad followed by **[PRINT/SELECT]**. The display will show the current position (default: 0).

[2 CH2] [PRINT SELECT] → 0

4. For 1 decimal place, press **1** on the keypad followed by the **[PRINT/SELECT]** key.

[1 CH1] [PRINT SELECT] → C 1234.4

5. To select Graduation size, press **3** on the keypad followed by **[PRINT/SELECT]**. The display will show the current Graduation size (default: 1)

[3 CH3] [PRINT SELECT] → 1

6. For a grad size of half a pound, press **5** on the keypad followed by **[PRINT/SELECT]**.

[5 SCAN] [PRINT SELECT] → C 1232.5

7. To select Scale Capacity, press **4** on the keypad followed by **[PRINT/SELECT]**. The display will show the current Scale Capacity.

[4 TOTAL] [PRINT SELECT] → C 1000.0

8. For a Scale Capacity of 5,000 lb., enter **5000** on the keypad followed by the **[PRINT/SELECT]** key.

[5 SCAN] [0 IN] [0 IN] [0 IN] [PRINT SELECT]

The Scale is now ready for calibration and/or more advanced Set-Up.

SCALE CALIBRATION PARAMETERS

The following parameters relate to basic Scale Calibration.

SCALE CALIBRATION UNITS - PARAMETER 7

Description: Selects measurement units for calibration. Test Weight units should match Calibration units. Verify on indicator display.

- Toggle weighing units by pressing **7** followed by the **[PRINT/SELECT]** key.

DEADLOAD SCALE - PARAMETER 12

Description: Identifies the weight of the scale itself. Before spanning the scale for the first time, the scale must be deadloaded.

EXAMPLE:

1. Ensure that all test weights are removed from the weighing platform and that the weight is stable.

2. Enter **12** followed by the **[PRINT/SELECT]** key. The Indicator Password will be required (Factory default "**1111**").

[1 CH1] [2 CH2] [PRINT SELECT] → | PASS | → [1 CH1] [1 CH1] [1 CH1] [1 CH1] → | -dEAd- |

3. After the deadload is complete, the indicator will briefly display the Deadload Value in raw A/D counts before returning to weight display mode.

| 1933 | → | C   0.0 |

Older M2000 software versions (**1.44** and older) will not prompt for the Password when the scale is deadloaded. Instead, the "Reconfirm" screen appears.

| r |

At this point, press **[1]** followed by the **[PRINT/SELECT]** key to activate the deadload function.

[1 CH1] [PRINT SELECT] → | -dEAd- |

> **IMPORTANT NOTICE FOR HIGH CAPACITY SCALES & SCALES UTILIZING A LARGE NUMBER OF LOADCELLS!**
>
> PLEASE VERIFY THAT THE CORRECT ANALOG INPUT RANGE IS SET BEFORE PROCEEDING TO SPAN SCALE. (SEE PARAMETER 11 - PAGE **47**)

SET SPAN - PARAMETER 13

Description: Calibrates (Spans) the scale with a known Test Weight.

EXAMPLE: IN CALIBRATION MODE, SPAN A SCALE TO 5,000 LBS.

1. Verify that scale is reading zero with the **Centre of Zero** LED illuminated.

        ┌──────────┐
        │ C   0.0 │
        └──────────┘

2. Place Test Weights on the scale (**5,000 lbs**).

3. Enter **13** followed by the **[PRINT/SELECT]** key. Once activated, the current displayed weight will be frozen on the display.

    [1 CH1] [3 CH3] [PRINT SELECT] → ┌──────────┐
                                      │ C4276.5 │
                                      └──────────┘

4. Enter the known test weight value followed by the **[PRINT/SELECT]** key. The display will show the new, corrected weight on the scale.

    [5 SCAN] [0 IN] [0 IN] [0 IN] [PRINT SELECT] → ┌──────────┐
                                                    │ C5000.0 │
                                                    └──────────┘
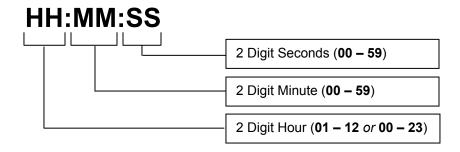
TIME & DATE ON THE M2000

M2000 Indicators have a built-in Time & Date Clock that is Y2K compliant and automatically adjusts for leap years. The real time clock runs from a battery on the main board and will continue to operate when power is cut. The time and date settings are changed when the M2000 is in Normal Weighing Mode.

PARAMETER 80 - SET TIME

Using the numeric keypad, enter the new 6-digit time in the format shown below. Press **[PRINT/SELECT]** to save the new time or cancel at any time by pressing the **[CLEAR]** key.

HH:MM:SS

| 2 Digit Seconds (**00 – 59**) |
| 2 Digit Minute (**00 – 59**) |
| 2 Digit Hour (**01 – 12** *or* **00 – 23**) |

EXAMPLE: *11:00 AM*

1. Select **Parameter 80**. The current time will be displayed.

[8 TEST] [0 IN] [PRINT/SELECT] → | *10.00.00* |

2. Enter the new time, followed by the **[PRINT/SELECT]** key.

[1 CH1] [1 CH1] [0 IN] [0 IN] [0 IN] [0 IN] [PRINT/SELECT]
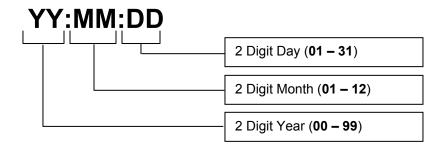
⚠ FOR 12-HOUR CLOCK MODE, PARAMETER 83 MUST BE USED TO SELECT **AM** OR **PM**.

PARAMETER 81 - SET DATE

Using the numeric keypad, enter the new 6-digit date in the format shown below. Press **[PRINT/SELECT]** to save the new date or cancel at any time by pressing the **[CLEAR]** key.

YY:MM:DD

2 Digit Day (**01 – 31**)

2 Digit Month (**01 – 12**)

2 Digit Year (**00 – 99**)

EXAMPLE: *January 1, 2004*

1. Select **Parameter 81**. The current date will be displayed.

| 8 TEST | 1 CH1 | PRINT SELECT | ➡ | 01.01.01 |

2. Enter the new time, followed by the **[PRINT/SELECT]** key.

| 0 IN | 4 TOTAL | 0 IN | 1 CH1 | 0 IN | 1 CH1 | PRINT SELECT |

PARAMETER 83 - TIME FORMAT

Description: Controls Time Format settings. 12 Hour or 24 Hour (military time) clock settings are available.

PARAMETER VALUE	TIME FORMAT
0 (default)	24 Hour Mode
1	12 Hour Mode AM
2	12 Hour Mode PM

NOTES:

2000

ADVANCED
CALIBRATION & SET-UP

SCALE MOTION PARAMETERS

The following parameters are used for adjusting **MOTION** characteristics. These settings are useful for installations experiencing instability problems, and adjusting the performance of the Motion character in the Output string.

MOTION WINDOW MULTIPLIER - PARAMETER 5

Description: Determines the scale's sensitivity to motion.

This Parameter Value is multiplied by the Graduation Size to give the **Motion Window**. A change in weight must be greater than this window to activate the **MOTION** LED.

To decrease Motion Sensitivity, increase the value of this parameter.

Default Value: **2** - When Graduation Size (Parameter 3) is set, the Motion Window is automatically set to **2 times** the Graduation size.
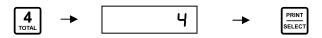
Accepted Values: **1 – 10**

EXAMPLE: **AN OLD AND UNSTABLE SCALE. THE WEIGHT IS NOT SETTLING FAST ENOUGH. DECREASE MOTION SENSITIVITY.**

1. In Calibration Mode, press **5**, followed by the **[PRINT/SELECT]** key to select "Motion Window." A **"2"** will be displayed (Default value).

2. Press **4** followed by the **[PRINT/SELECT]** key to double the value.

3. The motion sensitivity will now be **4** times the graduation size. If the Grad Size is **10 kg**, MOTION will not be indicated (blinking LED) unless the weight on the scale changes by more than **40 kg** (4 x 10 kg).

  BE SURE TO REFERENCE LOCAL REGULATORY REQUIREMENTS.

MOTION SETTLE TIME - PARAMETER 24

Description: Displays the number of ¼ **second** intervals that Motion will be indicated after the scale reading has stabilized within tolerance.

Motion is indicated by:

- A blinking Scale Channel LED.

- The presence of an ASCII character **'M'** in the Output String. (For most Output String Formats)

Default Value: **8 (2 seconds)**

Accepted Values: **1 - 255**

EXAMPLE: **THE SCALE COMMUNICATES WITH A CONTROL SYSTEM OR DATABASE. THE SYSTEM WANTS TO SEE A STABLE WEIGHT FOR AT LEAST 4 SECONDS BEFORE IT PROCESSES THE SCALE INFORMATION.**

1. Enter **24** followed by the **[PRINT/SELECT]** key. An '*8*' will be displayed (Default value).

| 2 CH2 | 4 TOTAL | PRINT SELECT | → | 8 |

2. **Sixteen (16)** ¼ second intervals are needed for a Motion Settle Time of **4 seconds** (16 x ¼ sec).

| 1 CH1 | 6 GR/NET | PRINT SELECT |

ZERO SCALE PARAMETERS

Track-off mud, dirt, rocks or other materials that may accumulate on the scale. Also, utilize Zero functionality to satisfy certain **Legal For Trade** requirements.

POWER ON "ZERO SCALE" MESSAGE - PARAMETER 9

Description: Enables a "Zero" prompt for the Scale Operator.

PARAMETER VALUE	DISPLAY EXAMPLE
0 (default)	Disabled. Weight is displayed. Normal Operation.
1	Enabled. "2Er0" is displayed. The Operator must Zero the scale before weighing.

⚠ This parameter may be a requirement for certain **'Legal For Trade'** applications.

PUSH TO ZERO WINDOW (OR ZERO RANGE) - PARAMETER 21

Description: The weight range, as a percentage of scale capacity, that can be zeroed-out by pressing the **[ZERO]** key.

Default Value: **2** (%)

Accepted Values: **0 to 99** (%)

AUTO ZERO TRACKING (ON/OFF) - PARAMETER 22

Description: Allows the M2000 to automatically zero off any residual weight on the scale (Up to a pre-determined limit – See **Parameter 23**)

PARAMETER VALUE	AUTO ZERO TRACKING
0	OFF
1 (default)	ON

AUTO ZERO TRACKING WINDOW (AZSM) - PARAMETER 23

Description: Adjusts the percentage of a graduation that can be tracked
off during Auto Zero Tracking.

ACCEPTED PARAMETER VALUES	AUTO ZERO
1-99 (default: 60)	Track off 1 to 99% of a graduation (d)
100	Track off 1 graduation (1d)
200	Track off 2 graduation (2d)
300	Track off 3 graduations (3d)

Auto Zero Tracking (Parameters **22** & **23**) is subject to local
regulatory requirements.

POWER ON ZERO (IZSM) - PARAMETER 45

Description: Automatically zeroes the scale on power up. The maximum
range is set to **+/- 10% of Scale Capacity**.

If the initial load on the scale exceeds +/- 10% of Scale
Capacity, no initial scale zero will take place.

PARAMETER VALUE	POWER UP ZERO
0 (default)	OFF
1	ON

DISABLE ZERO KEY - PARAMETER 111

Description: Prevents the user from zeroing the scale. The **[ZERO]** key
will continue to perform its other functions (In Calibration
Mode, etc.).

PARAMETER VALUE	ZERO KEY
0 (default)	Enabled.
1	Disabled.

TARE PARAMETERS

Tare function can be extremely important, especially in Legal For Trade applications. These parameters allow the customer to optimize the tare settings, reducing the potential for human error.

TARE FUNCTION MODE - PARAMETER 50

Description: Controls how the tare function is used on the M2000.

PARAMETER VALUE	ACTION
0	**Disable keyboard and scale tare**. • No weight can be tared off the scale. • No tare can be entered using the keypad.
1 (default)	**Enable both keyboard and scale tare**. • Both keyboard tare entry and pushbutton tare can be used.
2	**Enable pushbutton tare only**. • Weight may only be tared from the scale.
3	**Enable keyboard tare only**. • Tare entry can only be done from the keyboard.

FORCE ZERO FOR KEYBOARD TARE - PARAMETER 71

Description: Verifies the scale is at zero before allowing an operator to enter a keyboard tare.

