Memfeed MkII

FEEDER CONTROL BOX

INSTALLATION AND OPERATION MANUAL

OPERATING INSTRUCTIONS

The DAVLEC "MEMFEED" is capable of storing the feed requirements for up to 999 cows and to control the dispensing of feed in the parlour using a wide range of feed dispensers, ranging from vacuum operated feeders through auger feeders to the more complex gravimetric feeders. The unit is also capable of storing up to three messages for each cow and to display these messages to the operator automatically as the cow is being milked and fed.

There are two main modes of operation which are selected by the "feed/program" key switch located at the bottom left hand corner of the control panel.

1.0   PROGRAM MODE - PROGRAMMING FEED AMOUNTS AND NOTES

1.1   When the "feed/program" switch is moved from the feed to the program position, the unit will display the message:

      "Batch Program"
       "(Y)es/(N)o"

There are three acceptable responses to this question. These are, turning the key switch back to the feed position, pressing the 'No' key marked with an "X" or pressing the 'Yes' key marked with a "tick".

1.2   In order to program the feed requirements for individual cows, the operator must first enter the cow number by pressing the correct keys on the numeric key pad in the required order. The operator must then enter the amount of feed that he requires this cow to receive. In some cases it will be quicker to program all the cows that are getting one unit of feed first, followed by all the cows that are getting two units of feed followed by all the cows that are getting three units of feed etc.. In this case, when the unit asks the question "Batch Program (Y)es/(N)o", the operator should answer 'Yes' by pressing the key marked with a "tick".

When this mode is selected, the unit can only be used to program feed amounts and any notes or messages programmed for a particular cow

cannot be changed, or new messages entered. As an example, let us program the following list of cow numbers and feed amounts.

1	4
2	6
14	1
68	1
72	4
90	2
111	10
143	2
226	2
339	10
640	15
820	1

1.3   If we are batch programming, then it is logical to program all the cows requiring one unit of feed first.   To do this we simply select the first cow number to receive one unit of feed. This is cow number 14. To enter the cow number we press the following keys in the correct order as follows.

"1"   "4"

The number 14 will then appear on the display under the words "Cow number". If the operator has made an error in entering the cow number he can clear the display by pressing the "Clear" key.

When the cow number is correct, the operator can enter the feed quantity by pressing the keys in the correct order as follows.

"Feed"   "1"

As soon as he has done this the figure 1 will appear on the display below the word "feed".   Again if the operator has made an error, he can clear the display by pressing the "Clear" key and entering the correct number. When the cow number and feed are correct then the operator can transfer this information into the memory of the control unit by pressing the "Enter" button.   As soon as he has done this the cow number display will be cleared, but the number 1 will still appear on the feed display. The next cow in the herd to receive 1 unit of feed is cow number 68. To program this cow the operator will enter the correct cow number by pressing the keys in the correct sequence as follows.

"6"   "8"

Again the numbers will appear on the cow number display as they are being pressed.   The feed display will still show 1 and to enter this information into the memory of the unit the operator simply presses the "Enter" key. In the same way cow number 820 can be programmed for 1 unit of feed.   In our small list of cow numbers, these are the only three animals to receive 1 unit of feed.   We may now proceed to program all the cows to receive 2 units of feed.   To do this we select the first cow number to receive 2 units of feed which is number 90.   The cow number is entered as before by pressing the keys as follows.

"9"   "0"

As this is being done the cow number will appear on the cow number display.   However, the feed display is still showing 1 unit.   To change this to 2 units we simply enter the new value by pressing the keys as follows.

"Feed"   "2"

When the "feed" key is pressed the number 1 in the feed display will disappear and the flashing cursor will appear. As soon as the 2 key is pressed then the flashing cursor will be replaced by the number 2. As before, to transfer this information to the memory of the unit the operator simply presses the "Enter" key.   In this way it is possible to progress through the herd and this is by far the quickest method of proceeding when a large number of rations have to be programmed.

1.4 The disadvantage of this method is that the operator is not given the opportunity to look at the previous amount of feed programmed for a particular cow. For instance, cow number 640 may have been previously programmed for 2 units of feed, and the operator may wish to query the point that she is now to receive 15 units of feed.   This disadvantage is overcome by using the second method of programming. In this case when the "feed/program" key is turned from the "feed" to the "program" position and the "tick" key is pressed to select programming, when the unit asks the question "Batch Program (Y)es/(N)o", the operator should reply 'No' by pressing the key marked with an "X". In this case, taking cow number 640 as an example the operator enters the cow number by pressing the keys in the following sequence as before.

"6"   "4"   "0"

As soon as the 6 is pressed then the number 6 will appear on the cow number display and a feed amount may appear on the feed display. If it does, then this is the programmed amount for cow number 6. If cow number 6 has never been programmed, then the feed display will be blank. As soon as the "4" key has been pressed, the cow number display will now show 64 and again, if cow number 64 has a programmed feed amount then this will be shown on the feed display. When the "0" key is pressed then 640 will appear on the cow number display and since we have already stated that cow number 640 has been feed the number 2 will appear on the feed display. To re-program the feed amount for this cow the operator proceeds by pressing the correct keys as follows.

