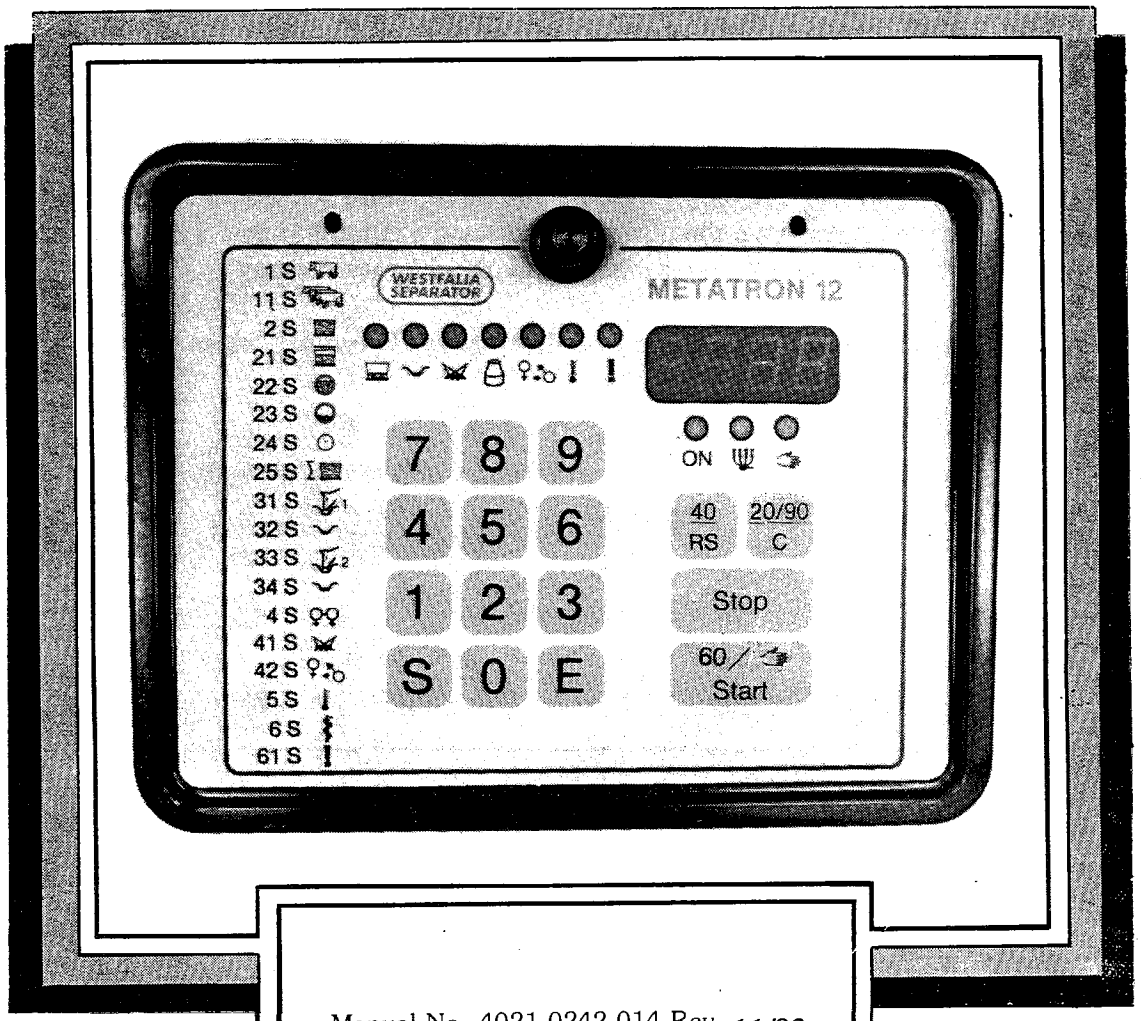
WESTFALIA SYSTEMAT

METATRON MILK METERING UNIT

Installation and Operating Instructions



Manual No. 4021-0242-014 Rev 11/93

CAUTION!

1. FOLLOW ALL LOCAL ELECTRICAL AND SAFETY CODES AS WELL AS THE NATIONAL ELECTRIC CODE.

   a. All electrical components must be proprerly grounded. All grounds must be connected to the central ground.

   b. Always disconnect power sources before working on the control box. If the power disconnect point is out of sight, lock it in the open position and tag to prevent unexpected application of power.

2. Electrical components are designed to operate under dry conditions. Use of water may damage electrical components by moisture entering the electrical compartment. Under these conditions, operation should be discontinued or injury may occur.

3. Only a trained, qualified dairy equipment service technician may service the Westfalia METATRON or power supply.

4. Determine what CIP cleaners are being used on the farm. We recommend only Westfalia cleaners. On the outside use only a mild detergent and rinse with clear water. Most iodine udder washes may deteriorate the plastic; use instead a chlorhexidene wash or plain water only. Do not hose off the outside of the meter with udder wash spray.

5. Do not use any aerosol in the parlor, e.g. with fly spray. This deteriorates plastic and makes it brittle.

All Westfalia equipment is designed to assist dairy farm mamangers in doing a better job with their herd. Because of variations in farm management, Westfalia CANNOT BE RESPONSIBLE for results obtained on individual farms. Westfalia CANNOT BE RESPONSIBLE for loss due to fire, lightning, flood, or other acts of God.

Note: Your METATRON has been assembled, tested and carefully packed at the factory. However, we advise you to check for missing or damaged equipment in your shipment. File a claim promptly when necessary with the freight company.

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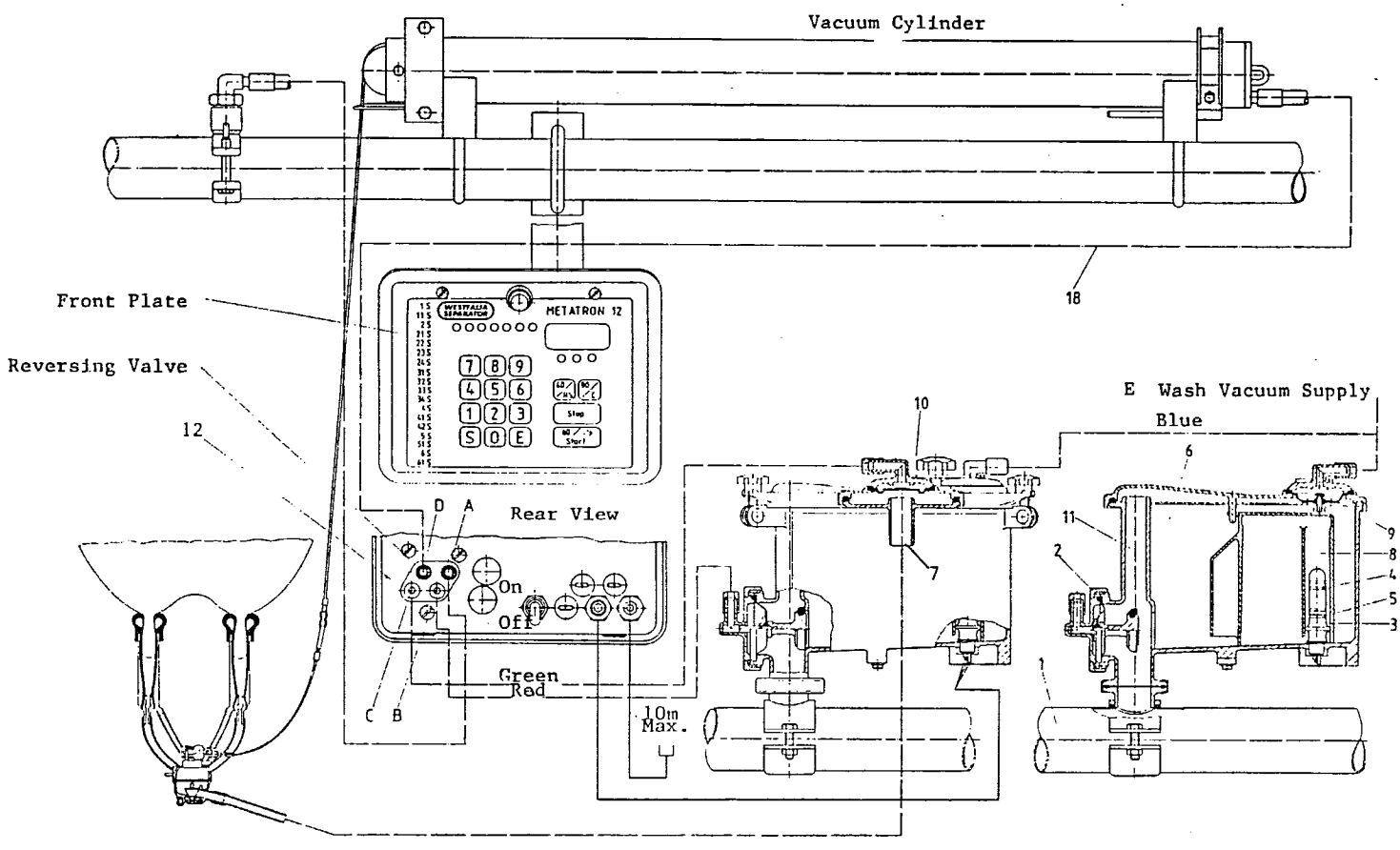
LAYOUT PLAN



A	Vacuum Supply -- Rubber Hose
B	Milk Discharge Valve -- Red
C	Vacuum Shut-off -- Green
D	Vacuum Cylinder -- Rubber Hose
E	Wash Vacuum Supply -- Blue

1	Milk Line
2	Milk Discharge Valve
3	Measuring Electrode
4	Upper Electrode
5	Lower Electrode
6	Meter Chamber
7	Milk Inlet
8	Measuring Chamber
9	Wash Lift for Washing
10	Vacuum Shut-off
11	Milking Vacuum Bypass Supply
12	Valve Block

1. DESCRIPTION

(The numerals in the text refer to the layout plan on page 1 and to the adjacent illustrations.)

The METATRON is a milk metering device for the milking parlor or flat barn. It consists of a milk meter and electronic control unit. The electronic control unit computes the amount of milk extracted and shows the result on a digital display. All instructions necessary for milking are entered by means of keys on the control unit. The following measurements are taken automatically and can be called up as required:

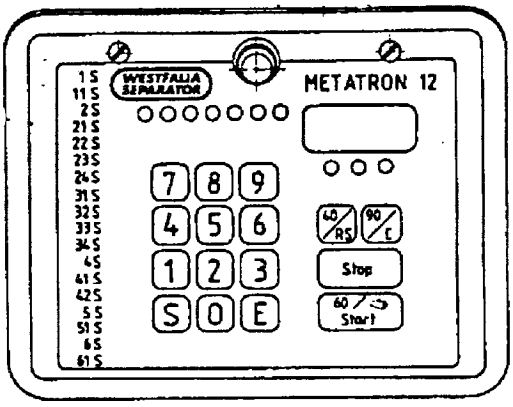
* milk yield (kg or lbs)
* maximum milk yield per minute (kg or lbs/min)
* average milk yield per minute (kg or lbs/min)
* duration of milking time per cow (minutes)
* total yield per milking time for a milking place (kg or lbs/min)

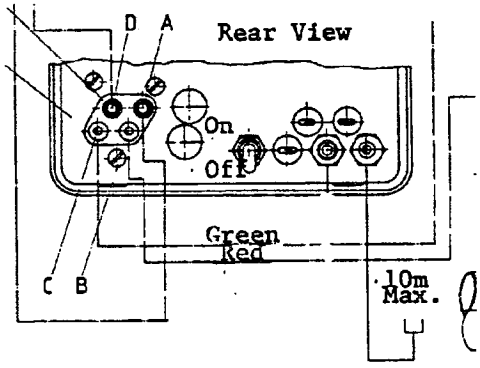
Operation of the automatic cluster remover is also controlled by the control unit. Each METATRON unit works independently. If required, the METATRON units in a parlor installation can be connected to a main computer (PC). Once a cow has been identified, data specific to the cow can then be called up on the control unit before the start of milking. The data is fed back after milking to the Dairy Plan in the PC. Cow identification (manually or automatically) is necessary before automatic transfer of data between the METATRON units and PC can take place.

1.1 METATRON ELECTRONIC CONTROL UNIT

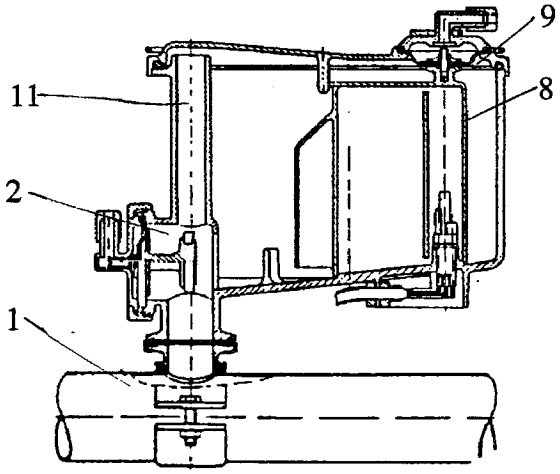
The control unit incorporates the electronics for control of milking, for computing, for pulsation control, for in-parlor feeding, and displaying milking data. It also contains the valve block 12 for control of the discharge valve 2 and shut-off valve 10. The control unit is continuously powered (24-28VDC), even between milkings. Vacuum is applied to the valve block during milking and washing by the right hand connector A. The connections for all control tubes are as follows:

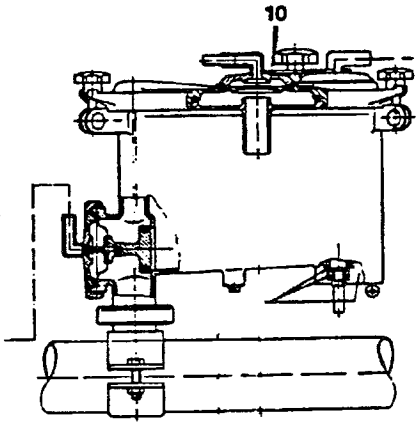
Connection A (7mm rubber tube) for vacuum supply to control unit.
Connection B (red control tube) for discharge valve 2 of milk meter.
Connection C (green control tube) for shut-off valve 10 of milk meter.
Connection D (7mm rubber tube) to vacuum cylinder.





A - Vacuum Supply
B - Milk Discharge
C - Vacuum Shut-off
D - Retraction Cylinder



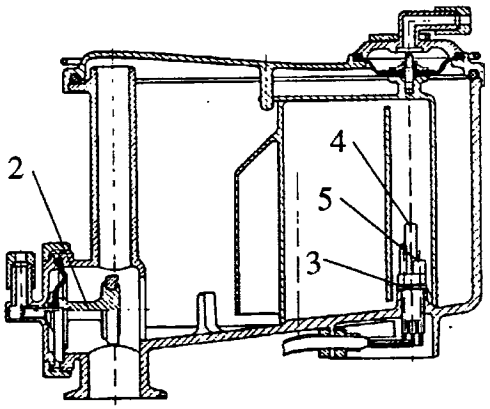


The operating and control functions for milking and cleaning and for calling up milking data are integrated into the control unit. The front panel of the control unit is covered with a water-tight decal on which the operating functions are printed. The large red signal lamp on the front panel signals by flashing the decline in the flow of milk towards the end of milking. It indicates the end of milking by lighting steadily. The milking yield is shown on the digital display. Other data, e.g. milk flow, duration of milking time, etc., can be called up as required after milking by pressing the appropriate key. Non-operative keys of functions on the front panel are intended for further expansion.

1.2 METATRON MILK METER

The milk/air mixture, which flows from the cluster via valve 10, is separated in the milk meter. The milk is collected and periodically released into milk line 1 via valve 2. The air is drawn off continuously through channel 11. Shielding of the measuring electrode by metering chamber 8 helps to buffer the milk level. The milk enters the metering chamber through the openings in the bottom. Venting is effected by means of the lateral slit in the top of the chamber. The metering chamber 8 is suspended from diaphragm 9. During milking the chamber is pressed firmly to the bottom of the milk meter by the diaphragm which is under atmospheric pressure. For cleaning, the space above the diaphragm is evacuated so that metering chamber 8 is raised. See section 4.9 for auto wash valve instructions.

1.3 DESIGN AND METERING FEATURES



The level of milk in the metering chamber is monitored by means of a measuring electrode 3. The electrode has a lower measuring point 5 (lower pin electrode) and an upper measuring point 4 (upper pin electrode). These two measuring points define a precisely determined metering volume. As soon as the rising milk reaches the lower electrode 5, measurement of the filling time begins. This finishes when the upper electrode is reached; the discharge valve 2 opens and the emptying time is measured. The milk flows into the milk line 1. When the lower electrode 5 is free again, discharge valve 2 closes, measurement of the emptying time is ended and a new metering cycle begins. The current milk flow rate is computed in the control unit from the filling time for the measured volume. This milk flow rate is also assumed during the emptying time until the start of the next metering cycle. A partial yield is obtained from the milk flow and the length of the metering cycle. The total yield accumulates continuously from the partial yields of the metering cycles and is shown on the control unit by the digital display. The amount of milk required to fill the milk meter to the lower electrode 5 at the start of metering is added to the total yield as a constant amount.

1.4 CLEANING PROGRAM

The milk meter is rinsed during circulation cleaning of the milking installation. During cleaning, the interior of the milk meter is periodically flooded and drained controlled by the cleaning program in the control unit. In order to obtain optimum cleaning of the electrode 3 and the inside of the metering chamber, the chamber is held in the raised position by a vacuum-controlled diaphragm 9 during the entire cleaning process. This exposes a large opening at the top edge of the measuring chamber into which some of the rinse liquid flowing in from the cluster is channeled. The cleaning program runs automatically. The dot in the RINSING symbol in

the digital display alternately lights up and goes out. Its lighting up means that the discharge valve on the milk meter is closed.

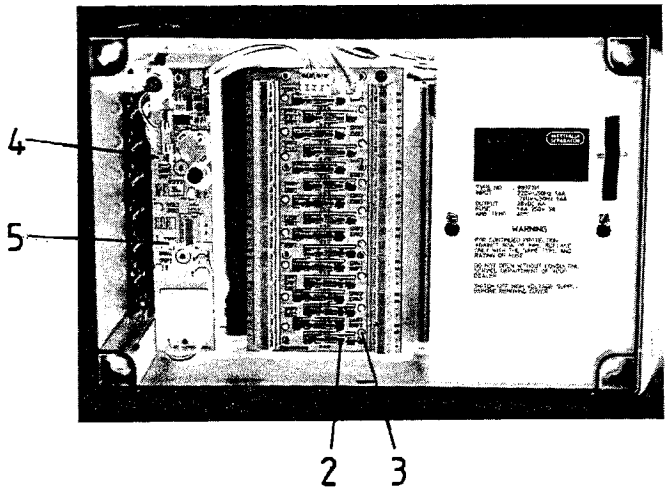
The rinse program includes a control function for the main rinse (see section 2.3).

1.5 IMPORTANT DIRECTIONS

Water hoses must not be aimed at electrical components which are not protected. Never clean electrical components with high-pressure cleaning units. The plastic (polysulfone) milk meter can be damaged by some harsh chemicals. Most iodine udder washes fall in this category. Users of the METATRON milk meter should therefore use only a chlorohexydine udder wash or plain water. To clean the outside of the METATRON milk meter, use a mild detergent and rinse with clean water.

1.6 POWER SUPPLY UNIT

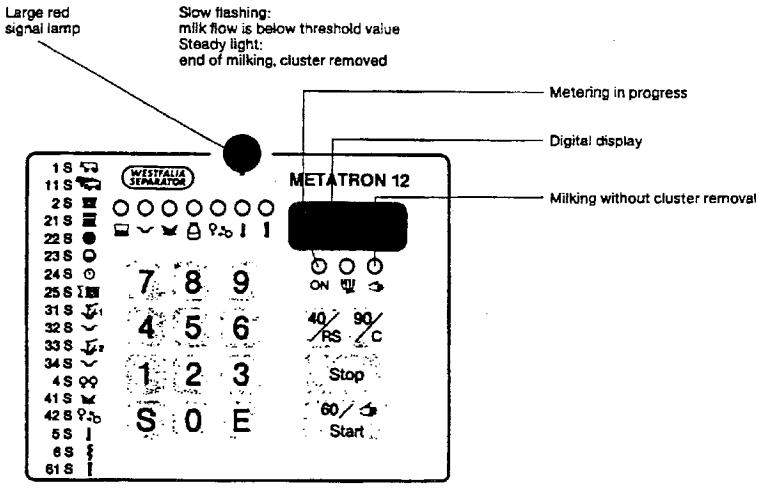
The power supply unit provides the METATRON control units with 24 VDC. Up to 16 METATRON units can be connected to one power supply unit or one fuse strip and coupler card in a heavy duty power supply. There is one 1.0A slow blow fuse (2) and one signal LED (3) for optical control of each control unit. A signal LED (4) on the coupler card lights when the power is on. A second LED (5) lights when the installation is not working (vacuum pump off, stand-by operation). This signal LED goes out when the vacuum pump starts up.



Keep all data communication transmission lines between the Metatron, Power Supply, and Computer away from high voltage lines. A minimum distance of 12" is recommended.

2. OPERATION

2.1 OPERATING KEY FUNCTION TABLE



2 Operating key function table

Key	Operation	Before milking	During stimulation	During milking	After cluster removal at the end of milking	During rinsing
40/RS	short or long	Start with 40 sec. stimulation ①	Shorten stimulation from 60 to 40 sec. 90 to 40 sec. ①	RS function Flashing of low milk flow is suppressed	RE-START of milking without stimulation	
90/C	short	Start with 90 sec. stimulation ①	Increase stimulation from 40 to 90 sec. 60 to 90 sec. ①			
	long	Control unit in rinse position	Activate FINILACTOR indirectly ⑪	Activate FINILACTOR directly ⑪	Control unit in rinse position	
STOP	short or long	Cancellation of monitoring functions	End milking Activate cluster remover	End milking Activate cluster remover		Establish readiness for milking
60/ Start	short	Start with 60 sec. stimulation	Change over Auto-Manual	Change over Auto-Manual	Start with 60 sec. stimulation	
	long	Start without stimulation	End stimulation ①			

Explanation of the function table

① These functions are only valid in combination with a stimulation pulsator type M (for further information see instruction manual for STIMOPULS M).

⑪ These functions are only valid in combination with the FINILACTOR automatic stripping device (for further information see instruction manual for FINILACTOR).

2.2 OPERATION -- MILKING

a. Remove the cluster from the holder and allow to hang. The symbol RINSING will apear on the digital display.

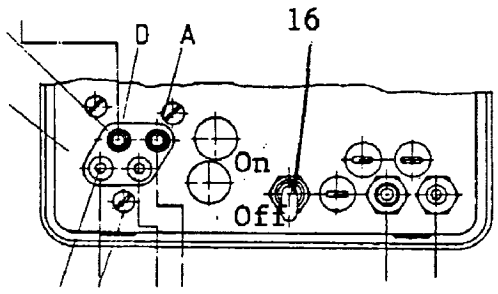
b. Then press the STOP key on the METATRON control units. When the STOP button is pressed, the letters "ST" for a connected stainless steel meter, "PL" for a plastic meter with ring electrode or "PS" for a plastic milk meter with pin electrode appear in the illuminated display (see information key table: 86S). The clusters are raised by the cluster remover cylinders. When the STOP key is released, an "O" appears in the illuminated display; the milking unit is then ready for operation.

c. Press the START key. The vacuum cylinder will release the cluster for attachment to the udder. When milk starts to flow, the amount will be indicated by the digital display. Pressing the START key automatically switches on the "2S" function.

d. A fall off in the milk flow (lack of milk) is indicated by blinking of the large red signal lamp (15 seconds or as changed with function 82S). Stripping can now be carried out. The red signal lamp lights steadily when the milk flow has ended. The vacuum is shut off to and the cluster is then removed automatically.

e. Re-Start "RS" - If the milking process is interrupted and the cluster automatically removed, milking can be continued without the metering data being lost by pressing the "RS" key within one minute or as changed with function 77S (display signal ON lights). When the "RS" key is pressed, the "low milk flow" lamp goes out. Milking is as normal for the "front time" 76S.

f. Milking in the event of a malfunction (emergency operation) - In the event of a malfunction, milking can continue if the METATRON control unit is switched off. When the main switch 16 is turned off, the vacuum supply on the back of the control unit must be momentarily interrupted (briefly pull off the black tube A) so that the valves fall into the initial position (cluster down, milk routes open).



g. Test circuit (see section 3.4) - During both milking and washing, the functioning of the upper and lower measuring electrodes can be observed by selecting functions 9-1-S. It is important to become familiar with this test program.

h. Milking without automatic cluster removal - If the clusters are not to be automatically removed, press the START key a second time after attaching the cluster. The illuminated HAND signal (manual milking) will be displayed. The STOP key must be pressed to end the milking process and the cluster will then be removed.

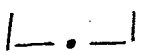
2.3 OPERATION -- CLEANING

a. When all METATRON units are to be set to the cleaning position: Switch off the vacuum pump. Place the clusters in the cluster holders. All METATRON control units are ready for washing as soon as the vacuum pump or power supply is turned on.

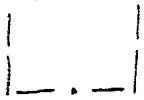
b. When individual METATRON units are to be set to cleaning: Pressing the "C" key, individual units can be put in the cleaning position (e.g. after other keys have been wrongly pressed). The key "C" must be pressed for at least one second. The ON illuminated signal will go out if a measurement in progress is broken off in this manner. If the ON illuminated signal has already gone out after a measurement, it will come on again when the "C" key is pressed.

c. Monitoring of rinsing: If the METATRON milk meter has been flooded during the main wash at least five times in a given time (see information key table: 73S), the rinsing symbol changes from symbol 1 to 2 in the illuminated display. Monitoring of rinsing can be called up before the next milking time by switching on the vacuum pump. All METATRON control units in the milking installation will display the rinsing symbol 2 after a faultless cleaning cycle.

Symbol 1



Symbol 2



3. METATRON 12 PROGRAMMING KEYS

3.1 DESCRIPTION

Program MWM 508. Program chip Part Number 7161-9051-120-H, Version H, contains all possible program variations for the METATRON 12 control unit possible at the present time:

* Milk Meter, Stainless Steel - Plastic (with ring or pin electrode) - Programmable
* Measuring Range, kg-lbs
* FINILACTOR - Automatic Stripping Device
* Milking Parlor Feeding
* Milking Time Monitoring
* Lactation Dependent Pulsation
* AUTOTANDEM Connection (Automatic Side Opening Stall Cow Flow Control)
* STIMOPULS M and AUTOPULS M Pulsation

Treated and Dry Cow Start Reminder

When milking a cow programmed for hold milk or do not milk using 6S or to "hold milk" or "dry" in Dairy Plan the "stop" button must be pressed before the "start" button will release the unit for milking. If "Start" is pressed the word "STOP" will appear in the display to remind the operator to press the "Stop" key.

Start Key Functions

The Start, RS and C keys can each independently be set for length of stimulation in seconds for all cows, or lactation dependent stimulation, or no stimulation at the start of milking.

Non-identification reminder

If cows are not identified automatically or manually, after pressing start the "Stop" will be displayed and stop will need to be pressed before again pressing start. These additional steps can be bypassed for the duration of the milking session by entering 1 S O E on each Metatron.

3.2 PARAMETERS

Various parameters, such as times or constants, can be changed by entries on the control panel. These changes, which are in the protected entry range, should only be made by trained personnel. It is necessary to be in the cleaning (wash) setting (pressing 90/C long) and to go in the entry readiness mode for changing these parameters pressing

8-8-S-1-E

3.3 INITIAL OPERATION

On inital start-up and after a power failure longer than 24 hours, the digital display indicates

cS (check system)

as a signal to check the parameter settings. Starting is only possible by entering operating readiness mode.

8-8-S-1-E

The default values pre-set in the program are set up (see section 3.5).

3.4 EXPLANATION OF INFORMATION CODES

1 S	Cow Number
11 S	Group Number
12 S	Change Group Number
2 S	Milk Yield
21 S	Reference Milk Yield - is computed by the connected master computer for every milking time from the average milk value, the time since the last milking, and the permissible tolerance (set at the connected computer). If on completion of the measurement the milk yield (2S) is less than the reference yield (21S), the "low milk flow" signal flashes. Continue the measurement with RESTART or press STOP to terminate (see 68S also).
22 S	Milk Flow Maximum - the average value from second and third shortest filling times.
23 S	Milk Flow Average - is obtained from the milk yield and the respective time from the wetting of the bottom electrode to the last completed milking cycle (not end of milking).
24 S	Duration of Milking - the time from first wetting of the electrode to removal of the cluster.
25 S	Total Yield/Milking Place - the amount of milk extracted at this milking place since the last cleaning is indicated.

31 S	Feed Ration 1
32 S	Feed Remainder 1
33 S	Feed Ration 2 (see section 12.4)
34 S	Feed Remainder 2
35 S	Feed Portion Weight (see section 12.5)
36 S	Feeding Pause Time (see section 12.6)
37 S	Unlock Feeding (see section 12.3)
38 S	Delay 1st Feed Release (see section 3.5)
4 S	Days in Lactation
41 S	Dry Period Marker (see section 8.7)
42 S	Heat Prompt (see section 8.6)
45 S	Stimulation Time curve (See Section 3.5)
6 S	Treatment - the STOP button followed by the START button must be pressed after pressing START when milking a cow with the "Separate Milk" light or "Do Not Milk" light on (see section 8.8.1).
61 S	General Code (see section 8.8.2)
65 S	Prevention of Milking Start for non-identified cows
66 S	External Alarm or FINILACTOR - an alarm (blinking of the big red light) can be switched to the outside using the A1, Y6 or Y7 connection and a relay board; ie, to central alarm board in large parlors.
68 S	Time Limit for Blocking at End of Milking - if there are problems at the end of milking (ie, milk yield too low (see 21S) or milking time is too short (see 84S)), STOP or RESTART has to be pressed. This can be limited from 0 to 600 seconds. This will eliminate the need to press the STOP key to acknowledge a problem at the end of milking.
69 S	Data Transfer Shown On/Out - the data transfer is visually shown by a decimal point in the bottom right corner of the display. This can only be seen at the immediate instant that data is transferred to the PC.

70 S Pulsator Pulsation Rate during Milking

71 S Pulsation Ratio

72 S FINILACTOR Response Threshold - the FINILACTOR responds as soon as the time from the end of one cycle-emptying to that of the next is longer than the pre-set threshold value, if the bridging time has elapsed and the amount of milk is more than 0.5 kg.

73 S Cleaning, Filling Time Max. - limit of a rinse cycle, otherwise forced discharge.

74 S Cleaning, Immersion Time - delay in emptying with electrode immersed in rinse liquid.

75 S Cleaning, Emptying Time - opening time of the drain valve.

76 S Bridging Time/Front Time - time from start of measurement while low milk-flow and FINILACTOR monitoring are switched off.

77 S End-of-Milking Time - the time starts with the removal of the cluster; the red signal lamp lights up. During the end-of-milking time, the present measurement can be activated again by pressing RESTART. At the end of the milking time - signal lamp off - the measured values are released for data transmission and the signal is given for control of the AUTO-TANDEM door if in use. The end-of-milking time is extended without limit with manual or pulse-stop operation and extended to time set at 68S for connection of external kick-off detector with malfunctions caused by low milk flow or too short a milking time.

78 S Bridging Time for kick-off retraction

79 S Time Delay for kick-off retraction

80 S Length of time the red signal lamp will blink until premature take-off because of kick-off.

78S, 79S and 80S are for connection of an external kick-off detector. Which is currently not available

81 S Low Milk Flow Time - time from the end of the last cycle-emptying until the low milk flow signal (signal lamp blinks) if milk level does not reach upper electrode again.

