

## #350020 EWM Electronic Weigh Meter

**Includes 313340 Display Box  
and 350015 Flo-Meter  
(without Butterfat Sampler)**

- **Compact**
- **Clean-In-Place**
- **Adaptable to Most Parlors**

The Universal solid state Electronic Weigh Meter, EWM, is the answer for today's and future weighing of milk production. With the EWM, there is no more wasted space of large weigh jars, no more fear of breaking glass and no more time-consuming, manual releasing of milk from the jar.

This simple and easy to use weighing device is adaptable to most parlors.

### How it Works

The Electronic Weigh Meter is composed of two assemblies. The first assembly is a flow head assembly which is connected to the pipeline and through which the milk from the cow passes on route to the pipeline. The second assembly is a computerized electronic module which processes the flow data from the flow head and displays the result in the correct numeric value.

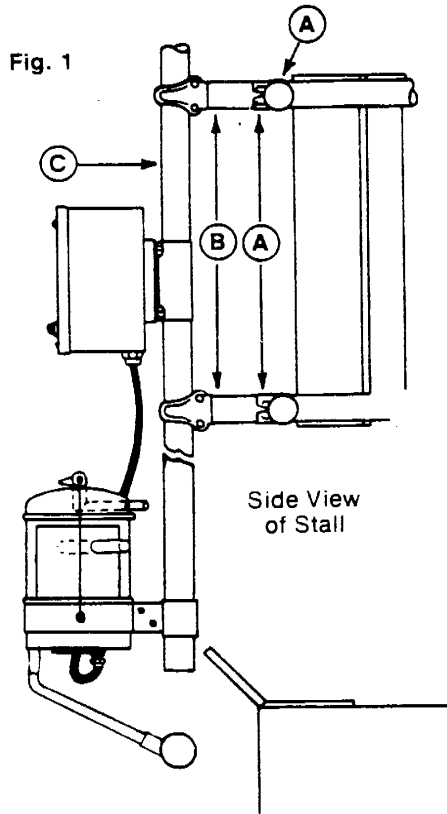
The milk flow head assembly is an electro-mechanical transducer which outputs a variable width on going pulse that is directly proportional to the mass of the fluid passing through the meter at any given time. These pulses, commonly referred to as windows, occur ten times a second and are passed to the electronic module for processing.

Processing of the window pulse in the electronic module is accomplished by counting the computer generated reference pulses which occur during the window pulse time, subtracting out the zero reset pulses, and then dividing this number by a calibration number to obtain the correct units (lbs. or kgs). This process is repeated ten times a second and continues until the unit is reset again.

# Installation Instructions

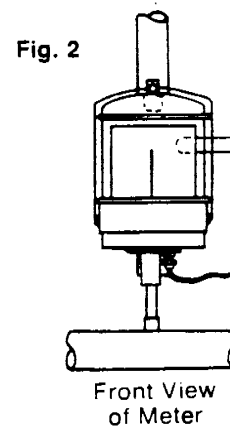
## Low Line Milking

Tee clamps and support posts are not included with the EWM and must be ordered separately. An optional 313333 mounting kit can be used. This included (4) 710448 tee clamps and 2 extension pipes.



1. Fasten a 710448 two-bolt tee clamp into the upper and lower rails on the stall (See A, Fig. 1) preferably close to the outer bend radius for S-rail parlors. Install 1 1/4" support tubes, approximately 4" in length, in tee clamps on S-rail and tighten. (See B, Fig. 1) Position and fasten two more two-bolt tee clamps to each of these support tubes. Cut a piece of 1 1/4" pipe approximately 54" long. This vertical support post is positioned in the tee clamps on the end of the horizontal support post. (See C, Fig. 1) and secured.
2. Attach the 350015 EWM Flo-Meter in a level position to the bottom of the vertical support post as illustrated in Fig. 2.
3. Position Flo-Meter base so outlet is towards the center of the parlor.
4. Once positioned, tighten the two bolts closest to the support tube first. The two bolts closest to the meter should only be tightened slightly.

**IMPORTANT:** The Flo-Meter must be installed in a level position, the base of the Flo-Meter is already pre-sloped towards the outlet tube.