"Feed"   "1" "5"   "enter"

In this programming mode, it is also possible to program messages for any cow number. In the previous example of cow number 640, when the number 6 is entered, in addition to any pre-programmed feed amount for cow number 6 being displayed on the feed display, the unit will also show up to three numbers on the bottom line of the display immediately above the word "messages". If no messages have been programmed for cow number 6 then this area will remain blank. Similarly when the number 4 is entered and the cow number display shows 64, and the feed display shows the feed amount programmed, then any messages programmed for cow number 64 will also be displayed. At the end of this manual there is a list of 20 useful messages which can all be programmed into the memory.

Up to three messages can be stored for each cow number. In the present example let us assume that cow number 640 was previously programmed for messages 1 and 16. When cow number 640 is entered then the numbers 1 and 16 will appear on the "messages" display. These messages can be altered or checked by pressing the "note" key. When the "note" key is pressed, then the text of the first message will appear on the display. The operator must now decide whether this is still a valid message or whether it should be erased. If it is still a valid message then the operator should press the "tick" key. If the operator wishes to remove the message then he should press the "X" key. If he chooses to remove the message, then the flashing cursor will appear asking for another message. To enter a new message, the operator

selects a message number and enters this on the keypad. To enter the information into the memory, the "enter" key should be pressed. If no replacement message is required, pressing the "enter" key will result in the text of the next message appearing and again the operator must tick this message if it is still valid or press the "X" key if he wishes it to be erased.

If we assume that the operator has ticked both messages then the equipment has the capability of storing one more message for cow number 640. As soon as the operator has pressed the "tick" key to accept message 16, then the flashing cursor will appear in the third message position. Should the operator wish to add another message, e.g. message 11, then he can do this by pressing the number "1" key twice in succession, followed by the "Enter" key. As soon as he has done this then the unit will display the numbers 1, 16 and 11 on the messages display. If a third message was not required, then pressing the "enter" key will result in the unit displaying the message numbers 1 and 16.

1.5   In this programming mode, the operator can re-program feed amounts or messages. However, this does not imply that the feed amount and messages for a particular cow number must be programmed at the same time. If the operator wishes to change feed amounts only then he should not press the "Note" key when a cow number has been entered. In the same way if he has entered a cow number and only wishes to check or amend the messages then he should not press the "feed" key. However, the unit will still display the feed amount and any existing messages programmed.

As a further example of this method of programming, let us consider cow number 820 which is programmed for 1 unit of feed and has no previous messages programmed. Let us assume that we do not wish to amend the feed amount but wish to add message number 19. In this case the operator should proceed as follows. The first step is to enter the cow number which is done by pressing the keys as follows.

        "Cow"   "8"   "2"   "0"

When he has done this the cow number display will show 820 and the feed display will show 1. Since no messages have previously been programmed for this cow then the message display will be blank. If the operator now presses the "Note" key, again since no messages have previously been programmed for this cow number, no messages will be

displayed. The flashing cursor will however appear in the first message position. To program the cow for message 19 then the operator simply presses the keys as follows.

"1"   "9"   "Enter"

As soon as he has done this the messages display will now show the number 19.   If the operator now wishes to add his second message for example message 9, then he simply presses the "9" key followed by the "enter" key.   When he has done this then the numbers 19 and 9 will appear on the messages display. The unit is now waiting for the next message number.   If no further notes are required for cow 820, then   the operator must press "enter" again to complete the programming for this cow before he can press "cow" to go on to the next number. If in this case, cow 820 only needed to be programmed for note "19", then the operator would have needed to press the "enter" key twice more before the unit would allow him to go on to the next cow.

1.6 In some cases the operator may simply wish to view the information programmed in the memory for a particular cow number. In this case, he should follow the procedure for going into the "Non-batch" mode. To check the programmed information for a particular cow the operator simply presses the "cow" key followed by the cow number in the correct order. The unit will then display any feed quantity or notes.   If the cow number has not been programmed then both the feed and messages display will be blank. Please note that in some cases an animal does not require to be fed in the parlour and therefore the feed value "0" is a valid value. Feed value "0" will always be indicated by a blank display. To end the programming session the operator simply turns the "feed/program" key switch back to the "feed" position.

2.0 SETTING TIME AND DATE

Unfortunately due to circumstances out of our control the time and date function no longer works. This however has no adverse effects on the functionality of the Memfeed unit.

3.0 FEEDING AND RESPONDING TO MESSAGES

3.1 During milking, the operator should ensure that the "feed/program" key switch is in the "feed" position.   As the key switch is turned from the program to the feed position the unit will assume that the operator is ready to start feeding. The portion of the display below the word "stall" will therefore show L1 or R1, meaning that the unit is ready to accept the number of the cow in the first stall on the left or right hand side of the parlour.

If the unit comes up with L1, it may be that the operator wishes to feed the right hand side first in which case he should press the right pointing arrow at the bottom right hand corner of the control unit. When the button is pressed, the area of the display below the word "stall" will change to R1, the L.E.D. above the left arrow will switch off and the L.E.D. above the right arrow will switch on.