PARAMETER VALUE	FORCE ZERO FOR KEYBOARD TARE
0 (default)	Disabled
1	Enabled

> The following 2 parameters deal with TARE OFFSET and are intended specifically for use in Grain Weighing applications. There should be no reason to access these parameters for any other application or reason.

TARE OFFSET VALUE - PARAMETER 25

Description: This value represents a build up of material in the scale that could come loose, resulting in an undesirable negative weight.

At Scale Zero, the **Centre of Zero** LED will illuminate, but the indicator display will show the tare offset value. This tare weight is always present.

Default Value: **0** (No Tare Offset Value)

Accepted Values: Any weight

TARE OFFSET FLAG - PARAMETER 26

Description: This command controls the **operating mode** of the Tare Offset.

PARAMETER VALUE	DISPLAY EXAMPLE
0 (default)	**Offset Disabled.**
1	**Legal For Trade Mode:** M2000 cannot be put in **NET** mode if no value has been set for tare. If a tare has been entered, the **Offset Value** is included in the **NET** display.
80	**Not Legal For Trade Mode:** Allows **GROSS/NET** switching when the M2000 displays **ZERO**. If **NET** is selected, the **Offset Value** is subtracted from the displayed **GROSS** weight.

SCALE CHANNEL & TOTAL MODE PARAMETERS

ENABLE SCALE CHANNEL - PARAMETER 98

Description: Enables Scale Channels 2 or 3. **By default, channels 2 and 3 are turned off.**

Channel 1 is always enabled.

To enable a channel, **enter Calibration Mode for that channel**.

Press **1** followed by the **[PRINT/SECLECT]** key.

To disable the channel, enter **0** followed by the **[PRINT/SECLECT]** key.

PARAMETER VALUE	SCALE CHANNEL
0 (default)	Disabled
1	Enabled

EXAMPLE: ENABLE SCALE CHANNEL 2.

1. Enter Calibration Mode for Scale Channel 2.

   [2 CH2] [9 START] [PRINT SELECT] → [C   4998]

2. Select **Parameter 98**. The current value (**0**) will be shown

   [9 START] [8 TEST] [PRINT SELECT] → [0]

3. Press **1** followed by the **[PRINT/SELECT]** key.

   [1 CH1] [PRINT SELECT]

4. Set-up and calibrate scale connected to Channel 2.

POWER UP CHANNEL SELECT - PARAMETER 46

Description: Determines which scale channel will be displayed on power up.

PARAMETER VALUE	ACTION ON POWER UP
1 (default)	Channel 1 as default at startup
2	Channel 2 as default at startup (if enabled)
3	Channel 3 as default at startup (if enabled)
4	Total mode (if criteria is met)
5	Scan mode

ENABLE TOTAL MODE - PARAMETER 70

Description: Sums all the scale channels into a single, total weight. Total mode is not legal for trade in Canada.

PARAMETER VALUE	TOTAL MODE
0 (default)	Disabled
1	Enabled

Scale Channels must first be enabled before they are available when using TOTAL MODE and SCAN MODE.   (See M2000 User Functions - Page **10**)

MORE SET-UP PARAMETERS

POWER ON UNITS - PARAMETER 6

Description: Selects the weighing units the M2000 will default to when powered on.

Example: For the M2000 to start up weighing in pounds, set this parameter value to **"0"**.

PARAMETER VALUE	POWER ON UNITS
0	lbs
1 (default)	kgs

SCALE OVERLOAD SETTING - PARAMETER 8

Description: Assigns the number of graduations for Scale Over. At this point beyond True Scale Capacity, the M2000 displays "EEEEEE".

Default Value: **1 Graduation**. (See Parameter 3 – Page **30**)

EXAMPLE: **SCALE CAPACITY: 1000 lbs**
GRADUATION SIZE: 2 lbs
DESIRED SCALE OVERLOAD THRESHOLD: 1010 lbs

1. Enter **Parameter 8**.

   [8 TEST] [PRINT SELECT] → [|]

2. Enter **5** for the parameter value. 5 Grads at 2 lbs per Grad equals **10 lbs** (5 x 2lbs).

   [5 SCAN] [PRINT SELECT]

3. At 10 lbs over scale capacity (1010 lbs) the M2000 will display its Overload message on the screen.

   [EEEEEE]

POWER SWITCH ([ON/OFF] KEY) BYPASS - PARAMETER 10

Description: Allows the **[ON/OFF]** key to be disabled.

PARAMETER VALUE	ACTION
0	Disables the **[ON/OFF]** key. The M2000 cannot be turned off from the keypad. The M2000 will power on when plugged in without pressing the **[ON/OFF]** key.
1 (default)	Enables the **[ON/OFF]** key.

> ⚠ Note: This parameter is used in applications such as control systems where the M2000 must power up running after a power outage.

LOADCELL VOLTAGE RANGE - PARAMETER 11

Description: Adjusts the Loadcell Voltage Range. This parameter accounts for loadcells with reversed polarity as shown by the "**+/-**".

It is important that the correct range be selected for optimal performance of the indicator.

PARAMETER VALUE	LOADCELL VOLTAGE RANGE
1 (default)	0 to +/- 9mV
2	0 to +/- 19mV
3	0 to +/- 39mV
4	0 to +/- 79mV

> ⚠ Note: If the loadcell input voltage exceeds the input range of the indicator the display will display '�' for "Analog over-range". Select the next highest input range to rectify the problem.

> ⚠ Selecting a lower voltage range does not guarantee better performance! Lower ranges have more amplification so as A/D counts rise, line noise may be amplified depending on the scale installation.

DISPLAY UPDATE RATE - PARAMETER 19

Description: The speed at which the M2000 displays changes in weight.

At a value of **0**, the Update Rate is very fast and the display may appear jittery in some applications. In this case, increase the parameter value.

The Display (LED) Update Rate has nothing to do with the actual A/D converter update rate or filtering.

PARAMETER VALUE	DISPLAY UPDATE RATE
0 (default)	No delay in the display update. Very fast.
Up to 9 (maximum)	Maximum 3-second delay in display update.

SCALE OVER MESSAGE - PARAMETER 20

Description: Changes the way Scale Over (capacity) is displayed on M2000 indicators and how the condition will appear in the Output Strings. If attempting to maintain compatibility with older Western Scale equipment, set this parameter to **1**.

PARAMETER VALUE	SCALE OVER DISPLAY / TRANSMISSION
0 (default)	EEEEEE
1	888888

SOUND VOLUME - PARAMETER 28

Description: This command controls the volume of the internal speaker.

PARAMETER VALUE	ACTION
0	Sound off
1	Volume low
2 (default)	Volume medium
3	Volume high

KEYPRESS FEEDBACK - PARAMETER 29

Description: This function will cause the display to blink every time a key is pressed. This gives the User a sense of feedback, especially in noisy environments where hearing the key beeps may be difficult.

PARAMETER VALUE	KEYPRESS FEEDBACK
0 (default)	OFF
1	ON

LOCK UNITS - PARAMETER 105

Description: Prevents the user from switching the measuring units.
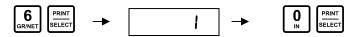
Used in conjunction with Parameter 6 – Power On Units.

Use Parameter 6 (See Page **46)** to select the desired units, then use Parameter 105 to lock the M2000 on those units.

PARAMETER VALUE	MEASUREMENT UNITS
0 (default)	Not Locked
1	Locked

EXAMPLE: **LOCK UNITS ON lbs.**

1. Enter **Parameter 6** and select **0** for "**lbs**".

2. Select **Parameter 105**.

3. Press **1** followed by the **[PRINT/SELECT]** key to lock the units.

SCALE FILTERING PARAMETERS

Digital Averaging, or Filtering, applies a certain number of weight samples taken by the indicator and averages them to display a stable weight in situations where the scale is subject to vibration or any other movement.

The M2000 has **2** digital filters to provide optimal weight readings on the display in unstable conditions such as in-motion, on-board, and livestock weighing.

Main Filter: Used to stabilize the scale once a sustained weight is supplied or the scale is at zero. The M2000 detects that a weight change is "flattening out" and uses the Main Filter.

Faststep Filter: Used to dramatically improve the display response time for a significant change in weight. When weight is being applied to (or removed from) the scale, the M2000 detects that the weight is changing rapidly and switches to the Fastep Filter, quickly bringing the M2000 display to the target weight.
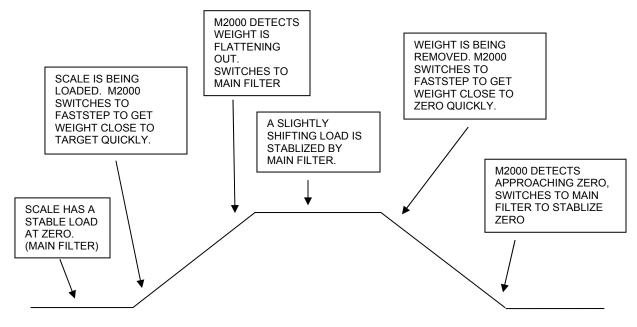
Without the **Faststep Filter**, the scale would be much slower in reaching the final weight reading and returning to zero.

The default Filtering Settings should be appropriate for most applications.

FASTSTEP DIAGRAM:

M2000 DETECTS WEIGHT IS FLATTENING OUT. SWITCHES TO MAIN FILTER

WEIGHT IS BEING REMOVED. M2000 SWITCHES TO FASTSTEP TO GET WEIGHT CLOSE TO ZERO QUICKLY.

SCALE IS BEING LOADED. M2000 SWITCHES TO FASTSTEP TO GET WEIGHT CLOSE TO TARGET QUICKLY.

A SLIGHTLY SHIFTING LOAD IS STABLIZED BY MAIN FILTER.

M2000 DETECTS APPROACHING ZERO, SWITCHES TO MAIN FILTER TO STABLIZE ZERO

SCALE HAS A STABLE LOAD AT ZERO. (MAIN FILTER)

MAIN FILTER (DIGITAL AVERAGING) SETTING - PARAMETER 41

Description: Adjusts the level of filtering (averaging) performed to get the final weight.

Increasing the filter value increases the number of weight samples used for the average. At a time of sustained weight, the display value will change very little.

Changing the filter value alters the settling time for the final weight.

Accepted Values: **1 to 255**

PARAMETER VALUE	RESULT OF FILTERING
1	Very little Main Filter. M2000 will be extremely fast, but will likely not settle.
64 (default)	Mid-range. Suitable for most applications.
255	Heavy Main Filter. M2000 will be very slow in any small weight change.

FASTSTEP FILTER THRESHOLD - PARAMETER 42

Description: Controls the how the M2000 switches from the Main Filter to the Faststep Filter.

The threshold value is the number of graduations the weight on the scale must change before the Faststep Filter kicks in.

Default Value: **8 graduations.**

> IF THE FASTSTEP FILTER THRESHOLD VALUE IS TOO LOW, WEIGHT READINGS WILL BE UNSTABLE *REGARDLESS* OF THE MAIN FILTER SETTING!

EXAMPLE: ▸ SCALE CAPACITY OF 5000 lbs, 0.5 lb GRADUATIONS.

▸ THE *FASTEP* FILTER THRESHOLD VALUE IS 8 GRADUATIONS (= 4 lb).

1. At zero, the scale is stable in **Main Filter** mode. A **200 lb** man jumps on the scale.

2. The rapid increase in weight causes the M2000 to go into **Faststep** mode, bypassing the Main Filter and displaying a quick jump to **200lbs**.

3. When the final weight is settling, the M2000 returns to **Main Filter** mode. Slight movements (resulting in small weight changes) will be masked by the Main Filter.

4. If a **2 lb** weight (**less than** Threshold Value) is placed on the scale, Faststep will not kick in and the weight change will be a little slower. The time needed for this change is a function of **Parameter 41**.

5. If a **5 lb** weight (**greater than** Threshold Value) is placed on the scale, the M2000 will briefly enter **Faststep** Mode and the weight will change quickly.

6. The man starts moving around. Every step exerts **10 lbs** of force on the scale. At the default values above, reading a weight would be virtually impossible.

7. Changing the Main Filter Setting to average out these changes in weight will be ineffective, since the M2000 currently switches to the Faststep Filter when the weight suddenly changes more than **4 lbs**.

8. To achieve a stable weight display, we want the M2000 to remain in **Main Filter Mode** while the man is on the scale.

9. Set the Faststep Filter Threshold value (**Parameter 42**) to **24**, resulting in a threshold of **12 lbs** (24 x 0.5 lbs). Note this is greater than the weight of the man's steps.