5. Attach a 5/8" milk hose, cut to required length, from the bottom outlet nipple of the Flo-Meter to a milk inlet nipple on the milk line. (Figs. 1 and 2) Be sure this hose does not have a loop or kink in it. It is important that this milk hose run in a downward position to the milk line on both low line and high line milking operations.
  6. Remove cover and body of Flo-Meter. Position the impeller on the pin located in the center of the base (see illustrated parts drawing). Replace the body. The impeller rod must fit into the impeller rod support at the top of the meter. The support may be lifted slightly to accommodate the rod of the impeller. Do not bend the rod when inserting. Be sure impeller slides freely in rod support.
  7. With the meter body securely seated in the gasket and the impeller in position, the body may be turned to accommodate the milker unit hose.
  8. Replace the Flo-Meter cover. Position the cover with the water inlet nipple in the direction of the C.I.P. wash line. Secure the meter assembly together with the bail and cam.
- IMPORTANT:** Be sure Flo-Meter body and cover are seated properly into gaskets before securing clamp.
9. The use of a radial arm or tension hanger is highly recommended.
  10. The EWM control box may be mounted on the vertical support post, for which a half clamp is provided. (Fig. 1)

## Installation Instructions

### High Line Milking

1. It is essential that the EWM Flo-meter be mounted above the milk line (Fig. 3) in a level position.
- IMPORTANT:** Meter should not be mounted over 7' above the milking platform to insure correct operation.
2. Using tee clamps and support posts, mount the Flo-Meter as shown in Figs. 1 and 2.
  3. Follow directions for installation of EWM control box and Flo-Meter for low line milking.
  4. Turn the pipe so the milk inlet nipples of the milk line are pointing straight up. Cut a piece of 5/8" milk hose and attach to the bottom outlet nipple of the Flo-Meter and the milk inlet nipple on the pipeline. Be sure there are no loops or kinks in this hose.

- The EWM control box may be mounted to a support post as described for low level milking, or it may be attached to the S-rail or any other convenient location.

**IMPORTANT:** Secure the milker unit hose before attaching to the side inlet on the Flo-Meter. This will help eliminate stress to the meter body while milking.

## Washing After Milking:

- The EWM may be cleaned-in-place with a few simple adjustments. Place milker units in C.I.P. unit washers. Leave the milker unit hose hooked up to the Flo-Meter.
- Cut a piece of  $\frac{5}{8}$ " milk hose 2" to 3" in length and attach to water inlet on cover. (See A, Fig. 3) Attach the 711012 valve, included, to the end of the hose. (See B, Fig. 3) Splice in the 256946 plastic tee in an appropriate location between the 711012 valve and the C.I.P. unit washer. (See C, Fig. 3) With another piece of hose, connect the plastic tee and the valve.

- Open 711012 valve for washing.
- If C.I.P. washer is not used,** install a clamp-on-nipple on the underside of a sanitary wash line to the immediate right of the Flo-Meter. (See A, Fig. 4) Attach to the nipple a  $\frac{5}{8}$ " ID hose of sufficient length to reach milk inlet on Flo-Meter. (See B, Fig. 4)
- Install the 711012 valve and 256946 plastic tee in this line as described above. (See C, Fig. 4)
- Open 711012 valve for washing and connect line D to milk inlet of Meter. (Fig. 4)
- Insert a 420530 plug in end of hose while milking. (See D, Fig. 4)
- For high line washing, see Figs. 5 and 6.

