m2000 technical manual

high speed 3 channel digital indicator

Preliminary Manual Release for V1.16 of software

We are continuously improving the manual and will send out updated manuals as soon as the manual has been finalized. More examples and features will be added.
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Western Scale Co. Ltd.

Keypad Functions Keys

The M2000 has several function keys, all of which are selected via the front panel. The function key operations are discussed below. All the keys have audio feedback when a key is pressed. The sound volume can be set in calibration.

On/Off Key
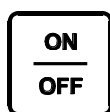
This is the ON/OFF button for the indicator. Pressing the switch once turns on the indicator. To turn off the indicator press the switch for 1 second. It is important to note that there is a power bypass switch option flag that can be set in calibration (parameter 10). If power bypass is enabled the indicator will always be on and cannot be turned off via the ON/OFF button. This option should be used if the indicator is used in process control applications where the indicator must power up running after a power outage.

When the indicator starts "m2000 " will scroll across the screen followed by the version number of the software. The indicator performs a full diagnostic of its internal circuits and will display any error messages if there is an internal problem with the indicator.

When the indicator is in calibration mode this key can be used to toggled between displayed weight and AD converter internal counts.

ZERO Key
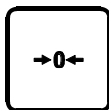
This key is used to zero the indicator. The scale cannot be zeroed if there is motion on the scale or the weight on the scale is out of the zero range. Three quick beeps will sound from the indicator if the zero key is unable to zero the indicator.

This key also functions as a ZERO key when the indicator is in calibration mode.

TARE Key
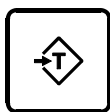
This key is used for taring weight on the scale. A tare can also be entered from the keypad. To tare from the scale simply press the tare key and what ever the weight on the scale will be tared. The NET indicator light should be illuminated showing that the indicator is in net weight display mode.

To manually tare from the keypad enter the weight using the numeric keypad followed the tare key. The indicator will only accept a tare from a stable and valid positive weight. An invalid tare will cause error message 41 to be displayed. Pressing the tare key will always overwrite any previously stored tare weight. Use the clear key to clear the tare weight.

It is important to note that the tare key can be disabled in the calibration menu using parameter 50.

CLEAR Key

This will clear any previously entered tare values entered using the tare key. Clear will also function as an escape key to cancel any key entry operations.

PRINT SELECT Key

Print select is a dual function key. Pressing the key will cause a ticket to be printed to a connected printer. If you have typed a numeric value from the keyboard followed by the PRINT SELECT key then the key acts as a function select key. More information on this will be discussed below.

Special Keypad Functions

Keypad functions are selected by entering a numeric function code on the keypad followed by the PRINT SELECT key. Some functions are marked on the key itself. The most common functions are discussed below.

Selecting scale channels

The M2000 has three independent scale channels. Press the channel number followed by the PRINT SELECT key as shown below.

| **1** CH1 | **PRINT** ── **SELECT** | To select channel 1 press 1 followed by the print select key. |

| **2** CH2 | **PRINT** ── **SELECT** | To select channel 2 press 2 followed by the print select key. |

| **3** CH3 | **PRINT** ── **SELECT** | To select channel 3 press 3 followed by the print select key. |

Note: that by default only channel 1 is enabled. To enable channels 2 and 3 you must enter calibration mode and use parameter 98 to enable them. Trying to select a scale channel that is not enabled will display error message 40.

Summing channels in TOTAL mode

Up to 3 channels may me summed together to display a total weight. An example of an application that may require this operation would be a truck scale with three sections. Each section would be a separate channel on the indicator allowing the operator to simultaneously record the total weight of the vehicle along with the individual axle weights of the truck.

4 **PRINT SELECT** To enter total mode press 4 followed by the print select key.

Total mode must be enabled before it can be used. Parameter 70 in calibration mode is used to enable the total mode function. Enter 1 followed by the TARE key to enable TOTAL mode. Total mode *cannot be used for legal for trade* applications in Canada.

Only channels that are enabled and calibrated with the same grad size, decimals and units of weight will be displayed in total mode. Total mode is indicated by illuminating more than one channel on the channel indicators. Channel 1 is always part of the total.

Example:
Ch1 and 3 are calibrated as 2000 x 2 lbs and Ch2 is calibrated to 500 x 0.2 lb .

When you press 4 followed by the PRINT SELECT key the CH1 and CH3 indicators will illuminate showing that the weight on the display is the sum of these two channels. Channel 2 however is excluded from the total as it is calibrated in 0.2d instead of 2d for channels 1 and 3.

When the indicator is in TOTAL mode all the channel operations are combined. Pressing the ZERO button will zero all the channels that are part of the total. The TARE function will tare all channels simultaneously displaying the total net weight. The motion indicator and center of zero indicators will indicate the status of all the scales that are part of the total. For example scale 1 may be at the center of zero, but channel 3 might not be at zero. The center of zero indicator would then not illuminate reflecting that we are not at zero.

To set the indicator back to single channel mode, select a channel followed by the print select key.

Scan mode

Scan mode allows the indicator to cycle between the scale channels that are enabled. The indicator will automatically switch the display to the next available channel and pause for 3 seconds before switching to the next channel. To stop scanning press a channel key followed by the print select key.

5 SCAN	PRINT SELECT	To enter scan mode press 5 followed by the print select key.

Gross/Net

6 GR/NET	PRINT SELECT	Pressing 6 followed by the print select key switches between displayed net weight and gross weight.

Pound/Kilograms selection

To change the displayed units on the display press 7 followed by the print select key. The indicator will toggle the displayed units on the display from lbs to kgs or kgs to lbs. The units that the indicator uses as a default when turning on the indicator is determined by the power up setting set in calibration.

7 lb/kg	PRINT SELECT

TEST display

To test the display segments press 8 followed by the print select key. All the segments in the display will light up for a short period of time.

8 TEST	PRINT SELECT

Entering into Calibration Mode

To calibrate a scale the indicator must be placed in calibration mode. Only qualified scale technicians should be performing these operations. The 3 scale channels are independent of each other and must be calibrated separately.

Placing the indicator into Calibration Mode

| 1 CH1 | 9 CAL | PRINT SELECT | To calibrate channel 1 press 19 followed by the print select key. |

| 2 CH2 | 9 CAL | PRINT SELECT | To calibrate channel 2 press 29 followed by the print select key. |

| 3 CH3 | 9 CAL | PRINT SELECT | To calibrate channel 3 press 39 followed by the print select key. |

The display will be showing a blinking "PASS" message. This prompts you to enter a 4 digit password. Key presses are not displayed on the display. If the 4 digit password sequence is correct then the indicator will automatically enter calibration mode.

The factory default for the password is 1111. This can be changed but we recommend keeping the password to the factory default, more on this later

You have 30 seconds to enter calibration mode before the indicator cancels and returns back to normal weighing mode.

Calibration mode is indicated when there is a blinking 'C' displayed in the left most digit on the display.

Special Keypad function keys during calibration

Selecting a calibration parameter.

The M2000 uses parameter numbers to access calibration functions. Each cal function has a unique number used to access that parameter.

PRINT SELECT   In calibration mode the print select key now becomes the calibration function select key. Entering a calibration function number followed by the print select key selects a calibration parameter to edit.

Immediately after a function parameter has been entered followed by the print select key the value of that parameter will be displayed on the display for a short period of time.

Editing a calibration parameter.
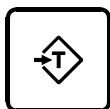
After selecting a cal parameter with the print select key a new value for that cal function can be entered. The TARE key now becomes an ENTER key for entering calibration parameters. Parameter values entered from the keypad must immediately follow with the TARE key to take affect.

Canceling a calibration parameter.

CLEAR   If you would like to cancel a calibration function you can use the CLEAR key as an ESCAPE key. This key will get you out of most calibration operations.

Toggling between weight display mode and AD counts mode.
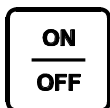
ON OFF   A unique feature of the M2000 is the ability to toggle between weight and the AD converters internal counts. This can be an excellent diagnostic tool for the experience scale technician. Pressing the ON/OFF key will show the internal AD counts. The blinking 'C' will now change to a blinking 'A' to indicate analog AD counts are being displayed. Press the ON/OFF button again to switch back to weight mode.

Exiting Calibration Mode.

9 CAL   **9** CAL   **PRINT SELECT**   To exit calibration mode press 99 followed by the print select key. All calibration parameters will be saved and the indicator will restart in weighing mode.

Note: Channels 2 and 3 are disabled by default. Remember to enable them before exiting calibration mode by using parameter 98.

Calibration Setup Parameters

There are over 80 different calibration parameters. There is a table listing in the manual for all of the parameters. We will go though step by step the most common parameters required to calibrate a scale.

Reload factory default values.

1 CH1   **PRINT SELECT**   This function will clear all previous calibration values for a single channel and reinitialize with factory values to the selected channel only. A small 'r' will be displayed which means, "reconfirm". Press 1 followed by the TARE key to confirm reloading factory values. Note this is for parameters related to calibration only. If you want to clear all calibration information and do a **complete factory** re initialize then use **parameter 260**. Clearing calibration does not affect tickets or databases. The indicator will reboot to reinitialize itself. This is normal.

Decimal Point Position.

2 CH2   **PRINT SELECT**   Set the decimal to correspond with the graduation size. Enter 0 to 4 followed by the TARE key. For example if you were displaying weight by 0.1d you would set the decimal position to 1 followed by the TARE key. To display weight by 1d enter a value of 0.

Display Divisions (d).

3 CH3   **PRINT SELECT**   Enter the division size the scale is to count in. Values that may be entered are 1,2,5,10,20,50 and 100 followed by the TARE key. Example set up the indicator for 2d press 2 followed by the TARE key. If you wanted 0.2 display divisions then use parameter 2 above to add the decimal.

Scale Capacity

4 TOTAL   **PRINT SELECT**   Enter the scale capacity here followed by the TARE key. This is the true capacity of the scale. The zero range is calculated from this value. If you want scale over to be above scale capacity then enter the number of divisions past scale capacity using parameter 8.

Motion Window

5
SCAN

PRINT
———
SELECT

Enter the motion window for scale motion. Set to 2 times the displayed division size. This value is automatically set when you set the display division size (parameter 3).

Power On units

6
GR/NET

PRINT
———
SELECT

Sets the default display units when the indicator powers up for the first time. This parameter is automatically set to parameter 7 below.
Select 1 for kgs or 0 for lbs followed by the TARE key.

Calibration Units

7
lb/kg

PRINT
———
SELECT

Set to 1 if you are calibrating with test weights in Kilograms or 0 if you are calibrating with test weights in Pounds.

Scale Over

8
TEST

PRINT
———
SELECT

Enter the number of divisions for scale over. Example if your scale capacity is 2000 x 1 division (parameter 4) and you would like 2009 for scale over, then enter 9 followed by the TARE key. Example if the scale is calibrated with a scale capacity of 5000 x 5 divisions and you want the scale over to be at 5020 then enter 4 in parameter 8 (4 x 5div=20).

Power On Reset Warning

9
CAL

PRINT
———
SELECT

When this parameter is set to 1 forces the operator to zero the scale after the indicator has powered up. This is required for certain legal for trade application.

Push to Zero Window

2 CH2   **1** CH1   **PRINT SELECT**

Sets the percent of scale capacity that can be zeroed by the zero key. The value can be 1 to 99 followed by the TARE key. Example: for a push to zero range of 2% enter the value 2.

Auto Zero ON/OFF (AZTM)

2 CH2   **2** CH2   **PRINT SELECT**

Enter 0 to disable or 1 to enable zero tracking followed by the TARE key.

Zero Tracking Window

2 CH2   **3** CH3   **PRINT SELECT**

This parameter sets the percentage of 1d to track off. For 60% zero tracking enter 60 followed by the TARE key. You may enter values 1-99 to track a percentage of 1 d or 100 for 1d, 200 for 2d and 300 for 3d.

Motion Settle Time

2 CH2   **4** TOTAL   **PRINT SELECT**

Enter the number of ¼ second intervals for which the motion will remain asserted after the scale stabilizes to within the motion window (parameter 5) Enter a value of 1-100 followed by the TARE key.

Selecting Power Up default Channel

Channel 1 is the default channel when the indicator powers up. In some unique cases you may want to power up displaying channel 2 instead, or in TOTAL mode. This can be done using parameter 46 to select the start up channel. More on this is in the parameter section.

Calibrating with Weights

Once the initial settings have been set up for the indicator, the indicator can be calibrated. Calibration in the M2000 is very efficient and fast.

Selecting Input Range

The default input range for the M2000 is 39mV. The input range can be selected from 4 different input ranges ranges.

Enter 11 followed by the PRINT/SELECT key. The current input range will be displayed. Enter the input range value 1-4 followed by the TARE key.

The input range values are as follows:

    1   for 0 to +/- 9mV
    2   for 0 to +/- 19mV
    3   for 0 to +/- 39mV (default)
    4   for 0 to +/- 79mV

Note: that the inputs of the indicator can go equally negative than positive for the input range. By negative we mean that the load cells go negative or polarity reversed. If the display shows "AAAAAA" then you have exceeded the input range of the indicator and you should select the next range up.

Deadloading the Scale (scale zero)

Before the indicator can be calibrated the deadload or scale zero value must be obtained. Remove all test weights from the scale.

 Key parameter 12 followed by the PRINT/SELECT key.

The display will show 'r' for "reconfirm". Press 1 followed by the TARE key to confirm to continue with deadloading the scale.

The indicator will pause for a short duration and then display the deadload value in AD counts to the display. The indicator will then return back to weight display mode.

The indicator can now be calibrated with a known test weight.

Spanning the indicator

Place a known test weight on the scale. Enter 13 followed by the PRINT/SELECT key.

The display will briefly flash the span entry pointer for the linearity correction on the display. If you are not using linearity correction then this will be 1. Shortly after the display will freeze with the last displayed weight. Enter the value of your test weight followed by the TARE key. The indicator will immediately calibrate and return back to weight display mode.

If the display shows "EEEEE" then you have exceeded the scale capacity value set in parameter 4 and 8. If the display shows "AAAAAA" then you have exceeded the input analog range of the indicator. The output voltage from the load cells exceeds the input for the AD converter.

Using linearity tables

Linearity tables are tables of action points with associated span values. Action points are defined as internal AD counts from the AD converter. When the weight input to the indicator passes over an action point the indicator will switch to a new span value. Having different span values at different weight ranges on the scale helps to correct scale structural or loadcell non-linearity.

The M2000 has 4 linearity table entries. Each scale channel has an independent table. Making adjustments to one channel will not affect another. If you have a non-lineratity error of more than 3d you should make a closer mechanical inspection of the scale and its installation.

For every new calibration span entry into the linearity tables the M2000 calculates 2 additional linearity action points in between. This makes the transition from one calibration entry to the next more gradual rather than a sudden jump at a specific action point value.

The following parameters are used for linearity adjustment:

Parameter 15 clearing the span tables

It is always recommended to reset the linearity table before starting calibration. This clears all entries except for the first calibration entry. To clear the table enter 15 followed by the PRINT SELECT key. You will see a small 'r' indicating "reconfirm". Press 1 followed by the TARE key to clear all the tables.

Parameter 16 incrementing a span table pointer

To add a calibration entry to the table you must increment the span table pointer.
To increment the table pointer press 16 followed by the PRINT SELECT key. The current span pointer will be displayed. Press CLEAR to cancel or TARE to increment the span pointer by 1.

Parameter 17 decrementing the span table pointer

To move one down through in the calibration entry you must decrement the span table pointer. To decrement the table pointer press 17 followed by the PRINT SELECT key. The current span pointer will be displayed. Press CLEAR to cancel or TARE to decrement the span pointer by 1.

Adding a new calibration entry to the table.

Adding a new calibration entry is exactly the same procedure for scale calibration. Place the known test weight on the scale. When the scale has settled enter 13 followed by the PRINT SELECT key. The indicator will briefly display the span table pointer value. Then the display will display the current weight. Enter the new weight followed by the TARE key.

An example of linearity adjustment.

We have a scale with a capacity of 5000 and counting by 5d.
We first deadload (zero calibration) the scale and then apply 1000 lbs of weight to calibrate the scale using parameter 13.

The scale is now calibrated.

We now remove all the weights from the scale. The scale reads 0.

We now add 1000 lbs to the scale. The scale reads 1000 lbs.
We add an additional 4000 lbs to the scale (total 5000 lbs) and the scale reads 4990.

There is an error of 10lbs or 2d.

To correct the problem increment the span pointer to the second span table location. Press 16 followed by PRINTSELECT then press the TARE key to increment the table pointer to 2.

With the 5000 lbs test weights still on the scale press 13 followed by the PRINT SELECT key. The display will briefly flash the value of 2 to indicate that you are at the 2nd position in the span table. Shortly after the indicator will display the last weight on the display of 4990 lbs. Enter the new weight of 5000 lbs followed by the TARE key.

Retest the scale at 0, 1000 and 5000lbs. If the readings are correct then exit calibration mode.

If the reading at 1000 is no longer valid then the distance between the action points of the first span and the second span is too wide. You will have to do a scale build up between 1000 and 5000 with more entries into the span table to provide a more linear transition in the span table.

Sealing the indicator

The M2000 is sealed electronically with a password.

