Application Note #3

Weighing cattle on the M2000

The M2000 is proving to be a popular indicator for animal weighing. This application note discusses tickets related to cattle weighing.

This application note discusses the following:

- **Accumulating drafts**
- **Printing running totals and draft count**
- **Totalizing cattle head count**
- **Calculating Average Cattle head weight**
- **Calculating and printing shrinkage weights**
- **Digital filter settings for animal weighing**

This application note has 2 examples and requires M2000 version 1.36 or greater. Ticket formatting in the examples are based on an Epson Tape printer.

Example 1 (simple draft weighing)

This example demonstrates:

- **Accumulating weights**
- **Implementing a draft counter**
- **Initializing accumulator and draft counter to zero**
- **Printing totals and draft counts**

Example 1: Draft Weighing

A cattle scale weighs multiple heads of cattle on the scale. Cattle are herded onto an enclosed scale and then weighed. This application weighs all the cattle on the scale and then prints the ticket. The indicator also keeps a running total of the drafts. This is a fairly generic ticket that can be used for other applications.

The IN and OUT keys are used for this example.

The **IN** key is used to print the weight draft and the draft count

The **OUT** key is used to finish off the weighing by printing the running total and then clearing the total to zero.

This example uses an EPSON tape printer. Some minor changes may be required for other printer types.

Ticket 200 Print Header and Time/Date, Clear Accumulators

This ticket is used at the start of every weighing. It prints the customer's name, time and date. Most important this ticket clears the total accumulator and draft count to zero.

13 CR
10 LF
P100 emphasized mode on
P104 underline ON
84,111,100,100, 32 "Todd "
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
C220 clear the acc2 register to zero (clear running total)
C257 clear the acc4 register to zero (clear draft count to zero)

Todd Cattle Company LTD.
18:50:06 08/11/2001

Ticket 201 Cattle IN sequence

This ticket is assigned to the IN key.

This ticket prints the draft number and the weight of the cattle that are on the scale. The cattle weight is stored for later use. The draft counter is also incremented.

13 CR
10 LF
P912 Send the string "Weigh Draft" to the printer
C259 Increment ACC4 by 1 (the weight draft counter)
C256 Print integer value stored in ACC4 (the weigh draft count)
32,32 spaces
13 CR
10 LF
P909 send "Scale Weight " string to printer
C30 print gross weight of the cattle on the scale

C250 add the gross weight on the display to total in ACC2 (running total)
13 CR
10 LF

```
Weigh Draft 1
Scale Weight 10005 kg
```

Ticket 201 Finish running total

This ticket is assigned to the OUT key.
It prints the running total and then clears the total and draft count to zero.

13 CR
10 LF
P101 double height ON
P904 Send the string "Total" to the printer
C240 print the running total in the ACC2 register

P108 reset printer font
P114 form feed 9 lines
9 number of lines

Total 52023 kg

The ticket below shows an example of weighing 5 drafts of cattle.

Todd Cattle Company LTD.
18:50:06 08/11/2001

Weigh Draft 1
Scale Weight 10005 kg

Weigh Draft 2
Scale Weight 10219 kg

Weigh Draft 3
Scale Weight 10258 kg

Weigh Draft 4
Scale Weight 10480 kg

Weigh Draft 5
Scale Weight 11061 kg

Total 52023 kg

Example 2 (Advanced cattle program)

This example demonstrates:

- **Sending text prompts to the M2000 display**
- **Keypad parameter entry**
- **Sounding a beep**
- **Keeping track of head count**
- **Calculating average weight (division)**
- **Calculating shrinkage (percent)**

Example 2: shrinkage and average cattle weight

This example is a more advanced cattle program. It supports counting cattle head, calculating average head weight and animal shrinkage in percent.

Cattle are herded on to the scale. When the IN key is pressed the weight on the scale is captured. The scale gate is then opened and the cattle head is counted.

The OUT key is then pressed and the indicator then prompts the user to enter the head count of the cattle on the scale. Knowing the head count the indicator can calculate the average head weight of the cattle on the scale.

For each draft the indicator prints the *draft count, time stamp, scale weight, head count and average head weight.*

When the user has finished weighing cattle he can total out. When totaling out the total weight will be printed along with the shrinkage weight and head count.

The user can change the shrinkage percent. A separate ticket is used for this.

Four different tickets are used for this applications and then are discussed below:.

Ticket 200: print the company name and clear totals
This ticket is called before weighing any drafts. It prints the customers name and clears the running total and clears the draft count to zero. To call this ticket the user must enter 200 print select.

Ticket 201: change the shrinkage value in percent
The operator calls this ticket by typing 201 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. This only needs to be called when you want change the shrinkage. The indicator will remember the shrinkage even when the indicator is turned off. To change the shrinkage to 2% you would enter 2 print/select.