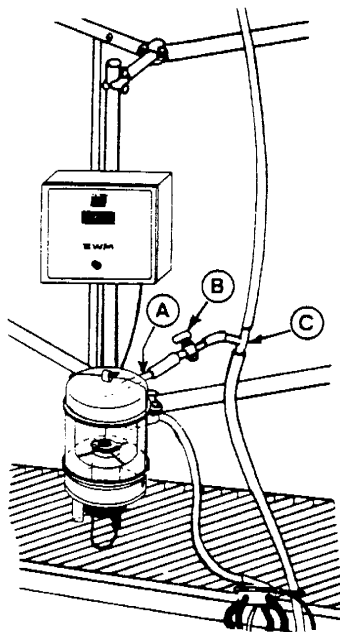


Fig. 3

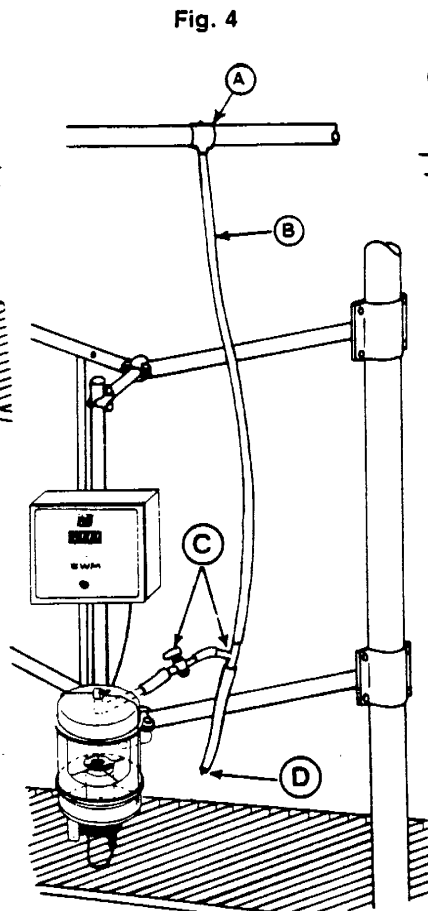


Fig. 4

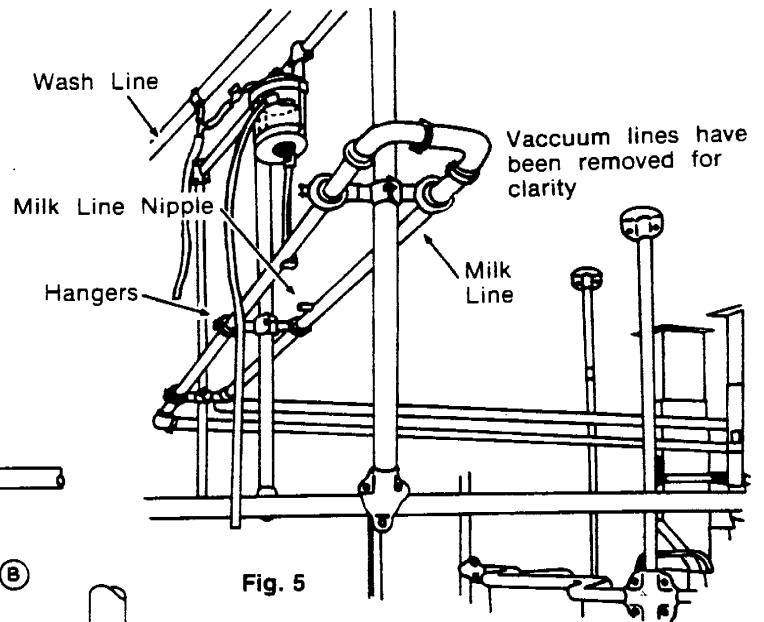


Fig. 5

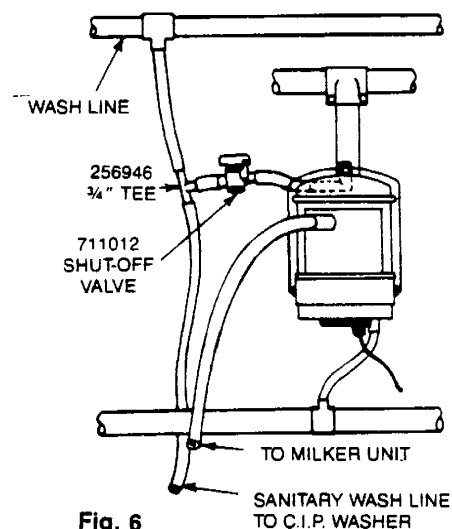


Fig. 6

# Electrical Installation

1. Place meter cable through right hand cord grip in bottom of control box. Insert wires from meter cable into pin connector according to Fig. 7 and 8. Use a small screwdriver to secure wires into place. Note each wire except the red is paired with a black. Be sure to secure the properly paired black wire in the correct position.
2. Run 412369 electrical cord into left-hand grommet on control box and attach to male terminals of P.C. board labeled 24V AC. (Fig. 7)