To feed cows as they come in to the parlour, the operator needs to tell the unit which cow numbers are in which stalls. Let us assume that we are feeding the left hand side of the parlour first.   The portion of the display below the word "stall" will show L1 and will wait in this condition until the operator has entered a cow number. Let us assume that cow number 68 is in this stall.   To enter the cow number, the operator presses the keys as follows.

<p style="text-align:center;">"6"   "8"</p>

The number 68 will appear on the cow number display and the quantity one will appear in the feed display. If there are any messages programmed for this cow number then the message numbers will be displayed. If the operator has made a mistake in entering the number then he can clear the cow number display by pressing the "clear" key. When the cow number has been correctly entered the operator should inform the unit that this is the correct cow number for this stall by pressing the "enter" key.   When he does this, two things will happen.   Firstly, the stall indicator will show L2 showing that the unit is ready to receive the number of the cow in the second stall, and secondly, the feed quantity for cow 68 i.e. one unit of feed, will be stored in a separate memory for that stall number.   The operator can now enter the identity numbers of the other cows in the stalls on the left hand side of the parlour.   Each time he enters a cow number for a stall, the number of units of feed required for that particular cow number will be recorded against the stall number.

As an example let us assume that we are operating a 16/16 parlour. As soon as the operator has entered the cow number for stall L8 then the display will ask the question "Ready to feed?". If the operator thinks that he may have made a mistake in entering the cow numbers, then he can go through the numbers again to check them by answering 'no' to this question and pressing the key marked "X". In this case the unit will show stall L1, cow number 68 and feed 1 unit. The operator must then decide whether this information is correct. If it is then he should answer 'yes' by pressing the key marked with a "tick". If it is incorrect then he should answer 'no' by pressing the key marked "X". In this case the cow number and feed displays will be blanked waiting for the operator to enter a new cow number. Since the unit is expecting the operator to enter a cow number, there is no need to press the "cow" key first. If the operator makes an error in re-entering the cow number then he can clear the display by pressing the "Clear" key. When the cow number is correct then he can proceed to the next stall by pressing the "enter" button. In this way the operator can move through the eight stalls checking the numbers that he has entered, and correcting them where necessary. When this process is complete, the unit will again ask the question "Ready to feed?". If the operator is confident that the cow numbers are correct then he can begin to feed the cows by pressing the key marked with a "tick".

Immediately above the display and the numeric key pad, there is a row of 12 L.E.D.'s. During the feeding process, these L.E.D.'s indicate what is happening at the feed dispensers. In the case of pulse type feeders, the L.E.D.'s will switch on and off with the solenoid valves on the feeders. In the case of auger type dispensers, the L.E.D.'s will show when the motors are switched on. In the case of gravimetric type feeders, the L.E.D.'s will light when the feeders are dispensing feed into the weighing mechanism, and will switch off when this feed is being dispensed. In this way the l.e.d.'s will give a clear indication of exactly what the feeders are doing.

3.2 During the feeding process the unit will scan through the memory looking for messages which have been pre-programmed for any of the cows being fed. Let us assume that two messages have been programmed for cow 68 in stall L1. When the unit starts feeding, the display will show stall L1, cow number 68, feed 1 and the text of the first message. The operator must now respond to this message, either by pressing the "X" key which informs the unit that he has read the message and wants it to be deleted from the memory, or pressing the "tick" key which informs the unit that the operator has read the message but does not wish it to be

erased from the memory. In this latter case, the message will be repeated the next time the cow comes into the parlour. If the message is removed by pressing the "X" key then it will not be displayed the next time the cow comes into the parlour unless the memory is re-programmed in the mean time.

When the operator has responded to the first message, the second message for cow number 68 in stall L1 will be displayed and the operator must respond as before. When the operator has responded to this second message, the unit will scan through its memory to see if there is a message relating to the cow in stall L2. If there is, then this message will be displayed, awaiting the operators response, and if there is not, the unit will look to see if there is a message for the cow in stall L3. This process continues until all the messages for the cows being fed on the left hand side of the parlour have been displayed and responded to by the operator.

When all the messages have been displayed and responded to, and the unit has completed the feeding process, the stall display will show R1, the L.E.D. above the left arrow will be switched off and the L.E.D. above the right arrow will be switched on. The process can now be repeated to feed the cows on the right hand side of the parlour. Please note that it is not possible to begin feeding cows on the right hand side of the parlour until the feeding process and the display of messages for the left hand side has been completed. In a similar way, it will not be possible to feed the left hand side of the parlour again until feeding of the right hand side and display of any messages is complete.

3.3 When the operator comes to feed the last side of cows, it is very unlikely that there will be exactly enough animals to fill the side. Let us assume that we have three cows and that the three identification numbers have been entered. We now have five stalls remaining and the operator can jump over these stalls by pressing the "stall" key five times. When he has done this the unit will again ask the question "Ready to feed?".