82 S — Blink Time - duration of the low milk flow signal until removal of the cluster.

83 S — Measuring Value Change-over; kg-lbs.

84 S — Minimum Milking Time - if at the end of milking the milking time is shorter than the minimum milking time (e.g. because of a milker unit kicked off), the "cluster" symbol flashes a warning. Continue the measurement with RESTART or terminate it by pressing STOP.

85 S — Interlock FINILACTOR for Start of Lactation -- the FINILACTOR can be put out of operation for the first period with recently fresh cows.

86 S — Kind of Meter - Stainless Steel; Plastic with Ring Electrode or Plastic with Pin Electrode - when changing to milking readiness mode after cleaning, the digital display indicates ST for Stainless Steel milk meters, PL for plastic milk meters with ring electrode and PS for plastic milk meters with pin electrode while the STOP key is being pressed.

87 S — Function of Start Keys (See Section 3.5)

88 S — Entry Mode On/Off

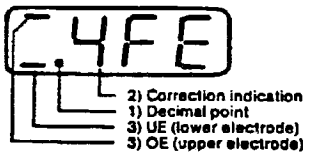
89 S — Changing Variables:
* Call-up: indication of the check number over the protected parameters
* Entry: with entry of 1E the paramters are overwritten with the factory pre-set parameters
* On "Start Up" always check this on each meter to ensure programming of every meter is the same

9 S — Indicate Device Address - The device address is set on DIP switches 1 - 4. DIP switches are called up when switching on the METATRON.

90 S Milk Meter Constant - the milk meter constant is set on DIP switches 5 - 8. To change the milk meter constant:
* Set unit to rinsing
* Switch off METATRON
* Change constant on DIP switch

Test circuit

Digital display for function 9-1-S

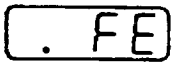
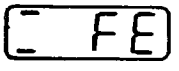
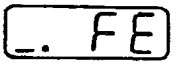


1) Decimal point:
appears when the lower electrode is ready to switch (active).

2) Correction indication:
shows a code if a constant correction amount has been added instead of the computed amount.

3) OE and UE:
appear when the milk level has reached the respective electrode.

During uninterrupted metering, displays 1 to 4 appear in succession in the digital display during each metering cycle.

Entry		Digital display	Lower electrode	Upper electrode	Milk level	Discharge valve
9-1-S	1		free active	free	below UE	closed
	2		wetted	free	between UE and OE	closed
	3		wetted	wetted	at OE	opens
	4		wetted active	free	between UE and OE	opened

* Switch on METATRON

91 S Filling-Level Electrode Test Indication - left digital display:
* top beam - upper electrode wetted
* bottom beam - lower electrode wetted
* decimal point - monitoring of lower electrode is active

If at the end of the measurement the digital display shows

then the measuring electrode is wrongly connected (Power Card Connections 5-6-7)

92 S System Test - test of memory and program range

93 S Indicate Program Version

94 S Interlock FINILACTOR - the FINILACTOR can be interlocked for a milking sequence. After the milking it is unlocked.

95 S Test program for control of the feed dispenser - see feed dispenser section.

96 S AUTOTANDEM Animal Change - with the AUTOTANDEM, the automatic change of animals can be blocked, e.g. for checking the udder. Pressing the STOP key removes the interlock.

97 S Pulse Stop - in manual mode, at the end of milking either pulse-stop or manual can be used.
* Pulse-Stop - Puslator stops, cluster remains on the cow
* Manual - Pulsator works, cluster remains on the cow

Continue milking with RESTART or end milking by pressing STOP. In automatic mode, you have pulse-stop and automatic take-off in both cases (different from ACR 3), you only can change manual mode.

3.5 TABLE OF PARAMETER INFORMATION CODES

METATRON 12 Program, Version G, MWM508.7

Keys	Instruction	Code	Factory Setting	Setting Min.	Range Max.	Changes	Remarks
ANIMAL IDENTIFICATION							
1 S	Cow Number	E		0	9999		
11 S	Group Number	A 1		0	9		
12 S	Change Group Number	E 1		0	9		
MILKING DATA							
2 S	Milk Yield	E	kg/lbs	0	99.9		
21 S	Reference Milk Yield	A 1	kg/lbs	0	99.9		
22 S	Milk Flow Max.	A	kg/lbs per min.	0	99.9		
23 S	Milk Flow Avg.	A	kg/lbs per min.	0	99.9		
24 S	Duration of Milking	A	min.	0	99.9		
25 S	Total Yield/ Milking Place	A	lg/lbs	0	999.9		
FEEDING							
31 S	Feed Ration 1	A 1	kg/lbs	0	999.9		
32 S	Feed Remainder 1	A 1	kg/lbs	0	999.9		
33 S	Feed Ration 2	E	kg/lbs	0	20.0		
34 S	Feed Remainder 2	A 1	kg/lbs	0	999.9		
35 S	Feed Portion Weight	P	100 gr /lbs	2	999		
36 S	Feeding Pause Time	P	10 s	5	30		
37 S	Function Feeding	E	1	0	1		0=Interlocked 1=Allowed
38 S	Delay 1st Feed Release	E	10 s	0	60		

Keys	Instruction	Code	Factory Setting	Setting Min.	Range Max.	Changes Remarks
ANIMAL DATA						
4 S	Days Lactation	A 1	days	0	999	
41 S	Dry Period	E 1		0	1	1=Dry Period
42 S	Heat	E 1		0	1	1=Heat
6 S	Treatment	E 1		0	9999	nnX1=Separate milk nnX2=Do not milk nn=number of milkings
61 S	General Code	E 1		0	9999	xxX1=Manual milking xxX2/xxX5, xxX7=Milking problem xxX6 Autotandem blocked xxX8=Feed remainder LED xxX9=FINILACTOR Interlocked 15nn=Additional 15 sec stimulation time added. nn=individual stimulation time of cows

PULSATION See Instructions on Page 21

CODE	DSPLY	FUNCTION	RANGE	REMARKS
45 S	0.000	1st DIM Breakpoint	FIXED	Stim. Time Curve
S	1. 20	1st STIM TIME	10-99 sec	
S	2.030	2nd DIM Breakpoint	10-300 DIM	
S	3. 20	2nd STIM TIME	10-99 sec	
S	4.120	3rd DIM Breakpoint	10-300 DIM	
S	5. 40	3rd STIM TIME	10-99 sec	
S	6.180	4th DIM Breakpoint	10-300 DIM	
S	7. 40	4th STIM TIME	10-99 sec	
S	8.300	5th DIM Breakpoint	10-300 DIM	
S	9. 70	5th STIM TIME	10-99 sec	

70 S	Pulsation Rate	P 2	62/min	30	160	
71 S	Pulsation Ratio	P 2	64% milk ratio	50	70	

Code Key
A=retrieval only
E=retrieval and entry
P=weighted entry in program mode 88S
1=with existing animal data only
2=with Stimopuls M only

Keys	Instruction	Code	Factory Setting	Setting Min.	Range Max.	Changes Remarks
87 S	Function of Start Keys	P 2				0=No stimulation 1=stimulation time lactation dependent (individual of each cow) 2-9= No stimulation 10-99=stimulation time fixed in sec.

Entry	Display	Remarks
87S	ST.01	"Start" key: stimulation time lactation-dependent
S/40E	RS.40	"RS" key: stimulation time is 40 seconds
S/0E	C.0	"C" key: no stimulation

The settings can be called up by pressing the "S" Key

97 S	Manual Pulse-Stop	E 2	1	0	1	0=Manual end-of- milking 1=Pulse-Stop end-of-milking

AUTOMATIC STRIPPING

72 S	FINILACTOR Response Threshold	P	10.0 s	14	30	
85 S	Interlock FINILACTOR for Start of Lactation	P	0 days	0	99	
94 S	Function FINILACTOR	E	1	0	1	0=Interlocked 1=Unlocked

CLEANING

73 S	Cleaning, Filling Time Maximum	P	40 sec	20	60	
74 S	Cleaning, Immersion Time	P	20 sec	5	60	
75 S	Cleaning, Emptying Time	P	7 sec	5	60	

MILKING CONTROL TIMES

68 S	Time Limit for Blocking at End of Milking	P	60 sec	0	600	
76 S	Bridging Time	P	90 sec	20	120	Front Time
77 S	End-of-Milking Time	P	60 sec	5	120	Waiting Time for Data Transfer

Keys	Instruction	Code	Factory Setting	Setting Min.	Range Max.	Changes Remarks
81 S	Low Milk Flow Time	P	25 sec	5	60	Milkout*
82 S	Blink Time	P	15 sec	5	30	*
84 S	Minimum Milking Time	P	150 sec	30	240	
KICK OFF						
78 S	Bridging Time	P	30 sec	5	60	No function as yet
79 S	Waiting Time Kick-off	P	2 sec	1	10	No function as yet
80 S	Flashing Time Kick-off	P	5 sec	1	20	No function as yet
MEASURING VALUE CHANGE-OVER						
83 S	Measuring Value Change-over Kg-Lbs.	P	0	0	1	0=kg 1=lbs.
86 S	Kind of Meter	P	2	0	2	0=Metal 1=Plastic w/ring electrode 2=Plastic w/pin electrode
SPECIAL FUNCTIONS						
66 S	External Alarm or FINILACTOR	P	1	0	3	0=no external alarm 1=via output Y7, output impulse signal 2=via output A1 feeder is blocked see feeding parameters 31S-38S output continuousl 3= via output Y6 no tandem stall can be connected 96S is blocked output impulse
96 S	Interlock AUTO-TANDEM change of animals	E	0	0	1	0=Box Unlocked 1=Box Interlocked
98 S	Display Israel	E	0	0	1	0=Display Dark 1=Display Bright
99 S	Function Israel	P	0	0	1	0=Interlocked 1=Unlocked

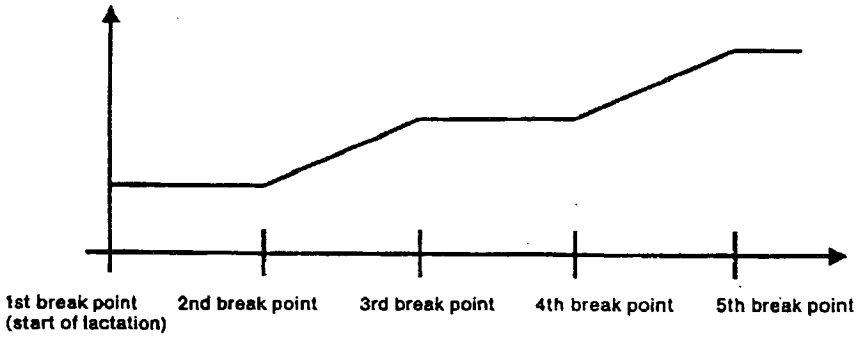
*A "pin" electrode meter will milk cows drier than the "ring" type. You may want to decrease 81 & 82S. 3X cows should generally not be milked as dry as 2X cows.

Keys	Instruction	Code	Factory Setting	Setting Min.	Range Max.	Changes	Remarks
TEST FUNCTIONS							
9 S	Indicate Device Address	A		0	15		
69 S	Data Transfer Shown	P	0	0	1		0=No Signal 1=Signal by Lit Decimal Point
90 S	Indicate Milk Meter Constant	A		0	15		
91 S	Indicate Filling Level Electrodes	A					
92 S	System Test	A					
93 S	Indicate Program Version	A					509.8=508.H
95 S	Test Program Feed Dispenser	E	0	0	1		
ENTRY KEY							
88 S	Entry Mode On/Off	P	0	0	1		0=Off 1=On
CONTROL VALUE							
89 S	Indicate Check Number Reset Variant Change	A P	0	0	1		1=Reset
	Check Number:	5C4	Changed Check Number:				

Code: A = Call-up only
E = Call-up and Entry
P = Weighted entry in program mode (88 S)
1 = Only with cow file present
2 = Only with STIMOPULS M or AUTOPULS M

3.6 LACTATION DEPENDENT STIMULATION

Lactation dependent stimulation time is computed from this curve (depending on the number of days in lactation of the respective cow)



The lactation curve is programmed via function code 45 S. The break point (days in lactation) and the respective stimulation time are entered alternately. The program will extrapolate the correct stimulation time using the break point ie: when days in mik falls between the break points a stimulation time will be sent to the Metatron based on where the cow falls on the curve that is formed by the two break points. The minimum stimulation time for an early lactation will be the value programmed as break point 2. The stimulation time will be displayed for 2 seconds after the pulsator has started for the cow being milked. When porgramming stimulation times use the chart below for recommendations as a starting point. These times may need to be changed later for specific applications.

Days in Milk (Dim)	Length of Stimulation
1-30	0
30-90	30-45
90-240	45-60
240-300	60-90

Entry	Display	Remarks
45S	0.000	1st break point (start of lactation) permanently set
S 0 E	1. 0	0 Seconds stimulation time at 1st break pt
S 30 E	2.030	2nd break pt - 30 days in milk (DIM)
S 30 E	3. 30	30 seconds stimulation time at 2nd break
S 90 E	4. 90	3rd break point (90 DIM)
S 45 E	5. 45	45 Seconds stim time at 3rd break pt.

Entry	Display	Remarks
S 240 E	6.240	4th break point (240 DIM)
S 60 E	7. 60	60 seconds stim time at 4th break pt.
S 300 E	8.300	5th break point (300 DIM)
S 90 E	9. 90	90 seconds stim time at 5th break pt.

The stimulation time can be changed over from on value to another during stimulation

When stimulation is started or change over is effected during stimulation with "C" or "RS", the display shows the selected actual stimulation time in seconds for two seconds and then switches to show the amount of milk.
If a mistake was made during entry of the lactation data, and no value can be obtained from the lactation curve, then stimulation is not carried out.

Additional stimulation time can be added to the lactation dependent stimulation time by the first 2 digits of the 4 digit general code (61S). This time is entered in seconds and will be added to the time calculated from the lactation curve.

Entry	Display	Remarks
1 S 5 E	5	entering cow 5
61 S 1400 E	1400	14 additional seconds stimulation

How to set 45 S with DP 4.2/4.3 control:
NOTE: Break point cannot be set at 0, just press enter.

3.7 PROGRAMMING THE METATRON

NEW SYSTEM START-UP (or Metatron that has been without power for an extended amount of time (more than 24 hours):

Upon initial start-up of the system or an individual unit you will not be able to get any response from the control panel. The display will indicate "cS" for "check System" as a signal that the factory settings are being used for all parameters. It is now necessary to press "8-8-S-1-E". You must then proceed with the following programming steps starting with step 3.

FOR A SYSTEM OR UNIT THAT HAS BEEN PREVIOUSLY PROGRAMMED:

Any programming must be done in the "clean" mode. The "clean" mode can be obtained in two ways: (1) When the vacuum pump is first started. (2) By pressing the "90/c" button until " . " or " " appears on the display. This indicates the "clean" mode.

Steps for programming:

*= code used for program chip versions "E" & "F" only
+= code used for program chip versions "G, "G+" and "H"

(1) Must be in "clean" mode

(2) 8 8 S 1 E - enters program mode

(3) 8 6 S _ E - indicates meter Type 1- ring electrode 2- pin electrode

(4) 8 3 S 1 E - to meter in pounds

(5) 8 1 S _ E - Automatic takeoff control -to produce the 6 oz. of milk to go from low to high electrode in the meter body. On a new installation start at 25 seconds without Stimopuls or 20 seconds w/Stimopuls. On an existing system, set this the same as the other Metatrons.

(6) 8 2 S _ E - Automatic takeoff control Number of seconds the red light will flash if a cow has not given the 6 oz of milk from low to high electrode as set in 81S. Start at 12 seconds without Stimopuls. With Stimopuls, use 10 seconds to start. A combination of 81S and 82S determines how dry a cow is milked before unit removal. This is not a memory strip time, if the milk reaches the upper electrode during the red light flash time, 81S and 82S settings begin again.

(7) 7 6 S _ E - Front time. Amount of time allowed for milk letdown before takeoff action can occur. Normally have @ 90 seconds. However on late lactation 3X cows without stimulation this must be increased

(8) 9 0 S - Meter constant. Indicates calibration constant programmed on dip switches on Metatron board. The Power switch must be turned off with the Metatron in clean mode and then back on for new dip switch settings to take effect.

(9) 7 3 S _ E - Washing. This is the number of seconds the dump valve will stay closed to attempt to flood during the wash cycle, even if the upper probe is never touched by water. If the upper electrode never gets wet, this setting controls when the dump valve opens.

(10) 7 4 S _ E - Washing. After the upper electrode is touched with wash water, this the number of seconds it will stay wet before the dump valve opens. This is the amount of time the meter floods over. Start at 20 seconds and adjust for about 5 seconds flooding time.

(11) 7 5 S _ E - Washing. The number of seconds the dump valve is open to allow the meter to drain completely, and allows water to flow across the bottom of the meter body to clean it.

Notes on washing: The meter body should flood completely and remain this way for about 5 seconds. The setting of 74S controls this. Next we want to completely dump the water in the meter (75S), allow the water to flow across the bottom of the meter body for 2-3 seconds and restart the cycle. This should occur as often as possible during the cycle.

(12) 7 0 S _ E - Pulsation rate.

(13) 7 1 S _ E - Pulsation ratio. Enter percent milk.

(14) 9 7 S 0 E - A required setting for units with Stimopuls M or Autopuls M. Keeps pulsator running during manual milking.

*(15) 8 7 S _ E - Turns stimulation on or off
0= OFF for Autopuls M
1= ON for Stimopuls M

*(16) 6 7 S _ E - Sets stimulation time when Metatron is started with 20/90 key.

+(17) 8 7 S - Sets function of keys used to start milking:
St.nn - _ E Start key function (see below)
RS.nn - _ E RS key function (see below)
C.nn - _ E C key function (see below)
0= No stimulation
1= Lactation dependent stimulation
2-9= No stimulation
10-99= Seconds of fixed stimulation

+(18) 4 5 S - Sets the lactation dependent stimulation curve.
0.000 - E 1st DIM breakpoint (fixed)
1. nn - _ E 1st stimulation time
2.nnn - _ E 2nd DIM breakpoint
3. nn - _ E 2nd stimulation time
4.nnn - _ E 3rd DIM breakpoint
5. nn - _ E 3rd stimulation time
6.nnn - _ E 4th DIM breakpoint
7. nn - _ E 4th stimulation time

8.nnn - _ E 5th DIM breakpoint
9. nn - _ E 5th stimulation time

The above settings are used to determine the stimulation time for each cow based on the days in milk sent from the computer to the Metatron when the cow is identified. The stimulation time is set in seconds (not including the 5 second change over period) and the breakpoints are set in days in milk. DIM values between breakpoints are adjusted proportionately between the two stimulation times.

(19) 7 7 S _ E - Amount of time after takeoff before milk weights are transferred to the computer. Pressing 40/RS during this time will add the additional milk to the original weight in the event of a kickoff. Set at 40-60 seconds depending on the shortest possible time from the last takeoff on a side to the first machine attachment in the next group on that side.

(20) 6 8 S _ E - Maximum amount of time before data will be transferred in the event of low milk production or short milking time warning after takeoff. (Additional to 77S).

(21) 9 S - Indicates the address as set by the dip switches on the Metatron board. Not changeable from the front panel.

(22) 3 5 S _ E - Metatron controlled parlor feed portion weight.

(23) 3 6 S _ E - Metatron controlled parlor feed pause between feed drops.

(24) 3 7 S _ E - Metatron parlor feeding 0 - off 1 - on

(25) 3 8 S _ E - Metatron controlled parlor feed delay before initial feed drop.

(26) 8 9 S - A code of letters and numbers will be displayed. All meters in the barn should have the same code indicating that all parameters are identical.

(27) 8 8 S 0 E - Exits program mode

This completes necessary programming of the unit.

When setting parameters in existing systems, all parameters except 9S and 90S can be duplicated from another Metatron.

NOTE: 97S can be changed without entering program mode and does not affect the result of 89S.

4. INSTALLATION

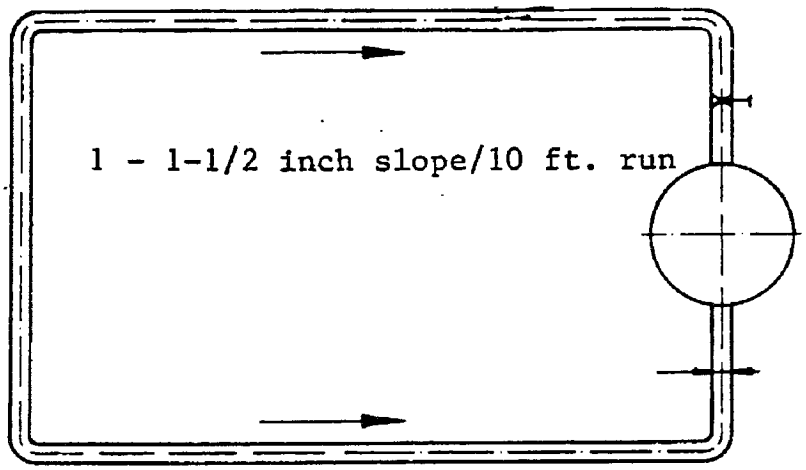
4.1 PIPELINE INSTALLATION

For general standards, refer to Form Number WS171-0886, "Pipeline Systems Design, Performance Standards and Recommendations."

Slope of milk line:

* In new installation, install the milk line according to figure 1.

* Check the slope of existing milk lines according to figure 1.



1

4.2 METER INSTALLATION

Meters should be mounted on the day the system is ready for start-up. They can be milked through if the installation is not completed without adverse effects on milking performance.

Carefully plan how meters can be mounted above the milk line. The milk meters can be clamped directly on the milk line or remote mounted. If remote mounting, be sure brackets can be securely fastened to curb or concrete directly above the milk line. Maximum hose angle to remote mount meters above the milk line is 45 degrees.

The meter should be mounted remote if the slope of the milk line is too great or the meter cannot be mounted direct because lack of space or because all meters shall be sloped towards the outlet independent from the clamp-on bracket slope to increase the measurable milk flow rate.

4.2.1 CLAMP-ON MOUNTING

The meter mounting brackets have a built-in slope of 2%. The meter must be mounted with slope to the outlet, ie. all mounting brackets must be mounted with the top sloped to the left. Use only Plastic Breakaway Clamps (7161-3270-000)

A custom fabricated 3" milk line with 1" welded ferrules is available.

A 1" 45 degree elbow can be used to direct mount lower line meters in a double loop system.

4.2.2 REMOTE MOUNTING

* Align brackets both horizontally and vertically (fig. 2).

* Mount milk meters to the pit wall or curb (protect from cow and operator) with the meter top level or sloped towards the outlet. Tighten the clamp on the meter ferrule by hand only, and not too firmly.

* Fit pipe connectors to milk line (fig 2). Do not exceed a slope of 45 degrees with 1" rubber hose only.

* Connect milk meters to the milk line with 1" hose; maximum length is 20 inches.

* Shorten hoses as appropriate, ensuring that there are no kinks (fig 2).

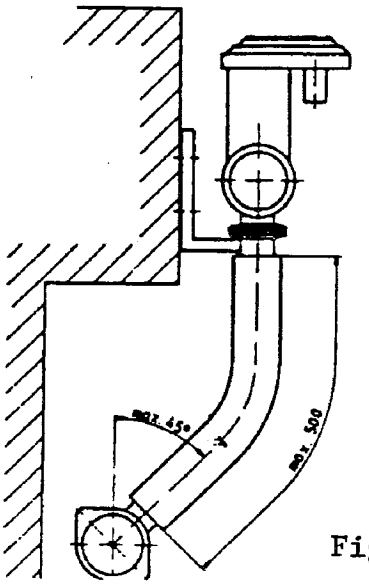


Fig. 2

Remote milk meter mounting bracket should be slightly sloped towards the milk discharge valve see 4.2.1 above.

4.2.3 DRILLING INSTRUCTIONS

* Use Hole Saw, diameter 32mm, for boring the milk line to install the milk meters (Part Number 0000-8635-010).

* Alternatively a "Unibit" or a "Varibit" may be used.

* Centering guides for hole saws:

  * 8mm, 1/4" diameter for new installations (Part Number 0000-8635-014).

  * 13.5mm, 9/16", diameter for enlarging existing holes (Part Number 0000-8635-015).

  * 16.5mm, 5/8", diameter for enlarging existing holes (Part Number 0000-8635-012).

* Carry out pre-drilling and cutting separately. A combination of hole saw and twist drill centering guide can cause the hard teeth of the hole saw to break.

* Pre-drill marked point with 1/4" diameter bit.

* Use plenty of cutting oil.

* Apply the hole saw gently and evenly - drill slowly.

* If the hole saw gets hot, allow it to cool in the air. Do not cool it with water.

* Deburr the holes with round file.

NOTE: After drilling all inlets, account for all large metal scraps; filings must be flushed from the milk line with the milk pump removed from the receiver.

4.2.4 STAINLESS STEEL "TRANSFLO" TUBE SPLICERS

5/8" "Transflo" Milk Tube Splicers made out of stainless steel are recommended to be put in the long milk hose in front of the milk inlet to the meter to eliminate stress on the meter when pulling off the long milk hose.

4.3 CONTROL BOX INSTALLATION

Pre-assemble the meter control box bracket to box - keep front panel and box together. DO NOT MIX. Care must be taken when closing the control panel box so the front panel is not damaged. Plug holes in back of control box with plugs removed from top and bottom bracket holes.

When pre-assembling brackets, while front panel is off, check for chip Part Number 7161-9051-120. If this chip is not in panel, call our office immediately for exchange. In order to get the

same check number at 89S (see section 3) the version (e.g. MWM 507G, G = version) should all be the same in an installation but they are also fully operational with different versions.

Choose the area to mount the control box convenient for the operator(s) (within comfortable distance from cow and eye level if possible).

Stretch a string line along stalls so boxes are mounted uniformly in parlor for a neat installation. If using the "S" rails as a reference point to mount the control boxes, be sure they are uniform height (some are not).

The ideal location to mount the control box is on the back side of the splash shield. This will help protect the unit and is a location the operator can see from other areas of pit.

The mounting brackets have a large hole in both the top and bottom. These are cut to accommodate 1-1/2" PVC conduit or 2" SS tube

The use of LBT, LR, and/or LL PVC conduit boxes at each METATRON control unit is recommended. For four stall runs or less, 1-1/2" PVC should be used between stalls. For more than four stalls, a 2" PVC should be used. If in doubt, determine how many tubes and wires will be run and where, and try to fit this in the conduit. This should be a loose fit. Wiring trough can also be used with conduit running down to connect the control box with the trough. The trough may be galvanized steel, stainless steel or PVC. Mice love troughs and chewing wires. MAKE MOUSE PROOF.

Follow diagrams for wiring and tubing carefully. Check and re-check all connections. Ensure strain reliefs on the back side of control box are tight on all wires entering the box. Instruct all operators in parlor that boxes should be hand washed with wet towels and a mild detergent - not by pressure hose. WATER DAMAGED ELECTRONIC PARTS ARE NOT COVERED BY WARRANTY.

Installation Notes:

Follow installation instructions on pages 23-45 of this manual.

IMPORTANT: On one piece boards always disconnect wire connection plugs from board before tightening or loosening connection screws. Failure to do so may break solder connections to the board.

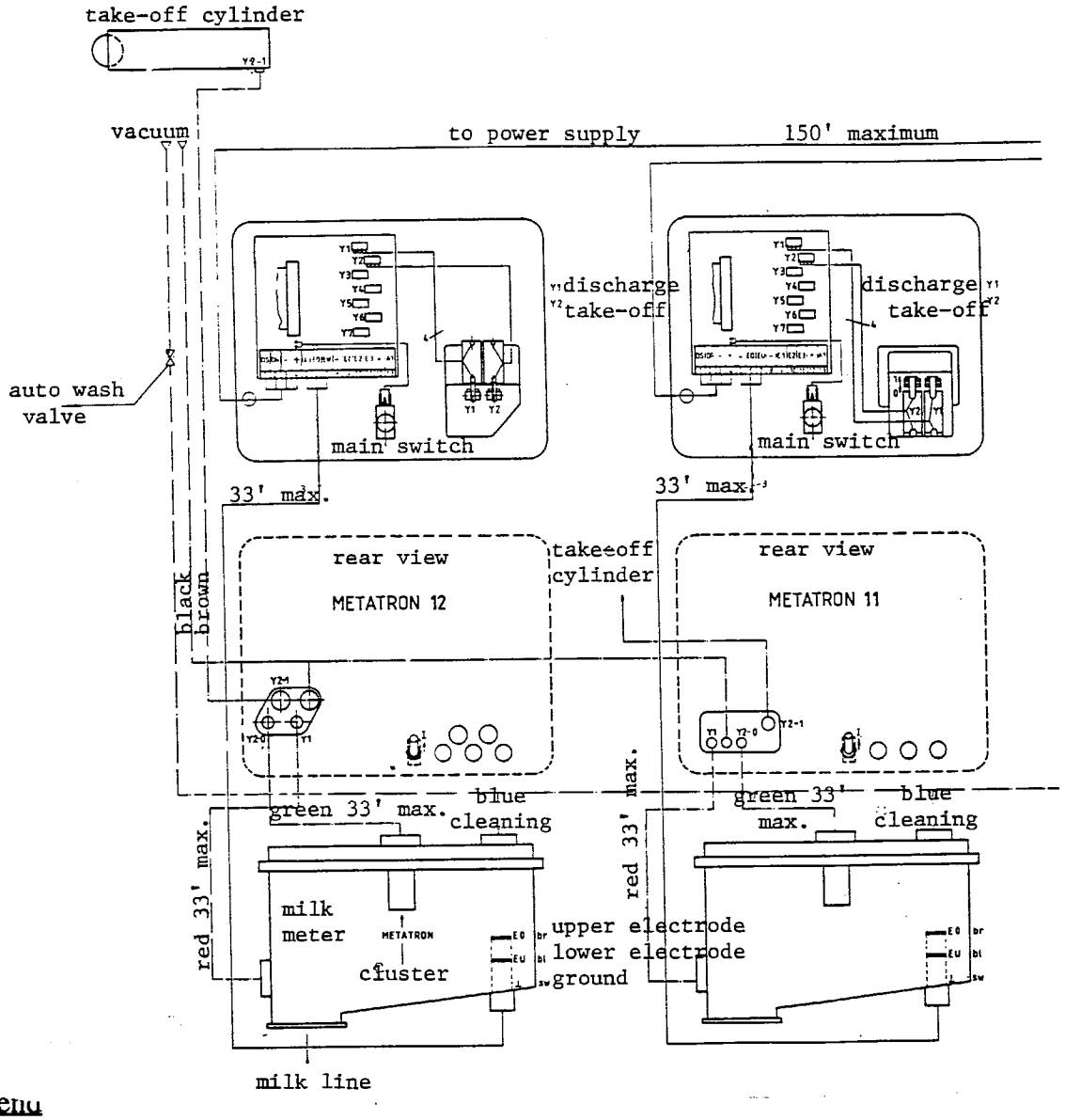
Meter body cables can be lengthened using solder and heat shrink tubing. Always leave enough extra cable to allow removal of the meter body from the pipeline.

Remember that a jumper must be connected between the DS and the minus terminals on all coupler cards of the power supply if the Metatrons are not connected to a computer.

Consider plugging the air vents on the underside of the control boxes with silicone and make hose connection to pulsation clean air line to further protect circuit boards from moisture.