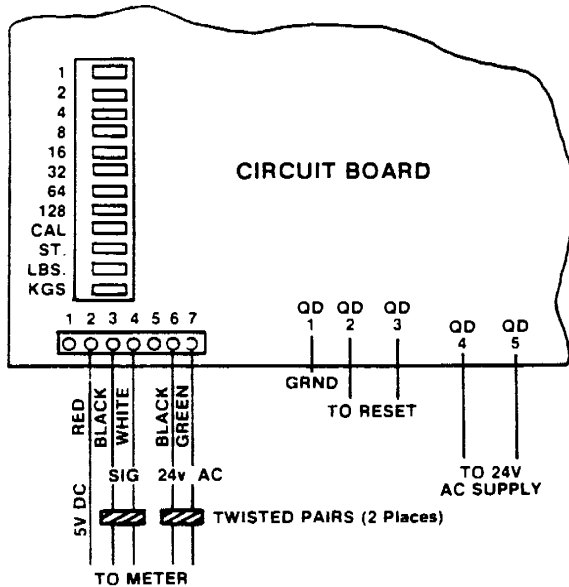


Fig. 7

3. Mount a 24V power supply in a clean and dry location, preferably in a utility room. (A 313370 power supply is shown in Fig. 9.) Run 110V from electrical supply to L1, N and G in power supply, preferably in conduit. (Fig. 9)
4. Run one (1) wire from 24-1 and Common to one side of the parlor, and 24-2 and Common to the other side of the parlor.

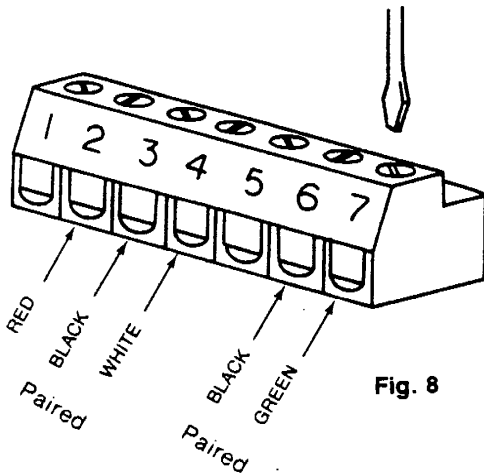


Fig. 8

5. Connect wires of EWM control box to appropriate wires running from the power supply. (Figs. 7 and 9)
6. One power supply may be hooked up to eight (8) EWM control boxes. If additional units are required, additional 313370 power supplies must be added or a 313296 multi-circuit transformer.
7. **Wiring must be done by an authorized electrician and must comply with local and national electrical codes.**

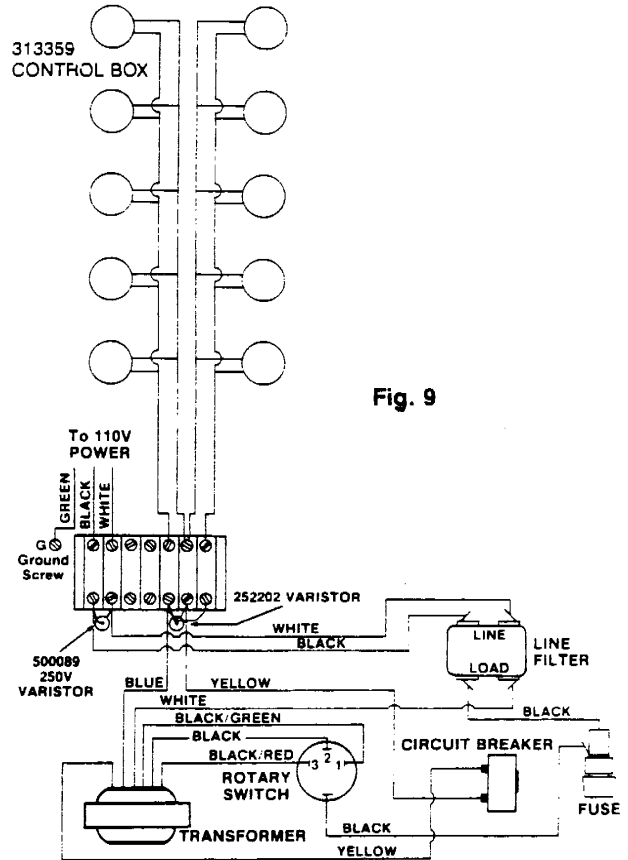


Fig. 9

## Operation of the Unit

**NOTE:** It is important to allow the EWM a warm-up period of 3-5 minutes. Start the system and allow the units to warm up before starting to milk.