3.4 Cow Totalizer

Pressing the "Cow" key will result in the display showing the total number of cows milked since the counter was last reset. The bottom line of the display shows the message "Reset (Y)es/(N)o". If the operator wishes to leave the counter at its current value then he should press the

"No" key. If the operator wishes to reset the counter then he should press the "Yes" key.

3.5 Feed Totalizer

In the same way, pressing the "Feed" key will indicate the total number of portions of feed dispensed since the counter was last reset. Again the operator has the option to leave the counter at its current value or to reset it to 0 either by pressing the "No" or the "Yes" keys.

3.6 Calibration Mode - Auger Type Feeders Only

Pressing the "Cal." key will result in the bottom line of the display changing to the message "Calibrate (Y)es/(N)o". Please note that this will only work if the "Memfeed" has been set up for "Auger" type feeders. If the operator does not wish to proceed with the calibration, then he should press the "No" key. If he wishes to calibrate, then he should press the "Yes" key.

The bottom line of the display will now change to the message "Seconds/Portion". Auger type feeders vary dramatically in the rate which feed is dispensed. Some will take as little as 1 second to dispense 500 grams while others will require 25 seconds. The operator must be aware of the approximate running time of the auger to dispense the required portion size. Let us say for instance that a portion size of 500 grams is required and that this takes approximately 5 seconds. The operator now presses the 5 key. The display will change to a 5 with the flashing cursor immediately afterwards. If this has been entered correctly, then the operator can then proceed to the next stage by pressing the "Enter" key. If the number has been entered incorrectly then he can start again by pressing the "Clear" key.
 As soon as the number of seconds per portion has been entered correctly, the bottom line of the display will change to the message "Enter grams/unit" and the centre portion of the top line display will show the default value of 500 grams. The default value can be entered by simply pressing the "Enter" key. If another value of grams per unit is required then this can be entered on the keyboard. Again if the amount entered is correct, the operator can proceed by pressing the "Enter" key. If the amount entered is incorrect then he can start again by pressing the "Clear" key.

Please note that the number of seconds per portion must be in the range of 1 to 30 seconds and the grams per portion can not exceed 600 grams. If

the operator attempts to enter a value outside this range, the "Memfeed" will flash up a message indicating that the amount is "Out of Range". It will then wait for a corrected value to be entered. When the number of seconds per portion and the number of grams per portion have been entered, the bottom line of the display will change to the message "Set Pot Central". At the bottom left hand corner of the control box is an adjusting potentiometer which can be used to compensate for changes in feed density, once the system has been calibrated. During calibration, this potentiometer should be set in its central position. This can be done by slackening the hexagonal nut, and turning the potentiometer fully anti-clockwise using a screwdriver. The potentiometer should now be turned precisely 3 full turns in a clockwise direction. The lock nut can now be tightened again. Please note that hand pressure only is required on this lock nut. Pressing the "Enter" key will now result in the bottom line of the display changing to the message "Calibrating......". "Memfeed" will now dispense 5 units of feed to each stall. If the seconds per portion have been set to, say, 5 seconds then the auger motors will be run for a period of 25 seconds (providing the adjusting potentiometer has been set correctly). In certain circumstances, particularly on larger parlours, the installing engineer may have selected the second auger mode of operation, which means that the feed dispensers will be operated in groups of 4. As soon as all the feeders have been operated, the bottom line of the display will change to the message "Enter weight" and the feed portion of the display will show the portion size selected x 5. The operator must now weigh the contents of each manger in turn and enter the feed amount using the keyboard. If the portion size has been set to the maximum possible of 600 grams, the feed display will show 3000. If the actual amount of feed is say 2450 grams then this amount should be entered on the keyboard. When the amount has been entered correctly, the operator can proceed to the next stall by pressing the "Yes" key. If the amount is incorrect then the operator can start again by pressing the "No" key. The weight for each manger is entered in turn for the first side of the parlour.

Please note that the accuracy of the calibration depends on the accuracy of the original estimate of the running time per unit of feed required. If for instance, we have selected 500 grams per unit the Memfeed will expect a weight of approximately 2500 grams. If the actual weights show a variation of more than say 20% i.e. are either below 2000 grams or above 3000 grams, then the calibration process will not be as accurate as possible, and the operator should recalculate the number of seconds per portion and restart the calibration process. Let us assume that we

originally set the "Memfeed" for 5 seconds per portion and 500 grams per portion. If the estimate of the running time per unit has been accurate, then we would expect to be getting 2500 grams in each manger. If we are actually getting weights of, say, 5000 grams then the auger is obviously running for twice as long as is required and the calibration process should be started again using, say, 2 seconds per unit. If on the other hand the weights are of the order of 1250 grams, then the augers are obviously running for half as long as they need to and the calibration process should be repeated using 10 seconds per unit. The calibration process can be terminated at any time by switching off the power to the Memfeed, waiting 10 seconds, and switching the power on again. The operator can then go into the calibrate mode again simply by pressing the "Cal." key. If the amount of feed in the manger is within 20% of the expected amount, then the actual amounts can be entered for each stall in turn. The operator can then go on to repeat the process for the second side of the parlour. As soon as the calibration process has been completed for the second side, the Memfeed will revert to its normal mode of operation. This procedure should be carried out at least once a month.