Electronic Seal

Passwords are 4 digit numbers. The factory default for the password is 1111, which can be changed in calibration mode. To change or view the password in calibration mode use parameter 96. Enter a 4 digit password followed by the TARE key.

Important note:
If you forget your password you will not be able to enter calibration mode on the indicator. Contact the factory for assistance at 604-941-3474.

Audit Trail

The M2000 is equipped with a Category 1 Audit Trail system. It is **important** that the correct time and date be set, as this is saved as part of the audit trail. The audit trail is permanent and cannot be disabled or erased by removing the internal battery inside the indicator.

The Audit Trail has two counters, the Calibration counter and the Parameter counter. Changing parameters that affect the calibration of weight will increment the Calibration counter by 1. All other parameters will increment the Parameter counter. The counters will count from 000 to 999 before rolling over again. Changing one or more parameters will only increment the counter by 1 per calibration session. Only an actual change of value to the calibration parameter will register to the audit trail.

Important Note:
Because the audit trail becomes active at the factory, the counters may not show 0 even when the indicator is new out of the box.

Accessing the Audit Trail

The audit trail can only be accessed from normal weighing mode and cannot be accessed while you are in calibration mode. Enter 1000 followed by the PRINT SELECT. The message "Audit" will briefly be displayed on the display. Shortly after the indicator will cycles through 3 times displaying the date of when the last change was made to the indicators calibration parameters, the calibration (CAL) counter and the configuration (CFG) counter. You may press the CLEAR key at any time to cancel this operation.

Time and Date on the M2000

Time and Date is changed **outside** of calibration mode in normal weighing mode. The M2000 has a build in time and date clock that is year 2000 compliant and automatically adjusts for leap years. The real time clock will run even if power is removed from the indicator. There is a battery inside the indicator that will keep the clock running continuously while there is no power to the indicator. **You are *not* have to be in calibration mode** to change the time and date. From the numeric keypad enter 80 followed by Print/Select to change the time and 81 to change the date.

Changing the TIME and DATE

Parameter 80: SET TIME OF DAY   (outside of cal mode)

This is a 6-digit value, and requires 6 digits to be entered when changing the time. The hour mode must be kept in mind when entering hours. Check the TIME FORMAT MODE command 83. Enter the new time in a format as shown below followed by the TARE key. You may also cancel at any time by pressing the CLEAR key.

HH:MM:SS

| Two digit seconds entry between **0-59** |
| Two digit minute entry \between **0-59** |
| Two digit hour entry **1-12 or 0-23 for 24 hour mode** |
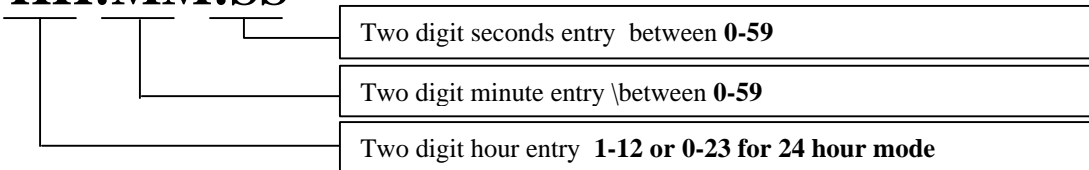
Note:
If you are en 12 hour mode then you must use parameter 83 to select AM or PM.

Parameter 81: SET THE DATE

This is a 6-digit value, and requires 6 digits to be entered when changing the date. Enter the new time in a format as shown below followed by the TARE key. You may also cancel at any time by pressing the CLEAR key.

YY:MM:DD

| Two digit day of month entry between **1-31** |
| Two digit month entry between **1-12** |
| Two digit year entry **00-99** |
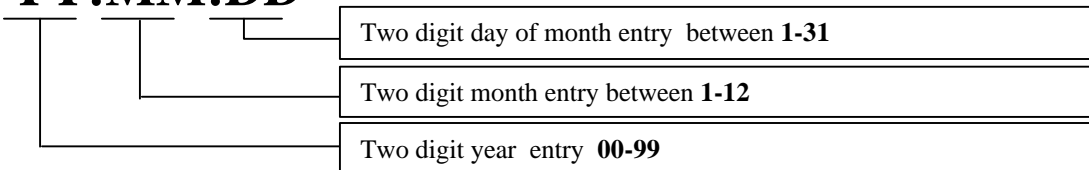
Parameter 83: TIME FORMAT MODE

This parameter controls if your using 12 hour or 24 hour (military time) clock settings. If you are using 12 hour mode then you must also indicate whether you are currently in AM or PM.

To change or view the time format enter 83 followed by the Print Select Key. Enter 0,1 or 2 followed by the TARE key to change the mode. The values are shown below.

- Enter 0 for 24 hour mode
- Enter 1 for 12 hour mode AM
- Enter 2 for 12 hour mode PM

You may press CLEAR at any time to cancel.

Battery Replacement on the M2000

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

Testing Battery (calibration mode)

Parameter 244 in calibration can be used to take a measurement of the 3V lithium battery. Voltage levels are in mV and can be interpreted below.

3000 (3V) and above considered good
2700 (2.7V) and above considered acceptable
2600 (2.6V) and below considered as low – replace battery

Replacing Battery

The back cover of the indicator has to be removed to replace the battery. Once removed you will see in the left corner a coin size battery in a battery holder. Using your fingers grab each edge of the battery and 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 an electronics store like Radio Shack.

Note: Never use metal objects such as screwdrivers to remove the battery. This can result short-circuiting the battery and damaging the indicator and is dangerous.

Printing with the M2000

Tickets can be created and edited in the M2000. The M2000 can hold several different ticket formats for different applications. Tickets are stored and called by ticket numbers. Ticket numbers *can be anywhere between 200 and 299* and is assigned by the indicator when you create a new ticket.

You can have several tickets in the ticket buffer. To recall a ticket you must enter the ticket number followed by the Print/Select key. For example to print ticket 201 enter 201 followed by the print select. Ticket 201 will be printed. The indicator always remembers the last ticket number printed. So if you press Print/Select again the last ticket number used is printed. If you want to change the ticket to 205 enter 205 followed by the print select key and the indicator will now print ticket 205 until it is changed. Default ticket numbers can be assigned automatically when the indicator powers up.

Note: It is important to note that in order to print tickets that COM ports on the M2000 must be set up to do so. See parameters 34 and 35 is the section on serial communications. The factory default is COM1 setup for printing at 9600 baud.

Note: If you try and print and there is motion, or the scale is overweight then a message will scroll across the display "Cannot Print". It is important to understand that if you are in Channel 1 and Channel 3 is overweight, or not connected to a load cell then you still will get the cannot print message even if you are not on Channel 3. Make sure that unused channels are disabled in Calibration using parameter 98.

To edit or create a new ticket you must be in calibration mode.

Calibration parameters used for ticket editing

The following calibration parameters are used for working with tickets:

84 Add a new ticket
If you are creating a new ticket from scratch then press parameter 84 followed by the print select key. The indicator will search for the next available empty ticket number. This number will be displayed on the display as TICXXX, where XXX is the new ticket number. Make note of this number, as you will need this number to recall the ticket later. The indicators display will switch to the ticket editor.

85 Edit exiting ticket
If you want to make changes to an existing ticket press 85 followed by the print select key. You will be prompt with the message "TIC". Enter the ticket you want to edit. If the ticket exits the display will go into ticket edit mode.

86 Number of tickets
Press 86 followed by the print select key will display the number of tickets in the buffer.

87 Display Memory
This function displays how much of the ticket memory has been used for tickets. The M2000 has 2Kbytes for tickets.

88 Clear Ticket Memory
This parameter totally wipes the ticket memory. All ticket data will be lost.

89 Delete Ticket
To delete a ticket press 89 followed by the print select key. The display will prompt you with "TIC". Enter the ticket that you want to delete followed by the print select key.

91 Assign PRINT/SELECT key
This parameter allows you to select which ticket will be the default ticket when the indicator powers up. So when Print is pressed for the first time the ticket number that is set in this parameter will be used to print the ticket.

92 Assign IN key
The IN key on the keypad can be assigned a ticket number. Normally this intended for a ticket for a truck in sequence.

93 Assign OUT key
The OUT key is the same as the IN key and can be assigned a ticket number. This key is normally used for truck out sequence.

95 Assign Barcode Scanner key
If you are using a barcode scanner with the M2000 you have the option of printing a ticket when a scanner scans a barcode. Assign the ticket number you want to print or enter 0 to disable printing.

The Ticket Editor

The ticket editor is used to modify your ticket data. Ticket data is composed of standard ASCII characters used to define the characters printed on the printer. Control function codes are embedded in the ticket strings to send control codes to the printer.

Because all character entry is ASCII, any escape control function for your printer can be generated. Special printer control codes for example for a paper cutter on a printer, or switching to a different color ribbon can be implemented. Your printer user manual should have a table of escape codes in the back of the manual.

The M2000 also has a library of commonly used escape codes for your printer to choose from.

Editing Tickets

To create a new ticket enter parameter 84 while in calibration mode. The indicator will search for the next available ticket number and flash briefly the ticket number that you will be using. The display will then go into ticket editor mode.

When you are in the ticket editor the display will change to the format below:

$$\underline{00}\ C\underline{000}$$

Address   Control   Data
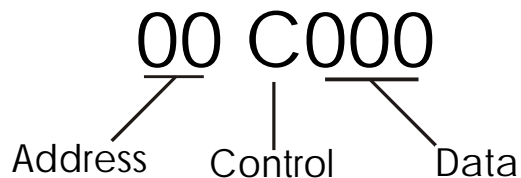
The first 2 digits represent the address, or character position in your ticket string. It is a 2-digit address that rolls over to zero again if your ticket exceeds 99 characters. It is only used as a reference for when you are scrolling through your ticket string. Your ticket can be longer than 99 characters.

The 'C' character in the middle of the display is the "control code" indicator and may or may not be displayed. If a 'C' or 'P' character is displayed then this indicates that the data value shown is a Control Code. A 'C' code represents an *indicator specific* control code. A 'P' code is a *printer specific* control code. More on Control Codes will be discussed later.

The last 3 digits is the data display field. Whatever value is displayed here represent your ASCII character. If there is a 'C' or 'P' character displayed in front of the data field then the value shown here is a control code and not a printable ASCII character.

Keys used by the ticket editor

Entering into ticket editor mode is done using Parameter 84 or 85.

The following keys are used to edit a ticket:
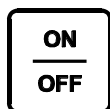
| ON OFF | Move to the left in the ticket string. Pressing the ON/OFF key scrolls the display one character to the left. If the address display shows 00 then you are at the beginning of the ticket. |

Move to the left in the ticket string.
Pressing the ON/OFF key scrolls the display one character to the left. If the address display shows 00 then you are at the beginning of the ticket.
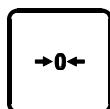
Move to the right in the ticket string.
Pressing the ZERO key scrolls the display once to the right. If you are at the end of the ticket, then "END" will be displayed.
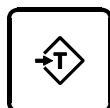
This key is used in conjunction with the above two keys. Pressing the key once followed by one of the above keys will jump to the next LF character. Pressing the key twice will jump to the beginning or end of the ticket.

Functions as an ENTER key for entering data. All data entry must terminate by the print select key.

This important key is used to toggle between normal ASCII entry mode and Control Code mode. Pressing the decimal once will display the 'C' control code. Pressing it again will display 'P' and pressing the decimal key for the third time will return you back to ASCII entry mode. You may press the CLEAR key at any time to abort command mode and return the display back to its previous state. After you have pressed the decimal key you then enter the numeric value followed by the PRINT/SELECT key. You have now entered a control code.

More on Control codes

As mentioned the above control codes are entered using the decimal key prior to entering a code number. Control codes represent functions such as printing time and date, or weight on a ticket. When the indicator sees a control code in the ticket string while printing, a specific indicator control function is performed.

A table listing of control codes follows shortly. When editing a ticket any value with a preceding 'C' character means it is a control code or 'C' code.

How to exit the ticket editor

To exit the ticket editor use control code C99 (decimal followed by 99 print/select) to return back to calibration mode. If you want to exit abandoning changes use C98. Tickets are not permanently saved until you exit calibration mode and return back to weighing mode.

How to delete a character in the editor

To delete a character entry in the ticket editor use control C1 (decimal 1 print/select) to delete a character.

How to overwrite a character

To overwrite a character entry use C2 (decimal 2 print/select). The editor will replace the entry with zeroes signaling for you to enter in the new value. Note that when you press print/select to enter the new value the editor will not increment to the next location automatically.

How to insert a character in the editor

You can insert a character any time. The editor is always in insert mode. To insert a new entry in between other characters, simply position the editor where you want to insert a character in the ticket and type in a new character. The character that was displayed on the display prior to you inserting a new character is pushed forward one in the ticket to make room for the new character entry.

Example:
You have a ticket with the letters ABDEF. You want to insert the letter C. Move the editor to point to D and type in the letter C. The ticket will now be ABCDEF. *Note: the above example shows letters, you would actually be seeing ASCII numeric values in the editor.*

How to Jump to the beginning or end of the ticket

Double press the TARE key followed by the direction you want to jump. Use the ON/OFF key to jump the beginning and the ZERO key to jump to the end of the ticket.

If you only press the TARE key once you will jump forward or backwards to the next LINE FEED character (character 10).

Indicator Specific Function Codes

The following codes in the table below are used in tickets to execute indicator specific print functions. Not all codes print at all, some perform internal operations inside the indicator.

To enter an indicator specific control code press the decimal key (you will see the 'C' character appear) followed by the numeric code from the table below. Press the PRINT/SELECT key to accept the code. You may also press CLEAR to cancel the code entry.

Ticket Specific Control Codes	
20	**Print time (HH:MM:SS)** Print the time from the internal real time clock
21	**Print Date (YY:MM:DD)** Print the date from the real time clock

22	**Clear ACC1 register** Internal accumulator1 register for accumulating weight. This will be cleared to 0.
23	**Add Displayed Weight to total of ACC1** Add whatever weight is on the display to the accumulator1 register. This can be GROSS or NET weight depending what mode the indicator is in.
24	**Print ACC1 register** Print the value in the accumulator register.
25	**Add Gross Weight to total ACC1 weight** Same as parameter 23 but the GROSS weight is added to the accumulator1 regardless if the indicator is in NET mode or not.
85	**Store ACC1 register to Truck IN loop** This function is used for truck in/truck out weighting. Store weight in ACC1by ID number to memory. This function prompts the user to enter an ID number from the keypad. The ID is checked and an error is given if there are duplicate ID numbers. When a duplicate ID number is found the ticket aborts. Use parameter 86 below to retrieve the stored weight.
86	**Truck OUT loop using ACC1 register for outbound weight** Recall weight by ID from memory when a truck leaves the facility. This function searches the memory for a truck by it's ID number

	entered using parameter 85 above. This function prompts the user to enter an ID number. It then searches the memory for a matching ID. When an ID match is found the weight is retrieved. If the ID number cannot be found in memory then an error is given and the ticket aborts. After the weight is retrieved the ID number is deleted and its weight is deleted from memory. After the weight has been retrieved from memory the function compares the retrieved inbound weight with the outbound weight currently stored in ACC 1; If the inbound weight is less than the outbound weight it becomes the tare weight and the outbound weight becomes the gross weight. If the inbound weight is greater than the outbound weight it becomes the gross weight and the outbound becomes the tare weight. After this function is called you can use functions 74,75,76 to print gross, tare and net weights.

26	**Clear ticket counter register to 0** There is an internal counter that can be incremented. This can be serializing tickets, and counting axels. This function clears the counter to zero.
27	**Increment Ticket Counter by 1** Increments the internal counter by 1
28	**Print ticket counter count value** Prints the 3 digit internal counter value.

30	**Print gross weight (Ch 1)**
31	**Print gross weight (Ch 2)**
32	**Print gross weight (Ch 3)**
33	**Print tare weight (Ch 1)**
34	**Print tare weight (Ch 2)**
35	**Print tare weight (Ch 3)**
36	**Print net weight (Ch 1)**
37	**Print net weight (Ch 2)**
38	**Print net weight (Ch 3)**
39	**Print total of all active channels** **Whatever channels are active will be summed and printed.**

50	**Turn Unit printing OFF** Whenever a weight is printed the units kg or lbs will follow the weight depending on the units of weight being printed. This functions turns unit printing off.
51	**Turn Unit printing ON** Only required to be used if unit printing was turned off earlier. Unit printing is on by default.

70	**Truck IN loop** This function is used for truck in/truck out weighting. Store weight by ID number to memory when a truck enters the facility. This function prompts the user to enter an ID number from the keypad. The ID is checked and an error is given if there are duplicate ID numbers. When a duplicate ID number is found the ticket aborts. The weight in stored together with the entered ID number and time and date. Use parameter 71 below to retrieve the stored weight.
71	**Truck OUT loop** Recall weight by ID from memory when a truck leaves the facility. This function searches the memory for a truck by it ID number entered using parameter 70 above. This function prompts the user to enter an ID number. It then searches the memory for a matching ID. When an ID match is found the weight is retrieved. If the ID number cannot be found in memory then an error is given and the ticket aborts. After the weight is retrieved the ID number is deleted and its weight is deleted from memory. After the weight has been retrieved from memory the function compares the retrieved inbound weight with the outbound weight currently on the scale. If the inbound weight is less than the outbound weight it becomes the tare weight and the outbound weight becomes the gross weight. If the inbound weight is greater than the outbound weight it becomes the gross weight and the outbound becomes the tare weight.