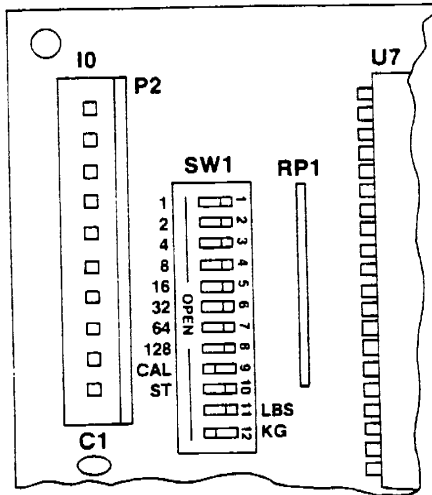
1. Close the 711012 valve.
2. **If C.I.P. washers are not used**, attach the milker unit hose to the milk inlet of the meter. Insert a 420530 plug in the end of the hose while milking. (See D, Fig. 4)
3. Push the reset button located on the front of the control box. Wait for the unit to clear (about 2 seconds). Place the milker unit on the cow and continue with milking procedure as normal.

# Electronic Weigh Meter Operation Guide

## A. Internal Controls

Operation of the EWM is controlled by internal switches S1 through S12 located in the upper left-hand corner of the P.C. board assembly. (Fig. 10)

Each of these switches has a specific purpose. The explanation of these purposes follows so that a better understanding can be gained of the actual way in which the EWM operates. This is particularly important in diagnosing malfunctions/problems which may occur.



### S1 through S8: Calibrate Divisor

The numbers set in these switches are used by the microprocessor as the divisor in the weight measurement formula. This number is Flowhead (drive assembly and shutter assembly) dependent and therefore must be obtained by calibrating the Flowhead assembly.

The value of each switch is indicated to the left of the switch. To set a calibration divisor, turn on the switches that when added together will equal the desired value.

*EXAMPLE: If a calibration of 185 is desired, it can be determined that  $185 = 128 + 32 + 16 + 8 + 1$ . So for a calibration of 185, switches 8, 6, 5, 4, and 1 must be set in the on position.*

Verification of the correct number is accomplished by pressing the reset switch on the front panel of the EWM. The calibration divisor is automatically displayed for 2 seconds when the reset triggers the Auto Zero cycle. In this example, C. 185 would be shown on the display for the 2 seconds, then the display would revert to 00.00 and be ready to process flow data.



Display shows calibration divisor for 2 seconds, then reverts to 00.00 and is ready for input.

### S9: Calibrate or Test Flowhead

Setting this switch on causes the microprocessor to perform a head quality calibration test. The flowhead is monitored for ten seconds (100 samples) and the average number of reference pulses in each head window pulse is displayed in the three left-hand display positions. Another 10 second sample is taken and the deviation from the average is displayed in the right most digit of the display. If the deviation is greater than 3, this indicates a faulty flowhead assembly.

### S10: Self Test (ST)

Setting this switch to on connects an internally generated head signal to the input signal conditioning circuitry. This allows the electronic module to be tested without a flowhead present. The flowhead must be disconnected in order to utilize this test. Running this test whenever error displays occur will allow the user to identify which of the two assemblies is malfunctioning.

### S11: Display Pounds (Lbs)

Setting S11 to on will connect the proper internal reference pulse frequency needed for calculation results to be displayed in pounds.

### S12: Display Kilograms (Kgs)

Setting S12 to on will connect the proper internal reference pulse frequency needed for the calibration result to be displayed in kilograms.

**NOTE:** If neither S11 or S12 are set to on or both are set on, the display will show an error message (ERR), display C001 for a calibration number, or no display.