3.7   Changes of Feed Density

The semi-automatic calibration process, effectively allows "Memfeed" to take into account variations between the feed dispensers. Once the calibration process has been completed the feeders should remain accurate unless there is a change in the density of the concentrates being dispensed. When a new load of concentrates is received, it may not be necessary to go through the full calibration process. Minor variations can be corrected using the density control potentiometer. To perform the calibration, the operator should feed say 5 units of feed to all the stalls on one side of the parlour. The contents of several mangers should now be weighed.   If there is a considerable variation from 1 manger to the next, then the whole calibration procedure should be followed as outlined above. If, however the weights in the mangers are very similar but are either all high or all low, minor variations can be corrected using the potentiometer. Turning the potentiometer in a clockwise direction will increase the amount of feed dispensed, and conversely, turning in an anti-clockwise direction will reduce the amount of feed dispensed. Please note that the lock nut should be slackened by hand prior to any adjustment, and once the adjustment is complete, the lock nut should be tightened up again, by hand.

4.0 MEMORY RESET

From time to time, it may be useful to reset the unit memory. This can be done by switching off the power to the unit and setting the "parlour size" switch to "0".   When power is restored, the display will show "Clearing memory Press any key...".   Pressing any key will reset the memory and the message "Clearing memory Please wait....." will appear briefly. As soon as this process is complete the unit will display the message "Set parlour size Press any key...". The operator must now set the "parlour size" switch to its original setting and press any key to return the unit to its normal mode of operation.

5.0   POWER SUPPLY CONSIDERATIONS

"Memfeed" has been designed to be as immune as possible to the affects of surges on the mains supply.   However,   during severe electrical storms, transients may cause the units to "Lock up". The display will appear to freeze and pressing the keys will have no effect.   The unit can be reset simply by switching off the power for approximately 10 seconds and switching it back on again.

Please note that "Memfeed" has a small rechargeable battery which is used to retain vital information during power cuts. To ensure that this battery is kept charged, the "Memfeed" should always be left switched on. This also generates gentle heat within the control box which helps to ensure that the electronics is kept dry.

6.0   EMERGENCY STANDBY

In the event of a fault in the "Memfeed" control box, a manual standby system is provided.   To use the standby, the operator should first switch off the power, remove the lid of the unit and disconnect it from the base.
  Two connections require removal, These are a 3-pin plug which is orange in colour, and a black connector which plugs into the relay card at the back of the unit. To remove this connector, the ejector clips at each end of the connector should be moved outwards.   The connector will then "pop" out. The manual standby has a grey ribbon cable fitted with a similar plug.   Please note that this connector is polarised and will only fit one way. One side of the connector has a small bump which locates in a slot on the mating connector on the relay panel.   The feeders can now be operated by selecting the side of the parlour using the toggle switch, selecting the stall using the 12 position rotary switch and pressing the feed button.

To refit the control box lid, the ribbon cable to the manual standby must first be removed by moving the ejector clips on each end in and outward direction.   The ribbon cable from the lid can now be plugged into the connector. This process should obviously be performed with the power to the unit switched off.   The orange plug can now be reconnected to the lid.   Please note that this plug is also polarised. Careful examination of the plug will show that one side is flat and the other side is made up of 3 curves. Examination of the mating connector in the lid will show that it has a similar shape.   Please note that forcing this plug into the socket the wrong way around will cause severe damage to the "Memfeed".

APPENDIX A. MESSAGE TEXT

Message No.	Message Text
1	DUMP MILK
2	DO NOT MILK
3	DIVERT FOR A.I.
4	DIVERT FOR VET
5	SLOW MILKER
6	NERVOUS COW
7	INSPECT UDDER
8	DRY OFF
9	* NOTE A *
10	* NOTE B *
11	* NOTE C *
12	* NOTE D *
13	CHECK R/LEFT QTR
14	CHECK F/LEFT QTR
15	CHECK R/RIGHT QR
16	CHECK F/RIGHT QR
17	TREAT R/LEFT QTR
18	TREAT F/LEFT QTR
19	TREAT R/RIGHT QR
20	TREAT F/RIGHT QR

Please note that these messages are pre-programmed into the PROM (Programmable Read Only Memory) in the MEMFEED. It is obviously very difficult to select messages that will suit every individual requirement. Messages 9, 10, 11 and 12 are therefore intended to fulfil any special requirements and can be allocated special meanings by agreement between the owner/manager and the operator.

7.0 PRODUCT SPECIFICATION

7.1 "MEMFEED" is a simple yet versatile controller which allows the operator to pre-program rations for up to 999 cows, and to control the dispensing of feed simply by keying in the correct cow number for each stall. Up to three messages can also be programmed for each cow. The controller automatically switches to select right or left (manual over-ride is available), and is therefore suitable for herring-bone parlours up to twelve a side.