Use milk hose splicer (in-line or weld type) to prevent unnecessary meter body breakage due to pulling of milk hose. A backflush valve also serves this purpose. Also older Metatron installations can be updated to the new break-away style meter body clamp to further lessen the chance of meter body breakage.

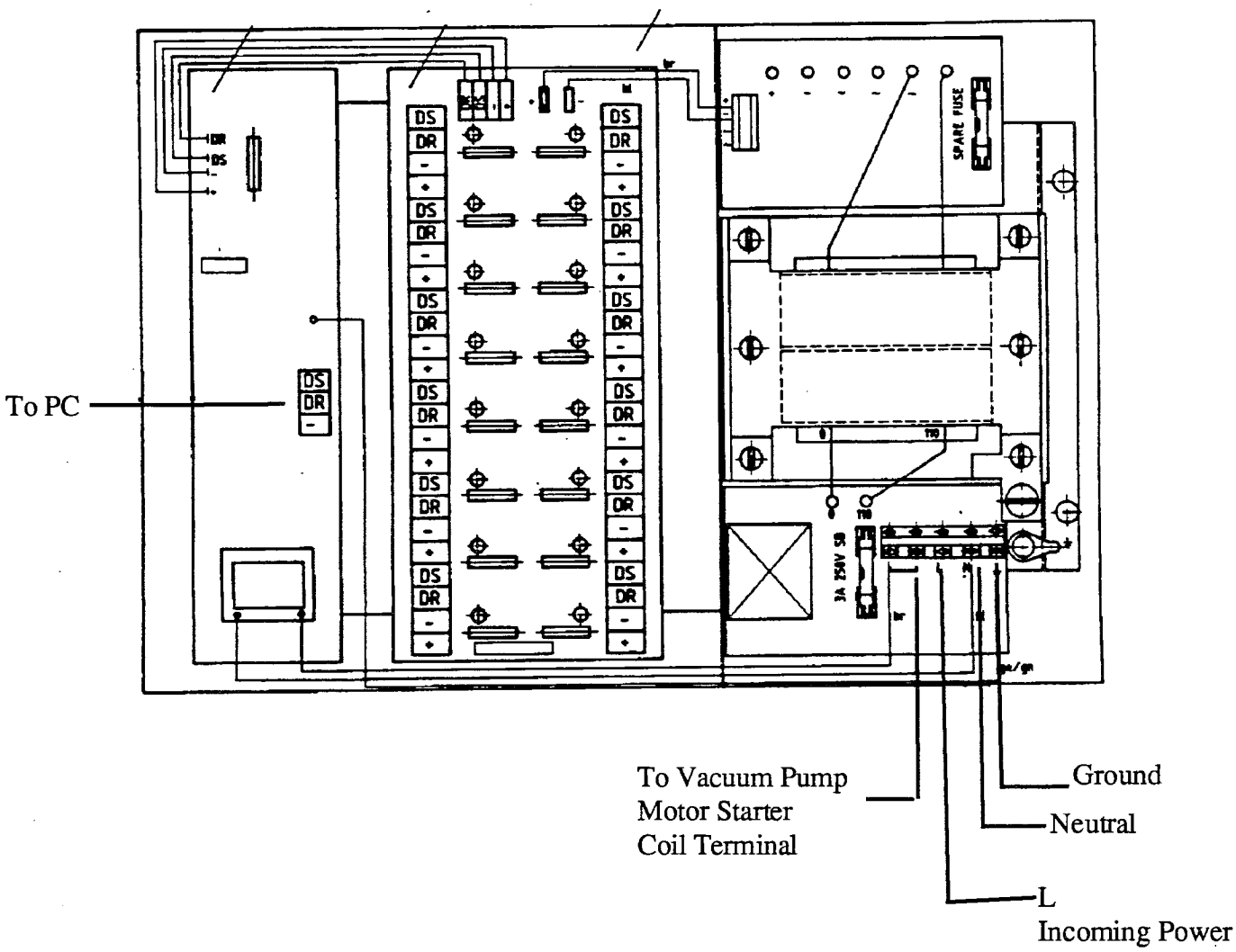
4.4 WIRING AND LAYOUT DIAGRAM



Legend

DS Yellow	Y2-1 Black	Vacuum Cylinder	
DR	Red	Y2-0 Green	Vacuum Shut-off Valve
(-)	White	Y1 Red	Milk Discharge Valve
+	Black		
( )	Black *		
EO Brown			
EU Blue			

* NOTE: On some units this wire is a yellow/green color.

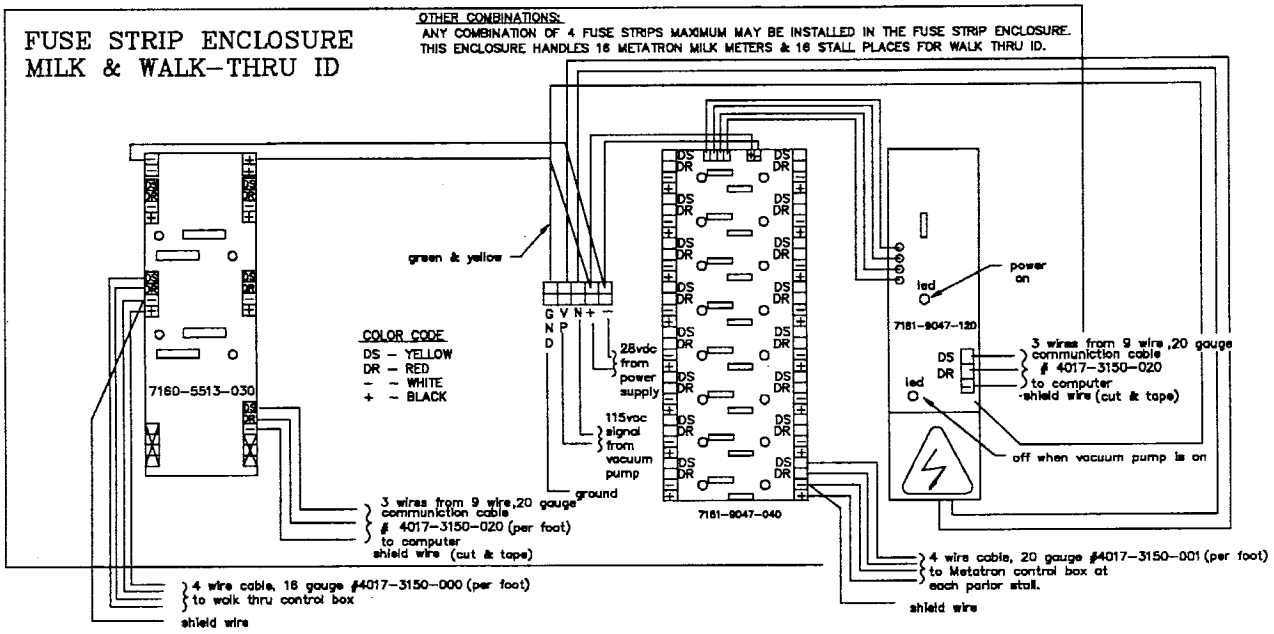


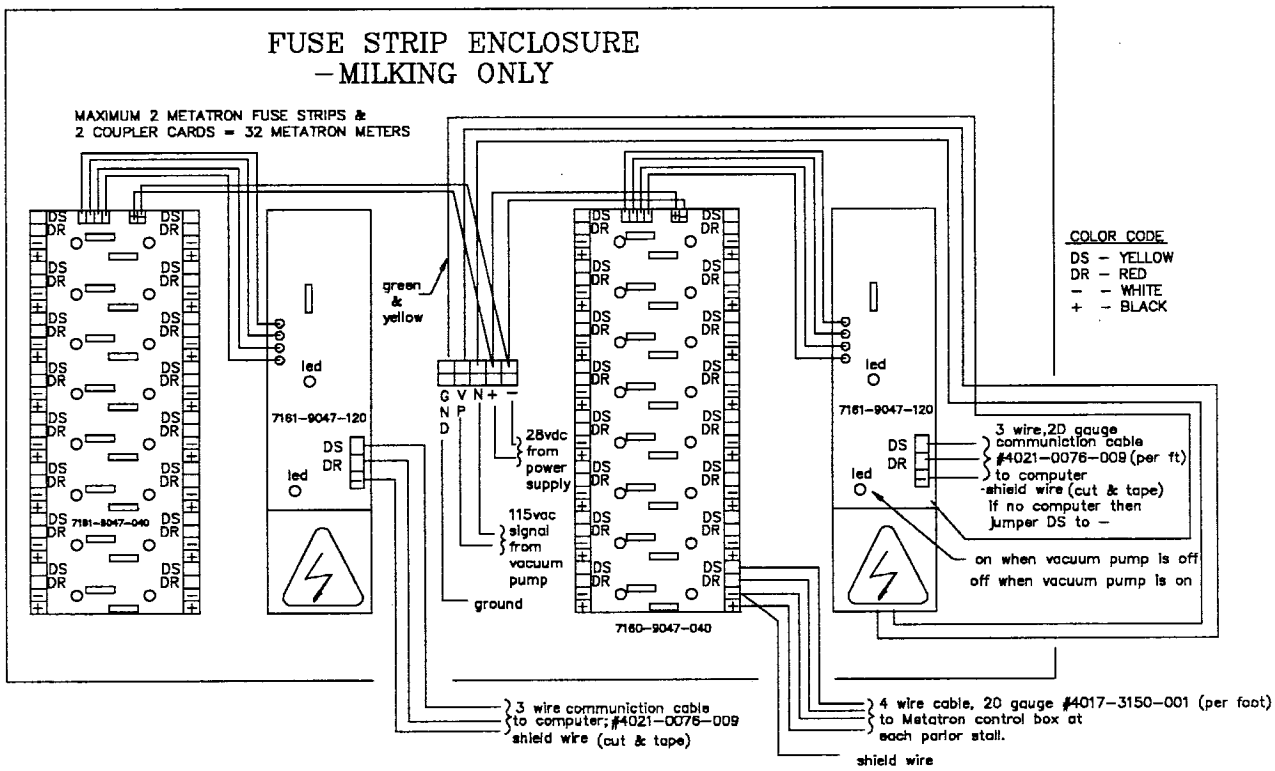
Legend

DS	Yellow
DR	Red
(-)	White and Drain
+	Black

NOTE: If no master computer is connected a jumper must be run between DS and (-) on the coupler card.

NOTE: All Metatrons, IDs and PCs must be on the same 120VAC power leg or preferably on the same circuit breaker.

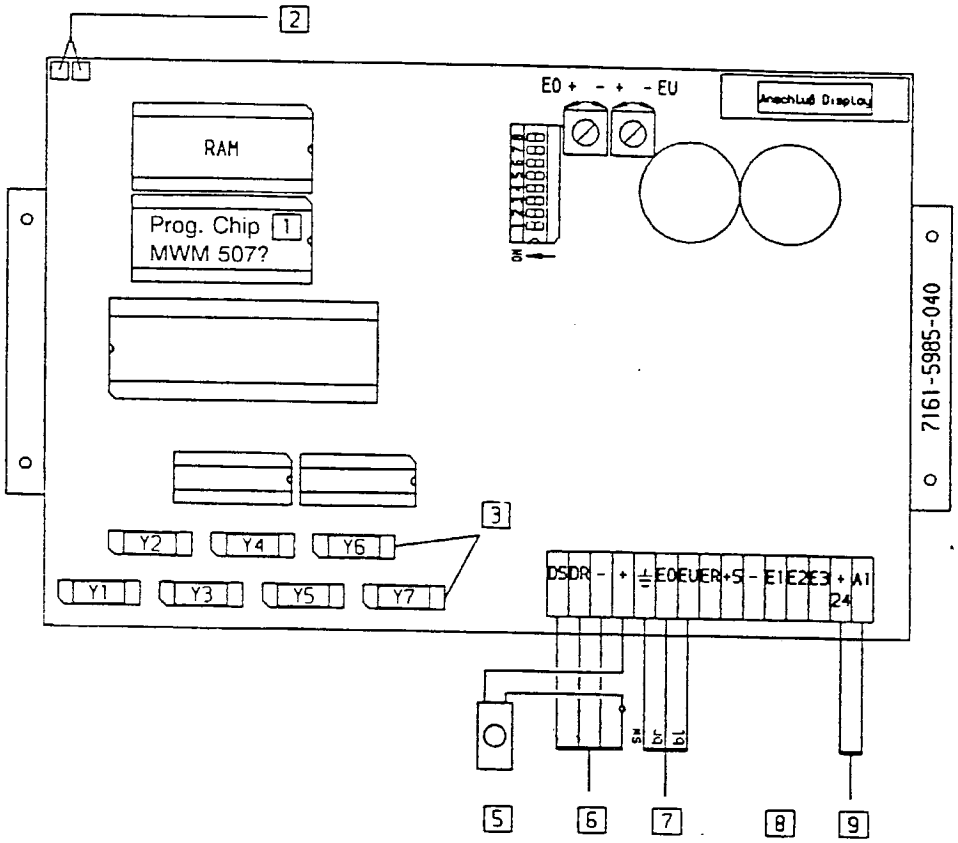

FUSE STRIP ENCLOSURE
MILK & WALK-THRU ID
OTHER COMBINATIONS:
ANY COMBINATION OF 4 FUSE STRIPS MAXIMUM MAY BE INSTALLED IN THE FUSE STRIP ENCLOSURE.
THIS ENCLOSURE HANDLES 16 METATRON MILK METERS & 16 STALL PLACES FOR WALK THRU ID.
COLOR CODE
DS - YELLOW
DR - RED
- - WHITE
+ - BLACK
7160-5513-030
green & yellow
G N D V P N + -
28vdc from power supply
115vac signal from vacuum pump
ground
7161-9047-040
7161-9047-120
led
power on
DS DR
3 wires from 9 wire ,20 gauge communiction cable # 4017-3150-020
to computer
-shield wire (cut & tape)
off when vacuum pump is on
3 wires from 9 wire,20 gauge communiction cable # 4017-3150-020 (per foot)
to computer
shield wire (cut & tape)
4 wire cable, 16 gauge #4017-3150-000 (per foot)
to walk thru control box
shield wire
4 wire cable, 20 gauge #4017-3150-001 (per foot)
to Metatron control box at
each parlor stall.
shield wire


FUSE STRIP ENCLOSURE
-MILKING ONLY
MAXIMUM 2 METATRON FUSE STRIPS &
2 COUPLER CARDS = 32 METATRON METERS
COLOR CODE
DS - YELLOW
DR - RED
- - WHITE
+ - BLACK
green & yellow
G N D V P N + -
28vdc from power supply
115vac signal from vacuum pump
ground
7161-9047-040
7160-9047-040
7161-9047-120
led
DS DR
3 wire,20 gauge communiction cable #4021-0076-009 (per ft)
to computer
-shield wire (cut & tape)
If no computer then
jumper DS to -
on when vacuum pump is off
off when vacuum pump is on
3 wire communiction cable to computer; #4021-0076-009
shield wire (cut & tape)
4 wire cable, 20 gauge #4017-3150-001 (per foot)
to Metatron control box at
each parlor stall.
shield wire

Electronic control card METATRON 12, Part Number 7161-5985-040, is similar in function to 7161-5895-030. Program chip MWM 507 (from version F), Part Number 7161-9051-120, must be used.

Switching resistance of electrodes:

Range 400-700 ohms. Factory setting: 700 ohms (potentiometer EO-EU).
Dip Switches: 1-4 device address, 5-8 device constant (calibration).



DS	Yellow	sw	Black
DR	Red	br	Brown
(-)	White	bl	Blue
+	Black		

1	Program chip MWM 507?
2	Connection of signal lamps
3	METATRON valve allocation/Valve outputs Y1-Y7 Y1 Discharge Y2 Removal Y3,Y4,Y5 Pulsator Y6 Connection ATD Y7 FINILACTOR/Ext. alarm
5	Main switch
6	Power supply
7	Milk meter
8	Inputs E1, E2, E3 (special function)
9	Feeding M

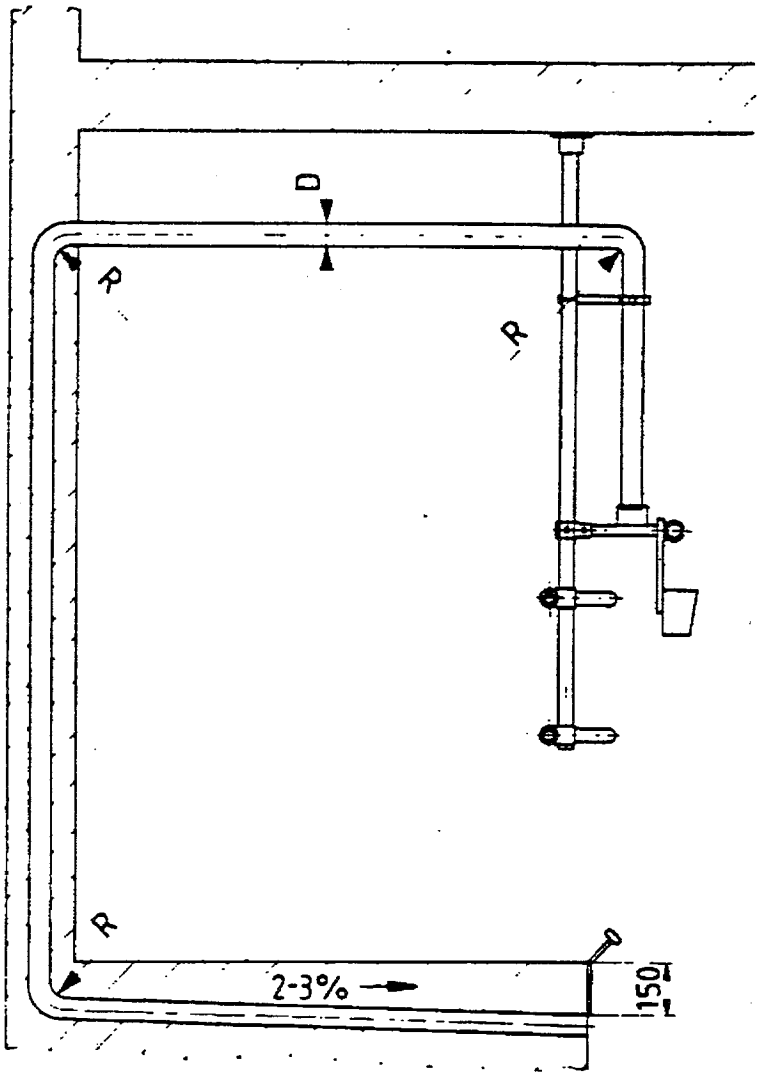
4.5 VACUUM CONTROL LINES

Install according to wiring and layout diagram section 4.4.

Maintain color coding of all lines.

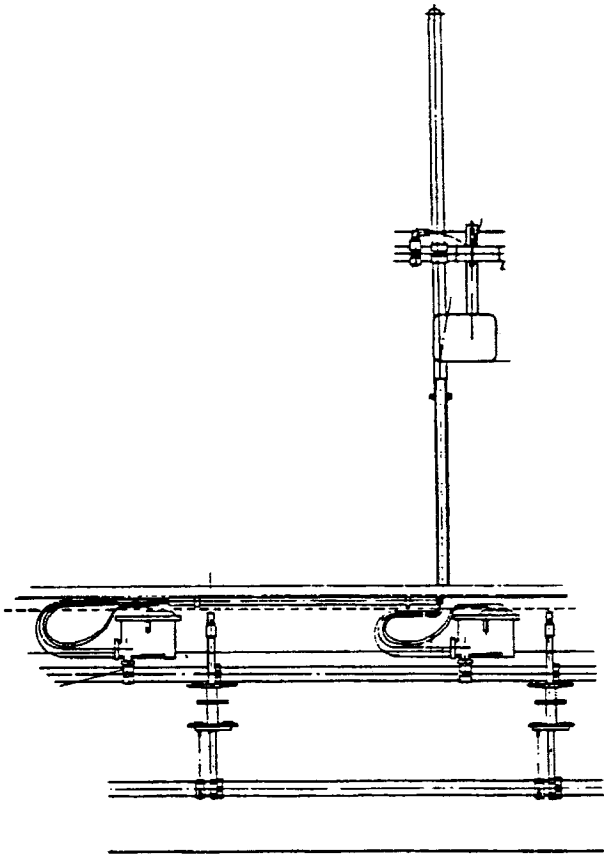
Red control line: Do not exceed a length of 10 meters (33 feet). In order not to exceed the maximum length of control lines in suspended parlors they must be laid in pipes as shown below together from two METATRON units.

* Minimum ID of pipe 1-1/2"
* Minimum radius of pipe 4"



Cut the ends of the control lines straight (at right angles).

Allow extra wire and tubing so the meter can be moved to a bucket for calibration. The diagram below shows approximate installation routing of meter, control, wire and tubes.



4.6 NUMBERING THE MILKING POSITIONS

The milking place for each cow is given a milking position number.

Numbering is important for the power supply, servicing and computer connections.

Start numbering with "0" at the right hand exit side of the parlor to the right hand entrance.

Continue numbering at the left hand exit (see figures 3, 4 and 5).

Figure 3
Numbering of the milking places in a milking parlor up to double 8, e.g. in a double 6.
* Lowest number at the right hand exit
* Highest number at the left hand entrance

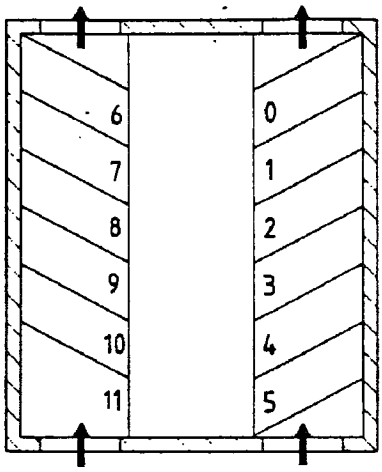


Figure 4
Numbering of the milking places in a milking parlor double 9 to double 16, e.g. in a double 10. Each side would be numbered 0-9 with the lowest number at the exit. Connect each side to one port each in the PC.

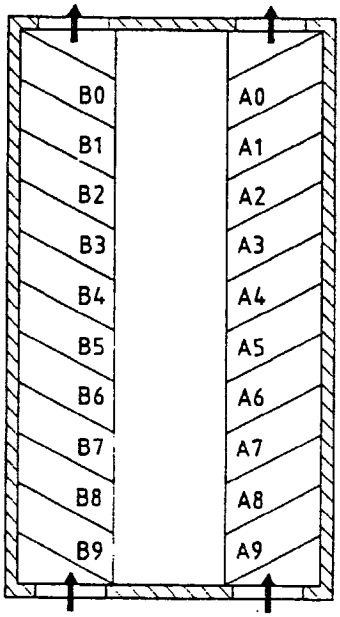
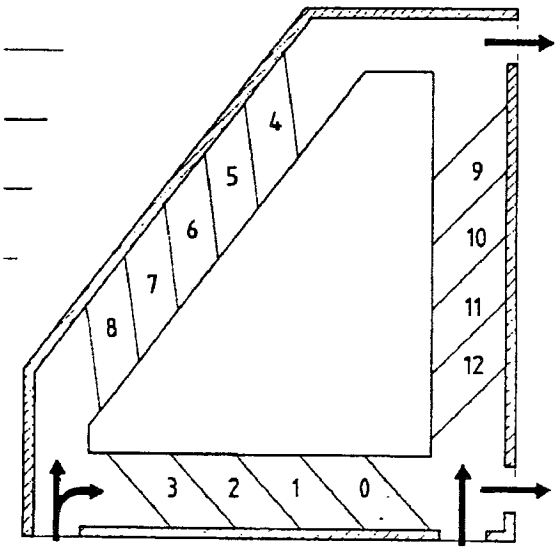


Figure 5
Numbering the milking places of tri-parlor; ie, 4-4-5.



4.7 ELECTRICAL INSTALLATION

Make wiring in accordance with wiring and layout diagram section 4.4

Wire in PVC conduit or any other protected trough wherever possible.

Be sure to number or mark wires before pulling through conduit, with numbered tape on both ends of the wire.

DO NOT tape wires together when pulling. You may need to remove one wire later to service equipment.

The METATRON Control Units:

* Operating voltage: 24 - 28 VDC.

The Power Supply:

* One Standard power supply controls a maximum of 16 control units.
* One Heavy Duty Power Supply controls a maximum of 32 conrol units.
* Install the power supply in a protected visible, ventilated area, preferably in a machine room or breezeway out of direct sunlight and away from high heat.

4.7.1 CABLE CONNECTION (CONTROL UNIT - POWER SUPPLY)

Pre-cut the cable for the run from the power supply to the METATRON control boxes as follows:

* Pull one wire from power supply to closest METATRON control box.
* Measure distance to next control box via routing of wire.
* Pull first wire back and add distance to next unit.
* If all METATRONS are mounted equal distance apart, you can use the same add-on wire measurement and cut all wires together.

Cable runs: 20 gauge, 4 wire with shield and drain; length 150 feet maximum (Part Number 4017-3150-001, per foot, or 4021-0076-001, 1000 foot coil).

Connect each control unit with above cable to provide the 24 VDC supply, data connection for computer and vacuum pump ON signal.

Turn METATRON control switch off. Open METATRON control units.

Remove the control panel with front plate and pull out the 34-pole flat cable connector on the control card, after releasing the two retaining clips.

Strip back the outer insulation from the communications cable and cleanly remove the aluminium foil and drain wire. Do not allow exposed drain wire or foil to touch electronic components.

Cut the cable cores in suitable lengths; remove about 1/4" insulation.

Connect in METATRON terminal blocks as follows:

1 =	DS	=	Yellow
2 =	DR	=	Red
3 =	-	=	White
4 =	+	=	Black

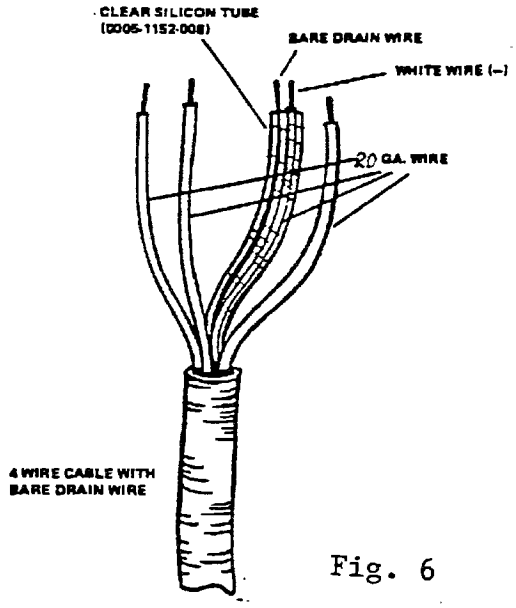


Fig. 6

Drain Wires:

* This must only be connected to the one corresponding (-) wire in the power supply.
* Fit a silicon tube over the bare copper wire and white cable (see fig. 6) and connect to the (-) terminal.
* Do not connect the drain in the control unit. Instead, cut it flush with the outer insulation and TAPE.

Colors of cores:

* Keep to the color coding.
* Follow the milking place numbers on the fuse strip of the power supply.

4.7.2 CABLE CONNECTION (CONTROL UNIT - MILK METER)

Make the electrode connection from milk meter to control unit with three-core cable attached.

This cable is permanently connected to the milk meter.

This 5m (16 foot) long cable must not be shortened, but can be lengthened up to 10m (33 feet). When splicing, stagger the solid solder joints. Insulate with "heat shrink".

Store excess wire length in cable conduit. Note color code where wire types change.

4.7.3 SETTING THE DECODER SWITCH

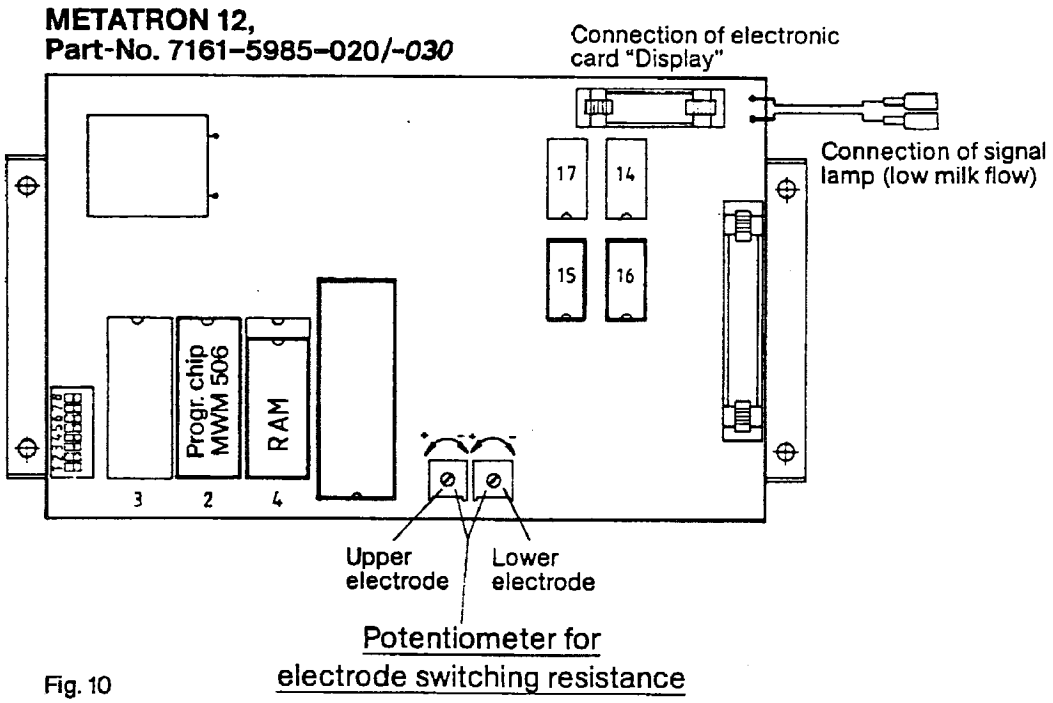


Fig. 10

14 Finilactor
15 Reversing Valve
16 Communication
17 Pulsator

Device Position (Location) Setting

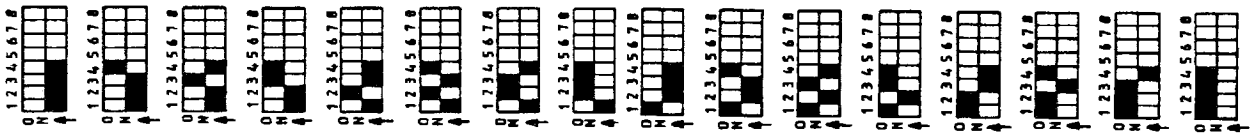


Fig. 11

Device Constant (Calibration) Setting

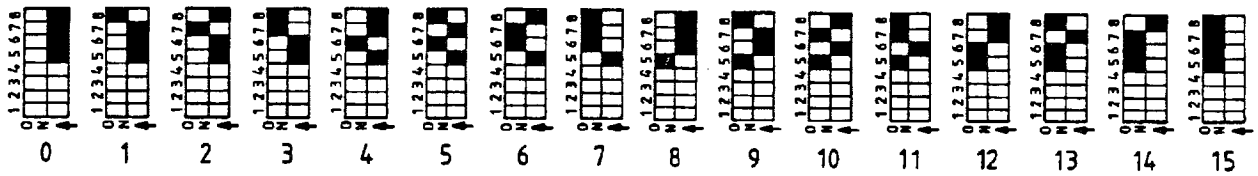


Fig. 12

The 8x decoder switch in the METATRON control unit (see fig. 10) performs two separate functions.

1. Switches 1-4 are used to set the exact METATRON location in the system (see fig. 11).

* These must be set individually when connected to a computer per meter location (fig. 3,4,5, section 4.6).