	After this function is called you can use functions 74,75,76 to print the gross, tare and net weights.
72	**Add a truck ID number and weight to database** This function is similar to function 70, but stores the weight permanently in FLASH memory. Up to 150 trucks can be stored.
73	**Recall truck ID from database** This function searches the FLASH memory for a matching ID number. The weight is then retrieved and stored in the inbound weight register. The ID number is not deleted from the database. The outbound weight register gets updated with the current weight on the display.
74	**Print Truck loop GROSS weight** Prints the gross weight from the truck loop database. Note that this weight is updated after parameter 71 is called.
75	**Print Truck loop TARE weight** Prints the tare weight from the truck loop database. Note that this weight is updated after parameter 71 is called.
76	**Print Truck loop NET weight** (truck loop Gross – truck loop NET) Note that this weight is updated after parameter 71 is called.
77	**Print Tare weight time stamp** When a truck weight is stored to the database using parameter 70, the time and date is stored with it. You can use this function to print the time stamp when the truck weighed in.
78	**Print Gross weight time stamp** Same as parameter 77 but prints the current time and date for the final outbound transaction.
79	**Print the current ticket ID** Prints the number in the ID register that was entered for truck in or out.

100	**Reassign Ticket number to Print/Select key** This is a powerful feature that allows you to reassign another ticket to the Print/Select key. An example of this is in axle weighing. The first key press prints the header and time/date and the first axle. After that a new ticket is assigned to the Print/Select key so that every subsequent key press prints only axles. The next ASCII value following this command code is the ticket number to reassign to. Invalid ticket numbers are ignored.
101	**Reassign Ticket number to IN key** Same function as parameter 100 but reassigns a ticket number to the IN key.
102	**Reassign Ticket number to OUT key** Same function as parameter 100 but reassigns a ticket number to the OUT key.
103	**Call and Return to another Ticket number** Jumps to another ticket number. This is handy for example if you have one ticket assigned to print the company header time and date. You can call this ticket from another ticket every time you need to repeat the function. When the end of the called ticket has been reached it returns to the ticket it was called from and that ticket continues where it left off. The next ASCII value following this command code C103 is the ticket number to jump to. Invalid tickets numbers are ignored.

* Not available on this version of software. To be added soon.

200	**Copy Displayed Weight to ACC1** What ever weight is on the display is copied to ACC1.
201	**Copy Gross Weight to ACC1** Same as 201 but only the gross weight is copied regardless if the display is in net.

220	**Clear ACC2 register** Internal accumulator2 register for accumulating weight. This will be cleared to 0.
230	**Add Displayed Weight to total of ACC2** Add whatever weight is on the display to the accumulator2 register. This can be GROSS or NET weight depending what mode the indicator is in.
240	**Print ACC2 register** Print the value in the accumulator register.
250	**Add Gross Weight to total ACC2 weight** Same as parameter 230 but the GROSS weight is added to the accumulator2 regardless if the indicator is in NET mode or not.

251	**ACC4=ACC1+ACC2**
252	
253	**ACC4=ACC1/ACC3** If ACC3 is zero then the division is aborted and ACC2 remains unchanged.
254	**ACC4=ACC1-ACC3**
255	**Print ACC4 register** Print the weight value in the accumulator register.
256	**Print ACC4 as an integer number (not formatted as weight)** Same as 255 but prints the register as it with no weight formatting. Use this code when you are printing none weight specific numbers.

257	**Clear ACC4 to 0**
258	**Decrement ACC4 by 1**
259	**Increment ACC4 by 1**
260	**Copy ACC1 to ACC4**
261	**Copy ACC2 to ACC4**
262	**Copy ACC3 to ACC4**
263	**Copy ID register to ACC4**
264	**Copy Ticket Counter to ACC4**
*265	**Copy Inbound Weight register to ACC4**
*266	**Copy Outbound Weight register to ACC4**
267	**Copy ACC6 to ACC4**
268	**Copy KEY to ACC4**
269	**Copy ACC4 to KEY**
270	**Copy ACC4 to ACC1**
271	**Copy ACC4 to ACC2**
272	**Copy ACC4 to ACC3**
273	**Copy ACC4 to ID register**
274	**Copy ACC4 to ACC6**
275	**Initialize ACC4 with values 0-999** Use this code to load a value into the accumulator. The next data entry after C275 is the value loaded. If you need to enter a value larger than 999 then use code 276.
276	**Initialize value in ACC4** This function allows you to embed values within the ticket. After command C275 the indicator looks for ASCII characters that represents numbers. The only legal ASCII values are 48 to 49 (0-9). The first non numeric ASCII character that is encountered terminates the number entry. Example you want to enter the value 1000 into ACC4. So the data entry into the ticket editor would be 'C275', '49','48','48','48'.

279	**Take a percentage of ACC1 and copy the result to ACC3.** The percentage value is determined by ACC6. Example ACC1 is 1000 and ACC6 is 80. ACC3 will then hold the value of 800 which is 80% of 1000. The value is rounded to the nearest division (1,2,5). If ACC6 is above 99 (>99%) then this function is not performed.

*280	**Store ACC4 to the Loop Database with reference to the ID register and the KEY register** Take the weight in ACC4 and store it in the loop database. The ID number in the ID register is used as the reference. If the ID number already exists then an error will be reported.
*281	**Store ACC4 to the Loop Database with reference to the ID register and the KEY register (over write mode)** Same as parameter 280 but does not check if the ID number already exists. If the number exists then overwrite with the new value in the ACC4 register.
*282	**Recall Loop Database value to ACC4** Searches the database using the record number in the ID register and the KEY register. If the ID number does not exist then an error message is generated and the ticket aborts.

*284	**Print all Weights in Loop Database** This function prints all the weights in the Loop selected by the KEY. If KEY=0 they all used records in the database are printed. Changing the KEY allows you print selected records. The format printed is: <ID number><TIME/DATE><WEIGHT> TIME/DATE is the time stamp of when the weight was recorded. A tape printer is recommended for this function. Pressing the CLEAR key will abort this function and return back to weighing mode.
*285	**Print all Weights in Loop Database (no TIME/DATE)** Same as 285 without TIME and DATE
*287	**Calculate Average Weight** This function scans through the Loop Database and calculates the average weight of all the weights it finds under the KEY. The average weight is placed in ACC4.
*288	**Search for Largest Weight** Same as 287 but searches for the largest weight and stores it in ACC4.
*289	Search for Smallest Weight Same as 287 but searches for the smallest weight and stores it in ACC4.

*290	**Change the database KEY to 0** The database KEY is used to created multiple tables referenced by a KEY number. When the KEY is zero then the key is disabled and the database is treated as one large database table. Changing the KEY allows you to change tables. KEYS can have a value of 1-9 to select a different table. For example lets say you are weighing cattle on a farm. The cows weights are stored in the database reference to an ID number on the cows ear tag with a KEY set to 1. Three months later he wants to weigh the herd again to see how much they have increased in weight. The farmer still wants to keep his old weights to compare against. The KEY number is changed to 2. This allows all the ID tags to be reentered into the database as a separate table not interfering with the cattle weight using KEY=1.
*291	**Change the database KEY to 1**
*292	**Change the database KEY to 2**
*293	**Change the database KEY to 3**
*294	**Change the database KEY to 4**
*295	**Change the database KEY to 5**
*296	**Change the database KEY to 6**
*297	**Change the database KEY to 7**
*298	**Change the database KEY to 8**
*299	**Change the database KEY to 9**

300	**Send Text to Display** This is a powerful feature that allows text to be sent to the 6 digit LED display. This is used to send prompts to the user, and is usually used in conjunction with keypad entry. Six characters must follow after this command including spaces. ASCII codes allowed are 65-90 (A-Z) and 49-59 (0-9) and 32 (space). Avoid using characters 'M','W' and 'X' as they cannot be displayed clearly.
301	Reset Display This may be required when using 300. This function clears the display returns back to weight display mode.

*400	**Keyboard Entry to ACC3** Wait for a keyboard entry and copy the weight value entered to ACC3. It is recommended that a user prompt be sent to the display using code 300 above. PRINT/SELECT acts as the enter key. Pressing CLEAR will abort the entry and return to weighing mode.
401	**Keyboard Entry to ACC3** Same as 400 but is used for entering integer values not related to

	weight.
402	**Keyboard Entry to ID register** Same as 401 above but copies the keypad entry to the ID register.
403	**Sound a beep** Sound a beep to the speaker
404	**Sound a double beep** Sound two quick beeps to the speaker
405	**Pause for 1 sec** Pause and do nothing for 1 second

*500	**Store Set points to Loop Database** This function stores Set Points 1-6 to the database. It uses the ID register as a reference to store the set-points as a set of 6 records. The KEY register is used to separate the 6 set-points. This is done automatically for you. Different set-point setups can be stored for different products.
*501	**Recall Set points from Loop Database** Load Set points using the ID register. All 6 set-points are loaded from the Database.

Control Codes for printer formatting.

Control codes for printers work exactly the same way as control codes for indicator specific functions. The difference is that the code represents a control function for a specific printer. An example of this would be changing the font size of the characters or sending a command to print in underline mode. A print control code is displayed as a 'P' character followed by a control code value. A table of control code values follows shortly. Entering a printer control is done by pressing the *decimal key twice* followed by a print code number. Pressing print/select enters the code into the ticket string.

Several different print control codes are available for different printers. If a specific control does not exist for your printer you can always create the ASCII escape codes for the function your want to perform. Escape codes for a printer are usually found in the back of the printer's manual.

The following tables below list the controls codes for different printers. There is also a table for dedicated common scale strings.

Printer codes for EPSON TM-U200D/U200PD Tape printer	
100	**Emphasized mode ON**
101	**Double Height ON**
102	**Double Width ON**
103	**QUAD ON**
104	**Underline ON**
105	**Underline OFF**
106	**Set to 9x9 font**
107	**Set to 7x9 font**
108	**Reset to NORMAL character mode**
109	**Set Line Spacing to 1/6inch default**
110	**Set Line Spacing to n/144 of an inch** n is entered as a parameter following the control code
111	**Double Strike mode ON**
112	**Double Strike mode OFF**
113	**Set justification n** n is entered as a parameter following the control code
114	**Print and feed n lines** n is entered as a parameter following the control code
115	**Turn upside down printing ON**
116	**Turn upside down printing OFF**

Printer Codes for EPSON TM-U295/U295P Slip Printer

201	**Double Height ON**
202	**Double Width ON**
203	**QUAD ON**
204	**Underline ON**
205	**Underline OFF**
206	**Set to 5x7 Font size**
207	**Set to 7x7 Font size**
208	**Return to Normal character mode**
214	**Print and Feed n lines** n is entered as a parameter following the control code
215	**Turn upside down mode printing ON**
216	**Turn upside down mode printing OFF**
217	**Paper Release**

Printer Codes for Epson compatible line printers

300	**Emphasized mode ON**
301	**Emphasized mode OFF**
302	**Double Strike ON**
303	**Double Strike OFF**
304	**Underline ON**
305	**Underline OFF**
306	**Expanded mode ON**
307	**Expanded mode OFF**
308	**Italics ON**
309	**Italics OFF**
310	**1/8th line spacing**
311	**7/72nd line spacing**
312	**1/16th line spacing (default)**
313	**n/72 line spacing** n is entered as a parameter following the control code
314	**n/216 line spacing** n is entered as a parameter following the control code
315	**Set the form length in n lines** n is entered as a parameter following the control code
316	**Set the form length in n inches** n is entered as a parameter following the control code
317	**Set the right margin n** n is entered as a parameter following the control code
318	**Set the left margin n** n is entered as a parameter following the control code
319	**Set letter quality mode ON**
320	**Turn letter quality mode OFF**

Printer Codes for IBM Proprinter compatible line printers	
400	**Emphasized mode ON**
401	**Emphasized mode OFF**
402	**Double Strike Mode ON**
403	**Double Strike OFF**
404	**Underline ON**
405	**Underline OFF**
406	**Expanded mode ON**
407	**Expanded mode OFF**
410	**1/8th line spacing**
411	**7/72nd line spacing**
412	**1/6th line spacing**
413	**n/72 line spacing** n is entered as a parameter following the control code
414	**n/216 line spacing** n is entered as a parameter following the control code
415	**Set Form Length in Lines** Lines is entered as a parameter following the control code
416	**Set Form Length in Inches** Length is entered as a parameter following the control code
418	**Set Left Margin** Margin is entered as a parameter following the control code
419	**Turn Letter Quality Mode ON**
420	**Turn Letter Quality Mode OFF**

Printer Codes for ELTRON graphic thermal printers

500	**Initialize special printer driver to support ELTRON printers** This code must be the first code in any ticket that will print to ELTRON printers. This code tell the M2000 to use the ELTRON printer driver. Without P500 tickets will not print correctly.
501	**Set the start position (X,Y) in dots (default X=50, Y=50)** Thermal Printers use an X,Y coordinate system. Text and barcodes are printed at the position that X and Y are pointing to. The X and Y position follows as the next entry after this command. *Example: to move to coordinate X=100 and Y=200 enter* **P501,100,200**
503	**Set the rotation of printing (default no rotation)** This command sets how the printer is going to print text or barcodes. The next value after command 503 sets the rotation value. 0 = no rotation (default) 1 = 90 degrees 2 = 180 degrees 3 = 270 degrees
504	**Set the font selection (default 4)** This function sets the fonts to be printed. The next value sets the font selection and is between 1-5. The type of fonts depends on the printer model you are using. Consult manual. 1 = 8x12 dots @ 203dpi or 12x20 dots @ 300dpi 2 = 10x16 dots @ 203dpi or 16x28 dots @ 300dpi 3 = 12x20 dots @ 203dpi or 20x36 dots @ 300dpi 4 = 14x24 dots @ 203dpi or 24x44 dots @ 300dpi 5 = 32x48 dots @ 203dpi or 48x80 dots @ 300dpi
505	**Control the font size (default 3)** This parameter controls how big the fonts are to be. The value that follows this parameter scales the font size larger.
506	**Set the print density (darkness of printing)** This values controls how dark you want to print. Values are 0-15. You only need to use this command if the printer's default is too dark to light. The next entry sets the value.
507	**Print graphic LOGO** This command prints a graphic image stored in the printer. The graphic format is PCX and must be uploaded to the printer's memory from a PC computer. Once the graphic is loaded into the printer it is permanently stored and can be printed using P507. Consult the printer's manual for more information.

508	**Box Draw** Draws a box of any size. The following 4 values follow the parameter: StartX, StartY, EndX, EndY. Use the line thickness parameter to set the line thickness. *Example: to draw box from the top left corner of 30,30 to the bottom right corner of 800,520 enter **P508,30,30,800,520***
509	**Draw Vertical Line** Draw a vertical line. The following 3 values follow the parameter: StartX, StartY, LineLength in dots.
510	**Draw Horizontal Line** Draw a horizontal line. The following 3 values follow the parameter: StartX, StartY, LineLength in dots. *Example: to draw a line starting at 30,84 and is 770 dots long enter **P510,30,84,770***
511	**Set Line Thickness is dots (default is)** Set the line thickness for line drawing and box drawing
512	**Add to Vertical start position** This parameters adds a value to the vertical start position. The value that follows this parameter is added to the Y value of the X,Y coordinate system.
514	**Select Barcode Type (default Code 39)** If you plan to print barcodes you must select the type of barcode you will use. Consult the ELTRON printer's manual for the table of bar code formats supported. Barcode types are selected from a table. The values following the parameter are ASCII characters that are either one or more characters long. Here is a short list of Bar Codes types to select from: Code 39 std. or extended **"3"** **(default)** Code 39 with check digit **"3C"** Code 93 **"9"** Code 128 auto ABC modes **"1"** Codabar **"K"** EAN8 **"E80"** EAN13 **"E35"** Interleaved 2 of 5 **"2"** Postnet 5,6,8 digit **"P"** UCC/EAN 128 **"1E"** UPC **"UA0"** The above letters in quotes are to follow the parameter to select the proper bar code. Code 39 is the factory default. See the example below.

	Example to select bar code printing of type UPC enter: **P541, 85,80,48** *where 85 is the ASCII code for **U** and 80 is **A** and 48 is **0**.* *To change the barcode to Code 39 enter*: **P541,51** *where 51 is the ASCII character for **3**.* Consult the printer's manual for full table of different bar codes that you can choose from and their limitations.
515	**Disable Human Readable Code** This parameter disables the text that is normally printed under the barcode.
516	**Set Narrow Width (default 3)** Set the narrow bar width in dots. Valid values are 2-10. See printer's user manual for more information. This is a function of the type of bar code you are printing. The value following this parameter sets the width.
517	**Set Wide Width (default 7)** Set the wide bar width in dots. Valid values are 2-30. See printer's user manual for more information. This is a function of the type of bar code you are printing. The value following this parameter sets the width.
518	**Set Bar Height (default 200)** The value following this parameter sets the height of the bar code in pixels.
519	**Print Bar Code** Any text that is in the string register is sent to the printer as a barcode. This is where the barcode is generated. Use C codes to build the string in the string register. If a barcode scanner is connected to the M2000 then what ever is scanned last is in the string register.
520	**Execute Print** This should be the last command in the ticket. This tells the printer that the print image is complete and to print it to paper.