10. At these values, the man's steps will not trigger the M2000 to switch to Faststep Filter Mode. The 10 lb steps will be filtered out by the Main Filter and the weight display will be stabilized.

FASTSTEP FILTER SENSITIVITY - PARMETER 43

Description: The number of A/D weight samples in a row where the weight has to change before the Faststep Filter kicks in.

This controls the M2000's sensitivity to a weight change greater than or equal to the Threshold Value (**Parameter 42**).

Increasing this parameter makes the Faststep Filter Threshold less sensitive.

Default Value: **8 samples**

> **Faststep Filter Sensitivity** is used to filter out false triggers induced by vibrations. This parameter is typically only used in extremely demanding weighing applications.

EXAMPLE 2:   ▸ **THE MAN ON THE SCALE.**

1. Using the previous example, it takes a sudden weight change of over **12 lbs** for the M2000 to switch to Faststep Filter mode.

2. This weight change must be recorded for at least **8 consecutive samples** (default value) for Faststep to kick in.

3. If vibrations are causing the M2000 to trigger Faststep Filter Mode to early, we can increase the value of **Parameter 43**.

4. The M2000 now needs to see the weight change of over 12 lbs for a longer period (more consecutive samples) before entering Faststep Filtering Mode.

DISABLE FASTSTEP - PARAMETER 44

Description: This parameter disables the Faststep Filtering system altogether. The M2000 will run with the Main Filter only. The response time for the indicator becomes a function of **Parameter 41**.

PARAMETER VALUE	*FASTSTEP FILTERING*
0 (default)	Enabled.
1	Disabled. (Main Filter Only)

> SOME CONTROL/BATCHING APPLICATIONS MAY REQUIRE THAT **FASTSTEP** BE TURNED OFF.

USING LINEARITY TABLES TO SET SPAN

Having different Span Values at different weight ranges helps to correct any structural or loadcell non-linearity. M2000 Indicators allow Technicians to set spans for up to **4** weight ranges using **4** linearity table entries.

 IF YOU HAVE A NON-LINEARITY ERROR OF **MORE THAN 3 GRADUATIONS**, A CLOSER MECHANICAL INSPECTION OF THE SCALE AND ITS INSTALLATION IS REQUIRED.

RESET SPAN TABLE - PARAMETER 15

Description: Clears the span table except for the first entry. It is recommended that this be done before calibrating the M2000.

INCREMENT SPAN TABLE POINTER - PARAMETER 16

Description: To add a calibration entry to the Span Table, the **Span Table Pointer** must be incremented. This allows for further Span adjustments to correct scale linearity errors.

Upon activation, the current Span Table Pointer (**1 to 4**) will be displayed. Press **[TARE]** to increment the Pointer by **1**

DECREMENT SPAN TABLE POINTER - PARAMETER 17

Description: Moves the **Span Table Pointer** back through the Span Table.

Upon activation, the current Span Table Pointer value (**1 to 4**) will be displayed. Press **[TARE]** to decrement the Pointer.

The Pointer **cannot** decrement past **1**.

EXAMPLE: ▸ SCALE CAPACITY OF 5000 LBS, 1 LB GRADUATIONS.

▸ THE SCALE IS INITIALLY CALIBRATED WITH 2500 LBS.

▸ IF 5000 LBS ARE LOADED AND THE SCALE DOES NOT READ "5000", THERE MAY BE A LINEARITY PROBLEM.

The Indicator reads "4998". Using the Span table, calibrate to correct the error.

1. Enter Calibration Mode.

   [1 CH1] [9 START] [PRINT SELECT] ➡ | [4998 |

2. Select **Parameter 16 - Increment the Span Table Pointer**. The current value (**1**) will be shown

   [1 CH1] [6 GR/NET] [PRINT SELECT] ➡ | 1 |

3. Press **[TARE]** to increment the Pointer to **2**.

   [⊕T] ➡ | 2 |

4. Select **Parameter 13** to Span. The Span Table Pointer will briefly be displayed.

   [1 CH1] [3 CH3] [PRINT SELECT] ➡ | 2 | ➡ | [4998 |

5. Enter a new Test Weight Calibration value. (See Parameter 13 - Set Span – Page **33**)

   [5 SCAN] [0 IN] [0 IN] [0 IN] [PRINT SELECT] ➡ | [5000 |

6. Check the scale again (Return to Zero, Holding Calibration) to see if more adjustments are needed.

7. Exit Calibration Mode.

   [9 START] [9 START] [PRINT SELECT]

RESET M2000 CALIBRATION & SETTINGS

SPAN FACTOR (SET SPAN) - PARAMETER 110

Description: Displays and allows entry of a Calibration Span factor. Field Service Technicians can instantly calibrate the M2000 to a specified value.

This feature is useful for replacing an indicator when a full span cannot be carried out, and for easily resetting the scale's calibration when experimenting with calibration solutions.
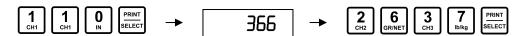
Accepted Values: Numeric. Up to 6 digits (No decimals)

EXAMPLE: ENTERING THE SPAN FACTOR ON A REPLACEMENT INDICATOR.

1. On the **old indicator**, enter **Parameter 110**. The scale's Span Factor (a number) will be displayed.

[1 CH1] [1 CH1] [0 IN] [PRINT SELECT] � [2637]

2. Connect the **new indicator** to the scale. If possible, Deadload the scale (See Parameter 12 - Page **32**) before proceeding.

3. Enter **Parameter 110**. A Span Factor is displayed. Enter the Span Factor (number) from the **old indicator** followed by the **[PRINT/SELECT]** key.

[1 CH1] [1 CH1] [0 IN] [PRINT SELECT] ➝ [366] ➝ [2 CH2] [6 GR/NET] [3 CH3] [7 lb/kg] [PRINT SELECT]

⚠ **THE SCALE MUST BE DEADLOADED AT SOME POINT DURING THIS PROCESS!**

RELOAD FACTORY CALIBRATION SETTINGS - PARAMETER 1

Description: Clears all previous Calibration values for the selected Scale Channel. The User will be prompted for the Password.

1. Enter **Parameter 260**.

`1` `PRINT/SELECT` → `CAL` → `CLEAr` → `PASS`

2. Enter the **Password**.

`CAL 1` → `in it`

3. The M2000 will restart.

The following Parameters will be reset:

Span & Span Table entries (13, 110) **Standard Scale Set-Up (2, 3, 4)**
Motion (5, 24) **Units (6, 7)**
Zero & Zero Tracking (12, 21, 22, 23) **Scale Filtering (41, 42, 43, 44)**

COMPLETE FACTORY INITIALIZATION - PARAMETER 260

Description: Completely resets **all** M2000 parameters to factory default values. All previous Calibration information will be lost.

> ⚠️ **ALL PREVIOUSLY SAVED SETTINGS & CALIBRATION IN THE M2000 WILL BE LOST! MAKE SURE ANY IMPORTANT SETTINGS ARE RECORDED BEFORE ACTIVATING THIS PARAMETER!**

1. Enter **Parameter 260**.

`2` `6` `0` `PRINT/SELECT` → `FAC` → `rESEt` → `PASS`

2. Enter the **Password**.

`FAC` → `in it`

3. The M2000 will remain in Calibration Mode.

NOTES:

M2000

SERIAL COMMUNICATIONS

SERIAL COMMUNICATIONS SET-UP PARAMETERS

The M2000 has **2** fully independent, fully configurable serial ports (COM1 and COM2) on the back of the indicator. The factory default settings allocate COM1 for printing tickets. COM2 is allocated for outputting a weight string (DF1500) in continuous mode. **RS232** & **RS422** are available.

> Please note that Single Channel Models only have one serial port (**COM1**).

> Parameters and Parameter Values pertaining to **COM2** are not supported on single channel indicators.

M2000 SERIAL WIRING CONNECTIONS

- A serial cable is required to connect the M2000 to a PC, Printer, data controller, or other serial device. Connections are as follows:

M2000	9 PIN SERIAL PORT	25 PIN SERIAL PORT
CTS	PIN 8	PIN 5
RX	PIN 2	PIN 3
TX	PIN 3	PIN 2
RTS	PIN 7	PIN 4
COM	PIN 5	PIN 7

DEFAULT SETTINGS

	COM 1 DEFAULT SETTINGS	COM 2 DEFAULT SETTINGS
Baud Rate	9600	9600
Parity	None	None
Data Bits	8 (fixed)	8
Stop Bits	1	1
String Output	**[PRINT/SELECT]** KEY	Continuous
Flow Control	None	None
Output Mode	Press **[PRINT/SELECT]**	Continuous
Driver	RS 232	RS 232

DATA BITS (COM2 ONLY) - PARAMETER 27

Description: COM1 on the M2000 is fixed at **8 Data Bits**. However, if EVEN or ODD Parity is selected then 7 Data Bits will automatically be used.

COM2 allows for independent selection of Data Bits. Parameter 27 is used to set this value.

PARAMETER VALUE	DATA BITS
0	COM2 Data Bits set to 4
1	COM2 Data Bits set to 5
2	COM2 Data Bits set to 6
3	COM2 Data Bits set to 7
4	**COM2 Data Bits set to 8 (default)**

BAUD RATE - PARAMETER 30 & 32

Baud rate for COM1:   Parameter 30
Baud rate for COM2:   Parameter 32

PARAMETER VALUE	BAUD RATE
0	150
1	300
2	600
3	1200
4	2400
5	4800
6	**9600 (factory default)**
7	14400
8	19200
9	32400

PARITY - PARAMETER 31 & 33

Parity for COM1:   Parameter 31
Parity for COM2:   Parameter 33

PARAMETER VALUE	PARITY
0	**No parity (factory default)**
1	ODD parity
2	Even parity

OUTPUT STRING FORMAT - PARAMETER 34 & 35

Description: Several different indicator string formats can be emulated by the M2000. To create a custom transmit string for a ticket, the COM Port must be set to **99**.

String Format for COM1: Parameter 34

String Format for COM2: Parameter 35

PARAMETER VALUE	OUTPUT STRING
1	DF1000
3	DF2000 (DF2000 Command Mode)
5	DF2500 mode1
8	**DF1500 (factory default Com2))**
9	DF2500 Command Mode 6
10	DF2500 Command Mode 7
12	AD4321, AD4323, AD5000
13	Cardinal 708
14	Cardinal 738
16	Weightronix 120
17	Consolidated Controls UMC600
18	Analogic 5316
19	Toledo & Fairbanks R2500
99	**Custom Transmit/Ticket Printer Mode (default Com1)**
100	Bar Code Scanner Mode (See Page **74**)

For a complete breakdown of M2000 emulated string formats, please see **Appendix C**.

For more information on creating a custom ticket and other M2000 ticket options, please refer to the M2000 Ticket Options Manual.

SERIAL HANDSHAKING (RTS / CTS) - PARAMETER 36 & 37

Handshaking for COM1:   Parameter 36

Handshaking for COM2:   Parameter 37

PARAMETER VALUE	SERIAL HANDSHAKING
0	**Disabled (factory default)**
1	Enabled

STRING OUTPUT MODE - PARAMETER 38 & 39

Description: Determines how the M2000 outputs strings to the COM ports.

String Output Mode for COM1:   Parameter 38

String Output Mode for COM2:   Parameter 39

PARAMETER VALUE	STRING TRANSMITS TO COM PORT...
1	When the **[PRINT/SELECT]** key has been pressed.
2	When the COM port receive data input is at logic low (-9 Volts DC).
3	When the COM port receive data input is at logic high (+9 Volts DC).
4	When the '**?**' character is received.
5	**Continuously (factory default).**

Remember that the default String Output Modes for **COM1** and **COM2** are different.

Parameters **38** and **39** can be ignored if a "Command Mode" Output String (Eg. DF2500 Command Mode 7) has been selected. (See Parameters 34 & 35 – Page **33**)

CONFIGURE COM PORTS FOR RS422 MODE - PARAMETER 40

Description: Some scoreboards and other equipment now support RS422, which allows for cable runs of up to 1000 feet. If the equipment connecting to the M2000 Indicator supports RS422, the M2000 COM ports can be configured to RS422 mode.

The default hardware settings for both COM ports are RS232. The output setting is changed using Parameter 40 and the values below:

PARAMETER VALUE	COM1	COM2
0 (default)	RS232	RS232
1	RS422	RS232
2	NOT CURRENTLY SUPPORTED	
3	RS422	RS422

FOR RS422 COMMUNICATIONS:

The wire connections to the COM ports on the back of the indicator are different for RS422 than for RS232. RS422 requires 2 lines for transmit (TX+ and TX-) and 2 lines for receive (RX+ and RX-).