* This meter location can be called up by entering function 9S on the control panel.

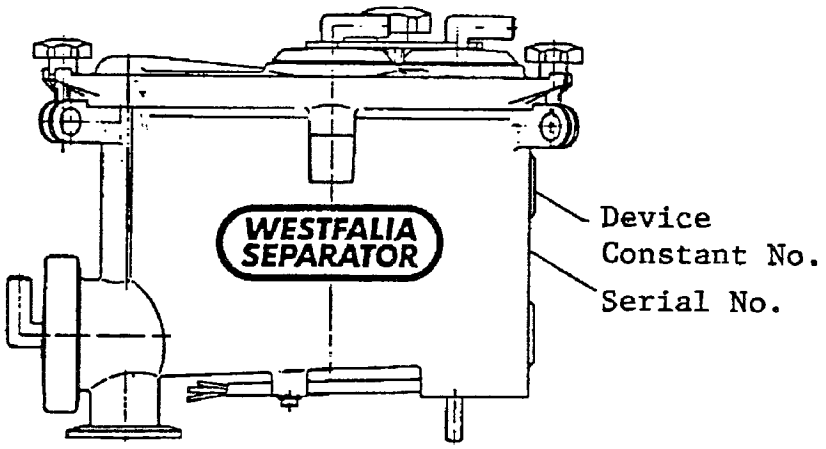


Fig. 9

2. Switches 5-8 are used to set the device calibration constant from a factory calibration.

* This number is written on the meter serial number tag (see fig. 9).

* If there is no device constant or when a meter body is changed, set the device constant number to 8.

* Set the device (precalibration) number to the settings per figure 12.

NOTE: Changes in the switch settings can only be made when the power to the units is turned off and only become effective when the power to the units is turned on again. See calibration instructions (section 5).

4.7.4 CONNECTING THE POWER SUPPLY

The power supply must be connected to a separate dedicated 120VAC, 20 amp circuit. (All power supplies and PC's in a system must be on the same dedicated circuit).

* Line L always has power.

* Line L1 only has voltage when the vacuum pump is running. This MUST NOT be connected to the load lugs in the magnetic starter for the vacuum pump - use the VP terminal in the pipeline washer or coil wire on the magnetic starter.

* The METATRON control units are permanently connected to the power supply fuse strip.

* The data line DS to the control unit is interrupted by the signal L1 and recognized in the METATRON control unit as a pause in operation.

* If motor controls of another make are used, tap phase L and L1 from an automatic cutout.

Note:

* Connections to the main supply should be made according to local regulations and the National Electric Code.

* The nominal voltage and nominal frequency must be maintained. If power fluctuates, use a constant voltage regulator (this is incorporated in heavy duty METATRON power supplies). If short duration power outages occur, a UPS (uninterruptible power supply) may be necessary.

* A power filter must be installed on the dedicated electrical circuit.

4.7.5 GROUNDING

All electrically conductive parts of the installation in the vicinity of the cow must be connected to ground according to regulations.

4.8 ELECTRODE RESISTANCE

The electronic circuitry for the polysulfone METATRON milk meter with pin electrode requires a switching resistance of 700 ohms. The polysulfone milk meter with ring electrode requires a switching resistance of 400 ohms. The milk meter with stainless steel measuring chamber requires a switching resistance of 100 ohms.

The METATRON double pc boards 7161-5985-010 and -020 can be set to 100 and 400 ohms. The pc board 7161-5985-030 can be set to 400 and 700 ohms and is pre-set to 700 ohms (see sticker over the potentiometer). It may be necessary to test and adjust the switching resistance in the case of new installations and servicing.

1. TESTING THE SWITCHING RESISTANCE

Testing must be carried out as described below:

a. Switch off the control unit at the main switch.

b. Disconnect the connecting cables on terminals 5, 6 and 7 on the connection card in the control unit housing.

c. Insert the probes of the adjusting potentiometer, Part Number 0005-1199-000, in terminal 5 and in the terminal of each electrode to be tested. Upper electrode - terminal 6; lower electrode - terminal 7.

d. Switch on the control unit at the main switch.

e. By pressing button 90/C for more than 1 second, put the control unit in the rinsing position. The rinsing symbol will be shown in the display. Then call up the electrode test circuit by entering 9-1-S (see section 3.4).

TESTING THE UPPER ELECTRODE

f. Connect the adjusting potentiometer to terminals 5 and 6.

g. Set the adjusting potentiometer to about 50 ohms above the expected resistance (150, 450 or 750 ohms) and then slowly turn it back to 100, 400 or 700 ohms until the symbol for the upper electrode lights up.

h. The number of ohms corresponding to the resistance set can then be read off the adjusting potentiometer.

TESTING THE LOWER ELECTRODE

i. Step (a) to (e) above must be carried out.

j. Connect the adjusting potentiometer to terminals 5 and 7.

k. For the lower electrode to be ready to switch, the START button must be held in during the test. A dot in the display next to the symbol for the lower electrode signals readiness of the lower electrode to switch (see fig. 2).

l. Set the adjusting potentiometer to about 50 ohms above the expected resistance (150, 450 or 750 ohms) and then slowly turn it back to 100, 400 or 700 ohms until the symbol for the lower electrode lights up (see fig. 2 below).

m. The number of ohms corresponding to the resistance set can then be read off the adjusting potentiometer.

2. SETTING THE SWITCHING RESISTANCE

The switching resistance must be changed as described below.

a. Switch off the control unit at the main switch.

b. Disconnect the connecting cables on terminals 5, 6 and 7 on the connection card in the control unit housing.

c. Insert the probes of the adjusting potentiometer, Part Number 0005-1199-000, in terminal 5 and in the terminal of each electrode to be adjusted. Upper electrode - terminal 6; lower electrode - terminal 7.

d. Set the potentiometer to the desired resistance.

e. Switch on the control unit at the main switch.

f. By pressing button 90/C for more than 1 second, put the control unit in the rinsing position. The rinsing symbol will be shown in the display. Then call up the electrode test circuit by entering 9-1-S.

ADJUSTING THE UPPER ELECTRODE

g. Connect the adjusting potentiometer to terminals 5 and 6.

h. With a small screwdriver, turn the potentiometer for the upper electrode on the printed circuit board while watching the indication on the front plate (see fig. 1 below).

i. By turning the potentiometer on the printed circuit board, a symbol can be illuminated on the display which shows the switching condition of the upper electrode (see fig. 2 below).

j. The potentiometer must be adjusted first so that the symbol for the upper electrode goes out. Then turn the potentiometer slowly until the symbol for the upper electrode lights up. Do not turn any further. When the symbol for the upper electrode lights up, the resistance of the electronic circuitry is set to the resistance pre-selected on the adjusting potentiometer.

ADJUSTING THE LOWER ELECTRODE

k. Step (a) through (f)must be carried out.

l. Connect the adjusting potentiometer to terminals 5 and 7.

m. For the lower electrode to be ready to switch, the START button must be held in during adjusting. A dot in the display next to the symbol for the lower electrode signals readiness of the lower electrode to switch (see fig. 2 below).

n. Turn the potentiometer for the lower electrode (see fig. 1 below) on the printed circuit board until the symbol of the lower electrode lights up in the display.

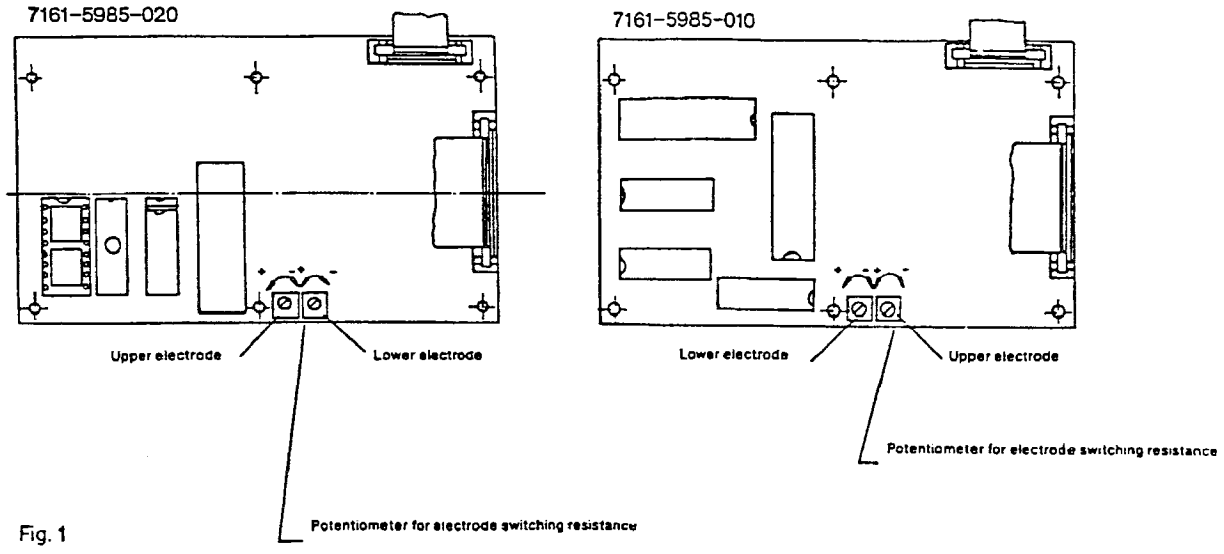
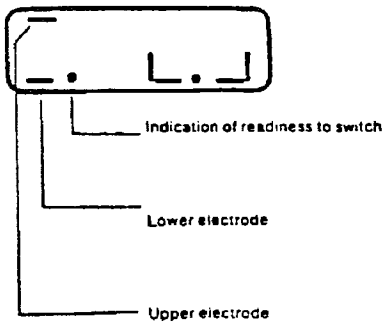


Fig. 1



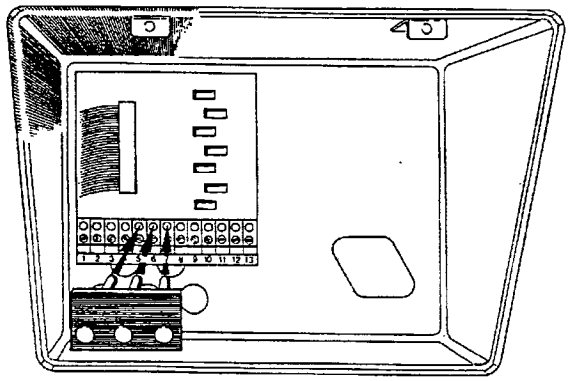


Fig. 2

Inserting the pc board Part Number 7161-9047-140 into terminals 5-6-7 (see picture) will increase the switching resistance from 400 to 700 ohms. This is necessary when a meter with ring electrode is exchanged with a meter with pin electrode. No further resistance adjustments are necessary. The above pc board must not be used with other resistance settings than 400 ohms.

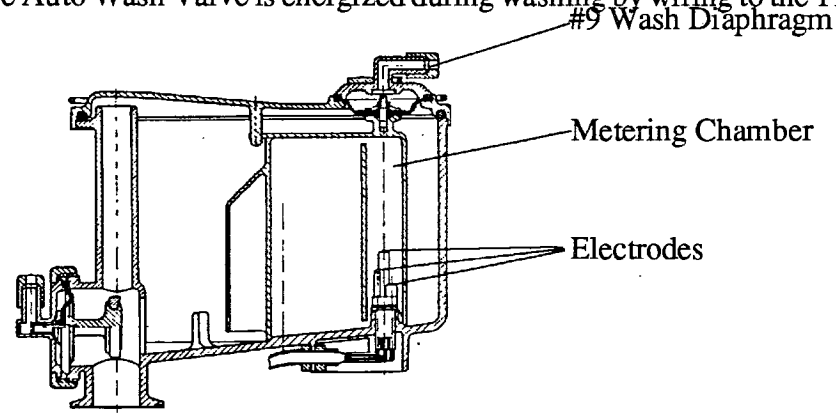
	Switching resistance necessary at the control unit	Kind of meter 86S
Plastic Meter with pin electrode 7161-6210-080 7161-6210-090 (exchange)	700 ohms	2
7161-6210-100 (exchange of meter with ring electrode)	400 ohms when pc board 7161-9047-140 is not inserted 700 ohms when above pc board is inserted	
Plastic Meter with ring electrode 7161-6210-030 7161-6210-050 (exchange)	400 ohms	1
S.S. Meter with plastic internal chamber 7161-6210-040	400 ohms	0
S.S. Meter with S.S. internal chamber	100 ohms	0

	Switching resistance pre-set at factory	Possible switching resistance
METATRON 12 Control 7161-2680-090 Double Control Board 7161-5985-030	700 ohms	400 - 700 ohms
METATRON 12 Control 7161-2680-080 Double Control Board 7161-5985-020	400 ohms	100 - 400 ohms
With PC Board 7161-9047-140	700 ohms	
METATRON 11 Control 7161-2680-010 , 7161-2680-050 Double Control Board 7161-5985-010	400 ohms	100 - 400 ohms
With PC Board 7161-9047-140	700 ohms	

4.9 INSTALLATION INSTRUCTIONS FOR AUTO WASH VALVE

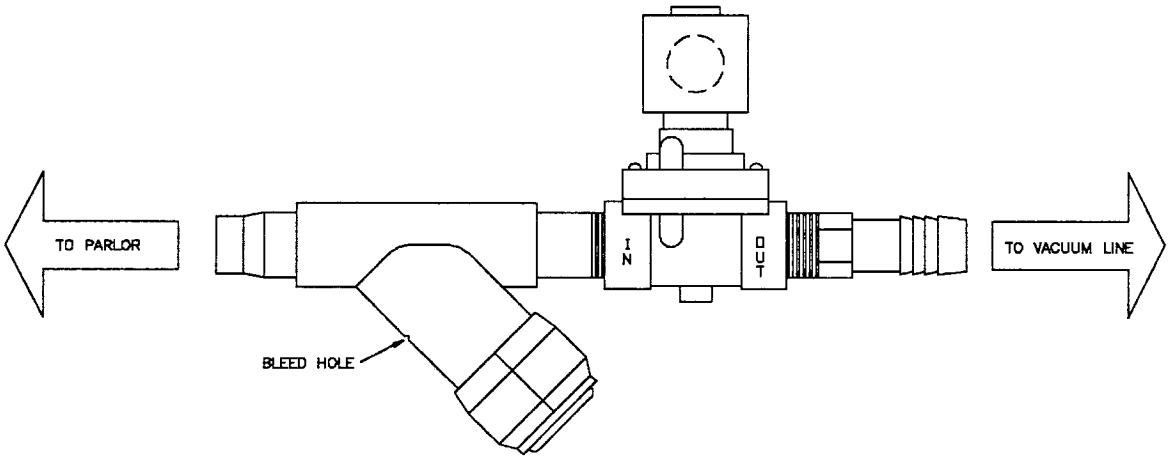
In order to obtain optimum cleaning of the electrode and the inside of the measuring chamber, the measuring chamber is raised during washing by applying vacuum to diaphragm #9.

The Auto Wash Valve is energized during washing by wiring to the 110V power used to operate



the air injector during washing. When energized, it allows vacuum to be applied to diaphragm #9. When de-energized, the vacuum is removed from diaphragm #9.

a. Install Looped 1/2" PVC in Parlor - Glue 1/2" PVC to auto wash valve PVC fitting. Run from valve to parlor and loop line around parlor. Install PVC Saddles (4021-0572-005) by drilling 1/2" hole near each Metatron and glue in place using PVC cement. Use blue fitting (0018-4474-860) to connect blue tubing to Metatron.



b. Wire to Auto Washer - Connect to Air Injector terminals in the Westfalia Washer or to similar terminals on other brands. 110V power shall only be applied during the wash cycle and must be turned off when the wash cycle is completed. Always wire solenoid valve with grounding wire.

c. Connect to Vacuum Source - Drill ¾ diameter hole in 3" PVC vacuum line. Fasten SS clamp-on inlet to vacuum line. Connect 5/8" transflo hose to clamp-on inlet and hose barb mounted in port labeled "OUT"

d. Connect to METATRON Milk Meter - Screw fitting supplied with meter into the PVC line. Assemble blue 1/4" vacuum tubing to fitting and to diaphragm #9 on the meter.

4.10 INITIAL START-UP

Carefully check all of the following:

* Air leaking
* Connections of control hoses
* Cable connections
* Electrode cables
* Settings of decoder switches
* Power supply
* Cleaning System adequacy

a. Connect the METATRON control board to the control unit by the flat cable connector and tighten the screws. Switch off the main switch (on back of control unit).

b. Turn on power to power supplies.

* All 16 signal lamps on the fuse panel light up.

* Both signal lamps on the coupling card in the power supply light up.

* Check the DC voltage, 24 to 28 volts.

c. Turn on vacuum pump. The upper signal lamp on the coupling card goes out.

d. Turn on main switches of METATRON control units. When the installation is started for the first time or after a power failure for more than 24 hours, the display shows "CS" (check system) to signal that the pre-set parameters have to be checked. Starting is only possible after setting the entry mode to ON by entering 8-8-S-1-E. The pre-set values of the program are taken over (see table in section 3).

e. Change the program codes as needed and check the check number (89S) which must all be the same in an installation with the same program chip version. Write down the code settings of the installation as reference for service.

f. Turn off vacuum pump. A small dot lights on the METATRON display. When the vacuum pump is turned on again the METATRON units show the active rinsing signal (see section 2.3).

g. Test operation of auto wash valve. When the pipeline washer is set to milking (and the vacuum pump running) the metering chamber must be down; when the pipeline washer is set to rinsing the metering chamber must be up.

h. Faults - In the event of a malfunction check the vacuum connections, control valve, electrode connections.

If necessary, change the METATRON control board or valve block with that of the next position.

If changing a milk meter, change the meter complete with cable.

5. CALIBRATION OF THE METATRON MILK METER

5.1 Milk Calibration

For calibration measurements to determine metering accuracy, the METATRON milk meter must be removed from the milk line and fitted to a milking bucket using calibration lid assembly Part Number 7161-2650-000 (see fig. 1). The amount of milk extracted must be checked on an accurate scale (see fig. 2).

NOTE: The metering values of METATRON units cannot be checked by use of a measuring device (Tru-test, Milkoscope, etc.) in front. The contradictory metering principles will lead to wide deviations in the values obtained.

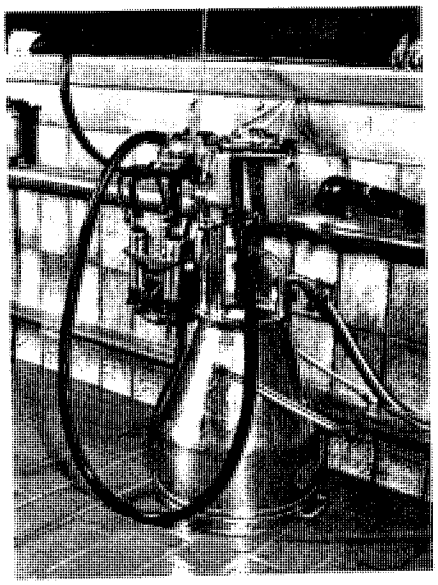


Fig. 1

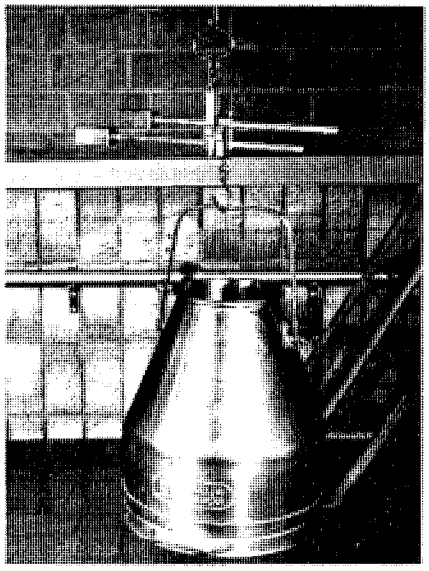


Fig. 2

METATRON CALIBRATION PROCEDURES:

Each METATRON meter has a factory calibration number (meter constant) hand written on the data tab next to the German word "Geratekonstante". This number must be used to set the DIP switches as per section 4.7.3. Note that the German 1 looks like 1 and the German 7 looks like 7. If a number is not on the meter body, begin calibration procedures with a number 6 switch setting (for example, with a meter constant number 6 switch, 6 and 7 on and switches 5 and 8 are off. The calibration is only affected by switches 5-8).

2. Each meter must be taken off the milk line or remote line connection and mounted to a calibration lid assembly on a milk bucket. The top of the METATRON body must be in a near level position for this calibration test. Milking vacuum to the milker bucket is to be supplied from the milk line.

3. Milk each cow through the meter into the bucket. Using a good balance scale, electronic scale, or a DHI Approved dairy scale, weigh the milk from the milking bucket.

4. The milk amount from the meter 2S must then be compared to the actual weight from the pail. Record this difference and divide by the pail milk weight to determine the individual milk weight difference multiplied times 100 to arrive at a percentage deviation. You must work only with the average percent deviations, not with the total milk amount deviations. See example on next page.

5. A minimum of 5 cow milkings must be obtained and the total differences then divided by the number of samples; i.e. 5, 6 or 7 to determine the percent of variation, plus or minus.

6. If the meter is reading high (more milk than is in the pail), the meter electronics must be lowered one setting per each percent variation, i.e. with a calibration (meter constant) setting of 8 and 3% high, the METATRON should be changed to a setting of 5.

7. To set the switch settings, change meter to cleaning position, turn the meter control off and change switches (fig. 12) to calibration setting #5. Turn meter back on, press stop, and continue with test.

8. If the meter electronics must be increased (meter not indicating enough milk), change switches to the positive: i.e. from 8 to 11.

9. After any adjustment, re-check each meter with three individual cow milk weights.

10. These calibrated settings must be marked on the DHI Approved label and attached inside the METATRON control.

11. If a meter constant or calibration is on a 0 or 15 setting and a further change is necessary, the electrode may be damaged and require changing the meter body or indicate a defective program chip in the meter control.

12. All meters must be calibrated to within plus or minus 1.5 percent accuracy. Do not change unless this is exceeded.

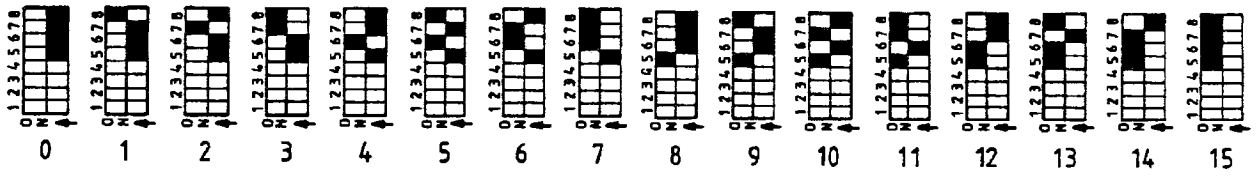


Fig. 12

EXAMPLE

Formula: Meter Weight - Milk Weight x 100 = Percent Deviation
Milk Weight

Sample #	Meter Weight	Milk Weight	Difference	Percent (+) (-)
1	24.6	23.2	- 1.4	- 6.0
2	35.2	35.1	- .1	- 0.3
3	17.1	16.9	- .2	- 1.2
4	21.8	21.9	+ .1	+ 0.5
5	19.4	19.0	- .4	- 2.1
			TOTAL	- 9.1

Divide the percent deviation (9.1) by the number of samples (5) equals 1.82 percent. In this case, change the meter one percent to the minus to decrease its measured milk amount and re-check.

Example: 1. Meter Weight (24.6#) - Milk Weight (23.2#) x100 = -6.0% Deviation Milk Weight (23.2#)

2. Meter Weight (21.8#) - Milk Weight (21.9#) x100 = +0.5% Deviation Milk Weight (21.9#)

Meter Constant No._____ Meter Serial No._____

Meter Calculation No._____ Date_____

Sample #	Meter Weight	Milk Weight	Difference	Percent (+/-)

13. When calibrating remote mounted Metatrons, it is not necessary to remove the milk meter from the mounting bracket. We are making a 1" milk outlet by 1-1/2" Clamp on ferrule connection available to make the connection to our Calibration Lid Assembly part number 7161-2650-000 for milking into a bucket. You must still use a 1" milk hose.

5.2 Salt Water Calibration (I.C.A.R.)

Note: the Metatron salt water calibration can only be used on milk meters with pin (bar) electrodes. With Metatron program chip part number 7161-9051-940 mwm 507 G+, 508 H or later, i.e. 93S (Program version) displays 508.7 or 509.8.

5.2.1 Preparation

1.1 Both the Metatrons and complete milking system must be in both a mechanically and hygienically faultless condition.

After completion of the regular complete wash cycle, including the rinse, perform another main hot acid wash at 2-3 times the regular amount of acid.

An unclean milking system must first be cleaned with possibly up to 3 times the normal amount of CIP cleaner. If a mechanical reason is found for the system to not be properly cleaned, i.e. inadequate hot water, this problem must be corrected.

Certain wear parts may need to be replaced or adjusted by a Certified Westfalia Technician. (Annual, or more frequent, change of diaphragms and milk discharge valves.)

5.2.2 Test Solution

With an accurate calibrated scale (Chatillon), carefully mix a water test solution of 1-1/2 ounces fine iodized table salt with well water (temperature 40° to 70° F) to have a total weight of 20 lb.. It may be necessary to pour this solution between two pails several times to ensure complete solvency of the salt. Repeat this mixing procedure until an adequate volume of test solution is available (10 pails).

During testing, pump the mixed test solution with a hose from the milk room back into the milking parlor for reuse; or, separate the milk transfer line after the milk pump to keep the test solution in the parlor.

5.2.2 Test set-up using Westfalia Test Set No. 7161-2862-000/4017-6165-006

The milk meters remain on the milk line or as connected to the meter mounting brackets. It is not necessary to use the milk sampling devices.

Remove the long milk tube from he milking cluster at the milk meter and connect the test set.

One milk meter on each side of a parlor can be tested simultaneously with this test set.

5.2.3 Test Sequence

Weigh 20.0 lb. or the test solution.

Turn ALL Metatrons to the milk position by pressing the STOP button.

Remove the blue tube to the measuring chamber (replace after completion of the test). This is the 6 mm line to raise the internal chamber during washing.

Press "Start" on the control unit.

IMPORTANT wait 10 seconds after pressing the start button (milk discharge valve with close). Then insert suction hose "Nozzle end" into test solution.

NOTE: Ensure that no extra air is drawn in during the course of measurement (only metered air through the "air nozzle" in the test unit).

After testing, reconnect all tubes and perform a "final acid rinse" to remove any dried-on salt deposits.

5.2.4 Evaluation: A perfect reading on the Metatron would be a display of 20.1 due to the volume weight difference between milk and water.

Run two samples. The average value must be between 19.6 and 20.5 during this salt water test.	After Correction
Example 1: Milk meter has measured 19.4 and 19.5. Make +1% correction on control unit.	19.7
Example 2: Milk meter has measured 19.4 and 19.7. Make +1% correction on control unit.	19.8
Example 3: Milk meter has measured 19.5 and 20.2. A third measurement is necessary. If the third measurement is between 19.8 or 20.2, then no correction is required.	
Example 4: Milk meter has measured 20.7 and 21.0. Make -2% correction on control unit.	20.4
Example 5: Milk meter has measured 18.9 and 19.3. Make +3% correction on control unit.	19.7

Example 6: Milk meter has measured 20.8 and 21.1. Make -3% correction on control unit. 20.3

5.2.5 Setting the device constants

Determining the constants with which the values are measured: Press keys "9-O-S." Device constant is indicated (i.e. 9 as shown below using Example 6 above).

Put control in wash position: Press and hold key "C" for 2 seconds.

Turn-off unit with switch on back of control.

Remove front plate from housing.

Adjust DIP switch by -3% according the established deviation: Set new device constant 6 (corresponds to new correction value of -3%) on DIP switches 5 to 8.

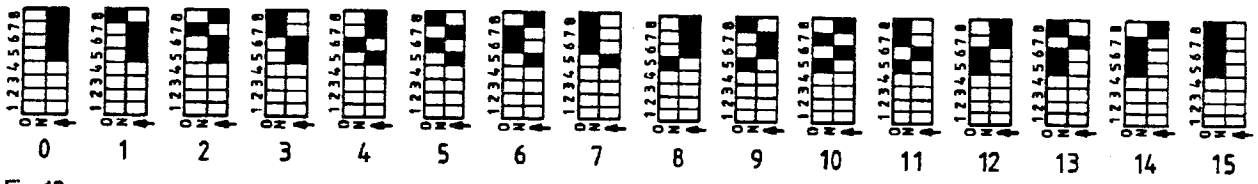


Fig. 12

Replace front cover.

Turn on unit by switch on back of control.

Put control unit in milking position: Press "STOP" key.

Call up newly preset device constant: Press key "9-O-S". New device constant (6) is indicated.

5.2.6 Total Milk Test

A second test to verify the amount of liquid solution drawn through the metering device is to press 25S. This will give the total amount, i.e. 2, 3 or 4 samples for example: 19.9 plus 20.2 with show 40 lb.

5.2.7 Trouble Shooting

If meter reads low, check for leaking milk discharge valve

If readings are inconsistent, check for meter cleanliness.

6. MAINTENANCE

Efficient cleaning of the inner parts of the milk meter is only possible when the metering chamber is raised. The automatic raising of the metering chamber should therefore be checked at regular intervals. If in doubt, lift one teat cup shell and allow air to be drawn in. The milk discharge valve is subject to a high degree of mechanical, chemical and thermal stress. Therefore, this discharge valve should be changed at least every 5000 milkings or annually. All diaphragms and gaskets must be exchanged annually. When washing is starting at a water temperature of 170 degrees F and above, the above wearing parts may require more frequent change. Circulating wash water temperatures over 170° F will cause stress fractures and a premature breakdown of the Polysulfone. To ensure faultless operation of the valves, it is necessary to check the fit and, consequently, the tightness of the control tubes on the respective valve head connector from time to time. In order to avoid cross-section restrictions, the control tubes must not be fitted too far into the connectors of the valve covers. Spacing washers fitted below the diaphragms must be adjusted when diaphragms are changed. Otherwise, the metering chamber will not be seated on the bottom of the milk meter.

7. SERVICE

SERVICE PROCEDURES

IMPORTANT NOTE:

Before changing any board, program chips or driver chips refer to section 7.3 in the manual regarding the testing of reversing valve coils. A bad reversing valve coil may cause a board or chip to fail again immediately upon power-up or very shortly thereafter. Replace any bad reversing valve coils before replacing any board, program chip or driver chip. This also includes pulsator coils driven off Metatron.

Program chip versions should be kept the same in a given installation. Program versions can be checked using 9 3 S. This will indicate if a different version program chip is the reason for inconsistent 8 9 S readings. -000 and -010 Metatron 11 Boards will work only with Metatron 11 program chips. -020 and -030 Metatron 12 boards will function with all versions of Metatron chips (B through H). -040 Metatron boards will function with Metatron 12 program chips version F, G, G+ or H only.

When replacing a ring type electrode meter body with a new pin type body using the existing board, use part #7161-6210-100 which includes the new meter body and the extra PC card (7161-9047-140), which must be inserted into terminals 5, 6 and 7 of the power card. This PC card will increase the switching resistance approximately 300 ohms allowing the resistance to be set at 700 ohms with the existing control board.

The ohm setting on the Metatron board must be correct for the type electrode contained in the meter body. Set the potentiometers as outlined in section 4.8. Consult the following chart for the correct setting.