The equipment comprises of two main working parts:-

a) The electronics card which is located in the lid of the unit.
b) The output relay card which is located at the rear of the unit.

Interconnection between these assemblies is via a ribbon cable which means that the lid is easily detachable from the base, for instance, during installation. All external connections are made to the output relay card.

7.2 There is a variety of feed dispensers available, some operated by vacuum and others having a small "Auger" powered by an electric motor. Some feed dispensers require 12volts D.C. and others require 24volts D.C.   "MEMFEED" is designed to cope with as many of these variations as possible. The basic unit is fitted with an output relay card suitable for 12 volt D.C. operation. However, a 24 volt D.C. card is available upon request, at no extra charge. The electronics card will function at either voltage and is therefore completely interchangeable. The electronics card has a "Parlour size" switch which must be set to he correct value. For a 16/16 parlour, the switch should be set to "8" i.e. the switch setting represents the number of feeders on each side of the parlour. Three additional controls are available which enhance the overall versatility of the unit.

7.3 The first of these is a switch which allows the installing engineer to select either "Pulse", "Auger1", "Auger2" or "Feedback" type feed dispensers. In "Pulse" mode, the controller will send pulses of voltage to the dispenser to switch a solenoid on and off. Each time the solenoid is switched on and off again, the dispenser will dispense one unit of feed.   In "Auger1" mode, the controller will send voltage to   the dispenser for a time interval proportional to the number of units of feed, all the feeders on each side of the parlour being operated at the same time. In "Auger2" mode, the feeders are operated in groups of four. This

option is useful on larger plants to reduce the size of the power unit required. In "Feedback" mode, the controller will send voltage to the dispenser until it receives a signal via a special terminal card, which tells it that the correct amount of food is in the weighing tray. As soon as this signal is received, the driving voltage is switched off and remains off until the feedback signal indicates that the tray is empty again. If further units of feed need to be dispensed, then the driving voltage is switched on again and the process repeats until the correct number of units of feed have been dispensed.

7.4   The second control is a "X1-X2-X4" switch which in effect gives a coarse calibration. Most "Pulse" type feed dispensers are set to dispense 1 lb. or 0.5 kg of feed. Some dispensers however will only deliver a quarter or a half of this amount at each operation and some method is required of increasing the number of times the dispenser is operated, in order to dispense reasonable amounts of feed. When the "X1-X2-X4" switch is in the "X1" position, and the cow in stall L1 is programmed for five units of feed, the "Memfeed" will send five pulses to the feed dispenser. If the "X1-X2-X4" switch is in the "X2" position, then the "Memfeed" would send ten pulses to the feed dispenser. In exactly the same way selecting "X4" will give twenty pulses. Where "Auger" type feed dispensers are being controlled, the "X1-X2-X4" switch has no effect.

7.5   The third control is a "Speed" potentiometer which allows the installing engineer to vary the feeding rate. Some "Pulse" type dispensers are much slower in operation than others and the speed control allows the "Memfeed" to be set up to cope with any such variations. In the case of "Auger" type dispensers, the amount of feed dispensed is directly proportional to the running time and the "Speed" control is therefore necessary for fine adjustment to compensate for variation in feed density. In either "auger" mode, "Memfeed" has a semi-automatic calibration facility. Please refer to the section entitled "Operating instructions" for further details.

7.6 Where a "MEMFEED" is required to replace an existing controller, a new power unit may not be required. As outlined above, the electronics card will function at D.C. voltages in the range of 12 to 24 volts. Please note that if the power unit gives an unsmoothed full waved rectified output, the peak voltage should not exceed 24 volts, i.e. the R.M.S. voltage should not exceed 17 volts.
In the case of pulse type feeders, these are vacuum or compressed air operated and controlled by a solenoid valve. These valves will be either

12 or 24 volts D.C. Solenoid valves nominally rated at 12 volts are usually operated from an unsmoothed 15-17 volt R.M.S. power supply. The Memfeed and the solenoids can usually be operated from the same power supply providing suppresors have been fitted in accordance with the schematic diagrams at the end of this manual. Memfeed will operate the solenoids so that all even stalls are operated together, and all odd stalls are operated together. Thus on an 8-a-side parlour, with all feeders dispensing feed, the maximum number of solenoids switched on at any time is four. If each of these is rated at 0.75 amps, the maximum load is 3 amps. Allowing 1 amp for the Memfeed itself, the power unit must therefore be rated at 4 amps. The output voltage must be suitable for the solenoid valves, and in turn, the voltage of the Memfeed output relay panel must be selected to suit the power unit. The power supply is connected to the + and - terminals on the output relay card, and the link to the left of the card and immediately above the fuse holder is not removed. For further information, see section 8 and the schematic diagrams at the end of this manual.

In the case of auger type feeders, it is possible to operate the system from a single supply connected as above. However, the recommended method is to have a separate 16 volt R.M.S. 2 amp. power unit to supply the Memfeed, and a separate power unit to supply the auger motors. In this case, the relays on the relay card will be operated from the 2 amp supply, and a 12 volt relay card is therefore suitable, even if the auger motors are 24 volts. The 2 amp power unit is connected to the terminals marked + and - on the relay card. The link above the fuse holder is removed, and the positive terminal of the auger motor power supply is connected to one of the terminals marked "Feeder Power Supply", preferably to the M5 stud at the top left hand corner of the card.