CTS	Terminal becomes	**RX -**
RX	Terminal becomes	**RX +**
TX	Terminal becomes	**TX +**
RTS	Terminal becomes	**TX -**

SERIAL OUTPUT STRING ROUTING - PARAMETER 47 & 48

Description: In certain applications, the M2000 indicator's COM ports may need to be locked to one of the 3 Scale Channels.

Serial String Output Routing for COM1: Parameter 47

Serial String Output Routing for COM2: Parameter 48

PARAMETER VALUE	OUTPUT ROUTING
0 (default)	COM port serial output string transmits from **current active channel**.
1	COM port serial output string **locked on Channel 1.**
2	COM port serial output string **locked on Channel 2.**
3	COM port serial output string **locked on Channel 3.**
4	COM port serial output string **locked on Total Mode.**

TRANSMISSION DELAY FOR COM1 & COM2 - PARAMETER 65

Description: Some older equipment may experience problems keeping up to the high update rate of the M2000. Parameter 65 inserts delays between string transmissions to slow down the output rate.

Accepted Parameter Values: **0 to 100**. Each Parameter Value represents approximately **1/16** of a second.

PARAMETER VALUE	COM1 & COM2
0 (default)	Fastest Output
4	Approximately ¼ second
8	Approximately ½ second
16	Approximately 1 second
32	Approximately 2 seconds

If a Scoreboard or other device is experiencing erratic behavior when connected to the M2000, a transmission delay of ½ second will likely fix the problem.

CONNECTING THE M2000 TO HYPER TERMINAL

Hyper Terminal is a terminal utility program that is supplied with all versions of Windows. The program is useful for:

- Viewing the M2000's String Output.

- Saving calibration data to a PC file.

- Loading calibration data from a PC.

- Saving tickets macros to a file on a PC.

- Loading ticket macros from a file on a PC.

- Trouble shooting serial ports.

CONNECTING THE M2000 TO THE PC COMPUTER

- Determine which COM port you are connecting to on the back of the computer. This will most likely be COM1 or COM2.

- A serial cable is required to connect the PC to the M2000. Determine whether your computer's COM port has a 9 PIN or 25 Pin Terminal.

- See the Connections Table at the start of the Serial Communications Section (Page XXX) for Pin-outs.

STARTING HYPER TERMINAL

Hyper Terminal can be started and setup manually, or with the help of the M2000 Hyper Terminal Set-Up Files.

RUNNING THE HYPER TERMINAL SET-UP FILE

To make things easier, using a Set-Up file is recommended. Western Scale has supplied Set-up files that will automatically start Hyper Terminal with the correct settings.

Set-Up files can be downloaded from the website at www.westernscale.ca. Contact your sales rep if you want the files sent via email or floppy disk.
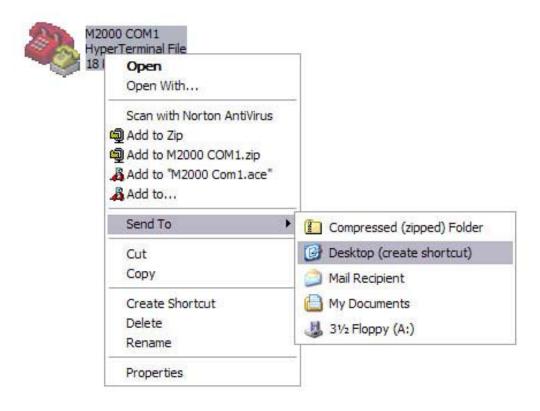
The files to download are "**M2000COM1.ht**" if you are using **COM1** on your PC computer or "**M2000COM2.ht**" if you are using **COM2**.

Copy these files to your computer hard drive. Double clicking the file will automatically start Hyper Terminal with the all the correct settings in place for the COM port you are using.

CREATING A SHORTCUT TO HYPER TERMINAL

Creating a Hyper Terminal shortcut on your computer desktop eliminates searching through the computers files each time you use Hyper Terminal.

- Locate the Set-Up file you downloaded from Western Scale. Right click your mouse on the file "**M2000 COM1.ht**" or "**M2000 COM2.ht**" (see below). Click on "**Send To**" then "**Desktop**".

- An icon will be created on your desktop. Every time you double click the icon, Hyper Terminal will automatically start with the correct settings for the M2000.
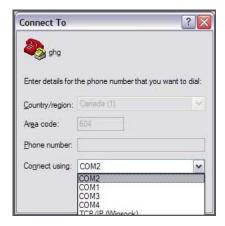
MANUALLY SETTING UP HYPER TERMINAL FOR THE M2000
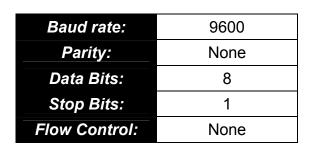
- Hyper terminal can be found in Windows under "Accessories" and then "Communications" on practically all PC computer installations. Click on Hyper Terminal to start the program.
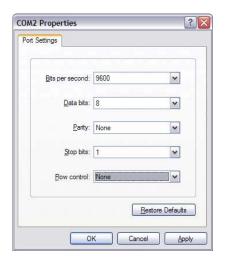
- Select the appropriate COM Port on your computer.

- Hyper Terminal needs to be setup to operate with the M2000. The default M2000 Communications settings are:

Baud rate:	9600
Parity:	None
Data Bits:	8
Stop Bits:	1
Flow Control:	None

Hyper Terminal must also be configured to these settings.
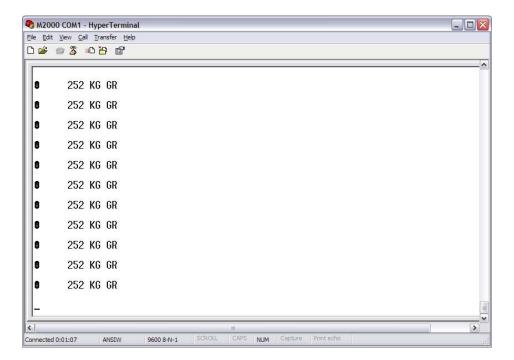
- A box in the **STATUS BAR** at the bottom of the display should show **"9600 8-N-1"**.

Hyper Terminal is now ready to help upload and download data between the M2000 and your PC computer.

CAPTURING THE M2000 OUTPUT STRING (DOWNLOADING)

- Make sure the Status bar at the bottom of the Hyper Terminal window displays "**Connected**".

- Make sure the serial cable is connected to the correct COM Port.

- The Hyper Terminal window will display the ASCII string output by the M2000.

TRANSMITTING CALIBRATION INFORMATION (UPLOADING)

TRANSMIT CALIBRATION INFORMATION TO PC - PARAMETER 75

Description: Transmits the M2000's full calibration structure information as an ASCII string to the designated serial port. The data structure is protected by a CRC checksum embedded inside the data. The ASCII string can be captured with any serial terminal program.
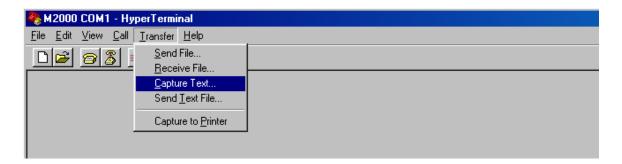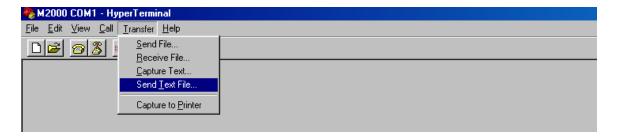
PARAMETER VALUE	ACTION
1	Output calibration data to **COM1**.
2	Output calibration data to **COM2**.

CAPTURE A TEXT FILE FROM THE M2000 USING HYPER TERMINAL

This feature is useful for capturing and saving the Calibration Information or Ticket Buffer Information from the M2000 for creating back-ups.

- Click on the "**TRANSFER**" menu and then click on "**CAPTURE TEXT**" as shown below.

- Enter a file name save the ticket or calibration data under. Use logical names to help keep track of your files.
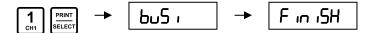
- Click "**START**".
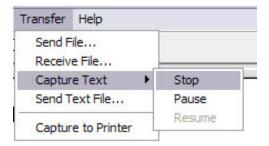
EXAMPLE: **TRANSMIT CALIBRATION INFORMATION TO A PC (CONNECTED TO COM1).**

1.   Connect the M2000 (**COM1**) to the PC serial port.

2.   Open the Terminal Program (HyperTerminal, Terminal, etc.) on the PC.

3.   Set the program's communication properties to match those of the M2000 (or vice versa). For most cases: **9600-N-8-1**.

4.   Enter Calibration Mode on the M2000.

5.   If the M2000 is transmitting continuously, enter **Parameter 38**. Set **Parameter 38** to **"1"** to prevent weight string from disrupting the Calibration Information.

6.   In Hyper Terminal, go the "**TRANSFER**" menu and select "**CAPTURE TEXT**".

7.   Select or create a file to save the Calibration Information to. Click "**START**" when ready.

8.   On the M2000, enter **Parameter 75**. The display will prompt, "Ready".

   [7 lb/kg] [5 SCAN] [PRINT SELECT] → [rEAd ı]

9.   Press **[1]** followed by **[PRINT/SELECT]** to transmit out of **COM1**.

   [1 CH1] [PRINT SELECT] → [buS ı] → [F ın ıSH]

10.   The Calibration Information will appear on the Hyper Terminal screen and be saved in the file you selected.

11.   In Hyper Terminal, go to "**CAPTURE TEXT**", then "**STOP**".

Transfer	Help
Send File...	
Receive File...	
Capture Text ▶	Stop
Send Text File...	Pause
	Resume
Capture to Printer	

⚠ To capture Ticket Buffer Information, follow the same steps, replacing **Parameter 75** with **Parameter 77** – Transmit Ticket Buffer Information to PC.

RECEIVING CALIBRATION INFORMATION (DOWNLOADING)

RECEIVE CALIBRATION INFORMATION FROM PC - PARAMETER 76

Description: Captures calibration information as an ASCII data dump from the designated serial port. The data structure is protected by a CRC checksum embedded inside the data. The ASCII string can be captured from any serial terminal program.

PARAMETER VALUE	ACTION
1	Capture calibration data via **COM1**
2	Capture calibration data via **COM2**
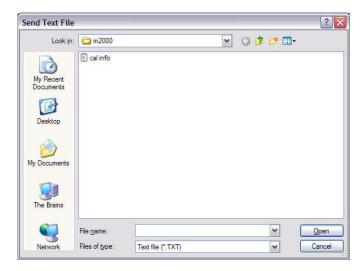
SENDING DATA TO THE M2000 USING HYPER TERMINAL

This feature is useful for capturing and saving the Calibration Information or Ticket Buffer Information from the M2000 for creating back-ups.

- Click on the "**TRANSFER**" menu and then click on "**SEND TEXT FILE**" as shown below.

- Select the file to send.

- The contents of the file will be transmitted from the PC.

EXAMPLE: **RECEIVE CALIBRATION INFORMATION FROM A PC TO THE M2000 (CONNECTED TO COM2).**

1. Connect the M2000 (**COM1**) to the PC serial port.

2. Open the Terminal Program (HyperTerminal, Terminal, etc.) on the PC.

3. Set the program's communication properties to match those of the M2000 (or vice versa). For most cases: **9600-N-8-1**.

4. Enter Calibration Mode on the M2000.

5. Enter **Parameter 76**. The display will prompt, "Ready".

| 7 lb/kg | 6 GR/NET | PRINT SELECT | → | rEAd ı |

6. Press **[2]** followed by **[PRINT/SELECT]** to transmit to **COM2**.

| 2 CH2 | PRINT SELECT | → | WAıt | → | FOr | → | dAtA |

7. The M2000 will wait to receive the transmission.

8. In Hyper Terminal, go the "**TRANSFER**" menu and select "**SEND TEXT FILE**".

9. Select the file to send to the M2000. Click "**OPEN**" when ready.

10. The sent file will appear on the Hyper Terminal screen.

11. The M2000 will display "Finish" when the transfer is complete and automatically restart.

| F ın ıSH | → | M2000 |

⚠ To transfer Ticket Buffer Information, follow the same steps, replacing **Parameter 76** with **Parameter 78** – Capture Ticket Buffer Information from PC.