Meter body part #	Required ohms setting
7161-6210-080	700 ohms
7161-6210-090	700 ohms
7161-6210-100	400 ohms w/out 7161-9047-140 board
	700 ohms w/7161-9047-140

Possible ohms settings of a given board:

Board part #	Ohms set at factory	Possible settings
7161-5985-040	700 ohms	400-700 ohms
7161-5985-030	700 ohms	400-700 ohms
7161-5985-020	400 ohms	100-400 ohms
above w/7161-9047-140	700 ohms	
7161-5985-010	400 ohms	100-400 ohms
above w/7161-9047-140	700 ohms	

NOTE: The Westfalia variable resistor (0005-1199-000) is not an ohm meter. It creates the desired amount of resistance across its two leads. In other words it creates resistance whereas an ohmmeter measures resistance.

The 9 5 S test program tests Metatron-controlled parlor feed by dropping 1 portion when 9 5 S 1 E is entered on the Metatron control.

The 9 1 S test program is very helpful in diagnosing problems. Its use is described in section 7.5 of this manual. 9 1 S quickly confirms or eliminates the possibility of problems involving the electrodes.

Failure of an electrode indication line to light can be caused by any of the following:

(1) Malfunctioning discharge valve
(2) Dirty probes from milk or hard water residues
(3) Incorrect wiring connections of electrodes in control box.
(4) Bad connection between the electrode and meter board or broken wire.
(5) Metatron or power board failure.

Continuous lighting of probe indication line can be caused by:

(1) Reversing valve failure
(2) Malfunctioning Auto Wash Valve
(3) Ruptured chamber diaphragm on any meter applying vacuum to the others. There should be no vacuum on the auto wash line during milking. Ruptured diaphragms can be easily located by removing the tubing from the wash diaphragm with vacuum on the meter and checking for vacuum at the tubing connection.

Always remember that some individual parts of the Metatron board are replaceable and may be causing the problem. Parts such as the push-button, program chips, microprocessor chip or driver chips can be replaced in the field and should be checked before replacing a "defective board". * See sect 7.4 NOTE: Chip # 14 is NOT an unused driver chip as indicated - this chip also controls the stimulation solenoid coil on Stimopuls M) *

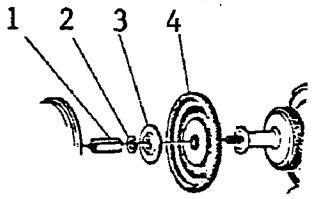
Also before replacing a board, move it to a functioning unit to be positive that the board is the problem. If the board functions correctly after being moved next try reconnecting it in its original position - sometimes a bad connection of the cable to the board can be the problem.

The discharge valve must be set properly for accurate milk weights to be obtained. Set the valve according to instructions in section 7.1.

Front decals must be replaced IMMEDIATELY if damaged or cracked to prevent exposure of circuit board to moisture. Replace as instructed in section 7.2.

7.1 DISCHARGE VALVE AT MILK METER

Check the milk discharge diaphragm tension on each meter -- proper adjustment is imperative for correct meter operation. To do this, tighten stem No. 1 until the outer rib of diaphragm No. 4 is below the inside edge of plastic disc No. 3. If this is too loose, milk will leak by the discharge valve during milking from improper alignment and will not be measured and/or the discharge valve will not fully open reducing the amount milk flow the meter can measure.



7.2 REPLACEMENT OF THE FRONT COVER DECAL

If the front cover decal is damaged or cracked a new one must be installed to avoid possible damage to the circuit board.

The new decal should be replaced per these instructions:

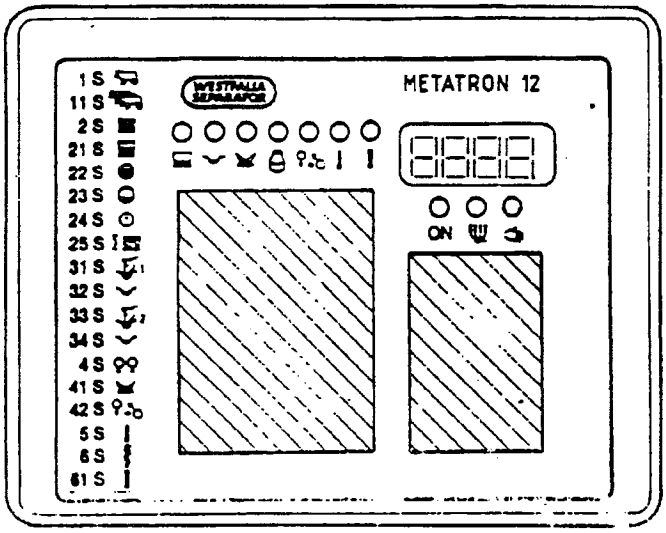
1. Remove the front cover and remove each electrical component.

2. Remove the worn out decal and clean the front cover frame in a hot, mild soap solution. Scrape off the old contact cement and dry thoroughly.

3. Use a sharp knife or file and scrape each rectangular opening in the cover frame to eliminate any sharp edges that might cut the decal during operation.

4. Affix new decal in place.

5. Replace electrical components and re-assemble to control box.



7.3 TESTING COIL RESISTANCE OF REVERSING VALVES

When checking a defective unit, ALWAYS check the coil resistance of the double reversing valves FIRST. Failure to check the resistance may cause a defective coil to burn out a perfectly good circuit board.

TEST PROCEDURE:

Each coil has four wires (2 blue and 2 yellow). Check the resistance between the 2 blue wires and between the 2 yellow wires.

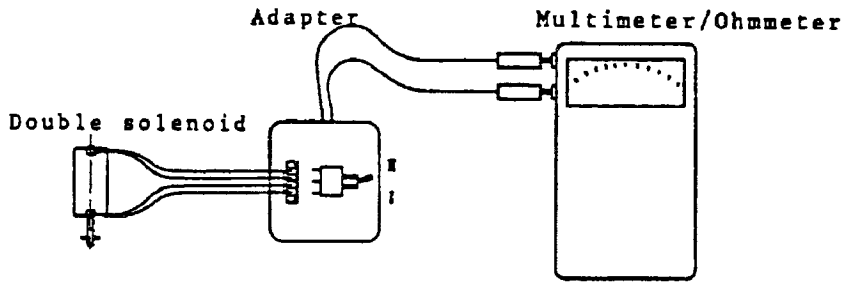
a. Nominal resistance: 40 to 80 ohms.

b. If resistance is less than 38 ohms, then coil is short-circuited and defective.

c. If resistance is more than 80 ohms, then the coil is "open" and is defective.

WESTFALIA TEST ADAPTER:

The double reversing valves can be quickly checked by plugging the double solenoid valve into the test adapter as shown below.



TEST PROCEDURE USING THE TEST ADAPTER:

1. Set meter to a range greater than 100 ohms.
2. Plug double reversing valve into the test adapter.
3. When switch is in position I, it checks the resistance between the blue wires.
4. When switch is in position II, it checks the resistance between the yellow wires.

The Westfalia Test Adapter is Part Number 7161-2508-000.

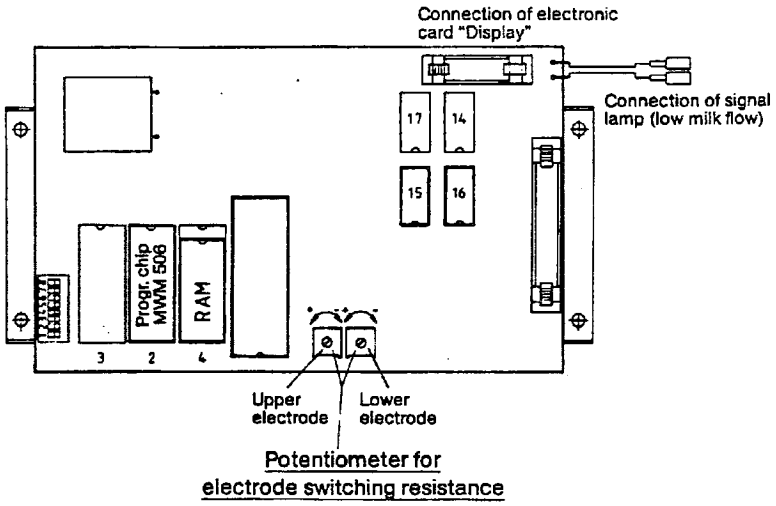
7.4 POWER DRIVER CHIPS

Metatron 12
7161-5985-020/-030

The power driver chips control and regulate power to the following items if used:

These are easily changed out individually as necessary.

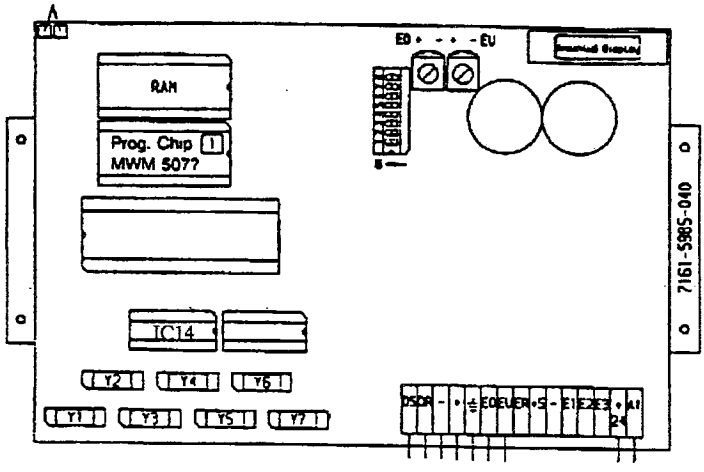
Driver Chip for 020, 030 Board, Part # 0005-0335-030



IC14 - Y5
IC15 - Y1, Y2
IC16 - Communication Line
IC17 - Y3, Y4

Metatron 12
7161-5985-040

Driver Chip for 040 Board, Part # 4021-0085-012



IC14 - Y1, Y3
IC15 - Y2, Y4, Y5

KEY:
Y1 - Discharge Valve
Y2 - Vacuum Shut-off
Y3 - Autopuls M & Stimopuls M
Y4 - Autopuls M & Stimopuls M
Y5 - Stimopuls M

7.5 9 1 S TEST PROGRAM

The 9 1 S test program is very helpful in diagnosing problems. It's use is described on page 13 of this manual. 9 1 S quickly confirms of eliminates the possibility of problems involving the electrodes.

Failure of an electrode indication line to light can be cause by any of the following:

1. Malfunctioning discharge valve.
2. Dirty probes from milk or hard water residues.
3. Incorrect wiring connections of electrodes in control box.
4. Bad connection between electrode and meter board or broken wire.
5. Metatron or power board failure.

Continuous lighting of probe indication line can be cause by:

1. Reversing valve failure.
2. Improper wiring connections of electrodes in control box.
3. Inner chamber raised during milking. See inner chamber paragraph below.
4. Metatron or power board failure.

7.6 AUTOWASH OPERATION

The inner chamber should be raised during the cleaning cycle and lowered over the electrodes during milking. If the chamber remains down during cleaning, the meter body will not wash properly. If the chamber is raised during milking, milk weights will not be accurate and the discharge valve may function erratically. This happens because the chamber prevents milk foam from reaching the electrodes. Raised chambers during milking can be caused by any of the following:

1. Improperly installed chamber
2. Malfunctioning Auto Wash Valve
3. Ruptured chamber diaphragm on ANY meter applying vacuum to the others. There should be no vacuum on the auto wash line during milking. Ruptured diaphragms can be easily located by removing the tubing from the wash diaphragm with vacuum on the meter and checking for vacuum at the tubing connection.

7.7 CIRCUIT BOARD SERVICE AND REPLACEMENT

Always remember that some individual parts of the Metatron board are replaceable and may be causing the problem. Parts such as the push-button, program chips, microprocessor chip, or driver chips can be replaced in the field and should be checked before replacing a "defective board". (SEE SECTION 7.4 OF THIS MANUAL)

Also before replacing a board, move it to a functioning unit to be positive the board is the problem. If the board functions correctly after being moved next try reconnecting it in its original position -- sometimes a bad connection of the cable to the board can be the problem.

7.8 MEMORY PROBLEMS

A very rare occurrence is for a Metatron unit to become irrational in its operation. It may show strange numbers during operation or perform in an unusual manner. De-energizing the circuit board microprocessor and reprogramming the unit may reboot the processor. The steps are as follows:

1. Turn off the power to the unit in question.

2. Remove both the program chip and memory chip and place legs down in the palm of your hand for 10 seconds then reinsert into the PC board.

3. Turn the Metatron switch back on. The display should read "cS", check System. This indicates that the unit has returned to factory parameter settings.

4. The unit must now be completely reprogrammed as outlined above.

Again it is rare for this to become necessary.

7.9 TROUBLE SHOOTING WITH METATRON

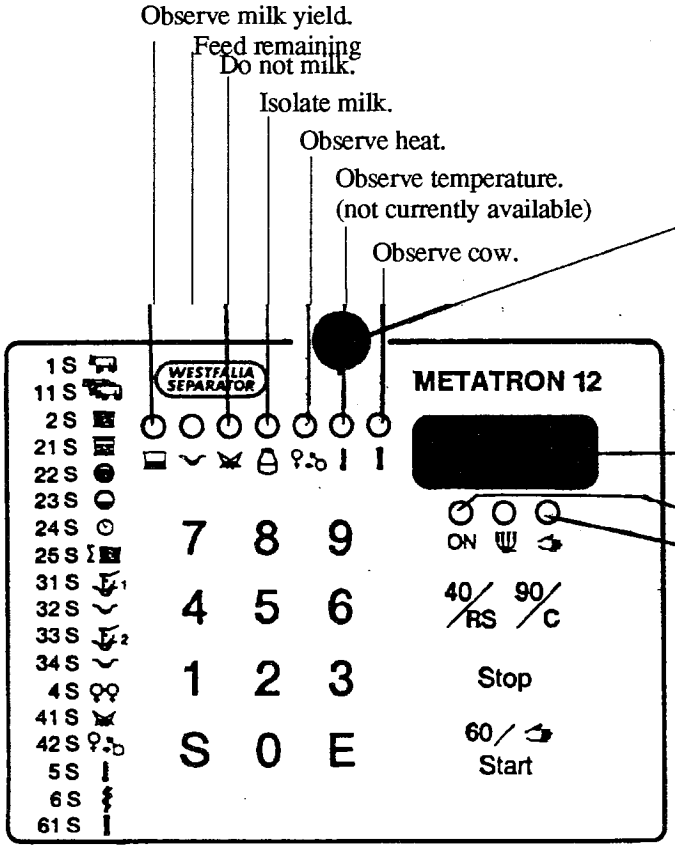
Fault	Cause	Remedy
Control unit does not indicate. There is no illuminated dot.	Power supply is faulty or unit is not switched on.	Switch on unit, check/replace fuse.
Control unit does not respond to the keys.	Program sequence is faulty.	Switch off unit for 5 seconds, then switch on again. If there is still no function, change control unit.
METATRON does not show rinsing position with vacuum pump on.	There is no motor control signal. Power supply is defective.	Request after-sales service.
A four-figure code appears in the display when the unit is switched on.	Memory store or program chip is defective.	Change the printed circuit card or program chip. See test function, system test.
Measured values of a normal magnitude have a wide spread.	Milk meter is tilted too much to the electrode side.	Check the installation.
	Discharge valve is malfunctioning; gasket has slipped off valve body.	Change gasket.
	Diaphragm of discharge valve has insufficient initial tension.	Change diaphragm.
	There is water in the control line (red and green).	Drain the water from control line.
	The control vacuum is too low.	Check control line and vacuum supply to valve (2kPa reading).
	Electrode or interior of milk meter is dirty (poor cleaning); measuring chamber is not raised.	Check vacuum at diaphragm. Check automatic milking/rinsing change-over (auto wash valve).
	Measuring chamber is jammed; insufficient water from wash vat.	Insert measuring chamber correctly.
	Temperature too low, insufficient cleaning solution, too little clear rinse water, rinsing time too short.	Check washing.
	No agitation in meter during washing.	Change air injector settings; change key settings for cleaning (73S,74S,75S).
	Leaking Autowash Valve	Chamber Diaphragm

Measured values vary greatly from those expected.	System has not switched from rinsing to milking.	Check automatic change-over from milking to rinsing.
	Measuring chamber is jammed. Measuring chamber is outside cap guide.	Insert measuring chamber correctly.
	Electrode connections are interchanged (maximum milk flow cannot be called up).	Make the connections correctly.
	Control valve does not switch.	Check valve control unit.
	Control vacuum is too low.	Carry out 2kPa measurement.
	Autowash Valve	Chamber Diaphragm
Indication shows max 0.6.	Discharge valve is not working; control unit is defective.	Switch off unit for 5 minutes and then switch on again.
	Valve body is jammed.	Check valve body.
	Gasket has slipped off valve body.	Change gasket.
	Control valve does not switch.	Check valve/control unit.
	Red control tube has slipped off/ is kinked.	Check vacuum supply/connect or change control tube.
Cluster is not removed.	METATRON control unit is switched to manual cluster removal.	Set METATRON control unit to automatic cluster removal.
	Control valve does not switch.	Check valve/control unit.
	No vacuum at control valve.	Check vacuum supply.
Cluster is not released at START.	Control valve does not switch.	Check valve/control unit.
Cluster is removed during the measurement in progress.	Discharge valve does not close or open. See above "Indication shows max. 0.6".	See above "Indication shows max. .06".

7.10 MONITORING OF WASHING

After the rinsing cycle a control unit displays symbol 1/_._/.	The milking unit for this control has drawn in too little rinse liquid, or none at all. The cluster is not connected to the cluster holder, or is incorrectly fitted. The clawpiece is closed. The long milk tube is kinked.	Check for straw or other particles in the CIP unit. Insert the cluster correctly for the next rinsing cycle. Open the clawpiece. If necessary, repeat the rinse cycle.
Several control units display symbol 1/_._/ after the rinsing cycle.	See 1. There is too little water in the installation during the main rinse. Water distribution is poor. Too little rinsing agent was dispensed during the main rinse.	See 1. Adjust the connector position on the rinse line. Adjust the air injector setting. Check the rinsing agent dispenser. Repeat the rinsing cycle.
All control units display symbol 1/_._/ after the rinsing cycle.	No rinsing agent was dispensed during the main rinse. The automatic rinsing system is faulty.	Check the rinsing agent dispenser. Check the automatic pipeline washer. Repeat the rinsing cycle.

8. OPTIONAL MASTER COMPUTER

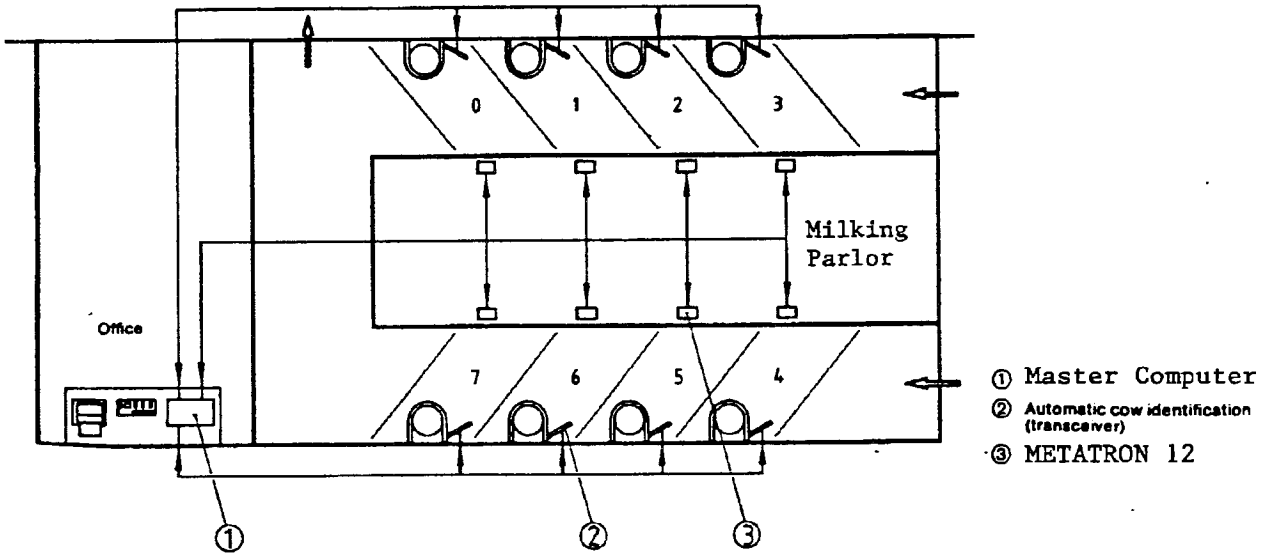


DATA RETRIEVAL FACILITIES

Entry	Information, Instruction
1 S	Cow number
11 S	Cow group number
2 S	Milk yield of cow
21 S	Milk yield expected
22 S	Maximum yield per minute
23 S	Average yield per minute
24 S	Milking time
25 S	Milk yield per parlor position/milking time
31 S	Amount programmed - feed 1
32 S	Remainder - feed 1
33 S	Amount programmed - feed 2
34 S	Remainder - feed 2
4 S	Days in lactation
41 S	Dry period
42 S	Heat

5 S	Temperature (not in operation as yet)
6 S	Treatment code
61 S	Observe animal
RS	Repeat start
C	Rinse
STOP	Terminate measurement and remove cluster
START	Start measurement
S	Retrieve data
E	Enter data

* Control unit keys or functions which do not respond are intended for further expansion.



8.1 INTRODUCTION

Connecting the METATRON control units in a milking parlor to the Master Computer System permits:

* Continuous recording of the milk yield of individual cows

* Entry and retrieval of the cow number and associated feeding, lactation and milking data at every milking position.

Depending on the equipment in the installation, the cow number can be entered automatically or manually. Then:

* Milking data (lactation and treatment data) is automatically signaled on the METATRON.

* Control tasks (parlor feeding) for individual cows are automatically performed.

* On completion of milking, the milk yield and any other data entered is automatically fed into the control system.

8.2 OPERATION

8.2.1 WITHOUT AUTOMATIC COW IDENTIFICATION

When the cow number is entered on the METATRON, it is fed to the master computer; and if this number is stored there, it is passed back to the METATRON with the stored information relating to the cow.

8.2.2 AUTOMATIC COW IDENTIFICATION

The master computer first interrogates the cow number via the transceiver (individual place or portal ID) and then feeds the data into the METATRON control unit located at that position.

8.2.3 MILKING WITHOUT ENTERING THE COW NUMBER

If there is no cow number, all seven LED's light up when the START button is pressed. If the START button is pressed again, the cluster is released, but the LED's stay on to indicate that the cow number is missing.

NOTE: Control tasks for individual cows (e.g. parlor feeding) and automatic signals (treatment with antibiotics) require that the cow number be entered before milking starts.

8.3 AFTER THE COW NUMBER HAS BEEN ENTERED:

The following information is automatically signaled if meeting your "set-up" criteria:

* Fresh cow
* Observe heat
* Do not milk
* Observe cow (general code)

The following information can be called up:

* Measured milk yield
* Expected milk yield
* Amount dispensed, feed 1 and feed 2
* Feed remainder, feed 1 and feed 2

* Days in lactation
* Health code
* General code
* Group number

The following data is automatically transferred for storage in the central control unit:

* Milk yield
* Milking time

The following data can be entered for storage in the central control unit:

* Heat
* Dry period
* Health code (treatment)
* General code

The following information is automatically signaled after removal of the cluster:

* Too low a milk yield (outside your set-up)

8.4 ENTERING DATA IN THE METATRON CONTROL UNIT

8.4.1 MANUAL ENTRY OF THE COW NUMBER

Example: Cow number 61

Instruction	Entry	Digital display	LEDs - METATRON						
									
Cow No. 61	1-S-6-1-E	61							

When the entry has been made, the cow number flashes in the digital display. While the number is flashing, the data is being fed from the master computer to the METATRON control unit.

When the cow number lights continuously in the digital display, the cow data can be retrieved from the METATRON control unit and new data can be entered.

After the first cow number, all subsequent cows can be entered by pressing the cow number and E if no other key was entered.

8.4.2 AUTOMATIC ENTRY OF THE COW NUMBER

If a new cow number is sent from a milking position, the METATRON automatically switches over to function 1-S (cow number). The digital display indicates the new cow number.

If the digital display was already indicating a cow number when the new cow number was automatically entered, or if the control unit was previously in the 1-S function, the old cow number flashes alternately with the newly entered cow's number. Pressing any key causes only the last cow number entered to be displayed.

8.5 MANUALLY ENTERING THE MILK YIELD

Example: 17.5 lbs.

Instruction	Entry	Digital display	LEDs - METATRON						
Milk yield. 17.5 lbs.	2-S-1-7-5-E	17.5							

The milk yield can be manually entered on completion of milking; ie, when the milk has been milked into a bucket as with a fresh or treated cow or when entering weights from weigh jars.

8.6 HEAT

The cow calendar signals possible heat via the METATRON control unit. The signal for heat is acknowledged from the parlor position as shown in the table.

Instruction	Entry	Digital display	LEDs - METATRON							Large lamp
Acknowledging heat	4-2-S-1-E	1					●			● 1)

1) Flashing of the large lamp is cancelled by operating the S-key.

8.7 DRY PERIOD

The dry period for the cow is signaled on the METATRON control unit by continuous lighting of the LED "Do not milk."

Entering the dry period:

Instruction	Entry	Digital display	LEDs - METATRON							Large lamp
Entenng the dry period	4-1-S-E	1			●					● 1)

1) Flashing of the large lamp is cancelled by operating the S-key.

The LED "Do not milk" flashes if the cow remains in the herd and is automatically identified at a milking position, or if the cow number is entered by hand.

8.8 HEALTH AND GENERAL CODES

Analagous to the entry of code on the panel of the control system, data can also be entered directly at the milking position via the METATRON control unit, e.g. if the cow has been treated for sickness. This information can also be entered at the master computer.

8.8.1 HEALTH CODE

Instruction	Entry	Digital display	LEDs - METATRON							Large lamp
Health code, e g. 14 days treatment indicated on the METATRON	6-S									
For separate milking (fresh cows) final dig=1	-1-4-0-1-E	1401				●				● 1
For "Do not milk" the final digit = 2	-1-4-0-2-E	1402			●					● 2

1) Flashing of the large lamp is cancelled by operating the S-key

EXPLANATION OF THE HEALTH CODE:

1st and 2nd digits =

Length of treatment in days; the figure entered is reduced by 1 each day. As long as the number is greater than 0, the cow is included on the printout from the printer. See digit 4 for signaling of the health code on the METATRON control unit.

3rd digit =

Type of sickness; e.g. code as chosen by operator:

1 mastitis
2 footrot

4th digit =

Indication on the METATRON:

1 "Isolate milk"
2 "Do not milk"

Both digits are signaled on the METATRON control unit according to the length of treatment.

Digit 2 "Do not milk" should be selected when an infection precludes the use of this milking cluster (milk cow in isolation stall if provided).

NOTE: When "Isolate milk" or "Do not milk" is displayed, the cluster is NOT released when the START button is pressed after entry of the cow number (automatically, or by hand on the control unit). This is over-ridden by double pressing the START key. Then the METATRON automatically will milk in the manual mode.

8.8.2 GENERAL CODE

Instruction	Entry	Digital display	LEDs - METATRON							Large lamp
										
General code with signal entry on METATRON	6-1-S-0-0-0-1-E	0001							●	● 1)

1) Flashing of the large lamp is cancelled by operating the S-key.

General code (as selected by user, 1st, 2nd and 3rd digit)

1st and 2nd digit will add additional stimulation time to calculated amount (see lactation dependant stimulation)

3rd digit =
Number of calvings

Alternatively, the first three digits can be used to register the sample bottle number.

4th digit =

1 = Manual cluster removal is pre-selected after start of milking
2-5, 7 = Small LED "Observe cow"
6 = AutoTandem animal change is blocked
8 = Feed remainder symbol lights up
9 = FINILACTOR is blocked

8.9 RETRIEVAL OF DATA: (See table below)

The following data can be called up; data denoted by "2" can only be retrieved after milking (cluster removed).

Entry	Digital Display	Explanation of Digital Display
1-S	6 9	Cow number 69
11-S	4	Cow group number 4
2 S	3 2.8	Measured milk yield = 32.8 lbs.
2-1-S	3 3.1	Expected milk yield = 33.1 lbs.
2-2-S	7.3	2) Maximum flow rate = 7.3 lbs/min.
2-3-S	3.9	2) Average flow rate = 3.9 lbs/min.
2-4-S	6.7	2) Milking time = 6.7 min.
2-5-S	1 7 5.3	Total milk yield per milking period and milking position = 175.3 lbs.
3-1-S	1 0.0	Amount programmed, feed type 1 = 10.0 lbs.
3-2-S	4.7	Remainder, feed type 1 = 4.7 lbs.
3-3-S	2.5	Amount programmed, feed type 2 = 2.5 lbs.
3-4-S	1.2	Remainder, feed type 2 = 1.2 lbs.
4-S	5 4	Days since start of lactation
6-S	1 2 0 1	Health code
6-1-S	2 6 3 1	General code

9. OPTIONAL IN-PARLOR WALK THRU IDENTIFICATION

Please refer to Instruction Manual No. 4021-0242-017.

10. OPTIONAL IN-PARLOR SINGLE PLACE IDENTIFICATION

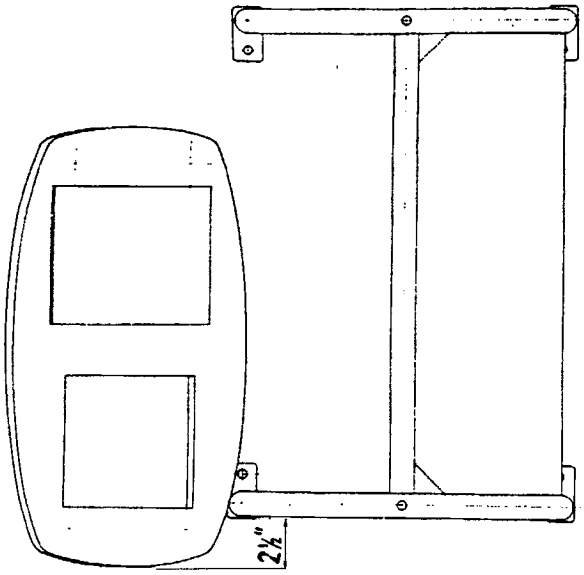
10.1 DESCRIPTION

There is installed a single antenna at each milking place. The cows are identified when they approach the antenna with the responder. The system operates with low speed or regular high speed responders only.

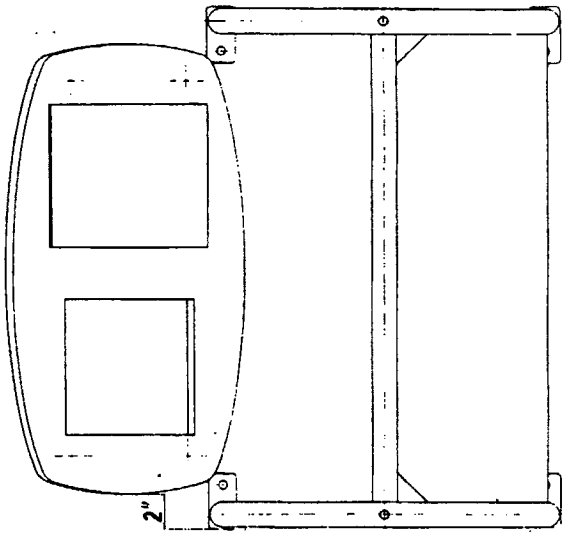
10.2 INSTALLATION

10.2.1 TRANSCEIVER INSTALLATION

Mount the parlor transceivers as shown in the drawings below. When installing the transceivers in the parlor it is necessary to decide whether or not feed is to be dispensed in the parlor.