When calculating the power supply capacity, please remember that all feeders on each side of the parlour will operate together. If each motor is rated at 3 amps, on an 8-a-side parlour, the power unit needs to be rated at 24 amps in "Auger1" mode. In "Auger2" mode, only 4 motors will operate at once and the capacity then needs to be 12 amps. To ensure accuracy of feeding, the auger power supply should have a regulated output. For 12 volt motors, a Davlec PU2 can be used. This has a 12 volt 25 amp capability. It also has an unregulated output which can be used in place of the separate 2 amp supply. For further information, see section 8 and the schematic diagrams at the end of this manual.

8.0 INSTALLATION AND CALIBRATION

8.1 The "MEMFEED" is normally installed on the bridge arm at the cow entry end of the parlour. In certain circumstances, the customer may have special requirements regarding the siting of the unit.

"MEMFEED" is housed in a strong, waterproof enclosure. The waterproofing of this enclosure is however, only as good as the arrangements that are made to connect conduit to it. Two 20mm conduit adapters are supplied to accommodate the conduit from the feeders on each side of the parlour. It is strongly recommended that these adapters should be fitted at the back of the box as close as possible to the bottom. There is adequate space on both sides of the output relay card for this to be accomplished. In most cases the cables from the power unit can also be brought in via one of these 20mm conduits. In some cases it may be necessary to bring a two core cable from the power supply, and a compression gland is supplied for this purpose. Please note that if the compression gland is being used, a round sheathed two core cable should be used and not two individual wires. It is impossible for a compression gland to provide a waterproof seal around two individual wires. In the very rare and extreme cases where it is necessary to drill the top of the box, then all the conduit joints must be adequately sealed together with any inspection elbows or tee's above the control box. A little care during this part of the installation process will pay dividends in terms of the long term reliability of the control box.

8.2 During the installation process, the lid of the control box may be detached from the output relay panel and taken to a safe place. The D.C. power supply should be connected to the terminals marked "+" and "-" at the bottom left hand corner of the output relay card, taking care to ensure that the correct polarity is observed. The size of the power cable will depend entirely on the types of feed dispensers. For "Pulse" type dispensers, where the solenoids are normally taking less than 1 amp each, then 2.5 mm square cable is perfectly adequate. In the case of "Auger" type dispensers, where the individual running current may be as high as 5 amps, a considerably larger cable may be required. It is advisable to follow the manufacturers recommendations on these cable sizes.

8.3 The common earth connections from each side of the parlour are connected to the terminals marked "E" again at the left hand corner of the output relay panel. In general, the earth wire should be of the same size as the power supply cable, i.e. for "Pulse" type dispensers 2.5mm square cable is normally adequate, with a larger conductor being required for "Auger" type feed dispensers. It should be noted that the

larger the number of dispensers, the more current is required in the common earth connection and therefore the greater the cable diameter required. On auger installations where there are more than six feeders on each side, it would be advisable to connect the common negatives of all the motors on each side, directly to the negative terminal of the power unit. This will reduce any voltage drops through the connections on the "Memfeed" relay card. It is advisable to connect one wire from the first feeder on each side of the parlour and another from the last feeder. The earth connections can then be daisy-chained to the remaining feeders.

8.4 The individual feeders may then be connected to their respective output terminals which are labelled clearly on the output relay card. The "MEMFEED" follows the conventional numbering system where stall "Left 1" is the stall furthest away from the operator on the left hand side of the parlour, as viewed from the cow entry end of the parlour. In the case of "Pulse" type dispensers where the solenoid current is less than 1 amp, then 1 mm square cable is perfectly adequate. In the case of "Auger" type feed dispensers then the conductor needs to be larger. Again the   manufacturers specification should be followed.

8.5 The output relay card is fitted with a 3 amp fuse which protects the control box only. The installing engineer should ensure that the power unit has its own adequate means of protection. The manufacturers of most types of "Auger" type dispensers recommend that each dispenser is fused individually and in-line fuse holders should be used for this purpose.   "Auger" motors are also notoriously noisy especially when they are more than a few years old and your "MEMFEED" is supplied with suppressers to control this interference. These suppressers should be fitted across the motor terminal or as close as practically possible. Fitting the suppressers inside the "MEMFEED" control box will not give adequate suppression of interference.   In any case, suppressers are already fitted on the output relay card to protect the relay contacts. The suppression devices supplied are diodes and should be connected so that the white band around one end is to the positive terminal of the motor.