CONNECTING A BARCODE SCANNER TO THE M2000

The M2000 allows for easy connection to a barcode scanner. Combine your scanner and your scale to print out accurate product/weight tickets.

Barcode scanners are intelligent devices that decipher bar codes into normal ASCII strings. Most brands of barcode scanner transmit an identical string that is easily transmitted to the M2000.

WIRING THE BARCODE SCANNER TO THE M2000

- Scanners can only be connected to COM1.

- Establish the Barcode Scanner's Pin-out. Use the M2000 Serial Wiring Connections Table (Page **60**) to determine the proper connections.

ENABLING THE BAR CODE SCANNER

- To enable Scanner Input on the M2000, **Parameter 34** must be set to **100** (See Output String Format – Page **62**).

M2000 - BARCODE SCANNER OVERVIEW

- The M2000 identifies that it has received a barcode string when it receives a burst of characters from the scanner.

- Before transferring the received string to the string register, the M2000 waits a short time after it receives the last character. This allows the M2000 to accept any string type not relying on a **Carriage Return** or **Line Feed** to mark the end of the barcode transmission.

ASSIGNING A TICKET EVENT TO THE SCANNER - PARAMETER 95

Description: Print a specific ticket as soon as a barcode is scanned. The ticket is executed as soon as the M2000 receives a scanner string. Use **Parameter 95** to assign the ticket number to the scanner.

Default Value: **0** (Disabled).

⚠	The M2000 will not execute the ticket if there is motion on the scale. The indicator will display Err 36.

SCANNER HANDSHAKING MODE - PARAMETER 90

Description: The M2000 has 4 handshaking options.

PARAMETER VALUE	FUNCTION
0 (default)	No handshaking, No beep.
1	No handshaking with a beep.
2	Hardware handshaking with no beep.
3	Hardware handshaking with a beep.

⚠	The beep option will cause the M2000 to beep every time it receives a bar code scan. Hardware handshaking disables the scanner if there is motion on the scale. Hardware handshaking must be enabled on the scanner, and is scanner specific. Most applications will require a Parameter Value of **0** or **1**.

NOTES:

///2000

CONNECTING AUXILLERY PERIPHERALS VIA SMARTWIRE

CONNECTING AUXILIARY PERIPHERALS VIA SMARTWIRE

The SMARTWIRE terminal on the back of the M2000 is a multi-drop, RS485 communications interface. It may be used to network several Option boards together in a "daisy chain" fashion.

WIRING FOR SMARTWIRE

SMARTWIRE terminal connections:

(V+)   Positive SMARTWIRE power
(V-)   Negative SMARTWIRE power
(A)   RS485 differential + signal
(B)   RS485 differential - signal
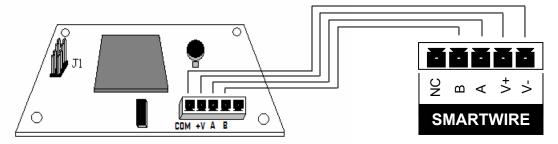
- The peripheral device being connected should have a terminal block with the same signal names.

- Connections between the M2000 and the peripheral should be done using a **Beldon type 8723** cable or equivalent. The shield wire can be connected to **"V-"** terminal.

> Since SMARTWIRE uses a differential type driver, cable lengths can run several hundred feet.

SMARTWIRE BRIDGE INTERFACE

Some available M2000 Option Boards utilize older technology and are not SMARTWIRE compatible. The **SMARTWIRE Bridge Interface board** will be included with these boards. If you have a **4-20 mA** or **Setpoint** option board and do not have a SMARTWIRE Bridge Interface, please contact the factory.

- A cable will be provided to connect **TB1** on the SMARTWIRE Bridge Interface board to the SMARTWIRE terminal on the M2000.

- Use the ribbon cable provided to connect the option boards to **J1.**

SMARTWIRE SET-UP PARAMETERS

> SMARTWIRE must be enabled to communicate with any connected device.

ENABLING SMARTWIRE - PARAMETER 59

Description: Opens or closes the SMARTWIRE port.

PARAMETER VALUE	ACTION
0 (default)	Disable SMARTWIRE port
1	Enable SMARTWIRE port

> IF NO DEVICE IS PLUGGED INTO THE ENABLED SMARTWIRE PORT, A COMMUNICATIONS TIMEOUT WILL OCCUR PRODUCING AN ERROR (Err 185).

SMARTWIRE FAILURE - ERROR 185

If there is a component failure, or the SMARTWIRE connection is lost due to breakage of the communications wire, "Err 185" will be displayed. This error message will continuously appear until a new link is established.

To regain control of the indicator, you may have to disable the SMARTWIRE port. This can be done in Calibration *or* Normal Weighing Mode.

1. Press **[CLEAR]** to temporarily get rid of the Error message.

> Err 185 → [CLEAR] → 0.0

2. Enter **Parameter 59**.

> [5 SCAN] [9 START] [PRINT SELECT] → 1
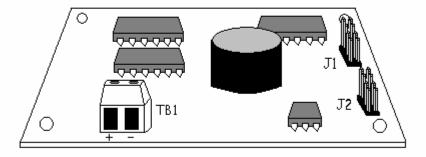
3. Enter **[0]** followed by the **[PRINT/SELECT]** key to disable.

> [0 IN] [PRINT SELECT]

4-20 mA OPTION BOARD

The M2000 has a 16bit, 4-20mA current loop board that connects to the SMARTWIRE Bridge Interface Board. This standard industrial sensor is useful for a wide variety of applications.

CONNECTING THE 4-20 mA BOARD

- Using the ribbon cable provided, connect **J1** or **J2** on the 4-20 mA board to **J1** on the SMARTWIRE Bridge Interface board.

- Make sure the boards have adequate clearance between them.

- Make sure the SMARTWIRE Bridge Interface board has been wired properly to the SMARTWIRE terminal (See page **78**).

⚠	FOR THE 4-20 MA BOARD TO WORK, **PARAMETER 59** MUST BE ENABLED!

PARAMETER 60 - SELECT SCALE CHANNEL TO CONNECT TO CURRENT LOOP

Description: Assigns the current loop to one of the M2000's 3 Scale Channels.

PARAMETER VALUE	ACTION
0 (default)	Current Loop Interface not connected
1	Current Loop Interface connected to Channel **1**
2	Current Loop Interface connected to Channel **2**
3	Current Loop Interface connected to Channel **3**
4	Current Loop Interface connected in **Total Mode**

PARAMETER 61 - CURRENT LOOP OFFSET ADJUSTMENT (ZERO)

Description: Sets the **4 mA** base current value (the value of the output board when the scale is at zero). The technician selects a Current Output Value (from the M2000) that will correspond to a 4 mA output by the 4-20 mA board.

Range: The Current Output Value is a linear representation of the current and can be adjusted from **0** to **65530**.

To make the process of arriving at the target current as easy as possible, preset current output values are assigned to **HOT KEYS**. The key assignments are shown below:

PARAMETER VALUE	CURRENT OUTPUT VALUE
1 (default)	Preset Output to 0
2	Preset Output to 10000
3	Preset Output to 20000
4	Preset Output to 30000
5	Preset Output to 40000
6	Preset Output to 50000
7	Preset Output to 60000
8	Current value

FINE TUNING: The Current Output Value can be micro-adjusted:

0
IN

Increase Current Output Value

.
OUT

Decrease Current Output Value

- When the Current Output Value results in a **4 mA** output from the 4-20 mA board, press **[TARE]** to lock in the current output value.

- To abort without saving changes, press the **[CLEAR]** key.

PARAMETER 62 - CURRENT LOOP SPAN ADJUSTMENT (CAPACITY)

Description: Sets the 20 mA capacity current value (the value of the output board when the scale is at maximum capacity). The technician selects a Current Output Value (from the M2000) that will correspond to a 20 mA output by the 4-20 mA board.

Range: The Current Output Value is a linear representation of the current and can be adjusted from **0** to **65530**.

To make the process of arriving at the target current as easy as possible, preset current output values are assigned to **HOT KEYS**. The key assignments are shown below:

PARAMETER VALUE	CURRENT OUTPUT VALUE
1 (default)	Preset Output to 0
2	Preset Output to 10000
3	Preset Output to 20000
4	Preset Output to 30000
5	Preset Output to 40000
6	Preset Output to 50000
7	Preset Output to 60000
8	Current value

FINE TUNING: The Current Output Value can be micro-adjusted:

| **0** IN | **Increase Current Output Value** |

| **.** OUT | **Decrease Current Output Value** |

- When the Current Output Value results in a **20 mA** output from the 4-20 mA board, press **[TARE]** to lock in the current output value.

- To abort without saving changes, press the **[CLEAR]** key.

PARAMETER 63 - CURRENT LOOP (GROSS OR NET MODE)

Description: Sets the current loop to operate in **GROSS** mode or **NET** mode.

GROSS: For most applications. 4 mA is output when the scale is at zero (Centre of Zero LED illuminated).

NET: For applications with varying tare weights. The 4-20 mA board will output only after a tare has been entered. 4 mA is out put when the weight display shows zero, even though the true weight on the scale is greater (**NET** LED illuminated).

PARAMETER VALUE	CURRENT LOOP MODE
0 (default)	**GROSS** mode
1	**NET** mode

PARAMETER 64 - CURRENT LOOP (SPAN)

Description: Spans the Current Loop Output to a custom weight entry. This is the weight at which the Current Loop will output its highest level (20 mA).

The True Scale Capacity weight is typically selected. In some applications (such as those utilizing **NET** mode), a weight less than Scale Capacity is desired.

Enter the weight on the keypad, followed by the **[PRINT/SELECT]** key.

If, for example, the scale capacity is 1000 kg, but Parameter 64 is set to 500 kg, the Current Loop will reach 20mA at 500 kg.
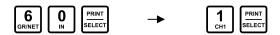
⚠️ IF, FOR ANY REASON, THE M2000 STOPS TRANSMITTING COMMANDS TO THE 4-20 MA BOARD, THE CURRENT LOOP OUTPUT WILL BE SET TO ZERO.
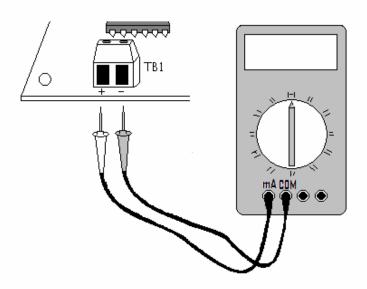
4-20 MA EXAMPLE: **SET UP THE 4-20 MA BOARD FOR A 5000 LB. CAPACITY SCALE ON CHANNEL 1. SET THE 20 MA OUTPUT FOR FULL SCALE CAPACITY. THE SCALE OPERATES IN GROSS WEIGHING MODE.**
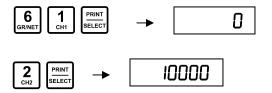
1. Make sure that SMARTWIRE is enabled (**Parameter 59** set to **1**).

2. Select the Scale Channel (Channel 1) that the 4-20 mA board is to read (**Parameter 60**).
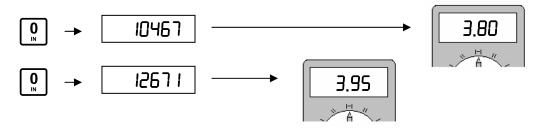
3. Connect an Amp-meter (in series) to the 4-20 mA board.

-   Place the **COM** lead in the terminal marked "**-**" on **TB1**.
-   Place the **mA** lead in the terminal marked "**+**".
-   Select the appropriate meter range (**~ 100 mA** on most models).
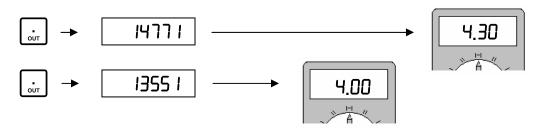
4.   Adjust the current loop output offset for zero (**Parameter 61**).

- Watch the Meter readings.