With feeding



Without feeding

If the transceivers cannot be installed in the parlor in accordance with the drawings, then they should be arranged as follows:

Before mounting the transceiver always check the position of the responder in accordance with the following instructions:

* Fit a group of cows for one parlor side with responders.

* Drive the group of cows into the parlor and mark the position of the responders on the wall or on the floor, also mark the height.

* Compare the positions found and mount the transceivers in the average position. The position of the responder equates to the middle of the transceiver. The distance from the transceiver to the responder should be maximum 12".

* Mount the transceivers vertically to the feeding bays on breast rail horizontally.

Mount the Reinforcement Backing (Part Number 4021-0477-014) behind the transceiver to strengthen the identifier antenna.

Metal parts with an edge length greater than 2" or diameter 2" are not permissible in the area of the coils.

The distance from large metal parts, e.g. T-supports, should be at least 8".

Do not install automatic feeders on the outside of the parlor wall, otherwise screen with galvanized metal sheet, minimum 4 feet by 4 feet on outside wall.

10.2.2 CONNECTION TO THE MAINS AND GROUNDING

The power supply must be connected to a separate dedicated 120 VAC, 20 amp circuit. (All power supplies and PC's in a system must be on the same dedicated circuit). The main power must be from a Westfalia constant voltage regulator.

Grounding: All metal parts of the parlor frame, milk transfer system, milk, rinse and vacuum lines must be connected to one ground.

10.2.3 LOW VOLTAGE INSTALLATION

Make wiring in accordance with the wiring diagram below.

The METATRON control units and milking place transceivers are divided into groups of 16 via the power supply unit.

Milking places are consecutively numbered beginning with 0 on the right exit side (see section 4.6).

10.2.3.1 MILKING PLACE TRANSCEIVERS

Connect up to four transceivers via 4-core 16 gauge cable (DS, DR, +, -), length maximum 80 feet.

Loop the cable from one transceiver to the next or go with one cable to a junction box near the transceivers and connect each time four transceivers to it.

The drain wire must be in a silicon tube and connected with the minus terminal in the power supply.

Program for transceivers is VPIC03? (Program Chip Part Number 7160-9051-940).

For setting the DIP switches in the parlor transceiver see drawings below.

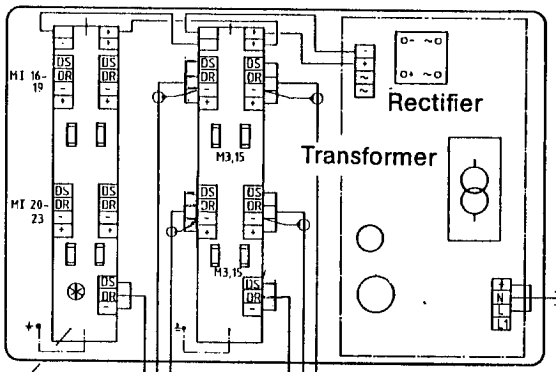
NOTE: There are two types of transceiver cards: with and without DIP switches in the middle.

NOTE: At older installations with the -490 transceiver program chip (program VPIC00?) the Parlor ID units MUST be connected to the same power supply as the corresponding METATRON units. Up to eight METATRONS and Parlor ID units can be connected to one power supply. They must be connected individually to a METATRON fuse strip and coupler card (not at groups of four). The settings of the code switches at METATRON and the transceiver are different (see drawing below). Only 3-digit low speed responders can be used.

For a flat milking barn with one METATRON for 2 milking stalls two identically addressed transceivers must be installed for each METATRON. A switch must be installed in the DR line to identify the cow being milked.

WIRING DIAGRAM

Power supply unit 1
MI 0...15*



Installation for MI 0...15
MI 16...31/32...47/48...63
accordingly

MI Milking place identification

Fuse strip
Milking parlour identification

MI 12...15
MI 8...11
MI 4...7
MI 0...3

l max. 25m /80ft.

to computer
Connections MI 0...15

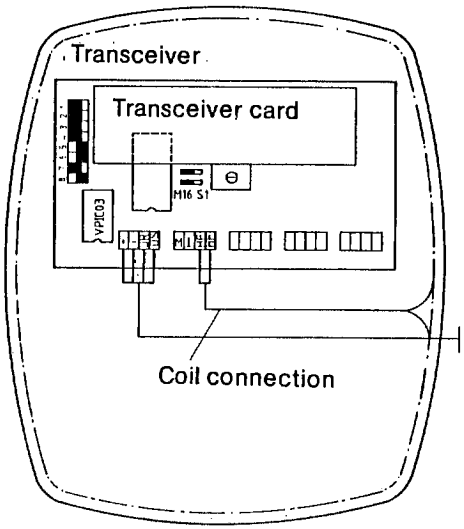
l max. 500ft.

Connections 16...31*

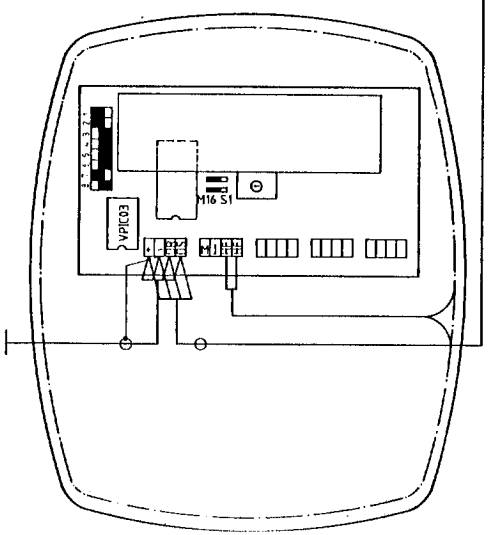
* MI power supply unit 1 for max. 24 MI transceivers, from MI 16 install second fuse strip. In addition use second power supply unit for MI 16...31

DS = Yellow
DR = Red
\+ = Black
\- = White

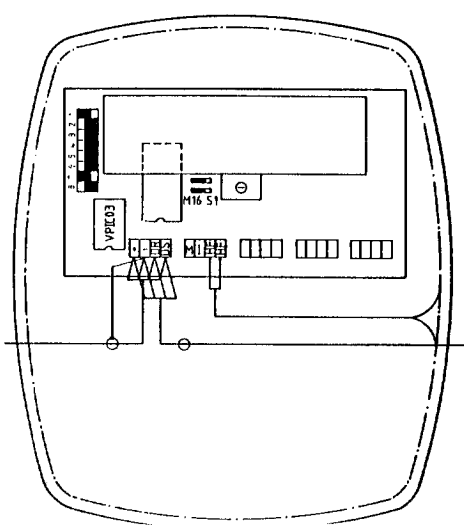
MI 0



MI 3

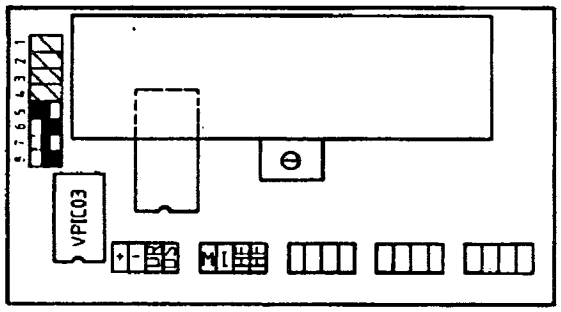


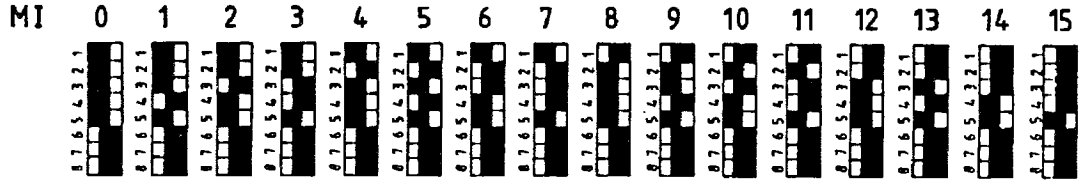
MI 7



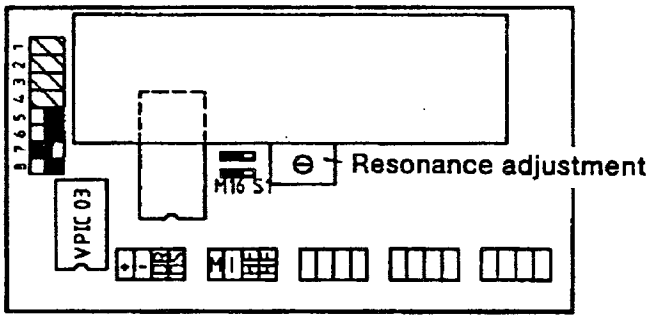
CODE SWITCH SETTINGS AT THE PARLOR TRANSCEIVERS WITH THE -940 TRANSCEIVER PROGRAM CHIP

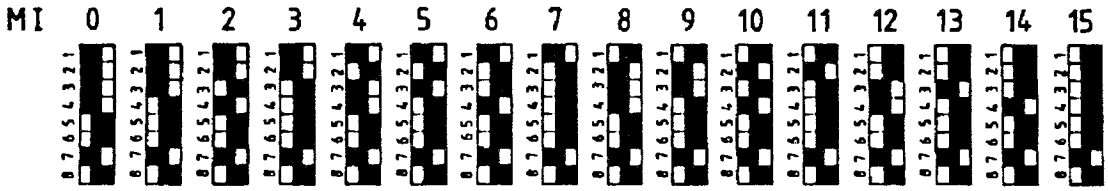
Coding MI 0...15 (without switches M 16 SI)



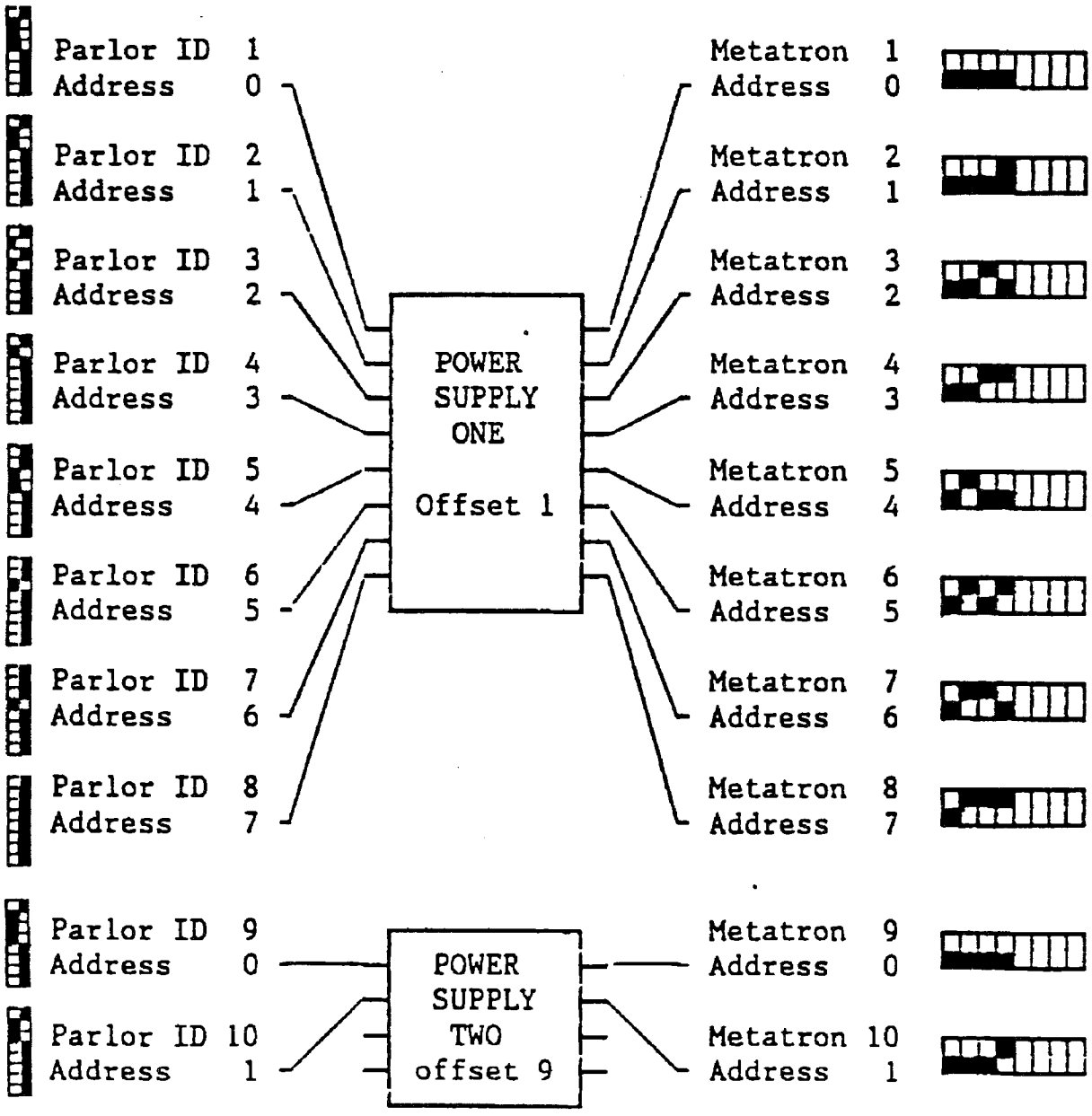


Coding MI 0...15





CODE SWITCH SETTINGS AT METATRON AND THE PARLOR TRANSCEIVERS WITH THE -490 TRANSCEIVER PROGRAM CHIP



10.2.3.2 CONNECTING THE PARLOR IDENTIFICATION POWER SUPPLY UNIT TO THE COMPUTER

The connection for 16 transceivers is made by means of a 3-core cable (DS, DR, -). Maximum distance 1500 feet.

10.3 ADJUSTING THE FIELD

To adjust the field pull off the lower decoding plug (8); the field is continuously switched on.

To adjust, place the aluminium cover on loose.

Set the adjusting condensor for maximum deflection on the measuring responder.

Secure the adjusting condensor with silicon rubber.

Plug in decoding plug 8; the field is again switched on and off from the computer.

Screw on the cover, ensuring that the gasket is cleanly seated. Check that the couplings and blind connector are securely sealed.

With the transceiver sealed the measuring responder indicates a deflection of 70 to 80 at a distance of 8".

Switch all METATRON units to ready-to-milk (STOP button).

Go from transceiver to transceiver with the measuring responder or programmed responders.

The respective cow number will be indicated on the METATRON control unit.

If there is no identification:

* Call up the test menu at Dairy Plan and see status (see Dairy Plan Instruction Manual Form Number WS193-0989).

* In the event of a malfunction check the DIP switch positions and wiring.

* Briefly switch the units off and on.

* If necessary switch off individual METATRON units until the remaining units are working correctly.

11. OPTIONAL PULSATOR CONNECTION -- STIMOPULS M, AUTOPULS M

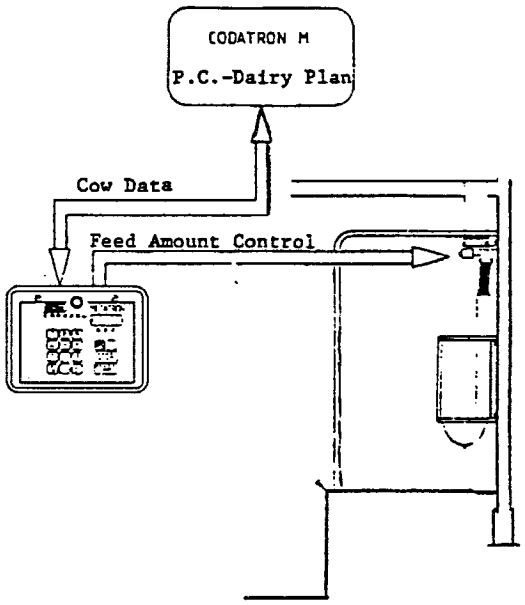
For description, operation, installation and service refer to instruction manuals:

* 4016-9015-003 for STIMOPULS M
* 4021-0242-030 for AUTOPULS M

For programming the pulsation data refer to section 3.

12. OPTIONAL IN-PARLOR METATRON/MASTER COMPUTER FEEDING

12.1 INTRODUCTION



The feeder type "M" is used in the milking parlor in combination with master computer (PC with Dairy Plan or CODATRON M) and METATRON control units. The feed amounts programmed in the PC are automatically dispensed during milking when the cow number has been entered on the METATRON. Depending on the type and technical configuration of the central control unit, the cow number can either be entered by hand on the METATRON or independently by using automatic cow identification. At each milking, the amount of feed individually stored for the cow under feed ration 2 on the METATRON is dispensed. The feed is released immediately after the cow number is entered or upon transfer of the cow file to the respective METATRON control unit.

12.2 OPERATION

1. For entry of feed rations for each milking, see the appropriate instruction manual for Dairy Plan or the M CODATRON.

2. Entry and retrieval on the METATRON control unit.

12.3 FEED RELEASE 37 S

The control units are pre-programmed at the factory for feed release. Feed release can be blocked as shown in table 1.

Table 1

Instruction	Entry	Digital display
Feed release	3-7-S	
Block	-0-E	0
Unblock	-1-E	1

12.4 FEED ENTITLEMENT 33 S

If a cow has no programmed feed entitlement in the central control unit, a feed amount can be entered as shown in table 2. If the feed entitlement programmed in the central control unit is not to be dispensed during a milking, it should be blocked as shown in table 2.

Table 2

Instruction	Entry	Digital display
Feed entitlement	3-3-S	
Release, e.g. 1.5 lb	-1-5-E	1.5
Block	-0-E	0

NOTE: Entry of the feed amount on the METATRON control unit is not transferred to the master computer.

12.5 PORTION WEIGHT 35 S

The portion weight is pre-programmed at the factory for 0.10 kg (= 100 g. This is the same as 0.10 lbs = 1/10 lb.). To determine the portion weight release 10 portions (test program 95 S) and weigh them. The weight obtained divided by 10 is the portion weight.

Table 3

Instruction	Entry	Digital display
Portion weight	3-5-S	0.100
Change to		
ie. .08 lbs.	-8-0-E	0.080

12.6 PAUSE TIME 36 S

The pause time is pre-programmed at the factory for 10 s. It can be set to any value between 5 s and 30 s.

1. If the cows receive individual amounts of feed in the milking parlor, the pause time should be set at about 5 seconds. T he portions are dispensed over a short period (ie. amount of feed - 4 lbs. portion weight is .100 lbs; 4 divided by .1 = 40 portions; 40 portions x 5 seconds = 200 seconds dispensing time or 3 minutes 20 seconds.

2. If the cows receive "stimulation" feed in the milking parlor, this can be "dribbled" to them over the duration of milking increasing the pause time.

Table 4

Instruction	Entry	Digital display
Pause time Change to ie. 10 s	3-6-S -1-0-E	5 10

12.7 TEST PROGRAM 95 S

With test program 95 S, the operation of the connected feed dispenser is checked. After entry of 9-5-S-1-E, the feed dispenser will always release 1 portion. If several portions are to be released, then the entry should be made again several times.

12.8 INSTALLATION

1. Select the appropriate CODATRON feed dispenser to use.
2. Install per diagram 1 shown below.
3. Installation should be according to wiring diagram 2.
4. Install control unit 7160-2680-000 beside the feed dispenser.
5. The 24 VAC power supply to the feed dispenser is obtained from the step-down transformer.
6. Current use per feed dispenser is 1 Amp each.

Diagram 1

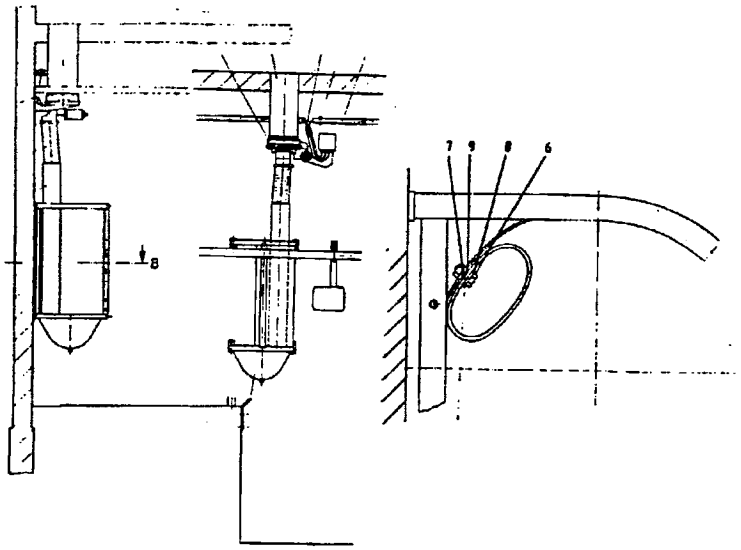
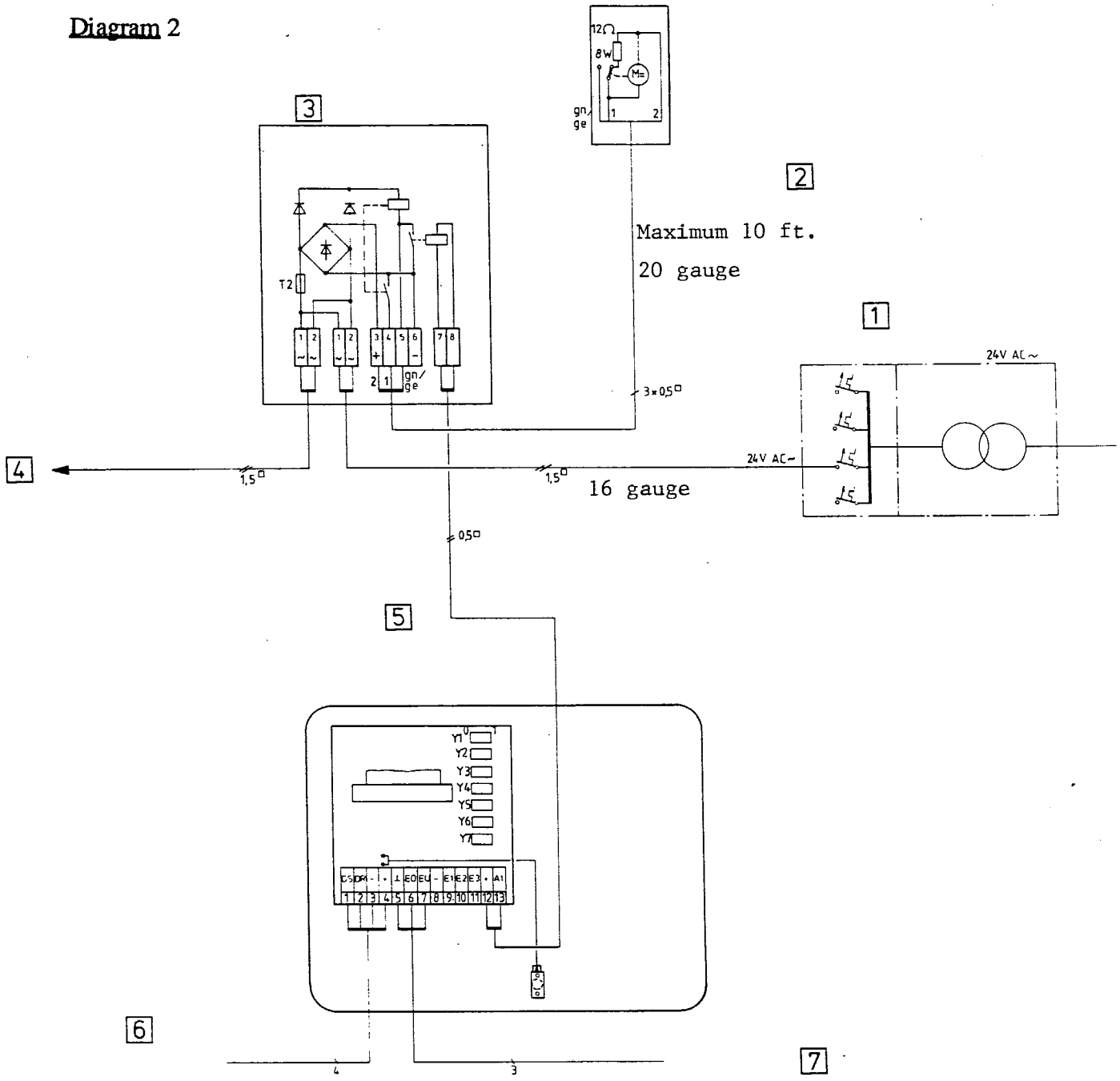


Diagram 2



1 - 24 VAC Step-down transformer
2 - CODATRON feed dispenser
3 - Control relay feed dispenser
4 - Additional control units (1.0 amp draw each - size step-down transformer accordingly, 6 max. in a row)
5 - METATRON control box
6 - METATRON power supply
7 - METATRON meter

Conversion of 7071-2206-000 Parlor Feeder Motor to 7160-2206-030 CODATRON Feeder Motor:

1. Remove junction box from motor switching area.

2. Attach cable to motor with cable tie through plastic loop.

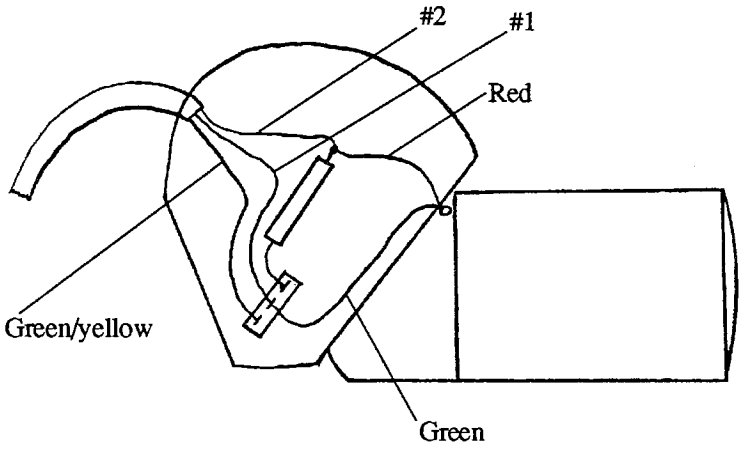
3. Solder resistor (Part Number 9131-0537-000) to terminal on motor as shown in diagram; use shrink tubing to insulate resistor leads.

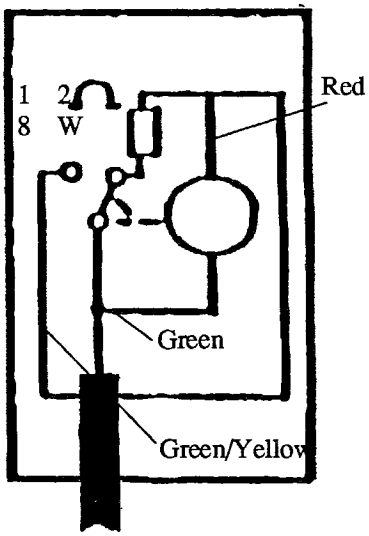
4. Solder green and red motor wires to terminal block and resistor as shown in diagram.

5. Solder cable leads to terminal block as shown in diagram.

6. Test motor for proper operation. After this test, align dispensing wheel so that accurate portions will be dispensed.

7. Cover switching area, all wires and connections with silicon sealant to prevent corrosion and breakage of the resistor.





12.9 INITIAL OPERATION

1. Check the wiring.

2. Turn on the power.

3. Release feed via test program. Dispenser will turn 1/4 revolution and dispense one portion.

4. Find the portion weight and enter it if necessary.

12.10 MAINTENANCE

Clean the feed tube regularly. In the case of meal-type feed, the insert in the feed pipe can be removed. When pellet feed is used, the insert prevents pellets from bouncing out of the feed trough.

12.11 INSTALLATION INSTRUCTIONS FOR FEED DISPENSER WITH SPARE PARTS

The feed dispenser should be cleaned when necessary. First, close the feed shaft with the shut-off slides. Remove encrusted feed residue and proceed according to instructions 1-6.

1. Disassemble the feed dispenser; remove lower split pin 2 from the shaft; continue dismantling dispenser, then clean it.

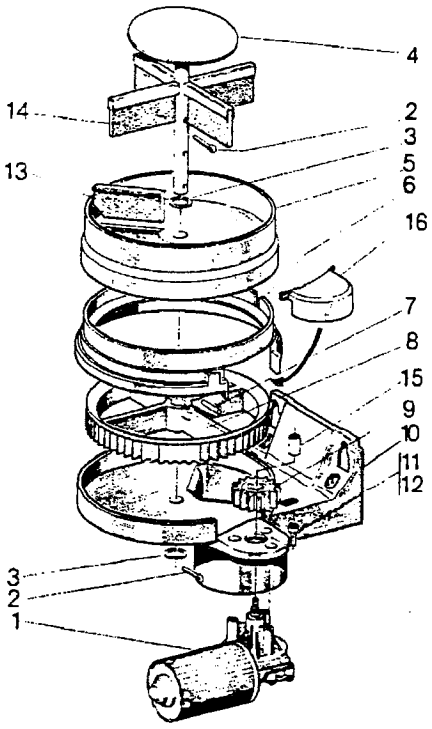
2. Fit dispenser wheel 8 on shaft 4 and insert cylindrical pin 7. Place the assembled parts on the bottom. Switch on the motor, holding the shaft tightly so that the motor is under slight load, and let it switch off once automatically. The motor will then be in the initial position.

3. Fit upper split pin 2, washer 3, cover 5 and housing 6 on shaft 4. Insert cylindrical pin 7 in shaft. Then slide dispenser wheel 8 and washer 3 on to shaft.

4. Place assembled parts on bottom 10. One dispensing chamber of dispenser wheel 8 must line up with the opening in bottom 10 (fine adjustment). Bottom 10, housing 6 and cover 5 must then be in the engaged position.

5. Finally, fit lower washer 3 and lower split pin 2. Take up any play by fitting extra washers.

6. During the subsequent test run, ensure that the dispensing chamber of dispenser wheel 8 and the opening in bottom 10 line up when the motor is switched off.

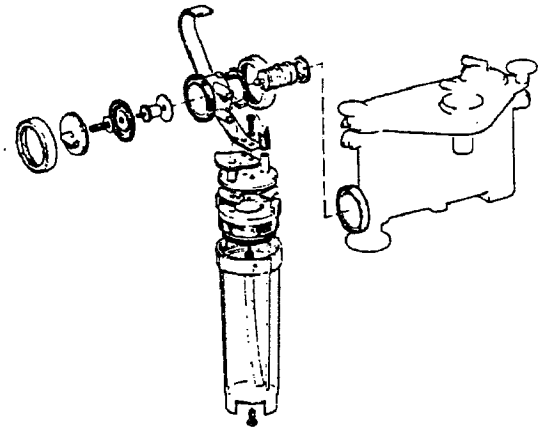


Key No.	Part Number	Part Description
*	7160-5610-020	Feed Dispenser
*	7160-5610-030	Feed Dispenser-Reduced Portion
1	7160-2206-030	Gear Motor 24VDC 32rpm
2	0026-1006-300	Split Pin
3	0026-1374-400	Washer
4	7260-5411-000	Shaft
5	7160-5750-000	Cover
6	7160-2459-000	Housing
7	0026-1089-400	Cylindrical Pin
8	7160-3498-000	Dispenser Wheel
8	7160-3498-030	Dispenser Wheel-Reduced Portion
9	7160-3498-010	Toothed Wheel
10	7160-5771-000	Bottom
11	0019-6105-400	Allen Screw M6x12
12	0026-1382-030	Washer 6.4
13	7160-2655-000	Molded Gasket
14	7071-5648-030	Rubber Plate
15	7121-2244-010	Nut
16	7160-2347-000	Cap

13. MILK SAMPLING

13.1 MILK SAMPLING DEVICE, PART NUMBER 7161-2503-000

13.1.1 DESCRIPTION



With the milk sampling device it is possible to sample the milk during milking without vacuum losses. First, the milk sampling valve, to which the sampling vessel is fitted, must be attached to the METATRON milk meter in place of the normal discharge valve. At each emptying of the milk meter during milking, a quantity of milk proportional to the opening time flows through the sampling valve into the sampling vessel. The milk sample accumulated at the end of milking is thus a representative average of the total yield. Before it is discharged, this milk sample must be thoroughly mixed by drawing in atmospheric air. After mixing, most of the milk is drawn off, leaving a small residual amount, the actual sample. If necessary, it is possible to increase the quantity of the remaining sample by shortening suction tube (8).