8.6 For auger type feeders, it is recommended that a seperate power supply is used for the Memfeed itself - see section 7.6. In this case, the negative terminals of the motors should be connected to the motor power unit as outlined above. The positive motor terminals should also be to connected to the relay card with fuses and suppressers as outlined above. In this case however, the connection from the positive terminal of the motor power supply should be connected to one of the terminals marked "Feeder Power Supply" on the relay card. The link between the two

terminals must first be removed. On no account should the motor power unit positive be connected to the terminal immediately above the fuse holder since this connects to the fuse itself. The second power unit can now be connected to the terminals marked "+" and "-". No connection should be made to the terminals marked "E". The voltage requirements of this second power unit will depend on whether a 12 or a 24volt relay card is being used. The output must be D.C. and must not exceed 18 volts r.m.s. or a peak value of 24 volts as detailed in section 3.6.

Where a Davlec PU2, 12 volt regulated power supply is in use on auger type feeders, it is recommended that the unregulated output is used to power the control box itself. The link on the relay card is removed, and the regulated output connected to one of the terminals marked "Feeder Power Supply". The unregulated supply and the negative output are connected to the "+" and "-" terminals respectively. Schematic diagrams of all types of installation are given in the back of this manual.

8.7   Before any attempt is made to fit the "MEMFEED" lid, or to switch on the power supply, the installing engineer should ensure that the polarity of the supply is correct and that the unit is being supplied from a D.C. source.   In situations where existing control boxes are being replaced, and the existing power supply retained,   then the installing engineer should ensure that a rectifier is fitted to the power supply where necessary.   Some types of feed dispensers may have the rectifier built into the individual control box and in these cases the existing power unit may have an A.C. output.   A suitable rectifier will be supplied free of charge upon request. Please note that the rectifier must be fitted to a large metal surface to give the necessary heat dissipation. The engineer should also ensure that the base of the unit has not been twisted in the installation process. This can be checked quite simply by offering up the lid and making sure it can be fitted without being pulled out of shape. If the base is twisted, the lid will be deformed when fitted, and the liquid crystal display may be damaged.

8.8   The installing engineer must also make sure that the unit he is fitting is suitable for the supply voltage from the power supply. The "MEMFEED" lid will operate at any voltage between 12 and 24 volts and it is therefore only necessary to ensure that the correct voltage output relay panel is being used. The part number for a 12 volt relay panel is 2820990A and the part number for a 24 volt output relay panel is 2820990B.

8.9   The "Memfeed" lid may now be reconnected to the output relay panel. Please note that the re-chargeable battery must be switched on before power is applied to the unit. The installing engineer should now set the switches on the "Memfeed" lid to select "Pulse" or "Auger" type dispensers and "X1", "X2" or "X4" mode of operation.   For "Pulse" type feeders, in most cases the factory setting of the output "Speed" will be suitable.   In some cases however, where the feeder operates very slowly, then the "Speed" control potentiometer should be turned in a clockwise direction to increase the duration of the output pulse.   In all cases the calibration of the feed dispenser should be checked by using the controller to dispense say five units of feed and weighing the amount of food dispensed.   If the unit is set in "X1" mode and the quantity of food dispensed is insufficient and the feed dispenser cannot be calibrated to give the correct amount, then the "X1-X2-X4" switch can be moved to the "X2" position so that two pulses are given for each unit of feed programmed.   In this case obviously the feed dispenser must   be calibrated to give half the desired amount per unit programmed. Please note that "Memfeed" only reads the bit switches and parlour size switch when power is switched on.   All adjustments to these three controls should therefore be made with the power switched off.

8.10 In the case of "Auger" type feed dispensers, the "Speed" control potentiometer will   vary   all   the   outputs   simultaneously   and   can therefore be used as an overall density calibration. In order to ensure that variations in dispensing rates are catered for, "Memfeed" has a semi-automatic calibration system.   The operation of this facility is fully described the section labelled "Operating Instructions". Please note that a "Memfeed" which is powered up for the first time, can not be used until it has been calibrated.   The calibration values are stored by the micro-processor and will be retained during an interruption of the supply voltage, by the rechargeable battery fitted to the circuit board in the lid - provided of course that the battery is in a charged condition.

8.11 During the calibration process, some cow numbers will have been programmed in order to operate the feeders. In order to leave the customer with a "clean slate", it is advisable to reset the system memory. This can be done as detailed in section 4.

9.0 ROUTINE MAINTENANCE AND SERVICE

9.1   The "MEMFEED" is housed in a strong, waterproof enclosure. It must be noted however, that this enclosure is not suitable for washing with a high pressure hose.   Any cleaning required should be done using luke warm soapy water and a soft cloth. Direct blows to the front of the unit should be avoided and sharp objects should not be allowed to come into contact with the waterproof membrane.

9.2   "MEMFEED" is fitted with devices which are designed to minimise the effect of electrical interference. No devices are available which will protect against violent transients such as are caused by thunder storms.   During a thunder storm, it is recommended that the system power unit is disconnected from the mains supply.   Transients may cause permanent damage, but may only cause the microprocessor to get "lost" in its own program. It can be reset and told to start again simply by turning the power off, waiting a few seconds and turning the power back on again. Transients may change some programmed values and it is advisable to check the memory after a storm.   If there is any doubt, reset the memory as detailed at the end of the operating instructions and re-program all cow data.

A "MEMFEED" treated with care and respect will give years of trouble free service.