- Use the Hot Keys (course adjustment) to select an output value that gives a reading close to 4 mA. (Should be around 1, 2, or 3)

$$\boxed{6}_{GR/NET} \quad \boxed{1}_{CH1} \quad \boxed{PRINT \atop SELECT} \quad \longrightarrow \quad \boxed{\qquad 0 \qquad}$$

$$\boxed{2}_{CH2} \quad \boxed{PRINT \atop SELECT} \quad \longrightarrow \quad \boxed{\quad 10000 \quad}$$

- If the closest reading is less than 4 mA, press the **[IN]** key to increase the output value.

$$\boxed{0}_{IN} \quad \longrightarrow \quad \boxed{\quad 10467 \quad} \quad \longrightarrow \quad \boxed{3.80}$$

$$\boxed{0}_{IN} \quad \longrightarrow \quad \boxed{\quad 12671 \quad} \quad \longrightarrow \quad \boxed{3.95}$$

- If the closest reading is greater than 4 mA, press the **[OUT]** key to decrease the output value.

$$\boxed{\cdot}_{OUT} \quad \longrightarrow \quad \boxed{\quad 14771 \quad} \quad \longrightarrow \quad \boxed{4.30}$$

$$\boxed{\cdot}_{OUT} \quad \longrightarrow \quad \boxed{\quad 13551 \quad} \quad \longrightarrow \quad \boxed{4.00}$$

- Holding down the **[IN]** or **[OUT]** keys cause the output value to change faster.

- Press **[TARE]** to save the current output value. To abort without saving, press **[CLEAR]**.
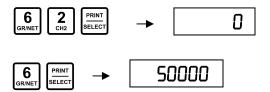
$$\boxed{\leftarrow T} \quad \text{- OR-} \quad \boxed{CLEAR}$$
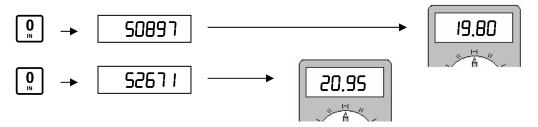
⚠️ The meter will not receive a reading if the output value is changing (**[IN]** or **[OUT]** key being held down). Fine tune in smaller increments as you approach the target output value.
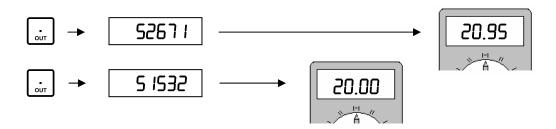
5. Adjust the current loop output offset for scale capacity. (**Parameter 62**)

- Watch the Meter readings.

- Use the Hot Keys (course adjustment) to select an output value that gives a reading close to 20 mA. (Should be around 5, 6, or 7)

| 6 GR/NET | 2 CH2 | PRINT SELECT | → | 0 |

| 6 GR/NET | PRINT SELECT | → | 50000 |

- If the closest reading is less than 20 mA, press the **[IN]** key to increase the output value.

| 0 IN | → | 50897 | ——————————→ | 19.80 |

| 0 IN | → | 52671 | ——————→ | 20.95 |

- If the closest reading is greater than 4 mA, press the **[OUT]** key to decrease the output value.

| . OUT | → | 52671 | ——————————→ | 20.95 |

| . OUT | → | 51532 | ——————→ | 20.00 |

- Holding down the **[IN]** or **[OUT]** keys cause the output value to change faster.

- Press **[TARE]** to save the current output value. To abort without saving, press **[CLEAR]**.

| →T | - OR- | CLEAR |

6. Select the current loop mode (**Parameter 63**).

| 6
GR/NET | 3
CH3 | PRINT
SELECT | → | 0 | → | PRINT
SELECT |
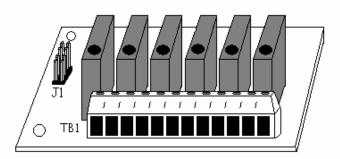
7. Span the current loop for maximum (20 mA) output at the selected weight (**Parameter 64**).

- Enter the desired weight for 20 mA output. It is good practice to increase this number by one or two grads to keep the output within metering range.

| 6
GR/NET | 4
TOTAL | PRINT
SELECT | → | 0 | → | 5
SCAN | 0
IN | 0
IN | 2
CH2 | PRINT
SELECT |

SETPOINT OPTION BOARD

There are a total of **6** Setpoints available on the M2000. Any of the 6 Setpoints can be assigned to any of the 3 channels. Once a Setpoint is assigned to a scale channel, it is not available for use by the other channels. The **Setpoint Board** connects to the SMARTWIRE BRIDGE INTERFACE and uses solid-state relay modules to switch AC and DC loads.


CONNECTING THE SETPOINT BOARD

- Using the ribbon cable provided, connect **J1** on the Setpoint board to **J1** on the SMARTWIRE Bridge Interface board.

- Make sure the boards have adequate clearance between them.

- Make sure the SMARTWIRE Bridge Interface board has been wired properly to the SMARTWIRE terminal.

FOR THE SETPOINT BOARD TO WORK, **PARAMETER 59** MUST BE ENABLED!

IF, FOR ANY REASON, THE M2000 STOPS TRANSMITTING COMMANDS TO THE SETPOINT BOARD, ALL OUTPUTS WILL BE RESET TO **"OFF"**.

SETPOINT SET-UP PARAMETERS

SETPOINT CONTROL MASK - PARAMETER 57

Description: Controls how each of the 6 Setpoints will function. This is a 6 digit parameter with each digit representing one of the Setpoints.

The left most digit represents **Setpoint # 6** while the rightmost digit represents **Setpoint # 1**.

When entering the control mask, 6 digits must be entered. The first digit entered represents Setpoint **6 of 6**. The last digit entered represents Setpoint **1 of 6**.
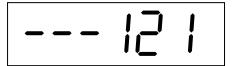
The value of each digit represents the function of that particular Setpoint.

PARAMETER VALUE	SETPOINT FUNCTION
0 (default)	Do not modify.
1	Energize output when weight **<** Setpoint value.
2	Energize output when weight **>=** Setpoint value.
3	Disable the Setpoint.

A dash (**-**) in a digit indicates the Setpoint is not assigned to this scale channel. It is either not used, or is being used by another scale channel.

A common Setpoint Mask may look like this:

Remember: It is very important to enter **"0"** for a Setpoint that you do not want to modify.

ASSIGN SETPOINTS 1 & 2 TO ENERGIZE OUTPUT WHEN THE
              WEIGHT ON CHANNEL 1 IS LESS THAN THE SETPOINT VALUE.

1. Enter Calibration Mode for Scale Channel 1.

    [1 CH1] [9 START] [PRINT SELECT] ➞ [C   0]

2. Enter the Setpoint Control Mask (**Parameter 57**). When Parameter 57 is
    entered for the first time, dashes will be shown across the display.

    [5 SCAN] [7 lb/kg] [PRINT SELECT] ➞ [------]

3.   Press **[0]** four times to skip Setpoints 6, 5, 4, and 3.

    [0 IN] [0 IN] [0 IN] [0 IN] ➞ [0000]

4. See the Setpoint Function table. Press **[1]** twice.

    [1 CH1] [1 CH1] [PRINT SELECT] ➞ [0000 11]

5. Enter Parameter 57 again to check the value. Note the Setpoint mask.

    [---- 11]

**Setpoints 1 and 2 have now been assigned the "≥" function. Now assign
Setpoint 6 the "<" function.**

1. Enter **Parameter 57** followed by the **[PRINT/SELECT]** key.

2. Then enter **"200000"** followed by the **[PRINT/SELECT]** key.

3. If Parameter 57 is entered, the Setpoint Mask shows "2--- 11".

Disable Setpoint 6.

1. Enter **Parameter 57** followed by the **[PRINT/SELECT]** key.

2. Then enter **"300000"** followed by the **[PRINT/SELECT]** key.

3. If Parameter 57 is entered, the Setpoint Mask shows "---- 11".

To exit or abort, press the **[CLEAR]** key at any time.

ENTERING SETPOINT VALUES

Parameters 51-56 are used to enter Setpoint values. Each of the 6 Setpoints has its own weight compare registers. The values entered into these registers will control the Setpoint relays. Setpoint values may be changed in **Normal Weighing Mode.**

NOTE THE UNITS OF MEASUREMENT! TO ENTER A SETPOINT VALUE IN KILOGRAMS, MAKE SURE THE M2000 IS CURRENTLY WEIGHING IN KILOGRAMS.

PARAMETER 51:   Enter weight for **Setpoint 1**, followed by **[PRINT/SELECT]**.

PARAMETER 52:   Enter weight for **Setpoint 2**, followed by **[PRINT/SELECT]**.

PARAMETER 53:   Enter weight for **Setpoint 3**, followed by **[PRINT/SELECT]**.

PARAMETER 54:   Enter weight for **Setpoint 4**, followed by **[PRINT/SELECT]**.

PARAMETER 55:   Enter weight for **Setpoint 5**, followed by **[PRINT/SELECT]**.

PARAMETER 56:   Enter weight for **Setpoint 6**, followed by **[PRINT/SELECT]**.

SETPOINT HYSTERESIS ADJUSTMENTS - PARAMETER 58

Description: Hysteresis adjustments are used when vibrations in the scale cause the Setpoints to falsely trigger. Increasing the Hysteresis value increases the weight settling period for accepting a Setpoint value.

Accepted Values: **6** digits are required (each digit represents each Setpoint as in Parameter 57). Each digit can have a value of **0 to 9**.
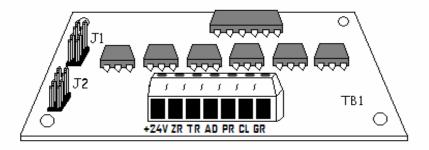
PARAMETER VALUE	SETPOINT FUNCTION
0 (default)	Output action on the **first occurrence** of a weight evaluation of the Setpoint.
1	Energize output when weight **<** Setpoint value.
2	Energize output when weight **>=** Setpoint value.
9	The Setpoint will only change after an evaluation has occurred for **9 consecutive weight samples in a row**.

The Parameter Value is internally multiplied by 10. A Hysteresis factor of 3 will translate to 30 valid weight comparisons to the Setpoint before an output action will take place.

REMOTE INPUT OPTION BOARD

The isolated Remote Input board allows the M2000 to accept remote input switch control.

CONNECTING THE REMOTE INPUT BOARD
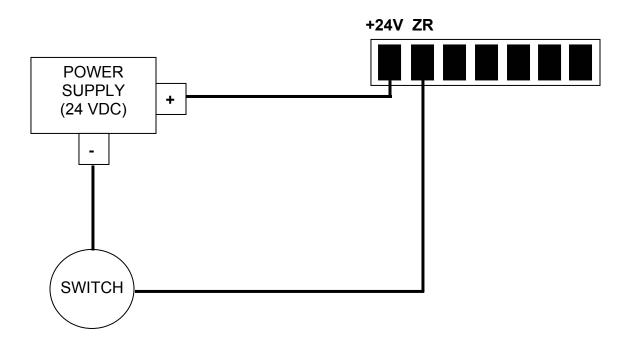
- Using the ribbon cable provided, connect **J1** on the Remote Input board to **J1** on the SMARTWIRE Bridge Interface board.

- Make sure the boards have adequate clearance between them.

- Make sure the SMARTWIRE Bridge Interface board has been wired properly to the SMARTWIRE terminal.

- Wire the **POSITIVE** power supply wire (24 VDC) to the Terminal marked **+24V**.

- The **NEGATIVE** power wire should run through the switch and terminate at the desired terminal.

REMOTE INPUT BOARD FUNCTIONS

The following remote functions are supported:

- **ZR - ZERO** (Zero scale)

- **TR - TARE** (Tare current weight from scale)

- **CL - CLEAR** (Clear tare)

- **GR - GROSS** (Switch to Gross weighing mode)

- **PR - PRINT** (Print ticket)

EXAMPLE: CONNECT A REMOTE ZERO SWITCH. WIRING DIAGRAM.

TRIGGERING THE SWITCH WILL ZERO THE M2000.