13.1.2 INSTALLATION

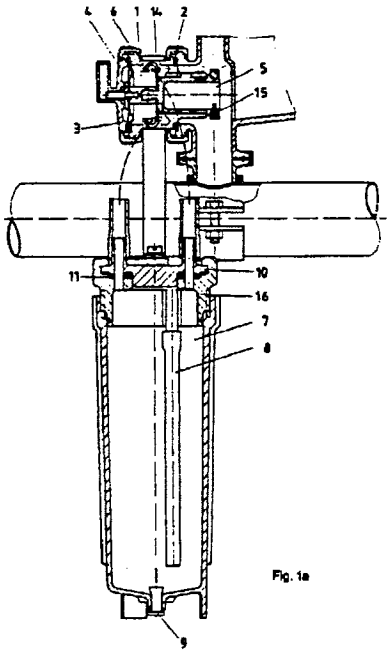


Fig. 1a

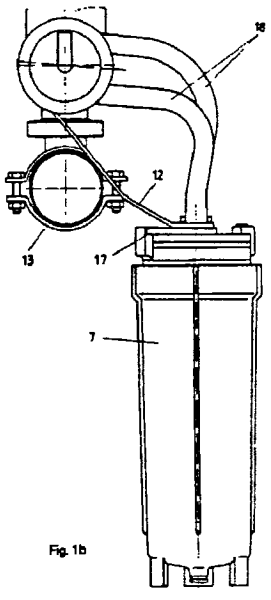


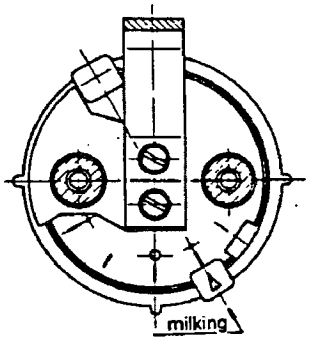
Fig. 1b

Before milking (vacuum pump switched off), fit the sampling valve of the milk sampling device in place of the discharge valve on the METATRON milk meter. Pull off the red control tube, undo the coupling nut, remove the valve cap and valve body, and fit the sampling valve as shown in Fig. 1. Ensure that gaskets (11 and 14) are properly seated. Then fit the red control tube to the hose connector of valve cap (3). The sampling valve must be installed so that the two hose connectors (18) slope slightly downwards towards sampling vessel (7). This is usually the case when the bracket (12) is against the milk line (13). See fig. 1B.

13.1.3 FUNCTIONS

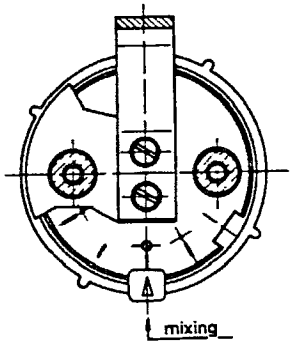
Four different functions can be set by turning the sampling vessel (7). The respective positions are marked on cover plate (10).

1. Milking



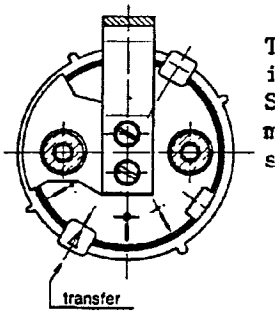
The vessel is against the right hand stop. The diverted sample runs into the sampling vessel.

2. Mixing



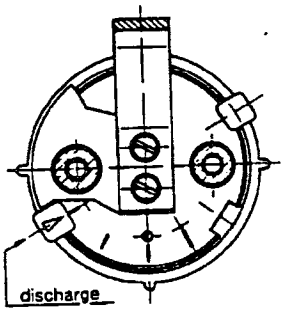
When milking is completed (after last milk has drained from meter), the milk in the sampling vessel is mixed by drawing in air for 1 second per 2 lbs. milk--10 seconds minimum.

3. Transfer



The amount of the sample not required for testing is drawn off into the milk line as far as the bottom of the suction tube (8). Suction tube (8) can be shortened as required if the amount of milk remaining in the vessel is insufficient for the desired sample.

4. Discharge



The vessel is against the left-hand stop. The milk sample can now be discharged into a sampling bottle held under bottom valve (9).

NOTE: Before milking the next cow, turn the device to "Milking" position, #1 above.

13.1.4 CLEANING

Cleaning of the milk sampling device should be carried out by hand after rinsing, using the brush supplied. The sampling device must first be partially dismantled. To dismantle the discharge valve, loosen rear coupling nut (6) and uncouple engaging piece (4) by shifting it sideways. The valve body (5) can then be pulled forward and removed for cleaning. Sealing disk (14) is then automatically pulled off the valve body. To permit better cleaning of the interior of the valve body, it may be necessary to remove gasket (15) from valve body (5). Here, care must be taken when re-assembling the sampling valve that the slightly projecting circumdifferential gasket edge is towards the milk meter and that the inside rubber lip is fully located in its groove in the valve body (see fig. 1a).

After cleaning, insert valve body (5) into the sampling device housing and fit sealing disk (14) onto the ball of the valve body from the opposite side. Then re-couple engaging piece (4) to the ball of the valve body and screw on valve cap (3) with coupling nut (6).

The upper part of the sampling vessel is disassembled by turning the metal plate (10) past the "Milking" position while slightly lifting rubber disk (17) so that the claws of cap (16) are released. Sliding gasket (11) can then be removed for cleaning. Re-assembly should be carried out in the reverse order of above.

NOTE: After cleaning the sampling vessel cover, insert gasket disk (11) with the plastic- coated side upwards.

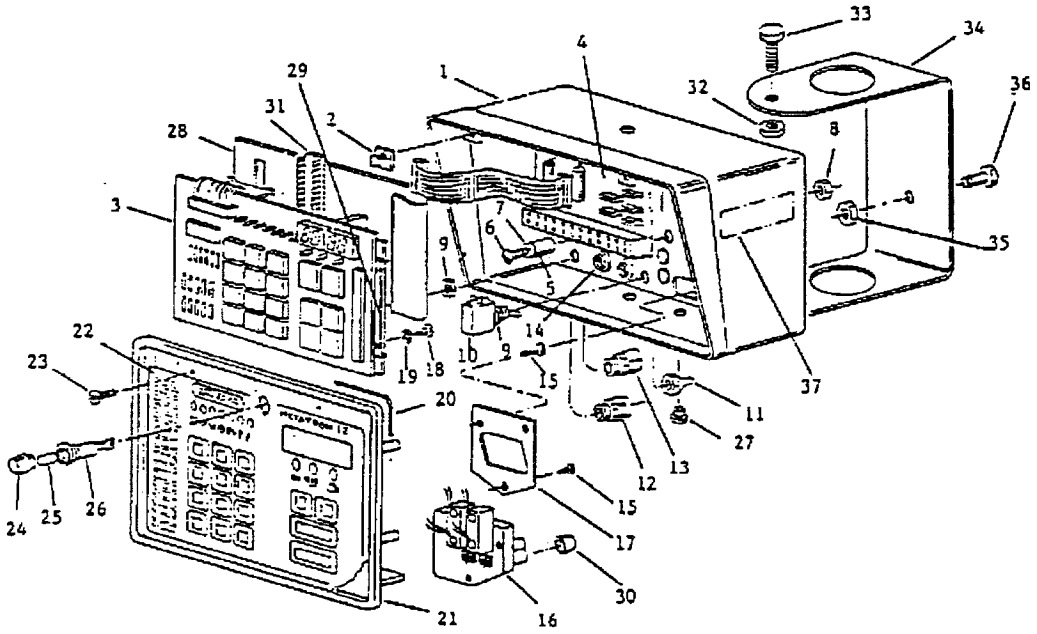
13.1.5 TROUBLE SHOOTING WITH THE METATRON MILK SAMPLING DEVICE

Fault	Cause	Remedy
No sample is removed.	Sampling beaker is not tight. There is entry of air because:	
	Sampling beaker does not hang free (e.g. side pressure from hanging sampling bucket).	Ensure that the sampling beaker is free after each measurement, particularly when fitting the beaker.
	Cover gasket is not tight.	Remove dirt from gasket or, if necessary, replace gasket.
	Sampling vessel is not in the right position. position.	Turn sampling vessel in milking
	Bottom valve is leaking air.	Remove dirt from valve or, if necessary, replace ventilating plug.
	Hose connectors of milk sampling valve housing do not slope down towards sampling beaker.	Loosen cap nut and turn housing of milk sampling valve until there is a definite downward slope to the sampling beaker. Then tighten the cap nut again.
	Valve body sticks in sampling valve housing.	Remove any dirt from valve body guides (do not scratch guide surface). Pull up valve body and ensure that it automatically returns to its initial position.
	3mm hole in valve body is blocked.	Clean hole.
	Milk sampling valve is not screwed tight to milk meter and draws in air.	Tighten cap nut. Ensure that O ring is correctly seated. Hose connectors must slope downwards from the milk meter.
	O ring is missing from between valve housing and milk meter.	Fit O ring.
	Diaphragm not sufficiently tensioned, or diaphragm slack.	Tension diaphragm by tightening nut, or change diaphragm.

Too large a sample is drawn off.	Red sleeve is not fitted.	Replace sleeve.
	Valve body does not open wide enough so that emptying times are too long.	Tension diaphragm by tightening nut, or change diaphragm. Remove dirt from valve body guide.
	Cam is not correctly engaged on valve body.	Engage cam on valve body.
	Aeration hole, dia. 8, in upper hose connector of valve body is blocked.	Free aeration hole.
	Valve body does not close due to excessively high milk flow or METATRON milk meter is incorrectly fitted (slope).	Check slope of METATRON meter with aid of installation manual. Check position of inlet bend in milk transfer system.

14. PARTS AND SCHEMATICS

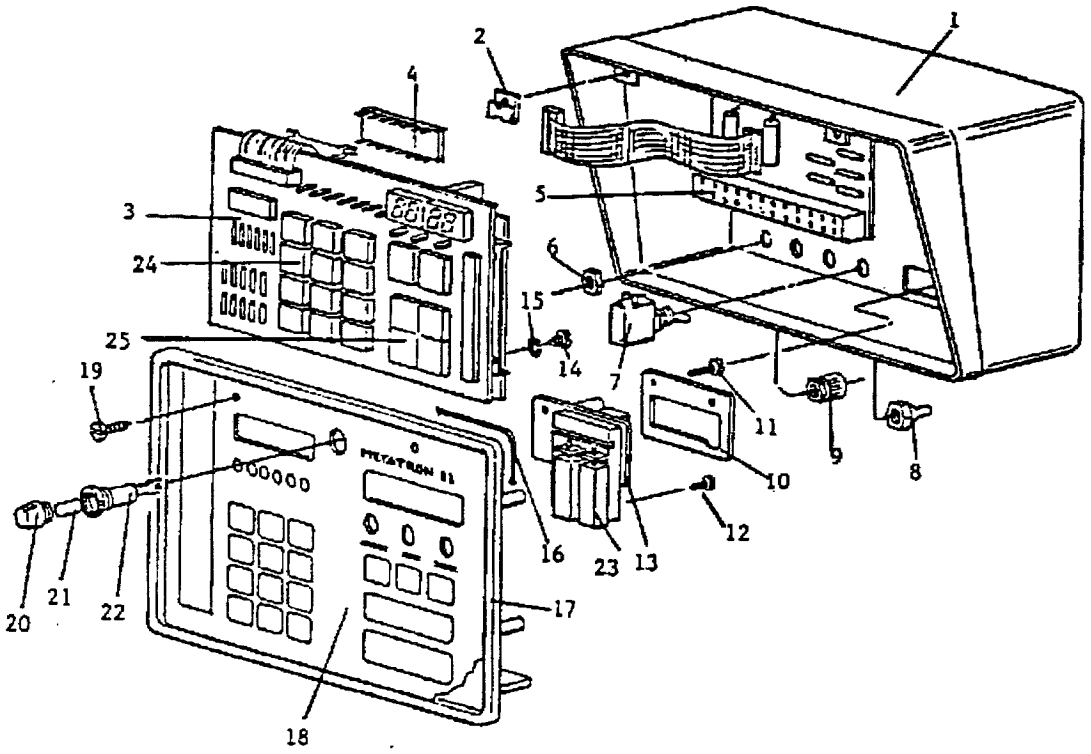
METATRON 12 CONTROL COMPLETE
Model No. 7161-2680-070, 080, 090



Key	Part Number	Part Description
1	7161-3001-010	Enclosure
2	0013-0425-300	Speed Nut
3	7161-5985-040	Double Control Board (Replaces -020/-030)
	7161-5985-030-9	Rblt Old Style Adapt. Board
	7161-5985-040-9	Rblt Dble Control Board
4	7161-9047-100	Power Card (use w/020,030)
5	0019-0429-840	Spacer
6	0019-2483-300	Screw 4x20mm
7	0026-1362-840	Washer
8	0013-0415-630	Hex Nut 4mm
9	0013-2867-630	Hex Nut
10	0005-0484-900	Switch
11	0005-3380-700	RubberSwitch Cover
12	0005-3990-900	Cable Coupling - Black
13	0005-3995-900	Cable Coupling - Yellow
14	0003-0170-800	Plug 17.6
15	0019-2511-840	Screw 6x20mm
16	7161-2780-060	Double Reversing Valve Complete
17	7161-2479-050	Gasket
18	0019-9095-300	Screw
19	0026-1322-300	Lockwasher
20	0004-2390-828	Gasket 4mm, per meter (.5m required per unit)
21	7161-5979-020	Front Cover with Decal
22	0024-5566-000	Decal Only
23	0019-9324-300	Screw
24	0005-1342-910	Red Dome Lens
25	0005-1299-000	Lamp
26	0005-3768-900	Red Lamp Complete
27	0003-0180-800	Plug 9.4
28	7161-2792-000	Shielding Cover
29	0005-0140-800	Plastic Standoff for Circuit Board
30	7161-2313-000	Sealing Cap
31	7161-9051-120	Program Chip
32-36:	7053-2187-030	Bracket
37	0024-5557-010	DHIA Approved Decal
*	7161-2108-000	Stick-on Heater
*	0005-0160-000	Small Push Button
*	0005-0160-010	Large Push Button
*	4016-6165-000	Epoxy Glue for Coils
*	7161-9047-140	700 ohm Adapter board
*	0005-0335-030	Driver Chip use 010/020/030bds ULN2068B/2069B
*	4021-0085-012	Driver chip for 040 ULN2813A
*	7161-9902-010	Set of 2 Coils for Reversing Valve
*	7161-4748-000	Slide
*	4021-0346-000	LED Display Module
*	4021-0066-003	Gold Capacitor 5.5V 0.1F
*	7161-9047-150	Front (Display) board 040
*	7161-9047-000	Front (Display) Board 020/030

* Not illustrated
NOTE: All prices and specifications are subject to change without notice.

METATRON 11 CONTROL COMPLETE
Model No. 7161-2680-010, 050

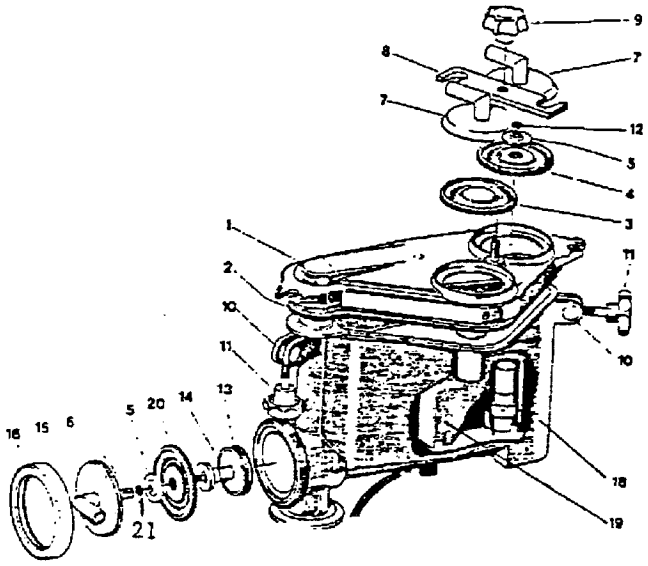


Key	Part Number	Part Description
1	7161-3001-000	Enclosure
2	0013-0425-300	Speed Nut
3	7161-5985-010	Double Control Board
	7161-5985-010-9	Rblt Dble Control Board
4	7161-9051-060	Lbs Chip MWP403N1 23/35-60 Normal Milkout
-	4017-9051-100	Lbs Chip MWP403M1 15/25-60 Short Milkout
-	4017-9051-099	Lbs Chip MWP400M1 23/35-40 Normal Milkout
-	7161-9051-050	Metric Chip MWP400N1 23/35-60 Normal Milkout
5	7161-9047-100	Power Card
6	0013-2867-630	Hex Nut
7	0005-0484-900	Switch
8	0005-3380-700	Rubber Switch Cover
9	0005-3990-900	Cable Coupling - Black
-	0005-3995-900	Cable Coupling - Yellow
10	7161-2479-030	Gasket
11	0019-2479-300	Screw M4x10
12	0019-2481-300	Screw M4x6
13	7161-2780-000	Double Reversing Valve
14	0019-9095-300	Screw
15	0026-1322-300	Lockwasher
16	0004-2390-828	Gasket 4mm, per meter (.5m required per unit)
17	7161-5979-020	Front Cover with Decal
18	0024-5388-000	Decal Only
19	0019-9324-300	Self Tapping Screw
20	0005-1342-910	Red Dome Lens
21	0005-1299-000	Lamp
22	0005-3768-900	Lamp Base and Red Dome Lens
23	7161-9902-020	Set of 2 Coils for Reversing Valve
24	0005-0160-000	Small Push Button
25	0005-0160-010	Large Push Button
*	0018-4802-818	Clear Tube, per meter
*	0005-0140-800	Plastic Standoff for Circuit Board
*	0024-5557-010	DHIA Approved Decal
*	0005-0335-030	Driver CHIP ULN 2068B/2069B
*	4016-6165-000	Epoxy Glue for Coils
*	7161-9047-140	700 Ohm Adapter Board
*	4021-0346-000	LED Display Module
*	4021-0066-003	Gold Capacitor 5.5V 0.1F
*	7161-2108-000	Stick-on Heater

* Not illustrated

METATRON MILK FLOW MONITOR
Model No. 7161-6210-030, 080

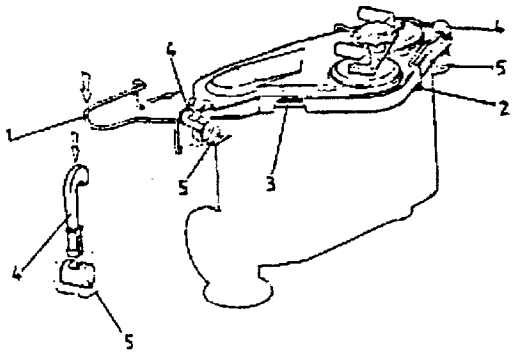
Key	Part Number	Part Description
1	7161-2457-010	Polysulfone Cover
2	7161-2479-060	Gasket
3	0004-2304-890	Diaphragm
4	0004-2304-890	Diaphragm
5	7161-1094-020	Plastic Disc
6	7161-2244-020	Tension Nut
7	7161-1457-050	Valve Cover
8	7161-1034-000	Bridge
9	0021-3134-700	Star Nut
10	7161-2244-000	Drift Nut
11	0019-1332-700	Star Screw
12	0013-0039-300	Nut
14	7161-1731-050	Valve Body (Gasket Vulcanized)
15	7161-1457-010	Valve Cover
17	7161-2643-000	Threaded Nut
18	7161-6210-100	Meter Body (Replacement for -030 with ring electrode
-	7161-6210-090	Meter Body (Replacement for -080 with pin electrode)
19	7161-6776-010	Internal Chamber
20	0004-2304-890	Diaphragm
21	0026-1362-300	Washer
*	7161-2313-000	Sealing Cap
*	7161-2165-000	Clamp and Gasket Kit For Cover (Includes Item 2 and new style spring clamps)
*	7161-1734-010	Valve Body Complete (Consists of Items 5, 6, 13, 14, 20, 21)
*	7161-3270-000	Break Away Clamp (for Mounting Meter)



COVER CLAMP KIT
Model No. 7161-2165-000

Key	Part Number	Part Description
1	7161-5559-000	Pressure Spring (Discharge Side)
2	7161-5559-010	Pressure Spring (Chamber Side)
3	7161-2479-060	Cover Gasket
4	7161-1698-000	Cover Latch
5	7161-2662-060	Drift Lock

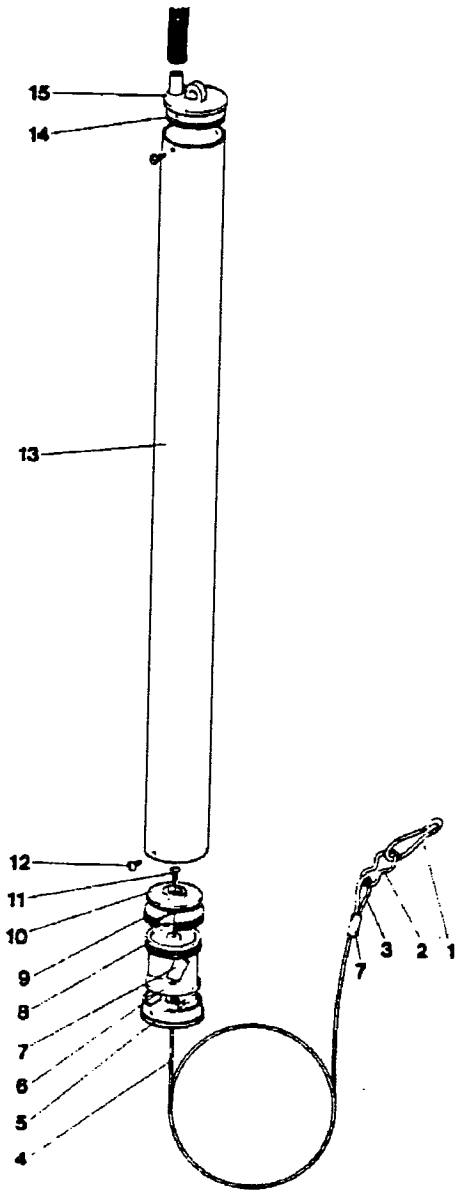
Not illustrated

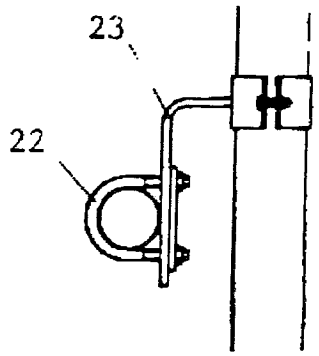


NOTE: All prices and specifications are subject to change without notice.

S.S. CYLINDER, Vertical
Model No. 7053-1970-040

Key	Part Number	Part Description
1	0026-1850-400	Spring Hook
2	7053-2492-000	Safety Link
3	0026-0806-840	Thimble
4	4017-6934-000	Nylon Cord, per foot
5	7053-1457-000	Cap
6	7053-1197-000	Piston
7	0026-0840-280	Clamping Sleeve
8	0006-4064-300	Cylindrical Pressure Spring
9	7053-2213-000	Sleeve
10	7053-1094-000	Washer
11	0019-9319-300	Self Tapping Screw
12	0019-9318-300	Self Tapping Screw
13	7053-1002-010	Cylinder
14	0007-1944-750	Gasket
15	7053-1457-050	Cap
22	7027-3270-010	U Bolt Assy for 1-1/2" Pipe
23	7071-2165-030	S.S. Clamp Assembly
*	0015-0101-000	Tube Lubricant for Cylinder

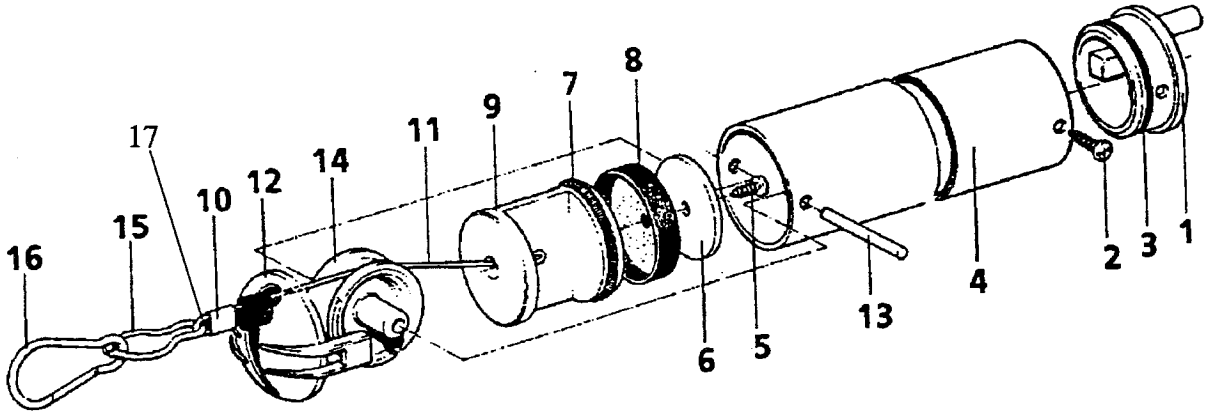




* Not illustrated

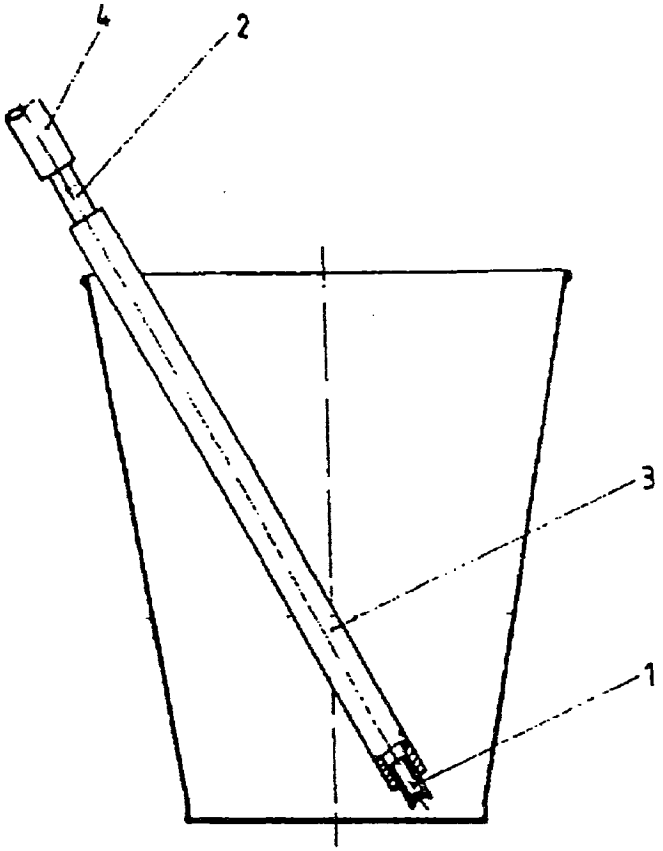
NOTE: All prices and specifications are subject to change without notice.