Printer Codes for Predefined Strings	
901	**"Gross "**
902	**"Tare "**
903	**"Net "**
904	**"Total "**
905	**"Customer Number "**
906	**"Truck ID: "**
907	**"Inbound Weight "**
908	**"Outbound Weight "**
909	**"Scale Weight "**
910	**"Head Count "**
911	**"Average Weight "**
912	**"Weigh Draft "**
913	**"Axle "**
914	**"Total Axle Weight "**
915	**"Inbound ID: "**
916	**"Outbound ID: "**

Table of ASCII characters

The table below shows the decimal values for ASCII characters. These values are used for entering characters into the ticket editor. For example the letter 'A' would be entered into the ticket editor as the numeric value 65.

ASCII	Decimal Value	ASCII	Decimal Value	ASCII	Decimal Value
Space	32	@	64	'	96
!	33	A	65	a	97
"	34	B	66	b	98
#	35	C	67	c	99
$	36	D	68	d	100
%	37	E	69	e	101
&	38	F	70	f	102
'	39	G	71	g	103
(	40	H	72	h	104
)	41	I	73	i	105
*	42	J	74	j	106
+	43	K	75	k	107
,	44	L	76	l	108
-	45	M	77	m	109
.	46	N	78	n	110
/	47	O	79	o	111
0	48	P	80	p	112
1	49	Q	81	q	113
2	50	R	82	r	114
3	51	S	83	s	115
4	52	T	84	t	116
5	53	U	85	u	117
6	54	V	86	v	118
7	55	W	87	w	119
8	56	X	88	x	120
9	57	Y	89	y	121
:	58	Z	90	z	122
;	59	[	91	{	123
<	60	\	92			124
=	61	]	93	}	125
>	62	^	94	~	126
?	63	_	95		

Special ASCII characters
Carriage Return =13
Line Feed =10

Example 1: gross, tare and net

Lets take a look of a simple application of creating a ticket to print the company name gross, tare and net.

This is a simple ticket that will be assigned to the print select key.

To start the ticket editor use parameter 84 in calibration mode to create a new ticket. Let assume that this will be ticket number 200. Remember tickets can be assigned between 200 and 300. The company name on the ticket will be "Western Scale".

Lets lay out the ticket below on a line by line basis. We will use an Epson tape printer.

13 CR send a carriage return and line feed to start with to the printer (just a habit)
10 LF
87,101,115,116,101,114,110, 32, 83,99,97,108,101, 32 ,67,111,46 "Western Scale Co."
13 CR
10 LF
C20 print the time
32
C21 print the date
13 CR
10 LF
10 LF
71,114,111,115,115,32 "Gross "
C30 print gross weight
13 CR
10 LF

84,97,114,101,32,32 "Tare "
C33 print tare weight
13 CR
10 LF

78,101,116,32,32,32 "Net "
C36 print net weight

13 CR
10 LF

```
Western Scale Co.
11:17:42 09/01/2000

Gross 1030 kg
Tare  341 kg
Net   689 kg
```
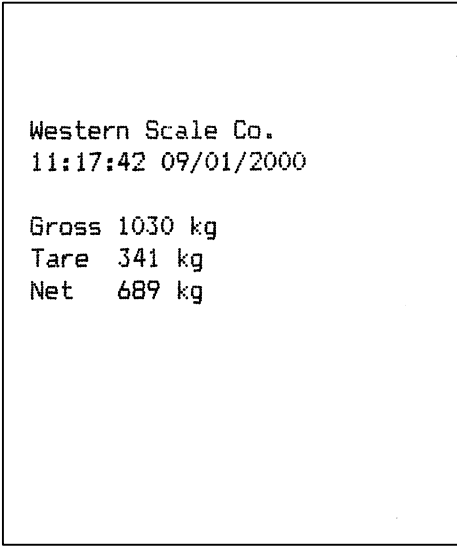
The **bold** numbers above are entered in the ticket editor one number at a time. Remember when there is a 'C' in front of the number it is a control code and is entered by pressing

the decimal key prior to entering the number. For example C20 will print the time on the printer. When you have exited calibration mode you can call your ticket by entering 200 followed by the print/select key. To avoid having to key the ticket number every time you want to print you can assign ticket 200 to the print select key using parameter 91 in calibration.

Example 2: gross, tare and net (improved)

Lets improve on the ticket we did in example 1 and take advantage of the special printer code fonts for the Epson tape printer. You will also notice below that we did not type in "Gross", "Tare" and "Net" but used predefined strings called through **P** codes.

The improved ticket looks like this:

13 CR send a carriage return and line feed to start with to the printer (just a habit)
10 LF
P100   set the printer to emphasized mode (darker letters)
P101   turn on the double height for larger fonts
P104   turn on underline mode
87,101,115,116,101,114,110, 32, 83,99,97,108,101, 32 ,67,111,46 "Western Scale Co."
P108   reset the printer fonts
13 CR
10 LF
C20   print the time
32
C21   print the date
13 CR
10 LF
10 LF
P101   turn on the double height for larger fonts
P901   send the string "Gross " to the printer
C30   print gross weight
13 CR
10 LF

P902 send the string "Tare " to the printer
C33   print tare weight
13 CR
10 LF

P903   send the string "Net   " to the printer
C36   print net weight
P108   reset the printer fonts
CR   carriage return
P114 form feed multiple lines
9   number of lines for form feed is 9

This ticket looks dramatically better and was a bit easier to enter. Notice the extensive use of P codes. These codes call routines that send control codes to the printer to change fonts and modes of operation of the printer. There are tables of P codes for different printers in the previous section. There is also a table of commonly used strings that will save you in typing the entire string. Remember P codes are entered by pressing the decimal key twice before entering the number.

Example 3: A simple Truck IN/Truck Out ticket

This example will make extensive use of C codes to implement a truck in and truck out program. A company called "John's Gravel Co." sells gravel by the truckload. Trucks come in empty and are weighted. John's Wife uses the numbers on the license plate as the truck I.D to identify the trucks coming and going.

The truck drives on to the scale and the 'IN' key is pressed followed by PRINT/SELECT key. The indicator prompts for an ID number and the tare weight is recorded along with the ID number.

The truck is then loaded and is weighted to get the final gross weight. A ticket is printed showing gross, tare and net.

In this example we will take advantage of the IN key and the OUT key. These keys can be assigned to tickets. For this example we will the IN key for the truck in sequence and the OUT key for when the truck weighs out with a full load.

In this example we are creating ticket 200 for inbound and ticket 201 for outbound. We are using an Epson tape printer.

Ticket 200 truck in loop:

13 CR send a carriage return and line feed to start with to the printer (just a habit)
10 LF
P100   set the printer to emphasized mode (darker letters)
P101   turn on the double height for larger fonts
P104   turn on underline mode
74,111,104,110,115,96,115, 32 ,71,114,97,118,101,108, 32, 67,111   "John's Gravel Co."
P108   reset the printer fonts
13 CR
10 LF
10 LF
C20   print the time
32
C21   print the date
13 CR
10 LF
C70   call truck in function and ask operator for truck ID
    note: if an invalid ID or if CLEAR is pressed the tickets
P115 print string "Inbound Truck ID:" to printer
C79   print truck ID number
13 CR
10 LF

> Johns's Gravel Co.
> 01:31:41 10/01/2000
>
> Inbound Truck ID: 1234
> Scale Weight 1028 kg

P101   turn on the double height for larger fonts
P909   send the string "Truck Weight"
C30   print the gross weight of the truck on the scale
P108   reset the printer fonts
13 CR
P114 form feed multiple lines
9   number of lines for form feed is 9

The above ticket handles the truck in part. Now we will create the truck out part.

Ticket 201 truck out loop:

13 CR send a carriage return and line feed to start with to the printer (just a habit)
10 LF
P100   set the printer to emphasized mode (darker letters)
P101   turn on the double height for larger fonts
P104   turn on underline mode
74,111,104,110,115,96,115, 32 ,71,114,97,118,101,108, 32, 67,111   "John's Gravel Co."
P108   reset the printer fonts
13 CR
10 LF
C20   print the time
32
C21   print the date
13 CR
10 LF
10 LF
C71   call truck out function and ask operator for truck ID
         note: if an invalid ID or if CLEAR is pressed the tickets aborts here
C916 print string "Truck ID:" to printer
C79   print truck ID number

13   CR
10   LF
P101 double height ON

P901   send the string "Gross " to the printer
C74   print trucks gross weight
13 CR
10 LF

P902 send the string "Tare " to the printer
C75   print trucks tare weight
13 CR
10 LF


```
   Johns's Gravel Co.
 02:19:17 10/01/2000

 Outbound Truck ID: 1234
Gross 5000 kg

Tare  1028 kg

Net   3972 kg
```

P903 send the string "Net " to the printer
C76   print trucks net weight
13 CR
10 LF

P108 reset printer font
13   CR
10   LF

P114 form feed 5 lines
5 number of lines

Now that we have finished the truck in ticket and truck out ticket we will exit calibration and try them. Type 200 followed by the print/select key and enter an ID number. The inbound ticket will be printed. Add some weight to the scale and type 201 followed by the print select key. The indicator will prompt you for the outbound ID number. Enter the same number as you entered for inbound. The indicator will now print the gross, tare and net for the weighing transaction.

To avoid having to type 200 and 201 every time assign 200 to the IN key using parameter 92 and ticket 201 to the OUT key using parameter 93.

In this example the truck inbound loop printed a ticket for the truck driver. In some cases a ticket would not be required to be printed for the inbound truck. You could just edit ticket 200 and remove the ticket printing text and codes.

Another importing thing to mention is that the ticket header time and date is entered twice for this application. You could create a separate ticket (202) that just prints the company name along with time and date. Use C code C103 to call that ticket from tickets 200 and 201. This cuts down on the amount of retyping you have to do.

In the truck out sequence we used C codes C74,C75,C76 to print the gross tare and net weights calculated from the weight captured in the truck in function. When the truck out function C71 is called it looks up the tare weight stored previously using the C code C70. When the truck ID number is found it is then deleted from memory. Noticed that we used P codes to print "gross", "tare" and "net" strings rather than spelling them out manually.

See the next example for an improved ticket design.

Example 4: An improved truck in/truck out

This example is identical to example 3. If you look at example 3 you will notice that you had to repeat the company's name and time and date for both the inbound and outbound tickets. This example shows how to eliminate this.

This example uses 3 tickets. Ticket 203 will be used for the sole purpose of printing the companies name and time and date. This ticket will be called from the other two tickets. This example uses C code C103 to jump to another ticket from within a ticket.

Lets have a look at all three tickets again (200,201,203):

Ticket 200 truck in loop:

C103 jump to another ticket (203) and print it
203 ticket 203 is called to print the ticket header, time and date

C70 call truck in function and ask operator for truck ID
   note: if an invalid ID or if CLEAR is pressed the tickets
P115 print string "Inbound Truck ID:" to printer
C79 print truck ID number
13 CR
10 LF

P101 turn on the double height for larger fonts
P909 send the string "Truck Weight"
C30 print the gross weight of the truck on the scale
P108 reset the printer fonts
13 CR
P114 form feed multiple lines
9 number of lines for form feed is 9

The above ticket is identical to the ticket in example 3, but we stripped away the company name and the time and date.

Ticket 201 truck out loop:

C103 jump to another ticket (203) and print it
203 ticket 203 is called to print the ticket header, time and date

C71 call truck out function and ask operator for truck ID
    note: if an invalid ID or if CLEAR is pressed the tickets aborts here
C916 print string "Truck ID:" to printer
C79 print truck ID number

13 CR
10 LF
P101 double height ON

P901 send the string "Gross " to the printer
C74 print trucks gross weight
13 CR
10 LF

P902 send the string "Tare " to the printer
C75 print trucks tare weight
13 CR
10 LF

P903 send the string "Net " to the printer
C76 print trucks net weight
13 CR
10 LF

P108 reset printer font
13 CR
10 LF

P114 form feed 5 lines
5 number of lines is 5

Once again the above ticket is the same as in example 3. We print the company name
from ticket 203.

Ticket 203 Company name, time and date.
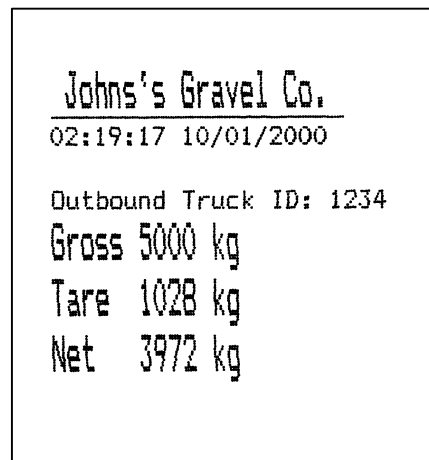
The ticket below prints the company name and time and date.

13 CR send a carriage return and line feed to start with to the printer (just a habit)
10 LF
P100   set the printer to emphasized mode (darker letters)
P101   turn on the double height for larger fonts
P104   turn on underline mode
74,111,104,110,115,96,115, 32 ,71,114,97,118,101,108, 32, 67,111   "John's Gravel Co."
P108   reset the printer fonts
13 CR
10 LF
C20   print the time
32
C21   print the date
13 CR
10 LF
10 LF

Using the C code C103 is very useful for these types of situations. Whenever you have multiple tickets that print the same thing twice (company name time and date) it is recommended that you create a dedicated ticket for this.

Example 5: Axle Weighing

This ticket was designed for safety inspectors that check axle weights on trucks using an axle scale. Once again we use an Epson tape printer. This ticket program is split over three different tickets that perform different functions.

The inspector starts the weighing process by using the IN key. This prints the ticket header and clears the accumulator registers. When the trucks axle is positioned over the scale the PRINT/SELECT key is pressed to capture and print the axle weight. This is repeated for each axle on the scale. When the truck is finished being weighed then the OUT key is used to complete the ticket and print the total axle weights.

The tickets are defined and their keys are assigned:

IN key is assigned to ticket 200 and is used to start the axle weighing process
PRINT/SELECT key is assigned to ticket 201 and is used to weigh an axle
OUT key is assigned to ticket 202 and is used to end the axle weighing sequence

Ticket 200 start of axle weighing

This ticket prints the site location time/date and clears the accumulators used to total axle weights and axle counts.

13   CR
10   LF
P100   emphasized mode on
P101   double height ON
P104   underline ON
80,114,105,110,103,101, 32   "Prince "
71,101,111,114,103,101 ,32, 83,111,117,116,104, 32 "George South"
87, 101,105,103,104, 32, 83,99,97,108,101,   "Weight Scale"
P108   reset printer fonts
13   CR
10   LF
C20   print time
32   space
C21   print date
C22   Clear the ACC1 register (total axle weights)
C257   Clear the ACC4 register (axle count)
C259   increment axle counter to 1
13   CR
10   LF

Ticket 201 print an axle number and axle weight

This Ticket Prints the Axel # and Axle Weight and adds the weight to the accumulator.

13   CR
10   LF
P913 send the string "axle: " to the printer
C256 print the acc4 as integer number (axle count)
32,32 " "   add some spaces
C30   print gross weight channel 1
C25   add gross weight to ACC1
C259 increment the axle count in ACC4
13   CR
10   LF

Ticket 202 finish axle weighing, print total axle weights

Print the total axels and finish off the ticket

10   LF
10   LF
P104 underline ON
P100 emphasized mode on
P914 send the string "Total Axle Weight " to the printer
C24   print the total axle weight
P108 reset printer fonts
13   CR
P114 form feed 9 lines
9   number of lines

```
Pringe George South Weigh Scale
07:37:37 12/01/2000

Axle: 1  3035 kg

Axle: 2  3120 kg

Axle: 3  3382 kg

Axle: 4  3728 kg

Axle: 5  3810 kg


Total Axle Weight 17075 kg
```

Example 5: A multifunction ticket application

This ticket program is an advanced example of what can be done with the M2000 ticket system. This example incorporates reassigning functions within the ticket, sending messages to the display and prompting the user for data input.

A cattle farmer has a truck scale that serves two purposes and he wants separate tickets for two completely different weighing applications. Farmer Scott uses the scale in a truck in/out fashion to weigh trucks delivering cattle feed to his farm. He weighs the truck entering the farm and then weighs it empty leaving the farm. He uses the net weight of the truck to make sure he is getting the amount of feed he ordered.

The truck scale is fenced in. He can close gates on each end of the scale. This is used to weight lots of cattle before shipping them onto trucks. Cattle are herded onto the scale and the gates are closed. A scale weight is captured. The indicator then asks for a head count of the number of cattle on the scale. From that information the indicator prints a ticket showing the scale weight the number of head of cattle and the cattle average weight. It also prints the cattle's shrinkage weight. Shrinkage is the weight taking into account the there will water loss from the cattle (from natural causes) and they will weigh less when they reach their final destination.