NOTES:

2000
APPENDICES

APPENDIX A – PARAMETER LISTING

PARAMETER	FUNCTION	PARAMETER GROUP	PAGE
1	Reload Factory Default Values (Calibration Only)	Reset	**57**
2	Decimal Point Position	Standard Scale Set-Up	**30**
3	Display Divisions (Graduations)	Standard Scale Set-Up	**30**
4	Scale Capacity	Standard Scale Set-Up	**30**
5	Motion Window	MOTION	**38**
6	Power On Units	Advanced Set-Up	**46**
7	Calibration Scale Units	Standard Calibration	**32**
8	Scale Over	Advanced Set-Up	**46**
9	Power On ZERO Prompt	ZERO	**40**
10	Power Switch Bypass	Scale Set-Up	**47**
11	Loadcell Voltage Range	Scale Set-Up	**47**
12	Deadload the Scale	Standard Calibration	**32**
13	Set Span (Spanning the Indicator)	Standard Calibration	**33**
15	Reset Span Table	Linearity Adjustment	**54**
16	Increment Span Table Pointer	Linearity Adjustment	**54**
17	Decrement Span Table Pointer	Linearity Adjustment	**54**
19	Display Update Rate	Advanced Set-Up	**48**
20	Scale Over Message	Advanced Set-Up	**48**
21	Push to Zero Window	ZERO	**40**
22	Auto Zero ON/OFF	ZERO	**40**
23	Zero Tracking Window	ZERO	**41**
24	Motion Settle Time	MOTION	**39**
25	Offset Value	TARE	**43**
26	Offset Flag	TARE	**43**
27	Data Bits (COM2 Only)	Serial Communications	**61**
28	Sound Volume	Advanced Set-Up	**48**
29	Keypress Feedback	Advanced Set-Up	**49**
30	Baud Rate (COM1)	Serial Communications	**61**
31	Parity (COM1)	Serial Communications	**61**
32	Baud Rate (COM2)	Serial Communications	**61**
33	Parity (COM2)	Serial Communications	**61**
34	Output String Format (COM1)	Serial Communications	**62**
35	Output String Format (COM2)	Serial Communications	**62**
36	Serial Handshaking (COM 1)	Serial Communications	**63**
37	Serial Handshaking (COM 2)	Serial Communications	**63**
38	String Output Mode (COM1)	Serial Communications	**63**

PARAMETER	FUNCTION	PARAMETER GROUP	PAGE
39	String Output Mode (COM2)	Serial Communications	**63**
40	Configure COM Ports for RS422 Mode	Serial Communications	**64**
41	Main Filter (Digital Averaging) Setting	FILTERING	**51**
42	Faststep Filter Threshold	FILTERING	**51**
43	Faststep Filter Sensitivity	FILTERING	**53**
44	Disable Faststep Filter	FILTERING	**53**
45	Power ON ZERO (IZSM)	ZERO	**41**
46	Selecting Power Up Default Channel	Scale Channel & Total Mode	**45**
47	Serial Output String Routing (Channel Allocation): COM 1	Serial Communications	**65**
48	Serial Output String Routing (Channel Allocation): COM 2	Serial Communications	**65**
50	Tare Function Mode	TARE	**42**
51	Set Weight for Setpoint 1	SETPOINT	**91**
52	Set Weight for Setpoint 2	SETPOINT	**91**
53	Set Weight for Setpoint 3	SETPOINT	**91**
54	Set Weight for Setpoint 4	SETPOINT	**91**
55	Set Weight for Setpoint 5	SETPOINT	**91**
56	Set Weight for Setpoint 6	SETPOINT	**91**
57	Set Point Control Mask	SETPOINT	**89**
58	Set Point Hysteresis Adjustments	SETPOINT	**91**
59	Enabling SmartWire Interface	SMARTWIRE	**79**
60	Selecting Scale Channel to Connect to Current Loop	4-20 mA (Analog Output)	**80**
61	Current Loop Offset Adjustment	4-20 mA (Analog Output)	**81**
62	Current Loop Span Adjustment	4-20 mA (Analog Output)	**82**
63	Current Loop Gross or Net Mode	4-20 mA (Analog Output)	**83**
64	Current Loop Span	4-20 mA (Analog Output)	**83**
65	Transmission Delay for COM1 and COM2	Serial Communications	**65**
70	Enable Total Mode	Scale Channel & Total Mode	**45**
71	Force Zero for Keyboard Tare	TARE	**42**
75	Transmit Calibration Information to Serial Port	Serial Communications	**70**
76	Capture Calibration Information From a Serial Port	Serial Communications	**72**
77	Transmit Ticket Buffer Information To Serial Port	See Printing & Ticket Formatting Guide	
78	Capture Ticket Buffer Information From Serial Port	See Printing & Ticket Formatting Guide	
80	Set Time of Day	Time & Date	**34**
81	Set the Date	Time & Date	**35**
83	Time Format Mode	Time & Date	**35**
84	Add New Ticket	See Printing & Ticket Formatting Guide	
85	Edit Existing Ticket	See Printing & Ticket Formatting Guide	
86	Number of Ticket Saved in the Ticket Buffer	See Printing & Ticket Formatting Guide	

PARAMETER	FUNCTION	PARAMETER GROUP	PAGE
87	Show Available Space in Custom Ticket Buffer	See Printing & Ticket Formatting Guide	
88	Clear Custom Ticket Buffer	See Printing & Ticket Formatting Guide	
89	Print Specific Ticket	See Printing & Ticket Formatting Guide	
90	Scanner Handshaking Mode	Serial Communications	**75**
95	Assigning a Ticket Event to the Scanner	Serial Communications	**75**
96	View/Change Password	Security Features	**14**
98	Enables Scale Channel	Scale Channel & Total Mode	**44**
99	Exit Calibration Mode	CALIBRATION MODE	**29**
100	Delete Truck IN/OUT Database	See Printing & Ticket Formatting Guide	
101	Delete Truck IN/OUT Database	See Printing & Ticket Formatting Guide	
105	Lock Units (lbs or kgs)	Advanced Set-Up	**49**
106	Auto Tare Clear	TARE	**42**
107	Peak Hold Threshold	See Applications & Examples Guide	
110	Span Factor	Reset	**56**
111	Disable ZERO key	ZERO	**41**
240	Boot Loader Version Information	Call Factory for Assistance	**
244	Testing Battery Information	Battery	
255	Software Upgrade Download	Call Factory for Assistance	**
260	Complete Factory Initialize	Reset	**57**
400	Grading Mode - Set Grade Entry 1 of 10	See Applications & Examples Guide	
401	Grading Mode - Set Grade Entry 2 of 10	See Applications & Examples Guide	
402	Grading Mode - Set Grade Entry 3 of 10	See Applications & Examples Guide	
403	Grading Mode - Set Grade Entry 4 of 10	See Applications & Examples Guide	
404	Grading Mode - Set Grade Entry 5 of 10	See Applications & Examples Guide	
405	Grading Mode - Set Grade Entry 6 of 10	See Applications & Examples Guide	
406	Grading Mode - Set Grade Entry 7 of 10	See Applications & Examples Guide	
407	Grading Mode - Set Grade Entry 8 of 10	See Applications & Examples Guide	
408	Grading Mode - Set Grade Entry 9 of 10	See Applications & Examples Guide	
409	Grading Mode - Set Grade Entry 10 of 10	See Applications & Examples Guide	
410	Enable Grading Mode	See Applications & Examples Guide	
411	Grading Mode - Select Product	See Applications & Examples Guide	
412	Grading Sample - Minimum weight	See Applications & Examples Guide	
413	Grading Sample - Validation Threshold	See Applications & Examples Guide	
414	Grading Mode - Reset All	See Applications & Examples Guide	

APPENDIX B - ERROR CODES

ERROR CODE	DESCRIPTION	SEE PARAMETER
1	Invalid parameter number for Calibration Mode	Calibration Mode
2	Invalid Graduation size	3
3	Invalid Decimal Position	2
4	Parameter value must be **1** for 'ON' or **0** for 'OFF'	22
5	Push to Zero Window must be 0-99	21
8	Only 1 will reset Span Table	15
10	IZSM value can be 1 for ON and 0 for OFF	45
12	Motion settle time out of range (1-50)	24
13	Power on units may only be 0=lb, 1=kg.	6
14	Invalid Time entry HH.MM.SS	80
15	Invalid Date entry YY.MM.DD	81
16	Motion value is out of range (1-10)	5
17	Press tare to increment span table, any other key invalid	16
17	Press tare to decrement span table, any other key invalid	17
19	Span table cannot be decremented past 1	17
23	Invalid Serial Port speed setting	30, 32
24	Invalid Serial Port Parity parameter	27, 31, 33
25	Cannot increment Span Table any further	16
26	Entered offset larger than Capacity	25
28	Power on Zero warning 0=Off, 1=On	9
29	Channel enable is 0=Off and 1=On	98
30	Only 1 will set the deadload	12
31	Sound Volume can be between 0-3	28
32	Keypress feedback can be 0=OFF or 1=ON	29
37	Channel 1 cannot be disabled	98
38	Invalid Print Select Function Number	Normal Weighing Mode
40	Scale channel is not enabled	Normal Weighing Mode
41	Pushbutton Tare is invalid (Over, Motion, or disabled)	Normal Weighing Mode
42	Keyboard tare available on channel 1 only	Normal Weighing Mode
43	Tare greater than capacity	Normal Weighing Mode
46	Invalid Entry (Parameter 26 - Values of 0, 1 & 80 are acceptable)	26
47	Bad Clock Mode (0-2)	83
48	Invalid Main Filter Value	41
49	Invalid Output String Format	34
49	Invalid Faststep Threshold Value	42
50	Zero tracking must be 1-99 or 100, 200, 300.	23

ERROR CODE	DESCRIPTION	SEE PARAMETER
50	Invalid Faststep Sensitivity	43
51	Keypad Tare Function Disabled	Tare Scale
51	Invalid Faststep Setting 0=OFF or 1=ON	44
52	Tare function Disabled.	Tare Scale
54	Invalid Tare Mode Entry (0-3)	50
56	Invalid Power Bypass Entry (0 or 1)	10
56	Invalid Display Update Rate (0-9)	19
56	Cannot delete ticket. Ticket # not found.	89
57	Invalid input for AD voltage range	11
100	Invalid Password number range, can only be 0000-9999.	96
110	SRAM failure	Call for Support
151	Audit trail CRC failed	Call for Support
152	Database CRC failed	Call for Support
153	CAL copy CRC failed	Call for Support
154	Ticket Buffer CRC failed	Call for Support
185	SMART wire COM link not responding	59
191	SMART wire set-point checksum failed	59
192	Channel 1 AD converter not responding	Call for Support
193	Channel 2 AD converter not responding	Call for Support
200	Channel 3 AD converter not responding	Call for Support
231	Ticket does not exist	Ticket Printing

APPENDIX C - SUPPORTED STRING SPECIFICATIONS

DF1000 STRING

<STX><POL><SP>WWWWWW><SP><Units><SP><Mode><SP><Status><CR><LF>

POSITION	CHARACTER	CHARACTER VALUES
1	STX	Start of Text Character (ASCII 02)
2	Polarity	"**-**" for Negative , **Space** for Positive
3	Space	ASCII 32
4	W	Weight String (Padded with spaces)
5	W	
6	W	
7	W	
8	W	
9	W	Least Significant Digit
10	Space	ASCII 32
11	Units	"**KG**" = Kilograms
12	Units	"**LB**" = Pounds
13	Space	ASCII 32
14	Mode	"**GR**" = Gross weight
15	Mode	"**NT**" = Net weight
16	Space	ASCII 32
17	Status	**Space**=Valid, "**O**"=Over, "**M**"=Motion, "**-**"=Negative
18	CR	Carriage Return (ASCII 13)
19	LF	Line Feed (ASCII 10)

DF1500 STRING

<STX><POL><WWWWWWW><SP><Units><SP><Mode><SP><Status><CR><LF>

POSITION	CHARACTER	CHARACTER VALUES
1	STX	Start of Text Character (ASCII 02)
2	Polarity	"**-**" for Negative , **Space** for Positive
3	W	Weight String (Padded with spaces, includes decimal point)
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	Least Significant Digit
10	Space	ASCII 32
11	Units	"**KG**" = Kilograms
12	Units	"**LB**" = Pounds
13	Space	ASCII 32
14	Mode	"**GR**" = Gross weight
15	Mode	"**NT**" = Net weight
16	Space	ASCII 32
17	Status	**Space**=Valid, "**O**"=Over, "**M**"=Motion, "**-**"=Negative
18	CR	Carriage Return (ASCII 13)
19	LF	Line Feed (ASCII 10)

DF2000 STRING

<STX><POL><SP><WWWWWW><SP><Units><Channel Info><Mode><SP><Status><CR><LF>

POSITION	CHARACTER	CHARACTER VALUES
1	STX	Start of Text Character (ASCII 02)
2	Polarity	"**-**" for Negative , **Space** for Positive
3	Space	ASCII 32
4	W	Weight String (Padded with spaces)
5	W	
6	W	
7	W	
8	W	
9	W	Least Significant Digit
10	Space	ASCII 32
11	Units	"**KG**" = Kilograms
12	Units	"**LB**" = Pounds
13	Channel Info	* **See Command Mode table below:**
14	Mode	"**GR**" = Gross weight
15	Mode	"**NT**" = Net weight
16	Space	ASCII 32
17	Status	**Space**=Valid, "**O**"=Over, "**M**"=Motion, "**-**"=Negative
18	CR	Carriage Return (ASCII 13)
19	LF	Line Feed (ASCII 10)

CHANNEL INFO CHARACTER:

CHARACTER	WEIGHT FROM:
1	Channel 1
2	Channel 2
4	Channel 3
3	Sum of channels 1 and 2
5	Sum of channels 1 and 3
7	Total Mode (Sum of Channels 1,2,3)

DF2000 COMMAND MODE

Simple 1-character command mode. When the indicator receives a command, it replies with the DF2000 string. The single character commands are listed below.