Ticket 202: cattle in function (assigned to IN key)
This ticket captures the weight on the scale. It also updates the running total and the draft count. The time/date, draft weight, running total and draft count is printed. It is assigned to the IN key.

Ticket 203: 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. The message "HEAD" will be displayed on the display. The user enters the head count of the cattle on the scale. The indicator will then print the head count and the average head weight on the scale.

Ticket 204: Total Out function

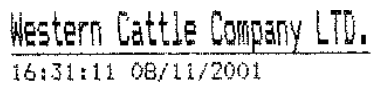
This ticket prints the total accumulated weight and shrinkage and head count. To print the total the user must press 204 followed by the print select key. This prints Total accumulated weight, total head count and the shrinkage weight. This ticket could be assigned to the print/select key to make things easier. The user can total as many times as he likes as this ticket does not clear any of the accumulators.

Ticket 200 Print Header and Clear Running Totals

This ticket must be called only at the beginning of weighing a herd of cattle. It prints the company name and zeros the running totals and draft count.

13 CR
10 LF
P100 emphasized mode on
P101 double height ON
P104 underline ON
87,101,115,116,101,114,110, 32 "Western "
67,97,116,116,108,101, 32 "Cattle"
67,111,109,112,97,110,121, 32 ,76,84,68,46 "Company LTD."
13 CR
10 LF
P108 reset printer fonts

C20 print time
32 space
C21 print date
13 CR
10 LF



C257 clear ACC4
C280 copy ACC4 to ACC5 (this clears the head total to zero)
C26 clear special ticket counter register to zero (used for draft counts)
C220 clear ACC2 (this clears the running total)
13 CR
10 LF

Ticket 201 Set Shrinkage Value

This short ticket is used to enter the shrinkage value in percent. It does not print to the printer. This ticket makes special use of sending characters to the display. The message "shrinc" is displayed (we cannot use the letter 'k' on the display). The keypad entry function is then called and whatever number is entered is stored in ACC3. Because the M2000 uses ACC6 to calculate percent we must copy ACC3 to ACC6.

Notice C301 at the end of the ticket. Whenever you use C300 to send text to the display you must use C301 at the end of the ticket to switch the display back to displaying weight.

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 (ACC4 is used to copy ACC3 to ACC6)
C274 copy ACC4 to ACC6 to set up the shrinkage
C301 reset display to weight (must have this at the end whenever you use C300)

Ticket 202 Cattle IN sequence

This ticket prints the weight draft and time stamp. It also prints the weight of the cattle that are on the scale. The cattle weight is stored for later use by ticket 203 (OUT sequence).

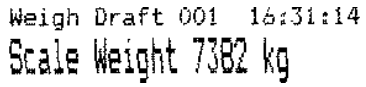
13 CR
10 LF

C27 increment ticket counter register (used for draft counts)

P912 send the string "Weigh Draft" to the printer
C28 print ticket counter (draft count)
32,32 spaces
C20 print time
13 CR
10 LF

C200 copy gross weight to ACC1 (current draft)
C250 add gross weight to the weight in ACC2 (running total is in ACC2)

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



Ticket 203 Cattle OUT sequence

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

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 (ACC4 holds head count for this draft)
C284 ACC5=ACC4+ACC5 (total head count stored in ACC5)

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

```
Head Count 3
Average Weight 2460 kg
```

Ticket 204 Print total weight, shrinkage, head count

This ticket prints off a final report for all the cattle weighing drafts.

P100 emphasized mode on
P101 double height ON

C261 copy running total from ACC2 to ACC4
C270 copy ACC4 to ACC1

P904 send the string "Total"
C240 print the total weight
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
P910 send string "Head Count"
C281 ACC4=ACC5 (get total head count)
C256 print ACC4 as integer (print total head count)