This is an advance program requiring 8 tickets. Not all the tickets actually print to the printer. Tickets 200 to 203 perform internal operations on the indicator. Think of these tickets as small modules that perform different tasks. We will summarize the tickets created below:

Ticket 200: switch the indicator to truck weighing mode.
The operator calls this ticket by typing 200 print/select when he wants to switch to truck weighing mode. This ticket assigns ticket 204 to the IN key and ticket 205 to the OUT key. Nothing is printed. A quick message "TRUC" is flashed to the display to indicate that we are in Truck weighing mode.

Ticket 201:switch the indicator to cattle weighing mode
The operator calls this ticket by typing 201 print/select when he wants to switch to cattle weighing mode. This ticket assigns ticket 206 to the IN key and ticket 207 to the OUT key. Nothing is printed. A quick message "CATTLE" is flashed to the display to indicate that we are in Cattle weighing mode.

Ticket 202: change the shrinkage value in percent
The operator calls this ticket by typing 202 print/select when he wants to enter a new shrinkage value (in percent) to the indicator. The indicator displays the message "SHRINC" to prompt the operator to enter the shrinkage value.

Ticket 203: print the customers name and time and date
This ticket is created as a sub routine to be called from other tickets. This saves us from having to retype the customers name every time we need to print to the printer. This ticket is called from the 3 tickets below. All it does is print the customers name, time and date.

Ticket 204: Truck In loop (assigned to IN key).
Capture the inbound truck weight and store it with a truck ID number. A ticket is printed.

Ticket 205: Truck Out loop (assigned to OUT key).
Capture the outbound truck weight. Get the tare weight using the an ID number and print gross, tare and net.

Ticket 206: cattle In function (assigned to IN key)
This ticket captures the weight on the scale and prints the header and scale weight.

Ticket 207: Cattle Out function (assigned to OUT key)
This ticket asks the user to enter the number of cattle head on the scale and prints the average weight and shrinkage weight.

Now that we have given a quick overview of the tickets lets look at the tickets source entry below.

Ticket 200 Select Truck In/Out Weighing

This ticket reassigns keys for truck in/out functions

C403   sound a beep
C300   send text to display
32,84,82,85,67,32   " TRUC "
C101   assign IN key
204   ticket 204 (now ticket 204 has been reassigned to IN key)
C102   assign OUT key
205   ticket 205 (now ticket 205 has been reassigned to OUT key)
C405 pause 1 sec
C301 reset display

Ticket 201 Select Cattle In/Out Weighing

This ticket reassigns keys for cattle in/out functions

C403 sound a beep
C300 send text to display
67,65,84,8476,69 "CATTLE"
C101 assign IN key
206 ticket 206   (now ticket 206 has been reassigned to IN key)
C102 assign OUT key
207 ticket 207   (now ticket 207 has been reassigned to OUT key)
C405 pause 1 sec
C301 reset display

Ticket 202 Set Shrinkage Value

This ticket is used to enter the shrinkage value in percent

C300 send text message to display
83,72,82,73,78,67   " SHRINC "
C403 sound a beep
C401 wait for keypad entry of shrinkage and store head count to ACC3
C262 copy ACC3 to ACC4
C274 copy ACC4 to ACC6 to set up the shrinkage
C301 reset display to weight

Ticket 203 Print Header and Time/Date

This ticket is used every time we have to print the customer's name, time and date. This ticket is called from other tickets, and saves us for having to retype the customer name several times. Also if a name change is required then it only has to be changed once in this ticket.

13   CR
10   LF
P100   emphasized mode on
P101   double height ON
P104   underline ON
83,99,111,116,116, 32   "Scott "
67,97,116,116,108,101, 32 "Cattle"
67,111,109,112,97,110,121, 32 ,76,84,68,46   "Company LTD."
P108   reset printer fonts
13   CR
10   LF
C20   print time
32   space
C21   print date

13   CR
10   LF

Ticket 204 Truck Inbound Sequence

This ticket prompts for a truck ID number and records the weight of the truck under that ID number. A ticket id is then printed for the inbound weight.

C70 call the truck inbound loop function to get user ID
Note: that if a bad ID is entered the ticket aborts, if the ID is OK then the ticket continues below.

C103 make a call function to another ticket
203   ticket 203 is called to print the ticket header, time and date
P906 send string "Truck ID:" to printer
C79 send truck ID number

13   CR
10   LF
P101   double height ON

P907   send string "Inbound Weight: " to printer
C30   print gross weight
P108 reset printer font
13   CR
10   LF

P114 form feed 9 lines
9 number of lines

Ticket 205 Truck Outbound Sequence

This ticket prompts for a truck ID number and searches for the inbound weight of the truck under that ID number. The trucks gross, tare and net weights are printed.

C71   call the truck outbound loop function to get user ID
Note: that if a bad ID is entered the ticket aborts, if the ID is OK then the ticket continues below.

C103 make a call function to another ticket
203   ticket 203 is called to print the ticket header, time and date

C906 send string "Truck ID:" to printer
C79 send truck ID number

13   CR
10   LF
P101   double height ON

P901   send the string "Gross " to the printer
C74   print trucks gross weight
13 CR
10 LF

P902 send the string "Tare " to the printer
C75   print trucks tare weight
13 CR
10 LF

P903 send the string "Net " to the printer
C76   print trucks net weight
13 CR
10 LF

P108   reset printer font
13   CR
10   LF

P114 form feed 5 lines
5   number of lines

Ticket 206 Cattle IN sequence

This ticket prints the customer's name, time and date. It also prints the weight of the cattle that are on the scale. The cattle weight is stored for later use.

C103 make a call function to another ticket
203   ticket 203 is called to print the ticket header, time and date

13   CR
10   LF
P101 double height ON
P909 send "Scale Weight " string to printer
C30   print gross weight
P108 reset printer font
C200 copy gross weight to ACC1
13   CR
10   LF

Ticket 207 Cattle OUT sequence

This ticket prompts the user for the head count of how many head of cattle that are on the scale. The ticket then prints the head count, the average head weight and shrinkage weight of the cattle on the scale.

13   CR
10   LF

C300   send text message to display
32,72,69,65,68,32   " HEAD "
C403   sound a beep
C401   wait for keypad entry of head count and store head count to ACC3
P910   send the string "Head Count" to the printer
C262 copy ACC3 to ACC4
C256 print ACC4 that holds a copy of the head count
13   CR
10   LF

P911   send the string "Average Weight " to the printer
C253   ACC4=ACC1/ACC3   divide ACC1 with head count stored in ACC3
C255   print weight in ACC4
13   CR
10   LF

83,104,114,105,110,107,97,103,101,40   "Shrinkage("
C267 copy ACC6 to ACC4 (ACC6 holds the percent value)
C256 print ACC4 as integer
37,41,58,32   "%): "
C279 calculate the ACC6 percent of ACC1 and store result in ACC3
C254 ACC4=ACC1-ACC3 calculate final shrinkage weight
C255 print the shrinkage weight stored in ACC4

13   CR
10   LF

P114 form feed 5 lines
9   number of lines

Example 6: Thermal Printer and Bar Code Scanner.

Graphic Thermal printers are completely different from traditional dot matrix printers. A thermal printer generates a bit image in memory and then prints it. Thermal printers use X and Y coordinates to position text, line drawing and barcodes. There are no such things as carriage return or line feeds. This might take a little getting used to. The M2000 hides a lot of the complexities of using thermal printers through predefined P code functions. The application below will show an example of a thermal printer used together with a bar code scanner.

A chemical company receives large totes of chemical "X" for a special process. The chemicals are weighed on a pallet jack. The chemical bin codes are in bar code form on the side of the tote. The operator scans the barcode on the tote with a scanner and a thermal printer prints a sticker that is applied to the side of the tote. The sticker contains the weight and the bin code numbers that were obtained from the barcode.

The ticket below will be created as ticket 200. The ticket is printed either by pressing the print key, or when the scanner scans a barcode. Parameter 95 is used to assign ticket 200 to the scanner. Anytime the operator scans a bar code the indicator will automatically print a ticket.

An example of the ticket is shown below. Notice the line drawing in the ticket. Line drawing is done by sending box and line drawing commands to the printer. These commands are shown in the ticket source on the following 2 pages which shows you exactly how this ticket was created.

```
CONTAINER ID: T-123456789101121
SCALE: Receiver 1
DATE: 12/01/2000

        GROSS: 188.4 kg
        TARE:  76.6 kg
     NET:111.8 kg

Chemical B34 Product A
```

Ticket source below for the ELTRON thermal printer. The table of P codes supporting the ELTRON printer is located earlier in this section.

P500   enable print driver for ELTRON printer (first thing that must be done)

P508   draw a rectangle
30,30,800,520   top left corner of rectangle is 30,30 lower right corner is 800,520

P501   move to coordinate 50,43
50,43

P504   select font
3   font type is 12x20

P505   font size is 2
2

67,79,78,84,65,73,78,69,82,32,73,68,58,32   "CONTAINER ID: "

P501   move to coordinate 413,50
413,50

P504   select font
4   font type is 14x24

P505   font size is 1
1

C305   send string captured by scanner to printer

P510   draw horizontal line at 30,84 and is 770 dots long
30,84,770

P501   move to coordinate 50,110
50,110

P505   font size is 1
1

83,67,65,76,69,58,32   "Receiver 1: "

P501   move to coordinate 50,155
50,155

P505   font size is 1
1

68,65,84,69,58,32   "DATE: "

C21 print the date

P510   draw horizontal line at 30,187 and is 770 dots long
30,187,770

P501   move to coordinate 180,270
180,270

71,82,79,83,83,58,32   "GROSS: "
C30   print gross weight

P501   move to coordinate 180,310
180,310

84,65,82,69,58,32,32 "TARE :"
C33 print tare weight

P505   font size is 2
2

P501   move to coordinate 180,350
180,350

78,69,84,58   "NET: "
C36 print net weight

P501   move to coordinate 180,350
50,453

P504 select font
4   font type is 14x24

67,111,97,116,105,110,103,32 "Chemical "
80,97,110,32 "B34 "
89,105,101,108,100,32   "Product A"

P520   send command to printer to print the label (required at end of ticket)

Some advice when working with thermal printers is to carefully plan out the ticket. Trial and error is time consuming. Because you are using an X,Y system you must position the text with precise coordinates. Take a ruler and measure starting points of text. The upper left hand corner of the ticket is 0,0. If you know the dots per inch (dpi) then you can calculate the X,Y positions.

For example if the dpi is 300 then 1 inch is 300. If you want to place text starting at half an inch to the right and 1 inch from the top then X=150 and Y=300. The printer's manual will state the resolution, which is usually 203dpi or 300dpi.

Remember carriage return and line feeds are not recognized by the thermal printer and should not be used. You must change the Y coordinate for every new line you want to print on. How much you increase Y by is a function of the font type and the font size.

Example: If you are using a font type of 14x20 and a font size of 2 then the final font size is 28x40dots. This means that the Y-axis should be incremented at least by 45 which is the equivalent of sending a LF character.
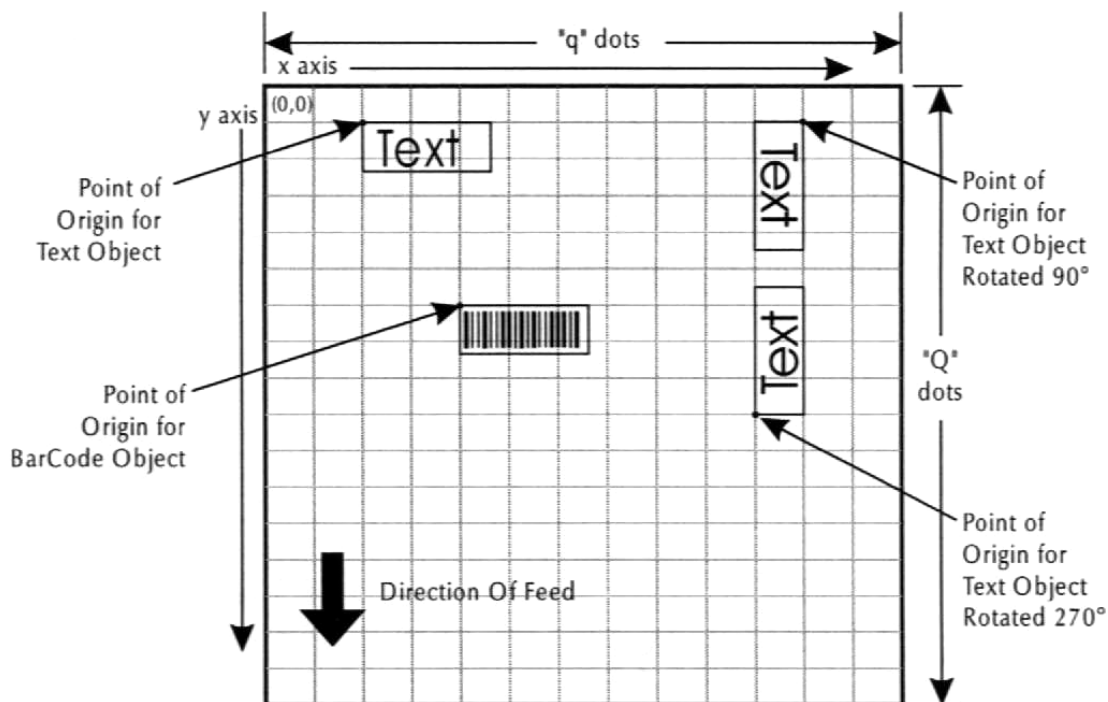
Example 7: Axle Scale with Truck in/ Truck out

A customer has an axle scale and wants to weight the individual axles on the truck and store the total weight using an ID number. This procedure is done both when the truck enters and leaves the facility. At the end of the transaction the driver will have a ticket showing the gross, tare and net weights.

This application requires some careful thought on the optimal procedure for weighing the axles.

To start axle-weighing press 200 followed by the print/select key. This prints the time and date and clears the axle weight accumulator. From here on the operator simply pressed the print/select key to record an axle weight. An axle weight is printed along with the axle number.

When the user has finished weighing all the axles on the truck he can then press the IN key for an inbound transaction or the OUT key for an outbound transaction. The user is then prompted for a truck ID number to either store or recall the total truck axle weights. The OUT key will also print the gross tare and net weights.

IN key is assigned to ticket 202 and is used to start the axle weighing process
PRINT/SELECT key is assigned to ticket 201 and is used to weigh an axle
OUT key is assigned to ticket 203 and is used to end the axle weighing sequence

We are using an EPSON tape printer for this ticket.

Ticket source definition
Four tickets will be used for this application and they are discussed below:

Ticket 200
This ticket will be used for the axle weighing procedure. It prints the time and date and the company name. Clears the accumulators to zero and prepares the axle weighing procedure. This ticket starts the axle weighing process. You must enter 200 print/select to start axle weighing.

Ticket 201
This ticket is assigned to the print/select key. Every time you press the Print/Select key an axle weight will be recorded and printed.

Ticket 202
This ticket is assigned to the IN key and is used to record the truck IN weight. Pressing the IN key will total all the axle weights and store them under an ID number. So after you are done with axle weighing (started by ticket 200), you would then finish the axle weighing for the inbound truck by pressing the IN key followed by print select.

Ticket 203
This ticket is assigned to the OUT key and completes the weighing transaction. It
totalizes the outbound axles weights and then prompts the user to enter an ID number to
retrieve the stored TARE weight. It finishes the ticket off by printing the gross tare and
net weights.

Ticket 200: Start the axle weighing

13   CR
10   LF
P100 emphasized mode on
P101 double height ON
P104 underline ON
87,69,83,84,69,82,78, 32   "WESTERN"
83,67,65,76,69, 32,67,79,46, 32,76,84,68,46 "SCALE CO. LTD."

P108 reset printer fonts
13   CR
10   LF

C20   print time
32   space
C21   print date
C22   Clear the ACC1 register (total axle weights)
C257 Clear the ACC4 register (axle count)
C259 increment axle counter to 1
13   CR
10   LF
C100 Assign Print/Select key to ticket 201
201   ticket 201

13   CR
10   LF

```
WESTERN SCALE CO. LTD.
08:35:42 12/01/2000


Axle: 1  2136 kg

Axle: 2  2184 kg

Axle: 3  2312 kg

Axle: 4  2385 kg

Total Axle Weight 9017 kg
Truck ID: 123
```

Ticket 201: Prints the Axel # and Axle Weight

13   CR
10   LF
P913 send the string "axle: " to the printer
C256 print the acc4 as integer number (axle count)
32,32 " " add some spaces
C30   print gross weight channel 1
C25   add gross weight to ACC1
C259 increment the axle count in ACC4
13   CR
10   LF

Ticket 202: Store total inbound axle weights

After the axles weighing is complete for the inbound truck, the weight can be stored with an ID number. This ticket is assigned to the IN key and stores the total axle weight to an ID number and prints the total axle truck weight along with the ID number. If you enter a used ID number, or an invalid one then the ticket aborts with nothing printed.