CHARACTER	ACTION
?	Send Current Displayed Weight
1	Set to Channel 1 and send displayed weight
2	Set to Channel 2 and send displayed weight
3	Set to Channel 3 and send displayed weight
4	Set to Total Mode and send displayed weight
T	Set Tare on current channel
C	Clears stored Tare weight
G	Switches to Gross mode
N	Switch to Net mode if a Tare weight is stored
Z	Zeroes indicator if within ZERO window

DF2500 STRING

<STX><POL><SP><WWWWWWW><SP><Units><SP><Mode><SP><Status><CR><LF>

POSITION	CHARACTER	CHARACTER VALUES
1	STX	Start of Text Character (ASCII 02)
2	Polarity	"**-**" for Negative , **Space** for Positive
3	W	Weight String (Padded with spaces)
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	Least Significant Digit
10	Space	ASCII 32
11	Units	"**KG**" = Kilograms
12	Units	"**LB**" = Pounds
13	Space	ASCII 32
14	Mode	"**GR**" = Gross weight
15	Mode	"**NT**" = Net weight
16	Space	ASCII 32
17	Status	**Space**=Valid, "**O**"=Over, "**M**"=Motion, "**-**"=Negative, "**F**"= Fault.
18	CR	Carriage Return (ASCII 13)
19	LF	Line Feed (ASCII 10)

DF2500 COMMAND MODE 6

A fully interactive Command Set can be sent from a remote computer to operate the indicator. This Command Mode has no checksum.

The maximum number of characters sent before the CR must not exceed 20. The M2000 may fail to respond to the command if this number is exceeded.

Preceding the message with the STX insures the input buffer is cleared before the next message. The indicator ignores LF and other control characters.

The following is a list of commands that can be executed:

COMMAND	DATA REQ'D.	FUNCTION
G	None	Set to GROSS mode and send string
N	None	Set to NET mode and send string
P	None	Tare scale & send NET string (0)
T	Tare Weight (left pad with spaces)	Set tare weight and send NET string
R	None	Recall tare weight
C	None	Clear tare weight & send GROSS string
?	None	Poll for weight (any mode)
L	None	Set units to LB & send string (any mode)
K	None	Set units to KG & send string (any mode)
Z	None	Zero the scale & send string (any mode)
A	None	Add to accumulator
S	None	Recall accumulator
B	None	Recall load counter
X	None	Clear accumulator
1	Setpoint 1 (left pad with spaces)	Enter Setpoint 1
2	Setpoint 2 (left pad with spaces)	Enter Setpoint 2
3	Setpoint 3 (left pad with spaces)	Enter Setpoint 3
4	Setpoint 4 (left pad with spaces)	Enter Setpoint 4
5	Setpoint 5 (left pad with spaces)	Enter Setpoint 5
6	Setpoint 6 (left pad with spaces)	Enter Setpoint 6

The format of the command string sent to the indicator must be as follows:

POSITION	CHARACTER	CHARACTER VALUES
1	**STX**	Start of text (02H)
2	**D0**	Data. These characters are filled by the numeric weight values used for the TARE and SETPOINT functions.
3	**D1**	
4	**D2**	
5	**D3**	
6	**D4**	
7	**D5**	
8	**D6**	
9	***Cmd**	The command character (see table below)
10	**CR**	Carriage Return

The M2000 will reply with the DF2500 output string when it receives a valid command. The returned data will reflect the command executed. Failure of the indicator to respond with the correct mode or weight indicates that execution of the command was not permitted.

Some commands may be inhibited (i.e. push to zero) and the return data will reflect the indicator's inability to complete these commands.

DF2500 COMMAND MODE 7

This mode is identical to DF2500 Command Mode 6 with the inclusion of an 'Exclusive OR' checksum. The checksum is included in both the SEND and RECEIVE data strings as a two-character string immediately preceding the CR.

The checksum is calculated using an 'Exclusive OR' of all characters between the STX and the first character of the checksum. The STX, checksum and CR are not included in the checksum . The single byte calculated is converted into two hexadecimal characters, each representing half of the byte. The most significant 4 bits are sent first. The values are sent in hexadecimal format (0-F).

CONSOLODATED CONTROLS

<STX><POL><WWWWWWW><Units><Mode><Status><SP><CR><LF>

POSITION	CHARACTER	CHARACTER VALUES
1	STX	Start of Text Character (ASCII 02)
2	Polarity	"**-**" for Negative , **Space** for Positive
3	W	Weight String (Padded with spaces, includes decimal point)
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	Least Significant Digit
10	Units	"**K**" = Kilograms, "**L**" = Pounds
11	Mode	"**G**" = Gross weight, "**N**" = Net weight
12	Status	**Space**=Valid, "**O**"=Over, "**M**"=Motion
13	Space	ASCII 32
14	CR	Carriage Return (ASCII 13)
15	LF	Line Feed (ASCII 10)

WEIGHTRONIX 120 FORMAT

<SP><Mode><POL><WWWWWW><SP><Units><CR><LF>

POSITION	CHARACTER	CHARACTER VALUES
1	Space	ASCII 32
2	Mode	"**G**" = Gross weight, "**N**" = Net weight
3	Polarity	"**-**" for Negative , "**+**" for Positive
4	W	Weight String (6 Characters, padded with spaces)
5	W	
6	W	
7	W	
8	W	
9	W	Least Significant Digit
10	Space	ASCII 32
11	Units	"**KG**" = Kilograms
12	Units	"**LB**" = Pounds
13	CR	Carriage Return (ASCII 13)
14	LF	Line Feed (ASCII 10)

CARDINAL 738 FORMAT

<CR><POL><WWWWWWW><SP><Status><SP><Units><SP><Mode><SP><SP><EOL>

POSITION	CHARACTER	CHARACTER VALUES
1	CR	Carriage Return (ASCII 13)
2	Polarity	"**-**" for Negative , "**+**" for Positive
3	W	Weight String (Padded with spaces, includes
4	W	decimal point)
5	W	
6	W	
7	W	
8	W	
9	W	Least Significant Digit
10	Space	ASCII 32
11	Status	**Space**=Valid, "**O**"=Out of Range, "**M**"=Motion
12	Space	ASCII 32
13	Units	"**kg**" = Kilograms
14	Units	"**lb**" = Pounds
15	Space	ASCII 32
16	Mode	"**G**" = Gross weight, "**N**" = Net weight
17	Space	ASCII 32
18	Space	ASCII 32
19	EOL	End of Line Character (ASCII 03)

ANALOGIC 5316

<STX><WWWWWWWWW><TTTTTTTTT><SP><Status><Units><SP><CR><LF>

POSITION	CHARACTER	CHARACTER VALUES
1	STX	Start of Text Character (ASCII 02)
2	W	Weight String (Padded with spaces, includes decimal point and SIGN character)
3	W	
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	
10	W	Least Significant Digit
11	T	TARE Weight String (Padded with spaces, includes decimal point and SIGN character)
12	T	
13	T	
14	T	
15	T	
16	T	
17	T	
18	T	
19	T	Least Significant Digit
20	Space	ASCII 32
21	Status	"**1**"= In Range, "**2**"= Standstill, "**4**"= Center of Zero, "**8**"= Net Mode (Bit Masking)
22	Units	"**0**"= Kilograms, "**1**"= Pounds
23	Space	ASCII 32
24	CR	Carriage Return (ASCII 13)
25	LF	Line Feed (ASCII 10)

APPENDIX D - M2000 SPECIFICATIONS

INDICATOR PERFORMANCE	
UNIT CONVERSION	lbs / kg
ZERO TRACKING	1-99% of d or 1,2,3d
RESOLUTION (M2000A)	+/- 520,000 A/D counts per loadcell
RESOLUTION (M2000D)	+/- 256,000 A/D counts per loadcell
SAMPLING RATE	100 times per second per AD channel
SPAN STABILITY	2ppm/ Celsius
ZERO STABILITY	5nV/Celsius
LINEARITY CORRECTION	5 span entries
CALIBRATION METHOD	Calibration through software stored in Flash memory
CALIBRATION SEALING	Class 1 Audit Trail System, password protected
FILTERING	FASTSTEP quick response
MODES	Display from CH1, CH2, CH3 and TOTAL MODE (All Channels)
FIRMWARE UPGRADING	Flash Memory - In field Firmware upgrading without affecting calibration data.
LOAD CELLS	Analog Cells. M2000D: Up to 16 Loadcells using two DLC slaves

LOADCELL INPUTS	
FULL SCALE	4 ranges: **0-9**mV, **0-19**mV, **0-39**mV, and **0-79**mV
EXCITATION (M2000D)	5VDC,16x350, 32x700 ohm in total
EXCITATION (M2000A)	7.5VDC,16x350, 32x700 ohm in total

COMMUNICATIONS	
SERIAL OUTPUTS	2 full duplex RS232/RS422 (1 only with Single Channel model)
IO INTERFACE	SMART WIRE peripheral expansion: RS485 multi-drop
EXTERNAL IO: SETPOINTS	6 channel Setpoint via SMARTWIRE (optional)
EXTERNAL IO: ANALOG OUTPUT	4-20mA board via SMARTWIRE (optional)
EXTERNAL IO: DIGITAL INPUTS	6 optically isolated inputs via SMARTWIRE (optional)
NETWORKING	RS485 Multi-drop Networking of up to 32 indicators as slaves

ELECTRICAL	
POWER REQUIREMENTS	12VDC, 1 Amp. (1.5A maximum)
POWER DRAW	200 mA
TEMPERATURE RANGE	-10C to +40C
RFI PROTECTION	Filtered Signal, Excitation, & Sense lines

ENCLOSURES	
STAINLESS	Wash-down stainless steel enclosures. Panel mount, swivel-bracket, or desktop. Light Stainless or NEMA 4-X.
ALUMINIUM	Slimline. M2000A only. 12 GA. Cast aluminium.

APPROVALS	
MEASUREMENT CANADA	AM 5371 – Rev.1
NTEP	00-076A1
CSA	CSA Approved Power Supply
OIML	Pending

APPENDIX E - WARRANTY

Warranty

The following terms of warranty apply to all new products sold by Western Scale Co. Limited (hereinafter called "Western") unless otherwise specified in the terms of sale.

All new products are warranted against defects in workmanship and materials for the following period and upon the following terms and conditions:-

1. The warranty period is for twelve (12) months commencing from the date of delivery of the product to the purchaser.

2. Western shall, at its option, repair or replace or refund the purchase price, within a reasonable period of time, after having been notified of the alleged defect and after having been satisfied that a defect pursuant to this warranty in fact exists.

3. Notice of the alleged defect must be given during the warranty period and must state the model number and serial number and the date the product was purchased.

4. If requested by Western, any product or part thereof must be promptly returned to Western with the shipping charges pre-paid. Purchasers who require on site servicing shall be responsible for travel labour and all other extra expenses incurred as a result of such on site servicing. Western does not accept responsibility for loss or damage to any product or part thereof in transit, nor will any claim be honoured unless the product or part thereof is received, by Western, intact, with no evidence of tampering or previous attempts at repair.

5. Western shall not be responsible for:-
    (a) consequential or special losses or damages, such as loss of use, inconvenience, commercial or economic loss;
    (b) defects caused by misuse, negligence, modification or neglect;
    (c) improper operation, maintenance or repair.

6. This warranty shall have no force and effect and shall not apply if there has been:-
    (a) any unauthorized modification, alteration or substitution of any part or parts of the product, or
    (b) the serial number of the product has been altered or defaced in any manner whatsoever.

7. No employee or agent of Western has any authority to add to, subtract from, or change any portion of this warranty and Western's obligation herein is strictly limited to these terms as written.

8. This warranty is the sole warranty of Western and any other warranties, expressed or implied by law, including the pro-visions of the Sale of Goods Act and in particular Section 20 thereof, are hereby specifically excluded.

WESTERN SCALE CO. LIMITED
1670 Kingsway Avenue,
Port Coquitlam (Vancouver), B.C.
V3C 3Y9