P108 reset printer fonts

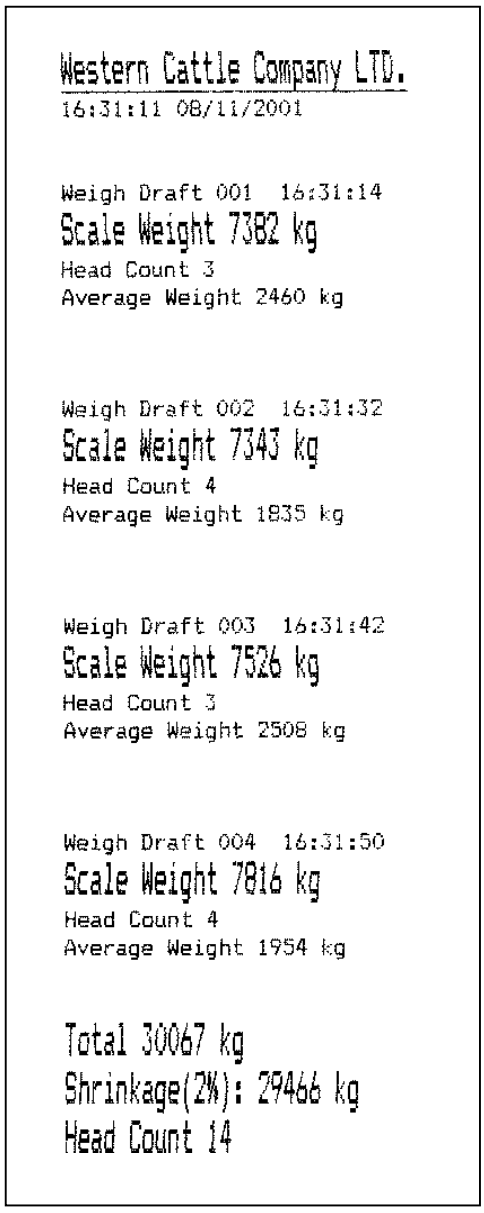
13 CR
10 LF

```
Total 30067 kg
Shrinkage(2%): 29466 kg
Head Count 14
```

Example of the printout

The printout below it a complete weighing consisting of 4 drafts. The company name on the top is printed using ticket 200 and also zeroes the accumulators.

Each draft is recorded using the IN key. The head count is recorded using the OUT key. At the bottom you will notice TOTAL weight, which is printed from ticket 204. The shrinkage weight and head count are also printed.



Digital Filter Settings for Animal Weighing

The M2000 is an extremely fast indicator. Animal weighing with default filter setting will provide unstable weight readings on the display. We will discuss how to set up the M2000 filter system for cattle weighing.

Understanding the filter parameters

The M2000 has two digital filters and they are called the *main* filter or "heavy" filter and the *fastep* filter or the "fast filter". The user can adjust the main filter, but the fastep filter is fixed and cannot be changed. Both these filters are always running in parallel.

The M2000 switches between either the main filter or the fastep filter depending what scale activity the indicator sees on the display. To explain how the indicator switches between the two filters we will use figure 1 below.

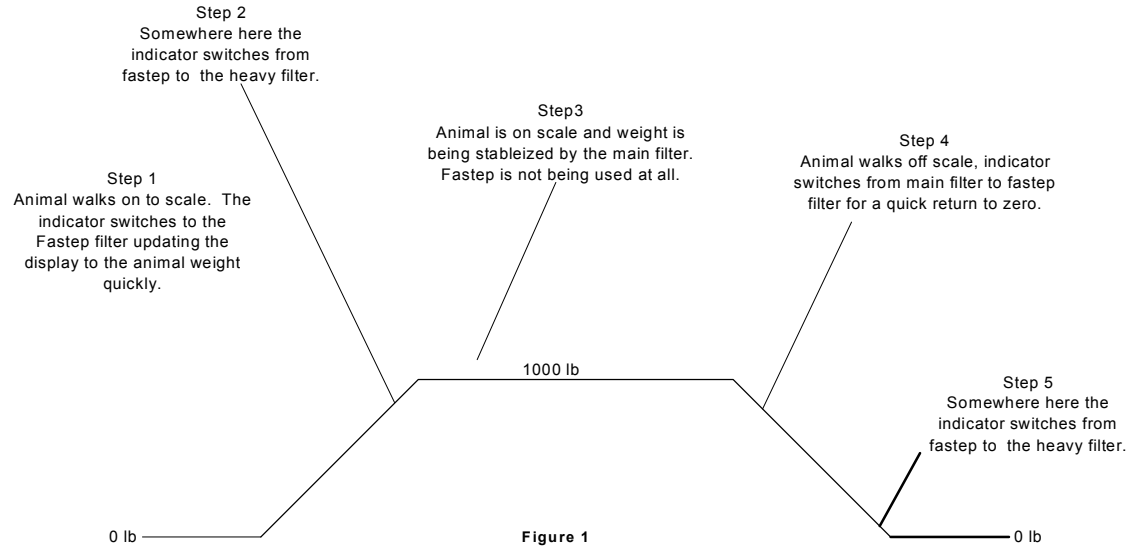


Figure 1

Figure 1 shows a graph of a 1000 lb animal walking onto the scale, and then a certain duration later walking off. When the animal walks onto the scale the indicator detects a step change in weight on the scale. It switches the display from the heavy filter to the fastep filter (step 1) to quickly bring the display to the target weight. When the indicator has detected that the weight on the scale is flattening out (step 2) the indicator will switch the display back to the main filter.