C85   Call the truck in loop function and store the total axle weight in ACC1
       (Note: if an invalid or used ID number is entered the ticket aborts here)
13   CR
10   LF
P104 underline ON
P100 emphasized mode on

P914 send the string "Total Axle Weight " to the printer
C24   print the total axle weight
10   LF
13   CR
P108 reset printer fonts

P906 send the string "Inbound ID"
C79   print the truck ID number that the weight was stored under

10   LF
13   CR
P114 form feed 9 lines
9 number of lines

Ticket 203   Recall stored axle weights and print gross, tare and net

C86   Call the truck out loop function and retrieve the stored IN weight
            (Note: if an invalid or unused ID number is entered the ticket aborts here)
13   CR
10   LF
P104   underline ON
P100   emphasized mode on

P914   send the string "Total Axle Weight " to the printer
C24   print the total axle weight
10   LF
13   CR

P108   reset printer fonts
P916   send the string "Outbound ID"
C79   print the truck ID number that the weight was stored under
10   LF
13   CR
10   LF

P101   double height ON
P901   send the string "gross weight"
C74   print the truck loop GROSS weight
10   LF
13   CR

P902   send the string "tare weight "
C75   print the truck loop TARE weight
10   LF
13   CR

P903   send the string "net weight   "
C76   print the truck loop NET weight

P108   reset printer fonts
10   LF
13   CR
P114   form feed 9 lines
9   number of lines


```
WESTERN SCALE CO. LTD.
08:36:33 12/01/2000


Axle: 1  2579 kg

Axle: 2  2886 kg

Axle: 3  3218 kg

Axle: 4  3555 kg

Total Axle Weight 12238 kg
Outbound Truck ID: 123

Gross 12238 kg
Tare  9017 kg
Net   3221 kg
```

Serial Communications on the M2000

The M2000 has two independent serial ports COM1 and COM2 on the back of the indicator. They are fully independent of each other. For example one port can drive a printer while the other drives a scoreboard. Both COM ports are identical with the exception that COM1 is fixed at 8 data bits only. COM2 can have its data bits configured to 7 bit as some older equipment may require this.

The factory default is COM1 setup for printing tickets at 9600 baud and COM2 setup outputting a weight string (DF1500) in continuous mode at 9600 baud.

Changing the baud rate on the COM ports.

The baud rate can be changed by using **parameter 30** for COM1 and **parameter 32** for COM2. Enter the value for the corresponding baud rate below. For example to change the baud rate to 14400 enter 7 followed by the TARE key.

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

9600 baud is the default baud rate for both ports.

Changing the Parity

The parity can be changed by using **parameter 31** for COM1 and **parameter 33** for COM2. Enter the value for the corresponding parity below.

>   **0: No parity (factory default)**
>   1: ODD parity
>   2: Even parity

No Parity is the default baud rate for both ports.

Serial port update rate for COM1 and COM2

The M2000 outputs strings at a very high update rate, the update rate can be slowed if required. This parameter most likely will never be required but may be needed when interfacing to older equipment. Parameter 65 will set the rate at which the serial ports of COM1 and COM2 will be transmitted. When the COM port operates in continuous mode a delay will be inserted in between is string transmission. The delay can be set with 0.25-second increments.

The value entered for calibration parameter 65 must be a number between 0 – 100. For example if we would like the strings on the serial ports to be updated once every second, we would enter 4. If we would like the strings to be updated as fast as possible, we would enter 0, which is the default.

COM2 Data bit rate

Parameter 27 sets number of data bits for the serial port on COM2. Only COM2 allow its data bits to be altered. It is important to note that this parameter is not available for COM1, which is fixed at 8 bits. To change the data bits for COM2 enter the new values as follows:

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**)

Enter the new data bit rate followed by the TARE key. You may also cancel at any time by pressing the CLEAR key.

Setting the String mode for the COM ports

Each COM port can have its own string mode. The string mode determines the format of the string that is being outputted by the COM port. This is an important parameter as it is also used to *enable ticket printing*. **Parameter 34** for COM1 and **parameter 35** for COM2 are used to change the string mode. The M2000 supports most of the string formats from the Western Scales DF family of indicators.

Note: It is also important that you select the correct string output mode that is discussed next under parameter 38,39.

Note: The M2000 does not have a specific string format called "M2000" it instead supports a variety of different string formats below. The DF1500 is the default string for the indicator.

Enter the value for the corresponding string types below followed by the TARE key.

1 DF1000
3 DF2000
5 DF2500 mode1
8 DF1500   (factory default)
9 DF2500 mode 6
10 DF2500 mode 7
12 AD4321, AD4323, AD5000
13 Cardinal 708
14 Cardinal 738
19 Toledo & Fairbanks R2500
16 Weightronix 120
17 Consolodated Controls
18 Analogic 5316
99 Set to ticket printer mode
100 Set to bar code scanner mode

Note: To enable ticket printing this parameter must be set to 99.

Note: The factory default is COM2 set to parameter 8 (DF1500) and COM1 set to ticket printing mode parameter 99.

String Output Mode

How the M2000 outputs strings to the COM ports is determined in **parameter 38** for COM1 and **parameter 39** for COM2. The values to enter are between 1-5 as shown below. Enter the value followed by the TARE key.

Note: If you have selected the string type as a command mode then these settings do not apply and are ignored. An example of this is the DF2500 command mode 6.

Note: If the COM port is set up for printing then this parameter does not need to be changed. For printing tickets this parameter should be left as its default value (5).

1 string transmitted to the COM port when the PRINT/SELECT has been pressed.

2 string transmitted when the COM port receive data input is at logic low (-9 volts dc).

3 string transmitted when the COM port receive data input is at logic high (+9 volts dc).

4 string transmitted to COM port when '?' character is received

5 string transmitted continuously **(default)**

Channel allocation for Serial String output

Because the M2000 can have up to 3 channels you may need to lock a specific channel to a COM port. Using parameter 47 for COM1 and parameter 48 for COM2 enter the parameters for the channel allocations as listed below. The default is 0 and you most likely will not have changed this parameter.

Note: In most cases you will never need to use this parameter and is not related in any way to printing tickets and should be left as its default value (0).

0   COM serial output string weight a function of current active channel **(default)**

1   COM serial output string locked on channel 1

2   COM serial output string locked on channel 2

3   COM serial output string locked on channel 3

4   COM serial output string locked on Total mode

String Specifications for Supported Strings

DF1000 String Format

1	STX	Start of Text
2	Pol	Polarity
3	Space	
4	W	Weight String MSD
5	W	
6	W	
7	W	
8	W	
9	W	MSD
10	Space	
11	U	Units "KG" for Kilos and "LB" for Pounds
11	U	
13	Space	
14	M	Mode "GR" for Gross or "NT" for Netweight
15	M	
16	Space	
17	Status	Space=Valid, "O"=Over, "M"=Motion, "-"=Minus
18	CR	Carriage Return ASCII 13
19	LF	Line Feed ASCII 10

DF1500 String Format

1	STX	Start of Character ASCII 02
2	Sign	"-" for Negative , space for Positive
3	W	Weight String (Mostt Significant Digit)
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	
10	Space	
11	U	Units "LB" or "KG"
12	U	
13	Space	
14	M	Mode "GR" for Gross or "NT" for Net
15	M	
16	Space	
17	Status	"O" for over, "M" for motion, "-" for negative
18	CR	Carriage Return ASCII 13
19	LF	Line Feed ASCII 10

DF2000 String Format

1	STX	Start of Text ASCII 02
2	Pol	Polarity Space or '-'
3	Space	
4	W	Weight including decimal point MSD
5	W	
6	W	
7	W	
8	W	
9	W	LSD
10	Space	
11	U	Units "KG" for Kilos and "LB" for Pounds
12	U	
13	*CH	Channel information code (see below)
14	M	Mode "GR" for Gross and "NT" for Net weight
15	M	
16	Space	
17	Status	"O" for over, "M" for Motion, "-" for Negative
18	CR	Carriage return
19	LF	Line Feed

* *CH character in the string holds the channel code information:*

"1" = Channel 1

"2" = Channel 2

"4" = Channel 3

"3" = Sum of channels 1 and 2

"5" = Sum of channels 1 and 3

"7" = Sum of Channels 1,2,3

DF2000 Command Mode

The DF2000 Command mode is a simple 1-character command mode. When the indicator receives a command it replies with the above string. The single character commands are listed below.

?	Send Current Displayed Weight
1	Set to Channel1 and send displayed weight
2	Set to channel2 and send displayed weight
3	Set to channel3 and send displayed weight
4	Set to total and send displayed weight
T	Set Tare on current channel
C	Clears stored Tare weight
G	Switches to Gross mode
N	If tare Weight Stored switch to net mode
Z	Zeroes indicator if within ZERO window

DF2500 Mode 2,3,4,5

1	STX	Start of Character ASCII 02
2	Sign	"-" for Negative , space for Positive
3	W	Weight String including decimal (Most Significant Digit)
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	
10	Space	
11	U	Units "LB" or "KG"
12	U	
13	Space	
15	M	Mode "GR" for Gross or "NT" for Net
16	M	
17	Space	
18	Status	"O" for over, "M" for motion, "-" for negative "F"=fault
19	CR	Carriage Return ASCII 13
20	LF	Line Feed ASCII 10

DF2500 Command Mode 6

Computer command operation without checksum. A fully interactive command set can be send from a remote computer to operate the indicator. The format of the command string sent to the indicator is as follows:

0	**STX**	Start of text (02H)
1	**D0**	Data,only if required
2	**D1**	
3	**D2**	
4	**D3**	
5	**D4**	
6	**D5**	
7	**D6**	
8	***Cmd**	The command character (see table below)
9	**CR**	Carriage return (0DH)

The maximum number of characters sent before the CR must not exceed 20. The indicator 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:

Cmd	MM	Data	Function
G	**GR**	None	Set to gross display
N	**NT**	None	Set to net display
P	**TR**	None	Capture weight as tare
T	**TR**	Tare wt	Set tare weight
R	**TR**	None	Recall tare weight
C	**TR**	None	Clear tare weight
?	**??**	None	Poll for weight
L	**??**	None	Set units to LB
K	**??**	None	Set units to KG
Z	**??**	None	Zero the scale
A	**TL**	None	Add to accumulator
S	**TL**	None	Recall accumulator
B	**LC**	None	Recall load counter
X	**TL**	None	Clear accumulator
1	**SP**	Set point 1	Set set point 1

2	SP	Set point 2	Set set point 2
3	SP	Set point 3	Set set point 3
4	SP	Set point 4	Set set point 4
5	SP	Set point 5	Set set point 5
6	SP	Set point 6	Set set point 6

The entry '??' in the MM field above means the indicator will respond with the current display mode it is in. The possible modes are GR for gross weight and NT for net weight. Failure of the indicator to respond with the correct mode or weight indicates that execution of the command was not permitted.

The indicator only replies when it receives a valid command. The returned data will reflect the command executed. Some commands may be inhibited, i.e. push to zero, and the return data will reflect the indicator's inability to complete these commands. The return data string is as follows

0	STX	Start of text characters (02H)
1	Sgn	Sign, - = negative, spc = positive
2	W0	Weight, 7 characters, may include decimal point
3	W1	
4	W2	
5	W3	
6	W4	
7	W5	
8	W6	
9	Spc	Space
10	U	Units, LB or KG
11	U	
12	Spc	Space
13	M	Reply type, indicates the type of data
14	M	
15	Spc	Space
16	Sta	Status, O = over, M = motion, - = negative, F = fault
17	CR	Carriage return (0DH)
18	LF	Line feed (0AH)

DF2500 Command Mode 7

Computer command mode with checksum. This mode is identical to Mode 6 with the inclusion of an 'Exclusive OR' checksum. The checksum is included in both the send and receive data steams. It is sent 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

1	STX	ASCII 02
2	POL	Space for Positive "-" for Negative
3	W	Weight 7 digits
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	
10	Units	"K" for kilogram "L" for pounds
11	Mode	"G" for GROSS "N" for NET
12	Status	"M"=motion, "O"=Over
13	Space	
14	CR	ASCII 13
15	LF	ASCII 10

CARDINAL 738 FORMAT

1	CR	ASCII 13
2	POL	"+" for Positive "-" for Negative
3	W	Weight 7 digits including decimal
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	
10	Space	
11	Status	"m" for motion, "o" for out of range
12	Space	
13	U	"lb" or "kg"
14	U	
15	Space	
16	Mode	"g" for GROSS or "n" for NET
17	Space	
18	Space	
19	EOL	ASCII 03

ANALOGIC 5316

1	STX	ASCII 02
2	W	Weight 9 characters including sign character
3	W	
4	W	
5	W	
6	W	
7	W	
8	W	
9	W	
10	W	
11	T	Tare Weight 9 characters including sign character
12	T	
13	T	
14	T	
15	T	
16	T	
17	T	
18	T	
10	Space	
11	Status	"1"= in range, "2"= standstill, "4"= Center of Zero, "8"= Net mode (note this is bit masking)
12	Units	"0"=kilo, "1"=pounds
13	Space	
14	CR	ASCII 13
17	LF	ASCII 10

WEIGHTRONIX 120 Format

1	SPACE	SPACE character
2	G/N	"G' for Gross mode and "N" for NET mode
3	POL	"+" for Positive and "-" for negative
4	W	Weight 6 digits
5	W	
6	W	
7	W	
8	W	
9	W	
10	SPACE	
11	U	Units "LB"=pounds "KG"=kilogram
12	U	
13	CR	ASCII 13
14	LF	ASCII 10

Serial Port Hardware configuration RS232 or RS422

Each COM port on the M2000 can be configured with RS232 or RS422 drivers. RS232 is the most common configuration used. RS422 uses differential transmitters and receivers and allow you to transfer serial data several thousand feet with high immunity to noise and cross talk. It is important to understand that you need an RS422 receiver/transmitter on the other end of the cable to use RS422 communications. Adapters can be purchased that convert RS232 to RS422.

Note: For proper operation of printers and other peripherals using standard RS232 the COM ports must be configured correctly to operate in RS232 mode, which is the default.

The Wire connections to the COM port on the back of the indicator are different for RS422 then for RS232. RS422 Requires 2 lines for transmit (TX+ and TX-) and 2 lines for receive (RX+ and RX-).

For RS422 communications:
CTS on the connector becomes **RX-**
RX on the connector becomes **RX+**
TX on the connector becomes **TX+**
RTS on the connector becomes **TX-**

Changing COM port driver configuration.
The default hardware settings for both COM ports are RS232. The hardware configuration can be changed by using *parameter 40*. Enter the value below followed by the TARE key.

0	COM1 set to RS232	COM2 set to RS232 **factory default**
1	COM1 set to RS422	COM2 set to RS232
2	COM1 set to RS232	COM2 set to RS422
3	COM1 set to RS422	COM2 set to RS422

Enter the value above followed by the TARE key.

Connecting a Bar Code Scanner to the M2000

The M2000 has the ability to connect a bar code scanner to COM1. This allows you to read barcode information and transfer it to a ticket.

Bar code scanners are intelligent devices that take care of deciphering bar codes into normal ASCII strings. Most scanners transmit the exact same string and can be connected to the M2000.

Enabling the bar code scanner.

To enable scanner input on the M2000 **parameter 34** must be set to 100. Scanners can only be connected to COM1. The way the M2000 identifies that it has received a barcode string is that when it receives a burst of characters from the scanner it waits a small time duration after the last character it has received before transferring the string to the string register. This allows the M2000 to accept any string type not relying on a carriage return or linefeed to mark the end of the barcode transmission.

Assigning a ticket event to the scanner

In some cases you may want the scanner to print a specific ticket as soon as you scan a barcode. Some scanners have triggers some do not. A ticket is executed as soon as the M2000 receives a scanner string. Use parameter 95 to assign the ticket number to the scanner. To disable this enter 0 which is the default.

When a ticket number is assigned to a scanner event the indicator will not execute the ticket if there is motion on the scale. The indicator will display Error 36 on the display.

Scanner handshaking mode

The m2000 has 4 handshaking options. Parameter 90 has the following options:

    0   No handshaking no beep (default)
    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 is the M2000's RTS signal connected to the scanners CTS. 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 only require option 0 or 1.

Connecting Auxiliary peripherals via SMARTWIRE

The Smart Wire port on the back of the M2000 is a multi-drop RS485 type communications interface. It is designed to network several options boards together in a daisy chain fashion.

SmartWire has the following connections:

(V+) positive SmartWire power
(V-)   negative SmartWire power
(A) RS485 differential + signal
(B) RS485 differential - signal

These wires must be connected to a terminal block with the same signal names on the Smart Wire device. Connections between the indicator and the peripheral should be done using a Beldon type 8723 cable or equivalent. The shield can be connected to V-. Because Smart Wire uses a differential type driver cables length can be several hundred feet.

Note: current versions of the M2000 use existing setpoint boards and 4-20mA boards from the DF family of indicators. These boards are not SmartWire compatible and must be used together with the SmartWire bridgeboard. The bridgeboard translates the SmartWire commands to the current Setpoint and 4-20 mA boards.

Enabling SmartWire

SmartWire is disabled by default and must be enabled to communicate with the bridgeboard. *Parameter 59* is used to enable SmartWire.

> 0   disable smart wire bridge interface
> 1   enable smart wire bridge interface

If the smart wire bridge device (setpoint board or 4-20mA board) is not plugged in to the smart wire connector the smart wire interface will detect a communications timeout and will produce an error message such as ERR 185 - *smart wire interface not responding*.

This condition will be regarded as a critical error and the user will have to clear the error message manually, and attend to the problem.