HORIZONTAL SS CYLINDER
7053-1970-050



Key	Part No.	Description
1	7053-1457-050	Cap
2	0019-9318-300	Self-Tapping Screw 4.8 x 13
3	0007-1944-750S	Rubber Ring 44.2 x 3
4	7053-1002-010	Cylinder
5	0019-9319-300	Self-Tapping Screw 4.8 x 16
6	7053-1094-000	Washer
7	0006-4064-300	Cylindrical Pressure Spring
8	7053-2213-000	Leather Sleeve
9	7053-1197-000	Piston
10	0026-0840-280	Clamping Sleeve
11	4017-6934-000	Nylon Rope 5/32"
12	7053-1457-080	Cap
13	7053-2455-010	Bolt
14	7053-5474-000	Pulley
15	7053-2492-000	Safety Link
16	0026-1850-400	Spring Hook
17	0026-0806-840	Plastic Thimble
*	4017-6165-004	Horizontal Pulley Kit (includes 12,13,14)

WATER CALIBRATION TEST KIT SET
4017-6165-006 or 7161-2862-000



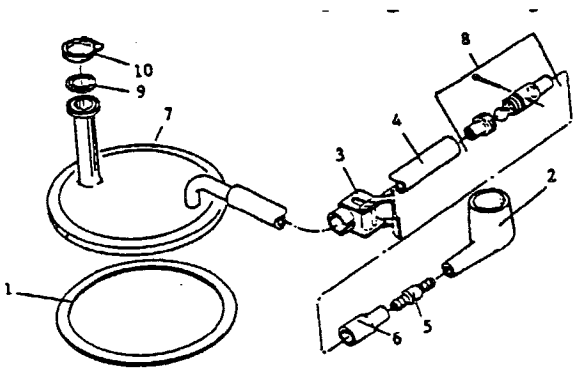
Item No.	Part No.	Description
1	7161-2862-000	Test Set, Complete
2	7161-2464-020	Connector (with nozzle)
3	7161-2627-010	Connecting Tube (with nozzle)
4	0018-2009-730	Hose 14 x 5.75 x 350
	0018-3359-730	Hose 14 x 5.75 x 1800

CALIBRATION LID ASSEMBLY
Model No. 7161-2650-000

Key	Part Number	Part Description
1	0007-3030-710	Gasket
2	0018-1620-700	Rubber Bend
3	0018-2662-300	Hose Clamp
4	0018-2669-730	Hose 14mm x 5.7
5	0018-3285-820	Tube Connector
6	7009-2864-030	Reducer Sleeve
7	7161-2756-010	Sampling Lid Only
8	7161-2935-000	Check Valve Assembly
9	0007-3239-890	Gasket

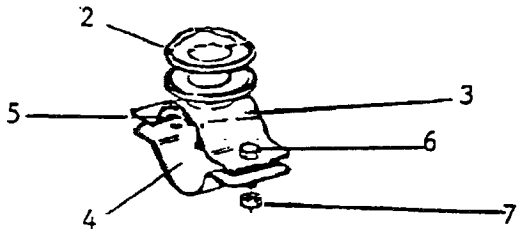
CALIBRATION LID WITH GASKET
Model No. 7161-2758-000

Key	Part Number	Part Description
1	0007-3030-710	Gasket
7	7161-2756-010	Sampling Lid Only



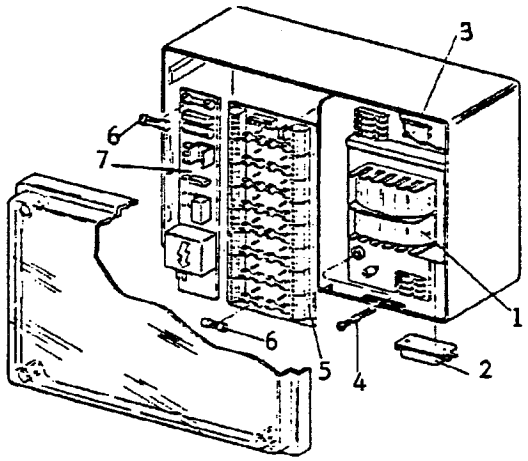
CLAMP-ON MILK INLET
Model No. 7161-4340-020, 030
7161-4625-020, 030, 080, 090

Key	Part Number	Part Description
1	7161-3270-000	Plastic Clamp Kit
1a	7161-2097-140	Clamp Half
1b	7161-2653-000	SS Snap Clip
2	0007-3239-890	Gasket
5	0004-2863-750	Gasket (1.6" wide)
-	7161-2479-070	Gasket (2.2" wide)
6	0019-6842-300	Hex Screw S.S. M6x20
7	0013-0276-300	Hex Nut S.S. M6
*	4021-0570-000	5/8" milk hose splice with center stop
*	4021-0570-001	5/8" milk hose splice with weld



METATRON POWER SUPPLY
Model No. 7161-5991-010

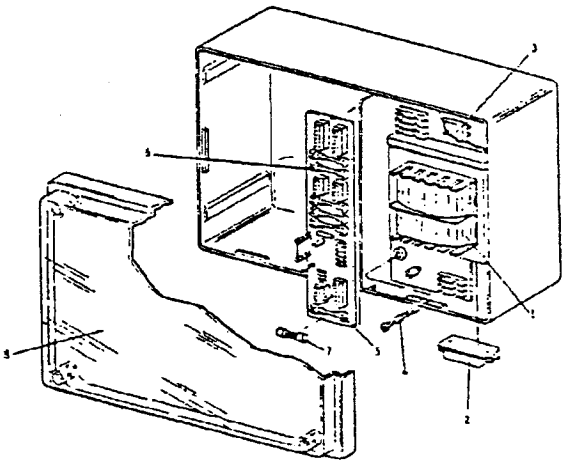
Key	Part Number	Part Description
*	7160-5992-068	Power Supply 115-24V 60Hz
1	7160-2675-040	Transformer 115-24V 60Hz
2	0005-4063-000	Powerline Filter
3	0005-3451-000	Rectifier
4	0005-0546-010	Fuse Element 3A
5	7161-9047-040	Fuse Strip
6	9105-1669-002	Fuse 1.0 Amp
7	7161-9047-120	Coupler Card
*	4021-9047-000	Power Supply Terminal Card



* Not illustrated

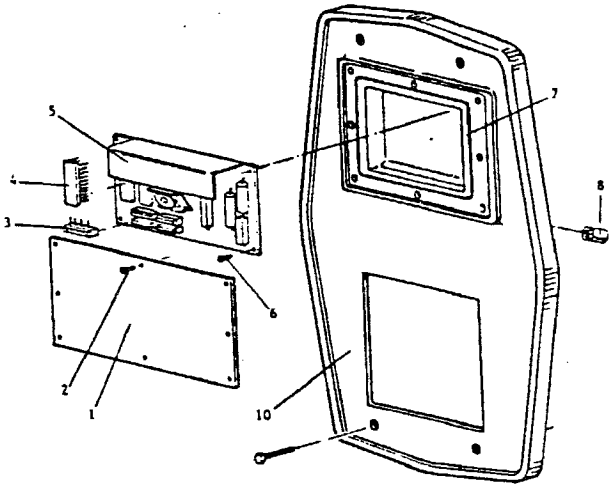
IDENTIFIER POWER SUPPLY
Model No. 7160-5991-040

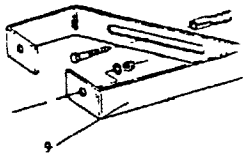
Key	Part Number	Part Description
1	7160-2675-040	Transformer 115-24V 60Hz
2	0005-4063-000	Powerline Filter
3	0005-3451-000	Rectifier
4	0005-0546-010	Fuse Element 3A
5	7160-5513-030	Identifier Fuse Strip
6	0005-0537-000	Fuse 1.6 Amp
7	9105-1433-001	Fuse 3.15 Amp
8	---	Cover - Contact Factory
*	4021-9047-000	Power Supply Terminal Card



PARLOR IDENTIFIER
Model No. 7160-2379-040

Key	Part Number	Part Description
1	7160-2457-110	Cover
2	7160-5913-000	Screw
3	0005-3667-010	Plug 4 Pin
4	7160-9051-490	Program Chip VPIC00
4	7160-9051-940	Program Chip VPAC03
5	7160-9047-270	Identifier PC Board (with -490 Program Chip)
5	7160-9047-420	Identifier PC Board (with -940 Program Chip)
7	0004-2390-828	Gasket 4mm, per meter
8	0005-3990-900	Cable Coupling
9	7160-2165-030	Mounting Kit with Hardware* (2 sets per package)
10	7160-5396-010	ID Panel Only
*	4021-0477-014	Reinforcement Panel**





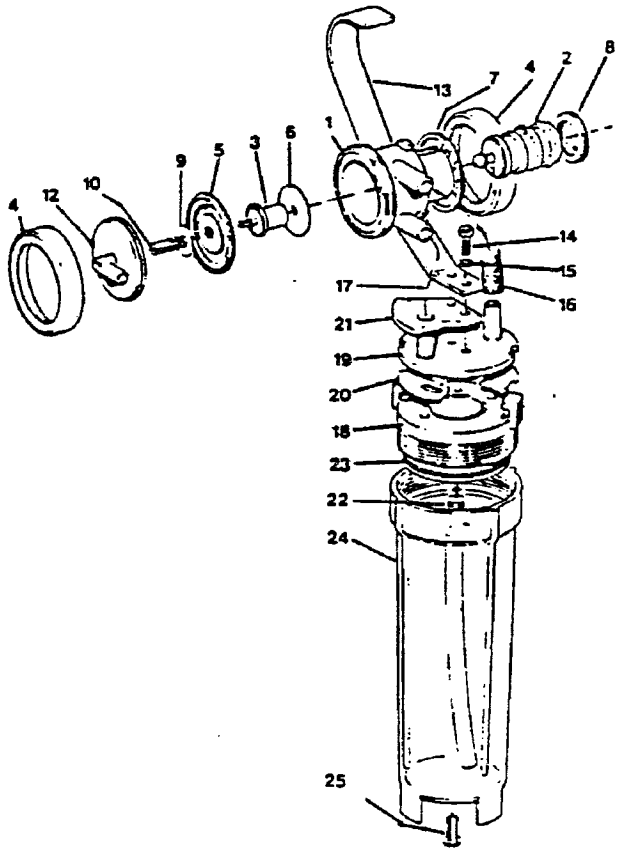
** NOTE: This item is not included in above complete assembly 7160-2379-040. Purchase separately.

* Not illustrated

NOTE: All prices and specifications are subject to change without notice.

BUTTERFAT SAMPLER
Model No. 7161-2503-000

Key	Part Number	Part Description
1	7161-4444-010	Sampler Housing
2	7161-1731-040	Sampler Valve Body
3	7161-2478-010	Spacer
4	7161-2643-000	Threaded Nut
5	0004-2304-890	Diaphragm
6	0004-1663-730	Buffer Valve
7	0007-1757-700	O Ring
8	7161-1277-020	Gasket
9	7161-1094-020	Plastic Disc
10	0013-0039-300	Nut
12	7161-1457-010	Valve Cover
13	7161-2084-020	Hanger
14	0019-2509-030	Cylinder Screw
15	0026-1324-300	Lockwasher
16	7027-2637-008	Milk Tube
17	7027-2637-008	Milk Tube
18	7161-2457-020	Sampler Screw Top
19	7161-1024-010	Cover Plate
20	7161-2479-010	Teflon Gasket
21	7161-1244-000	Alignment Lock
22	0018-2774-818	Discharge Tube
23	0007-1945-700	O Ring
24	7161-5588-000	Sampling Jar
25	7161-1731-010	Ventilating Plug
*	0003-4540-960	Cylinder Cleaning Brush 10 x 40 x 160
*	7161-2313-000	Sealing Cap for Valve Cover 7161-1457-010



* Not illustrated

NOTE: All prices and specifications are subject to change without notice.

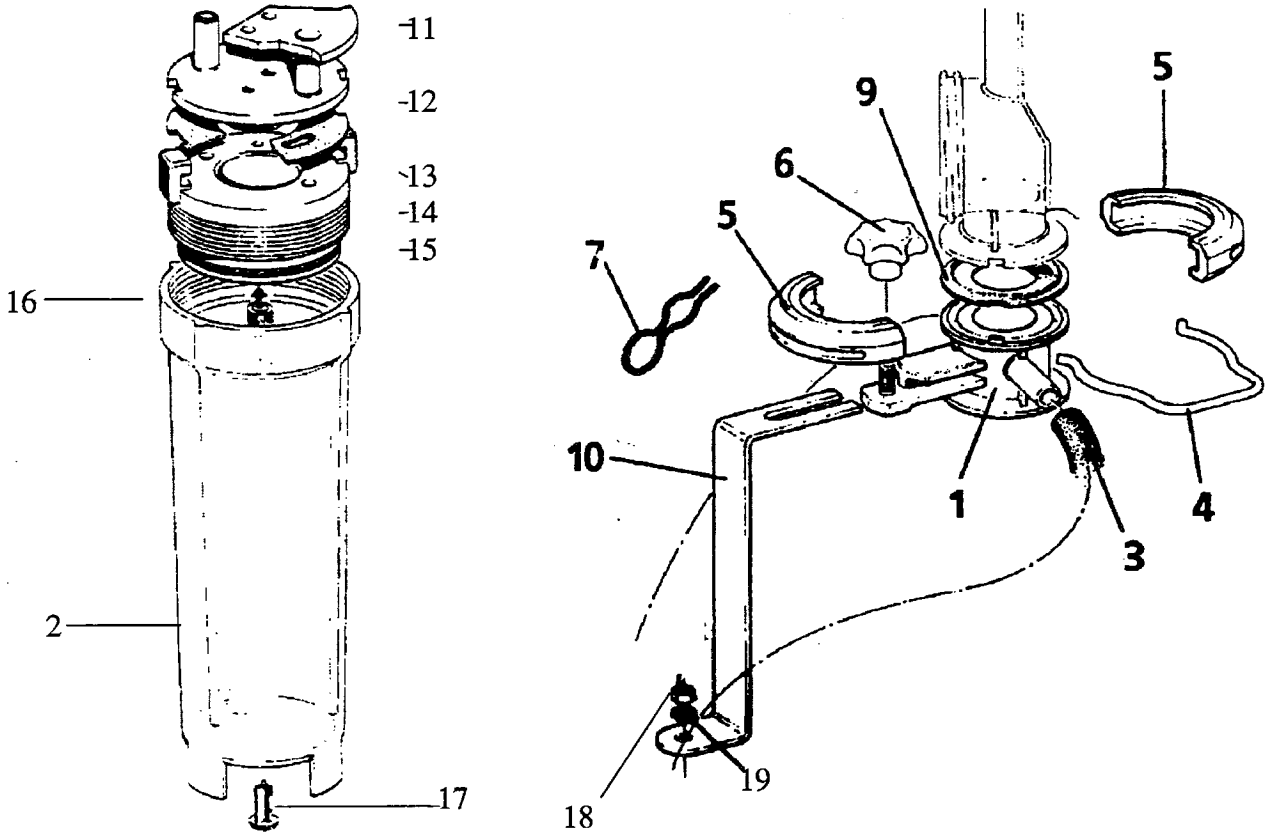
BUTTERFAT SAMPLER FOR MILK METER
Model No. 7161-2503-010

Key	Part Number	Part Description
3	7161-2478-010	Cam (Milk Sampling)
4	7161-2643-000	Threaded Ring
5	0004-2304-890	Diaphragm 53.3x6.5
6	0004-1663-750	Gasket 6.2x33x1.5
7	0007-1757-700	Gasket 40x4
8	7161-1277-020	Gasket
9	7161-1094-020	Disc
10	0013-0039-300	Hex Nut M4
11	7161-1457-010	Valve Cap
12	7161-2313-000	Sealing Cap
13	7161-5588-010	Beaker
15	7161-2298-010	Guide Piece
16	7161-5566-000	Lever
17	7161-1467-000	Sealing Plate
18	0007-2060-700	Gasket 66x6
19	0007-1818-700	Gasket 9x2
20	0013-0275-300	Hex Nut M5
21	0026-1323-300	Lockwasher B5
22	7161-2084-050	Support
23	7161-2637-020	Milk Tube 8.5x3.75
24	7161-2637-030	Milk Tube 8.5x3.75
25	7161-2610-000	Plug
26	0026-1507-300	Ball dia. 10
27	0026-1509-300	Ball dia. 12
28	7161-2045-030	T Piece Hose Connector
29	7027-2637-008	Hose 8.5x3.75, per meter
30	7009-2865-008	Hose 12x5.5
*	7161-2758-019	Cover Complete (Milk Sampling)
*	7161-2780-019	Valve Complete (Milk Sampling)

* Not illustrated

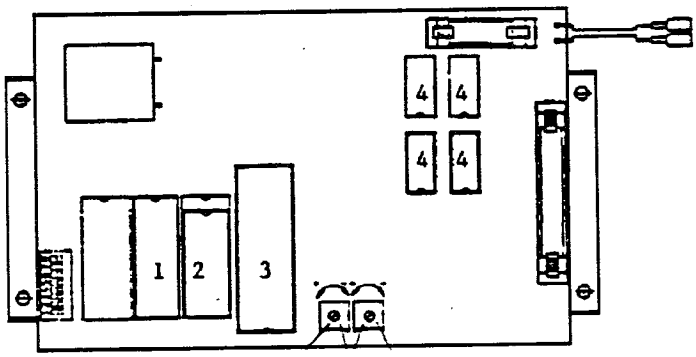
NOTE: All prices and specifications are subject to change without notice.

BUTTERFAT SAMPLER
7161-2503-030



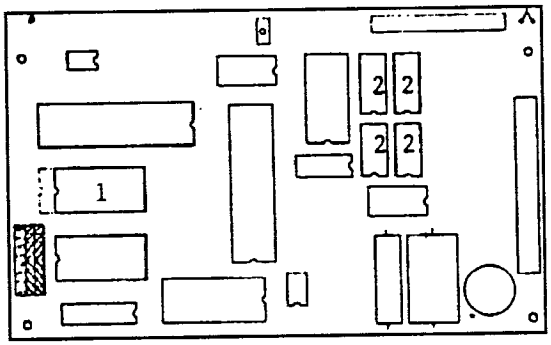
Key	Part Number	Description
1	7161-2513-010	Sampler Flange
2	7161-5588-000	Sampling Jar Only
3	7161-2637-030	Short Milk Tube 8.5 x 3.75 x 225
	7036-2637-010	Long Milk Tube 8.5 x 3.75 x 320
4	7161-2653-000	SS Snap Clip
5	7161-2097-140	Clamp Half
6	0021-3134-700	Finger Locking Nut
7	7161-2084-130	Hose Holder
9	0007-3239-890	Gasket
10	7161-2084-140	Bracket
11	7161-1244-000	Alignment Lock
12	7161-1024-010	Cover Plate
13	7161-2479-010	Teflon Gasket
14	7161-2457-020	Sampler Screw on Top
15	0007-1945-700	O-ring 65 x 3
16	0018-2774-818	Discharge Tube
17	7161-1731-010	Ventilating Plug
18	0019-2509-300	Pan Head Screw M6X16
19	0026-1324-300S	Lock Washer

METATRON 12 CIRCUIT BOARD
Model No. 7161-5985-020



Key	Part Number	Part Description
1	7161-9051-120	Program Chip
2	4021-0085-007	Static Ram Chip
3	4021-0085-008	Microprocessor Chip
4	0005-0335-030	Driver Chip ULN 2068B/2069B
5	4021-0066-003	Gold Capacitor

METATRON 11 CIRCUIT BOARD
Model No. 7161-5985-010



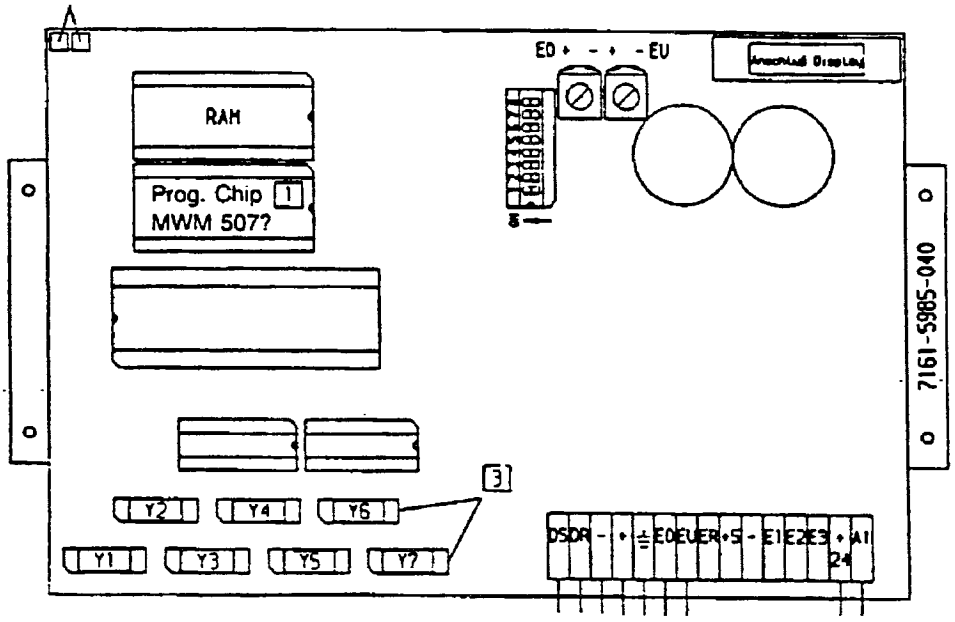
Key	Part Number	Part Description
1	7161-9051-060	Program Chip MWP403N1 23/35-60 Normal Milkout
1	4017-9051-100	Program Chip MWP403M1 15/25-60 Short Milkout
1	4017-9051-099	Program Chip MWP400M1 23/35-40 Normal Milkout
1	7161-9051-050	Program Chip MWP400N1 23/35-60 Metric Normal Milkout
2	0005-0335-030	Driver Chip ULN2068B/2069B

* Not illustrated

NOTE: All prices and specifications are subject to change without notice.

METATRON 12 CIRCUIT BOARD
7161-5985-040

Key No	Part Number	Description
1	7161-9051-120	Program Chip
2	4021-0085-003	Static Ram Chip
3	4021-0085-008	Microprocessor
4	4021-0085-012	Driver Chip ULN2813A



Field Servicing Addendum

Key Metatron Parts to be aware of:

All Metatrons

4021-0242-014	Metatron Installation and Operating Instructions, 11/93
4021-0242-041	Heavy Duty Power Supply Installation and Operating Instructions
7161-6210-090	Meter Body Only
7161-6210-080	Meter Body complete with all parts
7161-6210-100	Meter body only w/7161-9047-140, 700 ohm board
7161-2687-030	Single reversing Valve coil for Metatron 12, ACR 3
7161-2687-010	Single Reversing Valve coil for Metatron 11, ACR 2
4021-0085-008	Microprocessor chip
4021-0085-007	Static RAM chip (memory chip)
7161-9051-120	Program chip, specify version (A through H)
0005-0160-000	Small Push button
0005-0160-010	Large Push Button
7161-9047-000	Push button key board
4021-0346-003	LED display module (one position)
9105-1669-002	1.0 amp fuse
7161-9047-120	Coupler card in power supply

Single board Metatron-12 (NEW style, all connections on the board)

7161-5985-040	New Metatron control/connector board
7161-5985-040-9	Rebuilt/exchange Metatron control/connector board
4021-0085-012	Driver chip (2)

Double board Metatron-12 (Original Metatron 12 has separate power card)

7161-5985-030	New Metatron control board, 700 ohm
7161-5985-030-9	Rebuilt/exchange Metatron control board
0005-0335-030	Driver chip (4 used)
7161-9047-100	Power card
7161-9047-140	700 ohm plug in circuit board to upgrade "020" boards for pin electrode

Special tools Needed

0005-1005-000	Variable Resistance Meter (same as ACR meter)
7161-2508-000	Westfalia coil resistance Test Adapter
	Small Screwdriver
	Multimeter/ohmmeter, preferably digital
	5mm Metric nut driver
	2.0, 2.5, and 3.0mm Metric allen screw driver (M-11 only)

0015-1005-000	Epoxy glue Trichlorethylene solvent

NOTES:

Before changing any circuit board, program chips, or driver chips, refer to section 7.3 of this manual regarding the testing of Reversing Valve Coils. A bad reversing Valve Coil(s) will cause a board or chip to fail again immediately upon power up or within a short period of time. Check each Reversing Valve coil with the stem in each direction. The Ohm reading must be between 40 to 80 ohms. The Reversing Valve must also move freely. Replace any bad reversing valve coil(s) before replacing any board, chip or driver chip. Failure to follow this procedure can be an expensive mistake.

Before changing any circuit board, program chip, driver chip or other computer chip, or resetting any dip switches, turn off the switch supplying electricity to the Metatron milk meter control.

On New style, single boards, always disconnect the wire connection plugs from the circuit board before tightening or loosening the wire connection screws. Failure to do so may break solder connection to the circuit board.

The Ohm setting on the Metatron board must be correct for the type of meter body. All new and replacement Metatron meter bodies are polysulfone with pin electrodes. Refer to section 4.8 of this manual. As detailed in the instructions, a 7161-9047-140 PC board is necessary to increase the resistance from 400 ohms to 700 ohms on the 7161-5985-010 and -020 boards.

For the Metatrons to operate, the vacuum pump must signal the coupler card when it is turned on (refer to "Heavy Duty Power Supply" manual) Heavy Duty Power Supply, vacuum pump signal and Personal Computer 110 VAC plug **must be on the same leg of 110 VAC!**

All installations with a PC connected to the Metatrons must have the Metatron location dip switches properly set. These are switches 1 to 4. Refer to section 4.7.3 of this manual.

On installations without a PC or if the PC is disconnected from the Power Supply Coupler Card or Dual Port Card in the Computer, "DS" and "-" must be jumpered together on the Coupler Card in the Power Supply. This must be done on all Coupler Cards.

If the Circuit Board appears to be faulty in the diagnostics of a problem, first change the Program Chip. The Program Chip can be faulty. If this does not work, try removing and reinstalling the Static RAM Chip. The Static RAM chip must be left out for 60 seconds before reinstalling to de-energize it.

Faulty Driver Chips can often, but not always, be determined by a burn mark or crack.

Driver Chips control Reversing Valves for Stimopuls and Metatron operation. Refer to the Circuit board section regarding the Driver Chips and the Reversing Valves they control.

All computer and driver chips have a notch or mark on one end. This is an orientation mark and must line up with the notch or mark on the base socket in which they belong.

The Program Chip with the paper cover is light sensitive. The paper cover must always fully cover the hole underneath it. Do not expose these or other chips to direct sunlight as they may cause the program to act erratically.

"G", "G+" and "H" version program chips can be used on both Single and Double Metatron 12 boards. Programming is the same for all boards. "F" version Program Chips can be used on both Single and Double Metatron boards. Don not mix "A" through "F" with "G" through "H" chips in the same barn as this affects the automatic Stimulation control. When changing Program Chips, it is a good practice to de-energize the Static RAM chip (memory chip) by removing it for a period of 60 seconds. The Static RAM Chip is smaller than the base socket and must be re-inserted in the correct pin holes. After reinserting the chips in the original location, the Metatron must then be reprogrammed.

Occasionally an electrical glitch will cause a Metatron to lock up, operate in an abnormal manner or to display strange symbols in the LED display. The board needs to be rebooted to correct this.

1 - Turn off the switch to the problem Metatron
2 - Remove the Program Chip and Static RAM Chip (memory chip)
3 - After 60 seconds, reinsert the Program and Static RAM Chips.
4 - "cS" will appear on the display. The Metatron must be completely reprogrammed.

Operation: milk contacting the electrodes can be observed by pressing "9-1-S". The discharge valve should operate when the upper electrode is contacted (upper bar appears) and should close when the milk level falls below the lower electrode (lower bar disappears).

Color matching of any splice from the Metatron electrode probes is essential. Wire connections and splices must be good and tight. Color coding for original wires are:

Metatron wire color	Electrode connection	Connection number in control box
Black (or other)	Neutral (bare)	5
Brown	Upper	6
Blue	Lower	7

You can use this as a guide when trouble shooting a meter which does not dump. The neutral can be jumpered with the lower and upper electrodes to simulate milking. This can control

"Y1", Reversing Valve controlling the Discharge Dump Valve. Another method of testing the signal to a reversing valve is to switch plug-in connections of valves and observe operation.

Reversing Valve plugs have fine pins on the circuit board which they plug into. These can become bent with carelessness. If all four pins do not insert properly into the plug, a good Reversing Valve will not operate.

Proper vacuum tube connections to the correct ports are a must.

The milk metering function controls the Automatic Takeoff. If milk metering is not occurring as shown on the LED, automatic removal will occur after the front time, dryness of cow time (8-1-S) and strip time (8-2-S).

Follow the Program Card steps and be certain all meters in the barn have the same code by pressing "9-3-S". Additional codes are in this manual in section 3. Identical codes are only possible if all Metatron have the same version Program Chip.

When setting boards in an existing parlor with a Program Card for that barn, duplicate all settings from an adjacent meter. The only exception is "9 S" (meter address) and "9 0 S" (meter body calibration constant). These are dip switches and can be set to duplicate the board being replaced.

Metatrons must be installed with a rigid hose splice or backflush valve between the meter body and the claw.

Metatrons must be installed with spring loaded plastic line connections 7161-3270-000.

A dry vacuum supply is a must for a Metatron installation.

Wash water for Metatrons must not exceed 170° F in the CIP sink, 160° F at the Metatron.

Iodine removes the plasticizer from the polysulfone Metatron meter body. Do not allow Iodine sanitizers of teat dips to come in contact with the meter body.

Certain acids at full strength are harmful to the Metatron milk meter body.

Fly spray and solvents should not be directed in the area of the Metatron milk meter.

Any manual cleaning of the interior of the Metatron meter body should be done with greatest care not to scratch the interior surface. A scratched interior surface will not CIP. With proper CIP time, temperature, concentration, and action, there is no reason to disassemble and hand clean the Metatron. Occasionally, on new installations, a slight build up will occur during the first 30 days. A shock cleaning will remove this.

Metatron Reversing Valve Coils, 7161-2687-030, can be installed in Stimopuls or Autopuls pulsators. Pulsator Reversing Valve Coils, 7051-2687-000, cannot be installed in Metatrons. The wires on the pulsator Reversing Valves are too short.

PROBLEM DIAGNOSTICS

Section 7.9 of this manual contains a trouble shooting guide. In addition to the items mentioned in the manual, the most common causes of erratic milk weights include:

1-The inner chamber is raised during milking. This allows foam to gather around the probes which affects milk weights. This can be checked by removing one vacuum tube leading to an inner chamber diaphragm. During milking, there must not be any vacuum on this tube or on the chamber connection from which the tube is connected. If any vacuum is present, it is either a faulty auto wash valve or one meter has a torn diaphragm. Vacuum must be applied to the chamber diaphragms to raise the chamber for proper CIP of the milk probes.

2- Milk passing by the Discharge Valve and seat during milking. You can observe the milk leaking past make sure you are not seeing foam coming over the top from the vacuum bypass). Normal corrections include readjusting the tension on the discharge diaphragm, section 7.1 of this manual, or installing a new valve because the old silicone valve has pounded itself too flat.

3- Dirty electrodes or bad wiring or loose connections from the electrodes to the control board. This can be observed through "9-1-S".

4- Meter is in kilograms instead of pounds. Check by "8-3-S" which should display "1" on the LED.

5- Meters should be installed close to level; however should have slope towards the milk discharge.

Operation of the Metatron 12 Automatic Takeoff Control

The Metatron-12 controls when the Automatic Takeoff action will occur. The dryness of the cow is controlled by the milk produced over an adjustable period of time.

"8 1 S" is the dryness of the cow before strip time occurs. This is the number of seconds we allow the cow to produce the 6 oz (0.4 lbs) of milk between the low and high probe in the Metatron meter body. On new Stimopuls operation, suggest a start at 10 seconds (25 seconds without Stimopuls).

"8 2 S" is the strip time after "8 1 S" when the milk does not go from low to high electrode in the set period of time. The red light flashes during this period. This is not memory strip. If the milk reaches the upper electrode during the strip time (8 2 S), "8 1 S", cow dryness and "8 1 S", strip time, must both advance through their set time before automatic removal will

occur. Set "8 2 S" at 10 seconds on new Stimopuls installation. Set "8 2 S" at 12 seconds if Stimopuls is not available.

A combination of "8 1 S" and "8 2 S" will determine how dry a cow is milked before unit removal. These must be adjusted from their starting points to meet the requirements of the individual dairyman.

Operation of the Metatron -12 CIP

The goal is to flood each meter and run the CIP solution over the bypass for 5 to 10 seconds before opening the discharge valve to drain the meter body. We must flood -- drain cycle as often as possible during the CIP time to have maximum activity in the meter body.

When the system is properly set up to wash, "7 4 S" will control this. "7 4 S" is the number of seconds the discharge valve will remain closed after wash solution has contacted the upper electrode. Your observation will tell you if you have it set correct. A starting point is 17 seconds.

"7 5 S" is the length of time the discharge valve is open to allow the meter body to drain. 7 seconds is usually good.

"7 3 S" is the length of time the discharge valve will stay closed if the upper electrode is never contacted. This should not be a factor in your CIP. This is a sign of very inadequate water supply. 40 seconds is a good setting.

A change in the water supply to a Metatron can be caused by an obstruction in the CIP supply line to the unit. This can be a gasket, towel, or whatever has been drawn into the system.

Circuit Boards

Approximately 40% of the Metatron Circuit boards returned to Westfalia have very minor problems which could be corrected in the field.

The most common problem is a partial or complete lockup. Symptoms may include a locked display, strange display, or erratic operation. In most cases, this can be cleared by removing the Static RAM (memory) and Program chip from the socket for 60 seconds and then reinstall them. Most of the time, the cause of this lockup is a power drop out of 1 seconds or less.

Other times the Static RAM chip, program chip, or microprocessor chip may be damaged and clearing them will do nothing. In those cases, a new chip should be substituted for the old chip.

Driver chips control the outputs. A reversing valve can burn out due to continuous power because the driver chip controlling it may be defective. Driver chip and their functions are different on Single and Double board Metatrons.

Double board Metatron 7161-5985-030, 010, 020
Driver chip 0005-0335-030

IC 14 - Y5 (Stimopuls M)
IC 15 - Y1 Reversing Valve (milk discharge valve) & Y2 Reversing Valve (vacuum shutoff)
IC 16 - Communication line to PC
IC 17 - Y3 & Y4 pulsator reversing valve (Stimopuls M)

Single board Metatron 7161-5985-040
Driver chip 4021-0085-012

IC 14 - Y1 Reversing Valve (milk discharge valve) & Y3 Reversing Valve for pulsator.
IC 15 - Y2 Reversing Valve (vacuum shut off), Y4 & Y5 Reversing Valve for pulsator.

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All Westfalia equipment is designed to assist dairy farm managers in doing a better job with their herd. Because of variations in on farm management, Westfalia CANNOT BE RESPONSIBLE for results obtained on individual farms. Westfalia CANNOT BE RESPONSIBLE for loss due to fire, lightning, flood or other acts of God.

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