The indicator continues using the main filter (step 3) stabilizing the weight on the display. The animal then walks off the scale. The indicator detects a step change (step 4) and the indicator switches back to the fastep filter bringing the display rapidly to zero.

Without the fastep filter the scale would be very slow in reaching its target weight and returning to zero. The indicator uses weight changes to switch between the main filter or the fastep filter.

Parameters that control the filter setup on the M2000

The M2000 has three parameters used for setting the filter performance. They are 41,42 and 43.

Parameter 41 controls the main filter. It can be set between 1 and 255. The default setting is 64. The larger the number, the heavier the filtering.

Parameter 42 controls the switching between the main filter and the fastep filter. This is the most important parameter to understand. The factory default is 8.

As discussed earlier the indicator uses weight change to switch between the main filter and the fastep filter. Parameter 42 sets how much of a sudden weight change must occur before the indicator switches between the main and fastep filter. The value entered for 42 is by grad size. So if you entered 8 and your scale is counting by 2 lb increments then the scale will switch to fastep on a 16 lb sudden weight change. The main filter is switched back in when the sudden weight change is no longer present.

If the fastep filter is set to low then you will have unstable weight readings, regardless how large a value you enter into parameter 41 (the main filter). Lets assume that fastep kicks in with a 16 lb weight change. If the combined unfiltered animal movement on the scale sends spikes above 16 lbs then the indicator will always be switching over to the fastep step filter creating an unstable weight reading. That is why parameter 42 is an important parameter to set as it can produce a very unstable "jumpy" weight reading if set to low.

Parameter 43 controls the sensitivity of the fastep setting in 42. The value set here is how many samples in a row a weight change must occur before kicking in the fastep filter. The fastep filter checks for weight change at 50 times a second. The factory default is 8 samples.

For example if fastep is set to kick in on a 16lb weight change and 43 is set to 8, then the weight change must occur 8 consecutive samples in a row. This parameter is used to filter out false triggers induced by vibrations. This parameter is only used on more demanding weighing applications.

Setting up the parameters for weighing cattle

How the filter settings are set depends on the type of scale and the type of animals you are weighing.

Medium heavy filtering
A good starting point is to set *parameter 41* to **100**, *parameter 42* to **12** and leave *parameter 43* at the factory default of **8**.

This will give you a responsive scale with quick weighing times for cattle.

With *parameter 42* set to **12** then the fastep trip would be 12 lb for 1 lb grad size, 24 lb for 2 lb grad size and 60lb for 5 lb grad size.

It is recommended to start with the above settings and then increase parameter *41* and *42* to the desired filter settings. If you make *parameter 42* to high it will make the responsiveness of the scale more sluggish and less responsive to weight change.

If you find that after the cattle are completely on the scale, and the weight still is bouncing around then increase *parameter 41*. If you find that the scale is very erratic then 42 needs to be increased as animal movement is triggering fastep.

Heavy filter settings
For more demanding weighing applications with a lot of cattle movement set *parameter 41* to **200**, *parameter 42* to **30** and set *parameter 43* to **11**.

If you are shipping a cattle scale to a customer and are not sure on the filter settings then the above settings can be used for an all around cattle scale. The filter settings are not optimal but should handle a wide variety of cattle weighing needs.

Setting the display update rate

The M2000 allows you to control how often the display updates with a new weight. *Parameter 19* allows you to slow down how fast the display changes. It is important to understand that this has nothing to do with the filter settings discussed above. Slowing down the display update rate simply changes how often a new weight is displayed. The M2000 is still calculating weight at its fastest internal rate.

The reason why you want to slow down the display update weight is when there is a lot of cattle movement on the scale. The weight might be bouncing by 1 or 2 grads . For example 1000,1001,1000,1002,1000,999,1000 is considered stable but the least significant digit might be moving around to fast for farmer Johns eyesight.

Changing the display update rate
Slowing down the display will give the appearance of a more stable display. *Parameter 19* inserts a delay in between each display update in 0.25sec intervals.

A good starting point is a setting of about 2, which is a half second delay. So regardless of what is happening on the scale, the display is only updated every half a second.

Summary of Filter Setting

Optimal filter settings are function of the type of scale and animal movement. It is recommended that scales be setup with live animals. Below are two filter settings you can start with.

Medium Heavy Filtering: Most single and multi animal scales
Parameter 41=100.
Parameter 42=12.
Parameter 43=8
Parameter 19=1

Heavy Filtering: More demanding multi animal scales, universal setting
Parameter 41=200.
Parameter 42=30.
Parameter 43=11
Parameter 19=2.