If the M2000A stop transmitting commands to any connected devices the smart wire devices will reset the set points to all outputs off and the current loop output will be set to zero.

SmartWire Failure

If the SmartWire fails do to component failure or connection is lost do to wire breakage of the communications wire "ERR185" will be displayed. This error message must be cleared and will continuously appear until a new link is reestablished. To regain control of the indicator you may have to disable the Smart Wire interface. This can be done in calibration using *parameter 59*, or out side of calibration using parameter *59*. Enter 0 followed by the TARE key.

Setting up the 4-20 mA board

The M2000 has a 16bit 4-20mA current loop board that attaches to the SmartWire bridgeboard. Setting up the board is discussed below.

Select Scale Channel to Connect to Current Loop

Parameter 60 will assign the current loop to one of the three scale channels. For the 4-20mA board to work the SmartWire interface must be enabled and connected to the Smart Wire inputs on the 4-20mA board.

The following values that can be entered are:
  - 0   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

Current Loop Offset Adjustment

Parameter 61 is used to set the offset adjustment.
Before we can successfully use a 4-20mA device with the M2000 we have to perform an offset calibration. The offset adjustment sets the 4mA base current value. This is basically the value of the output board when the scale is at zero.

Connect a voltmeter in series with the 4-20mA loop and set it to measure milliamps. Adjust the output of the 4-20mA board so that it reads 4mA.

Adjusting the offset is done by changing the output value for the board. This can between 0-65530.   To make the process of arriving at the target count/current as easy as possible, preset counts are assigned to hot keys. The key assignments are shown below.

1   preset to   0
2   preset to 10000
3   preset to 20000
4   preset to 30000
5   preset to 40000
6   preset to 50000
7   preset to 60000
8   current value

To fine tune the output current the counter value can be adjusted by holding the IN or OUT keys down respectively.

When you have arrived at the correct count value then press TARE to lock in the value. To abort without saving changes press the CLEAR button.

Current Loop Span Adjustment

Parameter 62 Calibrates the 4-20mA output to a known weight.

The 4-20mA board uses the scale capacity (parameter 4) as the reference for scaling the 4-20mA output. Parameter 62 adjusts the upper end of the output to read 20mA. Once set when the scale is at scale capacity the out put will read 20mA. Example: the scale capacity is at 70 pounds, so when 70 pounds is on the scale 20mA is outputted on the 4-20mA board.

To adjust the current output value the output value will be displayed, this value is a linear representation of the current and is ranges from 0 to 65530. To make the process of arriving at the target current as easy as possible, preset counts are assigned to the hot keys as shown below.

1   preset to   0
2   preset to 10000
3   preset to 20000
4   preset to 30000
5   preset to 40000
6   preset to 50000
7   preset to 60000
8   current value

To fine tune the output current the counter value can be adjusted by holding the IN or OUT keys down respectively.

To lock in the value press the TARE key.

To abort without saving changes press the CLEAR button.

Current Loop Gross or Net mode

Parameter 63 Sets the current loop to be in GROSS mode or NET mode.
Enter 0 for Gross mode or 1 followed by the Tare key. The default is GROSS mode.

Setting Up the Setpoint Board

There are a total of 6 set points available on the M2000A. Each set point can be allocated to any of the 3 channels. The SmartWire uses solid state relay modules to switch AC and DC loads.

Entering Setpoints

Parameters 51-56 are used to enter in setpoints in calibration mode. Each of the 6 setpoints have there own weight compare registers. The values entered into these registers will control the setpoint relays. These values are with reference to the units of measurement you are using. If you enter the weight value in pounds, then pounds are the units the indicator must be in when operating setpoints.

51: Set weight for Setpoint 1
52: Set weight for Setpoint 2
53: Set weight for Setpoint 3
54: Set weight for Setpoint 4
55: Set weight for Setpoint 5
56: Set weight for Setpoint 6

Set Point Control Mask

Parameter 57 controls how each of the 6 set points will function.
This is a 6 digit parameter with each digit representing a set point mask value.
The left most digit is set point channel 6 and the rightmost digit is set point channel 1.

When entering the control mask value you are entering the mask values for all 6 channels, in other word you are always entering 6 digits. The first digit entered represents set point 6 of 6. The last digit entered represents set point 1 of 6.

Any of the 6 set points can be assigned to any of the 3 channels. Once a set point is assigned to a scale channel it is not available by the other channels for use.

For example, all set points can be allocated to one channel, which leaves no set points for any of the other channels. Another example would be to allocate no set points to channel 1, 4 set points to channel 2 and 1 set point to channel 3 etc.

Entering the set point mask consists of entering a 6-digit number at any time where each
digit represents one of the 6 set points. This number represents the mask mode of the
particular set point as follows

- ❑ 0 indicates that the existing setting must not be altered
- ❑ 1 energize output when weight >= set point value
- ❑ 2 energize output when weight < set point value
- ❑ 3 disable the set point

When you look at parameter 57 for the first time will notice dashes all across the display.
A dash "-" in a digit means that the set point is not assigned to this scale channel. It is
either not used, or being used by another scale channel.

Example:
We are in scale channel 1 and want to assign set point channels 1 and 2. Parameter 57 is
entered followed by Print/Select. Then we enter "000011" followed by the TARE key.
We enter parameter 57 to check the value again and we will see the set point mask
displayed as "----11".

It is important to enter 0 on a channel that you do not want to modify.
Set points 1 and 2 have now been assigned the ">=" function. We will now assign set
point 6 the "<" function. Enter parameter 57 print/select. Then enter 200000 followed by
the TARE key.

If you enter 57 print/select you will now see "2---11".

To disable set point 6 you would enter "300000" followed by the TARE clear.

To exit or abort may press CLEAR at any time.

So in the example above we have shown how to assign set point channels 1 and 2 the
"=>" mask and set point channel 6 the "<" mask mode.

Set Point Hysteresis Ajustments

Parameter 58 is a 6-digit command, this command requires 6 digits to be entered at any
time, where each digit represents one set point. The first digit entered represents set point
6 of 6. The last digit entered represents set point 1 of 6.

Hysteresis adjustments are used when you have a lot of vibrations in the scale which may
cause the set pointers to false trigger. Increasing the hysteresis value increases the settling
period for accepting a setpoint value.

The digit entry can have a value between 0-9. A value of 0 for the set point in will mean
an output action on the first occurrence of a weight evaluation of the set point. A value

of 9 will mean the setpoint will only change after an evaluation has occurred for 9 consecutive weight samples in a row.

Internal to the indicator the parameter entry will be multiplied by 10. Thus, a hysteresis factor of 3 will translate to 30 valid comparisons for the set point mask before an output action will take place.

Input Board

The isolated input board allows the M2000 to accept remote input switch control. All that is required is to plug the remote input board into the Smart Wire bridge board.

The following remote functions are supported remotely:

- ZERO (zero indicator)
- TARE (tare indicator)
- CLEAR (clear tare weight)
- GROSS (switch to gross display mode)
- PRINT (print ticket)

Calibration Parameters

As discussed earlier calibration parameters are selected by entering the parameter number followed by the PRINT/SELECT key. The currently set parameter value will be displayed for a short duration. Doing nothing will cause the indicator to revert back to weight mode, or you can press the CLEAR key for the same result. To enter a value key in your parameter to change followed by the TARE key. An invalid parameter will cause an error message to be displayed.

Parameters related to CAL INITIALIZATION

1   Reload Factory Default Values

This function will reinitialize the indicators scale calibration parameters for the specific channel to the default factory values. When you have selected his function you must confirm by pressing [1] followed by the [TARE] key. This will only initialize a single channel. The indicator will automatically exit calibration and reboot to initializing the calibration data to factory default. Any other values will display error 7. The indicator will reboot after performing a factory reset. Use parameter 260 below to reinitialize completely to factory defaults.

260   Complete factory initialize

Similar to parameter 1 above. This parameter completely initializes all indicator settings to factory defaults on all 3 channels. This includes COM port settings and all other system related settings. Ticket data and tares stored in memory are not initialized.

98   Enables scale channel (0)

This parameter enables scale channels 2 or 3. Channel 1 is always enabled and can not be disabled. By default channels 2 and 3 are turned off. To enable a channel enter 1 followed by the [TARE] key. To disable a channel enter 0 followed by the [TARE] key.

99   Exit calibration mode

This parameter will exit calibration mode and restart the indicator. All calibration changes are stored to flash memory and the audit trail is updated.

Parameters related to SCALE SETUP

2   Decimal Point Position (0)

Sets the decimal position for the display. Values 0 to 4 can be entered followed by the [TARE] key. An invalid entry will display error 3.

3   Graduation size (1d)

Selects the grad size to be used on the scale. Values that can be enter are 1,2,5,10,20,50 and100 followed by the [TARE] key. An invalid graduation size will display error 2.

4   Scale Capacity (10000d)

This should be set to the scale capacity for the scale. For example if your scale capacity is 1000 lbs then you would enter would be 1000 followed by the [TARE] key. The zero range window is calculated from this parameter

8   Scale Over (1d)

Enter the number of divisions for scale over. For example if your scale capacity is 1000 lbs (parameter 4) and you want the scale to indicate scale over at Scale Capacity + 9d then the value you would enter would be 9 followed by the [TARE] key.

20   Scale Over Message

Scale over is displayed as "EEEEEE" on the M2000 display and in the strings. If you require maintaining compatibility of older Western Scale equipment then set this parameter to 1. Scale over will now be displayed with the traditional all eights "888888".

98   Enables scale channel (0)

This parameter enables scale channels 2 or 3. Channel 1 is always enabled and can not be disabled. By default channels 2 and 3 are turned off. To enable a channel enter 0 followed by the [TARE] key. To disable a channel enter 0 followed by the [TARE] key.

99   Exit calibration mode

This parameter will exit calibration mode and restart the indicator. All calibration changes are stored to flash memory and the audit trail is updated.

Parameters related to scale MOTION

5   Motion Window (2d)

Enter the value to determine the motion sensitivity. A typical value is 2 times the graduation size. This is set automatically when the grad size changes (Parameter 3).

24   Motion Settle Time (8)

Displays the number of ¼ second intervals for which Motion will remain asserted after the scale reading has stabilized within the motion tolerance. Enter a value 1-255 followed by the [TARE] key. An invalid motion value will display error 50.

Parameters related to ZERO

9   Power ON Zero Scale Message (0)

With this parameter set to 1 the indicator will power up displaying "Zero" on the display. The operator must Zero the scale before continuing. This must be set for certain legal for trade requirements. If the parameter is set to 0 the indicator powers up displaying weight. An invalid parameter entry will display error 28.

21   Push to Zero Window or Zero Range (2)

This command displays the percentage of scale capacity that can be zeroed by the zero key. The allowable range is between 0 and 99%. Enter the range followed by the [TARE] key. An invalid value will display error 5.

22   Auto Zero Tracking ON/OFF (1)

This command displays the Auto Zero flag value. The value of 1=ON and 0=OFF. To turn auto zero tracking off enter 0 followed by the [TARE] key. An invalid entry will display error 4.

23   Auto Zero Tracking Window (AZSM) (60)

This command displays the percentage of a graduation that can be tracked off during zero tracking. Enter the value followed by the [TARE] key.
This value can be the following:

1-99: to track 1 to 99% of d.
100: to track off 1d.
200: to track off 2d.
300: to track off 3d.
To turn off zero tracking use parameter 22 above.
Any other value entered will display error 6.

45   Power up zero IZSM (0)

When this parameter is set to 1 the indicator will zero the scale automatically on power up. The maximum range the scale will zero on power is set to +-10% of full scale capacity. If the initial load on the scale exceeds 10% of scale capacity then no initial scale zero will take place. Enter 1 to enable or 0 to disable.

Parameters related to SCALE CALIBRATION

7   Scale Units

Toggles between pounds and kilos. Make sure that you have selected the units you are calibrating with. If your test weights are in pounds or kilos then make sure that the scale units illuminator is displaying the correct units.

11   Indicator Load Cell voltage range (39mV)

This parameter adjusts the input range for the scale-input channel. It is important that the correct range be selected for optimal performance of the indicator.

Use values 1 to 3 to select the following input ranges:

1   for 0 to +-9mV input range
2   for 0 to +-19mV input range
3   for 0 to +-39mV input range
4   for 0 to +-79mV input range

If the loadcell input voltage exceeds the input range of the indicator the display will display 'AAAAAA' which means "Analog over-range". Select the next highest input range to rectify the problem.
Only values 1 to 4 can be entered and any other value will display error 57.

It in important to understand that selecting a lower input range, for example 9mV range does not necessarily guarantee better performance. The 9 mV range has more amplification that lets say the 19 mV or 39mV range. You will get more AD counts for sure, but you are also amplifying noise. This depends on the scale installation. It most cases the default 39mV or 19mV range will be adequate.

12   Deadload Scale

Before spanning the indicator for the first time the indicator must be deadloaded. Ensure that the scale has all test weights removed from the scale and the scale is stable before performing a deadload. To perform the deadload function press 1 followed by the [TARE] key. The indicator will perform the deadload funtion. After the deadload has completed the indicator will briefly display the deadload value in AD rawcounts before returning to weight display mode.

13   Set Span

This command is used to span the indicator with a known test weight. Place the test weights on the scale. When the set span function has been activated the current displayed weight will be frozen on the display. Using the numeric keypad enter the known test weight followed by [TARE]. The display should now show the new weight on the scale. You can cancel a span any time by pressing the [CLEAR] button before [TARE] is pressed.

15   Reset Span Table

Clears the span table except for the first entry. It is recommended that this be done before calibrating the indicator. This operation will clear the span table from any previous entries. Press 1 then [TARE] to confirm clearing the table.

16   Increment Span Pointer

Allows you to make a second adjustment to correct a scale linearity error. This function will increment the table pointer in the span table. This command displays the span pointer value. To abort this function you may press the [CLEAR] key. To increment the span pointer press 1 followed by the [TARE] key. The next time you span the indicator (parameter 13) you will notice that a new span pointer value will be displayed briefly on the display. This tells you the current span pointer position that you are currently at.

The span pointer cannot increment passed 4. It is also important to understand that the span parameter 13 does not automatically increment the span pointer. Error message 25

will be displayed if you attempt to increment passed the maximum allowable span pointer value. Error message 17 will displayed for any other invalid entry.

17   Decrement Span Pointer

This command will decrement the table pointer in the span table. This command displays the span pointer value. To abort this function you may press the [CLEAR] key. To decrement the span pointer press 1 followed by the [TARE] key. The next time you span the indicator (parameter 13) you will notice that a new span pointer value will be displayed briefly on the display. This tells you the current span pointer position that you are currently at.

The span pointer cannot decrement passed 1. Error message 19 will be displayed if you attempt to increment passed the maximum allowable span pointer value. Error 18 will be displayed for any other invalid entry.

99   Exit calibration mode

This parameter will exit calibration mode and restart the indicator. All calibration changes are stored to flash memory and the audit trail is updated.

Parameters related to INDICATOR POWER UP

6   Power On Units (0)

Determines what units the indicator defaults to when the indicator is turned on. Entering 1 followed by the [tare] key selects Kilograms. Entering 0 selects Pounds. An invalid entry will display Error 13.

9   Power ON Zero Scale Message (0)

With this parameter set to 1 the indicator will power up displaying "Zero" on the display. The operator must Zero the scale before continuing. This must be set for certain legal for trade requirements. If the parameter is set to 0 the indicator powers up displaying weight. An invalid parameter entry will display error 28.

10   Power Switch Bypass (1)

This parameter controls the keypad ON/OFF switch for the indicator. Entering 1 for this parameter disables the ON/OFF switch and the indicator can never be turned off from the keypad. Also when the indicator power is plugged into the wall the indicator will turn on

without pressing the ON button. This should be used in applications such as control systems where the indicator must power up running after a power outage. An invalid entry will display error 56.

46   Power up channel select (1)

This parameter will determine what channel to be the default channel at boot up. This parameter will only be implemented if the calibration values meet the criteria.

- ❑ 1   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 met)
- ❑ 5   Scan mode

70   Enable Total Mode (0)

Using 4 PRINT/SELECT puts the indicator in total mode and sums channels into a single total. Total mode is disabled by default. Total mode is not legal for trade in Canada and can only be used in non-legal for trade applications.

0   Total mode disabled
1   Total mode enabled

Parameters Related to TARE

25   Offset Value (0)

Allows the entry of tare offset value. At scale zero, the center of zero light will illuminate , but the weight will be at the tare offset value. Enter the offset weight followed by the tare key.

26   Offset flag (0)

This command controls the operating mode of the tare offset. Enter the parameter followed by the [TARE] key. The following values accepted are:

0=Offset Disabled
1='Legal for trade mode' – Indicator cannot be put in 'NET' mode if no value has been set for tare. If tare has been entered the offset value is included in the NET display.

80=Not "Legal for Trade mode - Allows gross/net switching at zero value. If NET is selected , the offset value is subtracted from the displayed gross weight.

50   Tare function mode (1)

This parameter controls how the tare function works on the indicator. The options available are:

0: disable keyboard and scale tare
No tare can be entered using the keypad or taring off the scale using push button tare.

1: enable both keyboard and scale tare
Both keyboard tare entry and pushbutton tare can be used.

2: enable pushbutton tare only
Taring is only allowed from the scale.

3: enable keyboard tare
Tare entry can only be done from the keyboard

71   Force Zero for keyboard tare (0)

This parameter checks if the scale is at zero before allowing an operator to enter a keyboard tare. If the scale is not at zero when a keyboard tare is entered then error 35 is displayed. Enter 1 to enable, 0 to disable.

Parameters Related to SYSTEM SETTINGS

28   Sound volume (2)

This command controls the volume of the internal buzzer.
The following values can be entered followed by the [TARE] key:
        0: sound off
        1: volume low
        2: volume medium
        3: volume high

Error Message 51 will be displayed for an invalid entry.

29   Keypress Feedback

This function will blink the display every time a key is pressed. This gives a sense of feedback to the end user when a key is pressed. This is especially handy in noisy environments where the operator may not be able to here the key beeps from the indicator. Parameters are 0 (off) or 1 (on) followed by the [TARE] key.
Error 32 will be displayed for an invalid entry.

80   Set Time

Time is set out side of calibration mode in normal weighing mode (you must exit cal mode). This parameter allows you to set the battery backed real time clock on the indicator. Pressing 80 followed by the [PRINT/SELECT] key will display the current time on the display. To change the time, enter your new time as HHMMSS followed by the [TARE] key.
Example: to change the time to 9 hours 33 minutes and 30 seconds enter 093330 followed by the [TARE] key.

81   Set Date

Date is set out side of calibration mode in normal weighing mode.
This parameter allows you to change the battery-backed date on the indicator. Pressing 81 followed by the [PRINT/SELECT] key will display the current date on the display. To change the time, enter your new time as YYMMDD followed by the [TARE] key.
Example: to change the date to December 14 year 2001 enter 011214 followed by the [TARE] key.

240 Boot Loader Version Information

This command in calibration mode displays the current version number of the boot loader programmed in the EEPROM area of the M2000 processor.

244 Battery Information

This command in calibration mode takes a measurement of the Lithium button cell that is used to back up the Real Time Clock (RTC) and the SRAM memory in the system. Voltage levels are displayed in mV should be interpreted as follows:

3000 (3V) and above considered good
2700 (2.7V) and above considered acceptable
2600 (2.6V) and below considered as low – replace battery

Low battery levels might affect the RCT information , SRAM based truck in/out database and working entries for set points. The battery to be used should comply with the specifications similar to that of Renata Lithium batteries of type CR2450N 3V Lithium button cells @ 540mAh

255 Software Upgrade Download

This command prepare the indicator for software upgrade to its FLASH memory. This command does not return control to the indicator and the only way to exit this mode is to remove the power from the indicator. The download sequence takes place over COM1 of the indicator and communicates with a PC and the necessary software supplied by the

factory. Upgrading the firmware should in most cases not influence the calibration information, truck IO databases, and ticket information or audit data.

After entering the parameter the command should be completed by pressing one followed by the TARE key.

Parameters related to SERIAL COMMUNICATIONS

30   baud rate for COM 1 (6)

Changes the baud rate for COM1. Valid parameters are 0-9. An invalid entry will display error 52.

32   baud rate for COM 2 (6)

Changes the baud rate for COM1. Valid parameters are 0-9. An invalid entry will display error 52.

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

9600 baud is the default baud rate for both ports.

Note: only a single COM port can be used for printing.

31   Parity for COM 1 (0)

Changes the parity setting for COM1. Valid parameters are 0-2. An invalid entry will display error 53.
0: No parity
1: ODD parity
2: Even parity

33   Parity for COM 2 (0)

Changes the parity setting for COM1. Valid parameters are 0-2. An invalid entry will display error 53.
0: No parity
1: ODD parity
2: Even parity

34   Stringmode for COM1 (99)

The M2000 supports several string output modes through either COM1 or COM2. Select the string mode from the table below. Use 99 if you are using the COM port for ticket printing.

35   Stringmode for COM2 (8)

1 DF1000
3 DF2000
5 DF2500 mode1
8 DF1500
9 DF2500 mode 6
10 DF2500 mode 7
12 AD4321, AD4323, AD5000
13 Cardinal 708
14 Cardinal 738
19 Toledo & Fairbanks R2500
16 Weightronix 120
17 Consolodated Controls
18 Analogic 5316

99 **Set to ticket printer mode**

36   Flow Control for COM1 (0)

Select 0 for none and 1 for Hardware

37   Flow Control for COM2 (0)

Select 0 for none and 1 for Hardware

38   String output polled mode for COM1 (5)

39   String output polled mode for COM2 (5)

0 selected output string will be continuously transmitted on COM1
1 selected output string will be transmitted on COM1 when the PRINT/SELECT key is pressed
2 output when the receive data input is at logic low (-9 volts dc). A string will be transmitted after each sample whenever the receiver data line is held low – send on break.
output when the receive data input is at logic high(+9 volts dc). A string will be transmitted after each sample whenever the receiver data line is held high – send on idle

4 output string to COM1 on '?' character received
5 output string to COM1 continuously

47   Serial String Output Routing FOR COM1   (0)

48   Serial String Output Routing FOR COM2   (0)

Parameter 47 and 48 will determine which channel's weight will be routed the COM serial port. This parameter will only be implemented if the calibration values meet the criteria.

- ❑   0   COM1 serial output string weight a function of current active channel
- ❑   1   COM1 serial output string locked on channel 1
- ❑   2   COM1 serial output string locked on channel 2
- ❑   3   COM1 serial output string locked on channel 3
- ❑   4   COM1 serial output string locked on Total mode

40   RS232/RS422 Output Mode

This parameter will configure the serial output drive mode to be RS232 or RS422 for the serial port in question. .

- ❑   0   COM1 set to RS232   COM2 set to RS232
- ❑   1   COM1 set to RS422   COM2 set to RS232
- ❑   2   COM1 set to RS232   COM2 set to RS422
- ❑   3   COM1 set to RS422   COM2 set to RS422

75 Transmit Calibration Information To Serial Port

This parameter will transmit the full calibration structure information of the indicator as an ASCII string to the designated serial port.

The data structure is protected by a CRC checksum embedded inside the data. The purpose of the checksum is to verify validity of the data. The ASCII string can be captured with any serial terminal program. The parameter supplied with this command is as follows

- ❑ 1   output calibration data to COM1
- ❑ 2   output calibration data to COM2

After entering the parameter the command should be completed by pressing key one followed by PRINT/SELECT followed by TARE.

76 Capture Calibration Information From a Serial Port

This parameter wills captures calibration information an ASCII data dump from the designated serial port.

The data structure is protected by a CRC checksum embedded inside the data. The purpose of the checksum is to verify validity of the data. The ASCII string can be captured from any serial terminal program. The parameter supplied with this command is as follows

- ❑ 1   output calibration data to COM1
- ❑ 2   output calibration data to COM2

After entering the parameter the command must be confirmed by pressing 1 followed by TARE.

77   Transmit Ticket Buffer Information to Serial Port

This parameter will transmit the full ticket buffer information of the indicator as an ASCII string to the designated serial port. The ASCII string can be captured with any serial terminal program. The parameter supplied with this command is as follows

1   output ticket buffer data to COM1
2   output ticket buffer data to COM2

78   Capture Ticket Buffer Information From Serial Port

This parameter will capture ticket information as ASII data dump from the designated serial port. The ASCII string can be captured form any serial terminal program. The parameter supplied with this command is as follows

1   output ticket buffer data to COM1
2   output ticket buffer data to COM2

Parameters Related to Scale Filtering

19   Display Update Rate (0)

This parameter will set the LED display update rate. The update rate has nothing to do with the actual AD converter update rate or filtering. The parameter may have a value between 0-9. A value of 0 will introduce no delay in the display update, while a maximum value of 9 will introduce a display update rate of a 3-second delay. The update rate at a value of 0 is very fast and the display may appear jittery in some applications. In this case increase the value of this parameter.

41   Digital Averaging Filter (64)

Changing this parameter changes the mount of averaging performed on the final weight. This function is used to help filter the scale from vibrations and display a stable weight. The default setting should be adequate for most installations however if heavier filtering is required then increase the filter value. Changing the filter does alter the settling time for the final weight response. Values that can be entered are 1-255 followed by the [TARE] key. The higher the number the heavier the filtering. Error 14 is displayed for an invalid entry.

42   Filter Faststep threshold (8)

The filter averaging system has a filter bypass mode called faststep. Faststep dramatically improves the display response time for a step change in weight. When the faststep mode is active the digital averaging filter is bypassed (parameter 41) displaying an instant change in weight. The threshold or the amount of instant weight change that has to occur before the indicator is to go into faststep mode is defined by this parameter.

This parameter normally does not have to be changed. Let us look at an example, we have a 500lb-floor scale. The faststep value is 8. If a 200 pound man jumps on the scale, the scale will go into faststep mode, bypassing the averaging filter and displaying a quick jump to 200lbs. When the final weight is settling filter averaging is returned back to normal weight averaging. If you place a 5 pound weight on the scale the faststep will not kick in and the weight change will be a little slower. How slow the weight changes to the 5lb load is a function of parameter 41.

43 Fastep Sensitivity (8)

This parameter normally does not need to be changed, and may be removed in future releases of the software. This parameter controls how sensitive faststep is to be (see parameter 42). The value entered here indicates how many AD samples the weight has to change in a row before the faststep filter kicks in. For example a 200 pound man jumps on a 500 pound scale. The "Faststep parameter" 42 has been set to 20 and the "Fastep Sensitivity" parameter 43 has been set to 5. Only when a weight change of more than 20lbs and has occurred 5 samples in a row then the filter averaging will go into fastep mode. Increasing this parameter makes the Fastep filter threshold less sensitive.

44   Disable Faststep (0)

This parameter disables the faststep system altogether. The values for parameter 42 and 43 are ignored and the system runs in weight averaging mode only. The response time for the indicator is a function of parameter 41. Some control batching applications may require that faststep be turned off.

Parameters related to PRINTING

84   Add new ticket

This parameter appends a new ticket to the end of the ticket buffer. You can have several different formatted tickets defined, which can be recalled when needed. A new ticket number is displayed briefly and then the display will switch over to tick editor mode. If the user does not want to add a new ticket but start a new ticket from scratch then the ticket buffer can be cleared using parameter 88.

85   Edit existing ticket

You can edit an existing ticket by entering the ticket number followed by the [TARE] key. This will put the display in ticket editing mode with the ticket loaded. You can now modify the ticket.

86   Number of tickets saved in the ticket buffer

This Parameter displays how many tickets that have been saved in the ticker buffer. Several different ticket formats can be defined and recalled depending on the weighing operation.

87   Show available space in Custom ticket buffer

This parameter displays how much room you have left for storing ticket formats. In most cases you never will run out of room as the ticket buffer can hold 4000 characters used for formatting 1 or more tickets.

88   Clear Custom Ticket buffer

This parameter will erase all custom ticket formats in memory. Press 1 followed by the [TARE] key to confirm to clear the print buffer. All ticket formatting will be lost.

89   Print specific ticket

Enter the ticket number you want to print followed by the [TARE] key. The ticket will be printed with the current displayed weight.

100   Delete Truck IN/OUT Database

This command clears the SRAM based truck in out database. The truck in/out database is SRAM battery backed up and would only be destroyed if the battery were removed or low while power is removed from the indicator.

After entering the parameter the command should be completed by pressing key one followed by PRINT/SELECT followed by TARE.

101 Delete Truck IN/OUT Database

This command clears the FLASH memory based truck in/out database. The truck in/out database is stored in non-volatile FLASH memory and this is the only way to clear the database.

After entering the parameter the command should be completed by pressing key one followed by PRINT/SELECT followed by TARE.

There are a total of 6 set points available on the M2000A. Each set point can be allocated to any of the 3 channels. This parameter will be used to enter the weight at which the set point will do its evaluation. This value is channel dependent as far as the lb/kg units are concerned.

Parameters Related to SMART WIRE

59 ENABLE SMART WIRE INTERFACE

This parameter will enable or disable the smart wire system. If the smart wire bridge interface card is not plugged in to the smart wire connector, with the interfaced enabled, the smart wire interface will detect a communications timeout and will produce an error message such as ERR 185 - *smart wire interface not responding*. This condition will be regarded as a critical error and the user will have to clear the error message manually, and attend to the problem.

Because it is possible to adjust set point levels from outside calibration mode, these set point values are stored in battery backed SRAM and is protected by a CRC checksum. If the smart wire system is enabled and SRAM contents get corrupted or the battery is low, the working set point checksum might fail and will produce an error message such as ERR 186 – *SRAM based set points not valid.* This condition will be regarded as a critical error and must be cleared by the user. The SRAM based set points will then be filled in with the calibration set point values.

 If the M2000A stops transmitting commands to the smart wire bridge for some reason, the smart wire bridge will reset the set points to all outputs off and the current loop output will be set to zero.

0   disable smart wire bridge interface
1   enable smart wire bridge interface

60 Select Channel Connected To Current Loop

❑   0   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

61 Current Loop Offset Adjustment

1   preset counter to   0
2   preset counter to 10000
3   preset counter to 20000
4   preset counter to 30000
5   preset counter to 40000
6   preset counter to 50000
7   preset counter to 60000
8   current counter value

To fine tune the output current the counter value can be adjusted by holding the IN or OUT keys down respectively.

Press TARE to enter or CLEAR to cancel.

62 Current Loop Span Adjustment

1   preset counter to   0
2   preset counter to 10000
3   preset counter to 20000
4   preset counter to 30000
5   preset counter to 40000
6   preset counter to 50000
7   preset counter to 60000
8   current counter value

To fine tune the output current the counter value can be adjusted by holding the IN or OUT keys down respectively.

Error Messages

1 Invalid parameter number for calibration mode
2 Graduation size invalid
3 Decimal Position Invalid
4 Flag values must be 1 for 'ON' and 0 for 'OFF'
5 Push to Zero Window must be 0-99
6 Zero tracking must be 1-99 or 100, 200, 300.
7 Only 1 will reset parameters
8 Only 1 will reset span table
9 Span exceeds maximum capacity or span to small
10 IZSM value can be 1 for ON and 0 for OFF
11 Test Weight units must be 0=lb or 1=kg.
12 Motion settle time out of range 1-100
13 Power on units may only be 0=lb, 1=kg.
14 Invalid Time entry HH.MM.SS
15 Invalid Date entry YY.MM.DD
16 Motion value is out of range
17 Press tare to increment span table, any other key invalid
18 Press tare to decrement span table, any other key invalid
19 Span table cannot be decremented passed 1
20 Parameter memory write error, indicator requires service
21 Parameter checksum error, Parameters have been lost.
22 Program check fault, indicator requires service
23 Invalid Serial Port speed setting.
24 Invalid Serial Port Parity parameter
25 Cannot increment Span Table any further
26 Entered offset larger than Capacity
27 Invalid String mode for com port
28 Power on Zero warning 0=Off, 1=On
29 Channel enable is 0=Off and 1=On
30 Only 1 will set the deadload
31 Sound Volume can be between 0-3
32 Keypress feedback can be 0=OFF or 1=ON
33 Invalid Com String mode parameter
34 Invalid Com Port Interface value
35 Scale must be at zero before entering a keyboard tare (see parameter 71)
36 Scale not ready to print
37 Channel 1 cannot be disabled
38 Invalid Print Select Function Number
39 *
40 Scale channel is not enabled
41 Pushbutton Tare is invalid (Over, Motion,or disabled)
42 Keyboard tare available on channel 1 only

43 Tare greater than capacity
44 Invalid Password number range, can only be 0000-9999.
45 Parameter 1 to enable password, 0 to disable
46 Only a value of 0, 1 or 80 is accepted as a parameter
47 *
48   Invalid Filter value
49   Invalid Filter Fast step value
50   Invalid Fast step Sensitivity
51   Invalid Fast step on/off
52 Invalid Tare Function Parameter 0-4
53 Invalid input for AD voltage range

90   Calibration checksum failed
100 SRAM failure
110 RTC RAM failure
112 Clock Reset
115 Clock Failed

120 Battery flat or does not exists
121 Battery must be removed
130 COM1 loop back test failed
131 COM2 loop back test failed
133 COM driver chip failed

140 FLASH memory erase failed
141 FLASH memory write failed

151 Database CRC failed
152 CAL copy CRC failed
153 Ticket Buffer CRC failed
150 Audit trail CRC failed
154 DPAGE stack overflow

185 SMART wire COM link not responding
   SmartWire is enabled and is trying to find devices. This error will occur as a result of
   not having devices connected to the Smart Wire port or a bad wire connection. Hit
   clear to bypass this error message. To disable smart wire use parameter 59 in weight
   mode. Enter 0 to disable smart wire and 1 to enable it again.

186 SMART wire set-point checksum failed
191 Channel 1 AD converter not responding
192 Channel 2 AD converter not responding
193 Channel 3 AD converter not responding

Error message "Cannot Print"
Note: If you try and print and there is motion, or the scale is overweight then a message will scroll across the display "Cannot Print". It is important to understand that if you are in Channel 1 and Channel 3 is overweight, or not connected to a load cell then you still will get the cannot print message even if you are not on Channel 3. Make sure that unused channels are disabled in Calibration using parameter 98.