## B. Flowhead Calibrating Procedure

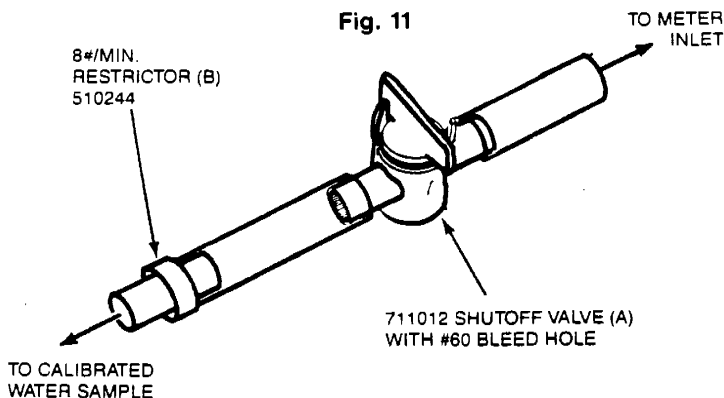
The flow meter assembly 350015 has been tested at the factory. A calibration number is located on the base of the flowhead and should be used. If a calibration is required in the field, the following procedure should be used.

1. Connect flowhead to electronic module, mating the numbers on the module to the number on the connector pin. (See Figs. 7 and 8) Check wiring to insure that the connections match that of the guide printed on the P.C. card.
2. Set the control switches (S1-S12) in the following manner:  
S1-S8: Set to calibrated weight  
S9: Set on  
S10: Set off  
S11: Set on (for display in lbs.)  
S12: Set off

**NOTE:** It is recommended that 20 lbs. of fluid be used as the calibration weight. Therefore switches S3 and S5 should be set "on" since their values (S3 = 4 and S5 = 16) add up to 20.

3. Apply power to unit (24V AC) and allow to run for the 3-5 minute warm-up period.

4. Press reset switch. "CAL." should appear in the display. After a 10 second delay, a 3 digit number will appear in the left most portion of the display. After another 10 second delay, a fourth number will appear in the right hand display position. If this last number is not below 4, the flowhead assembly is faulty (See Replacement Guidelines).
5. If the flowhead passes the above test, continue with the following check test. Set switch S9 to off and press the reset. The unit should display the divisor for which it has been set. in this example 20 (C.020) for 2 seconds. Then the display will revert to 00.00 for a flow value.
6. Assemble the Test Kit 313365 as shown in Fig. 11. Water run through the meter should be circulated into a test bucket. Turn Valve A to off, place Restrictor B into the water sample and apply vacuum to the unit. Reset as per number 5 and open Valve A after display reverts to 00.00.



After the fluid flow stops, the display will show a reading between 160 and 185. Record the reading, then repeat the test. After the second test is complete, average the two readings and enter that average as the calibration divisor on switches S1 through S8 (See S1-S8: Calibrate Divisor).

7. Reset the unit after the divisor has been entered and run the sample through again. If the reading is significantly different from the weighed sample, adjustment must be made. If reading is significantly low (greater than -1.5%), subtract 1 divisor for every .4% off. If the reading is significantly high (greater than +1.5%), add 1 divisor for every .4% off.
8. Reset and repeat test to verify new divisor.

**NOTE:** If test is run to calibrate for kilograms, turn switch S11 to off and S12 to on. Repeat test with calibration sample of 10 kg as listed in 1 through 8.

## C. Diagnostic Software

The EWM has built-in diagnostic software to analyze the operation of the weighing system and display an error message in the event that abnormal operation is detected. When an error is detected, the microprocessor freezes the present display value and alternates it and the error message on two 1 second intervals.

1. Time out of sample



The microprocessor did not see a head window pulse in half a second. Since head pulses should occur every 1/10 second, either a head malfunction has occurred or the wiring from the head to the module is incorrect.

Corrective Action:

Check wiring diagram on P.C. board for correct wiring.

See Diagnostic and Replacement Guidelines for information on replacing drive or shutter assembly.

2. Cumulative count out of range



The display data has exceeded the maximum capacity of the unit (653.8 units of measure). Usually this means the unit has been running for a long time without being reset. Usually no malfunction has occurred.

Corrective Action:

Press reset button and resume normal operation.

3. Divisor is zero



Microprocessor senses that no divisor has been set, therefore the weight calculation formula cannot be processed.

Corrective Action:

Check proper switch values.

If all switches are set properly, check the pounds or kilograms switches (S11 and S12). They may not be making proper contact. Rock the switch several times, then set in correct position.

If error condition is still displayed, replace P.C. board.

4. Zero flow reset pulses exceeds 999 counts.

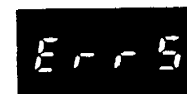


The head window pulse is greater than 999 reference pulse counts while in a no-milk-flow condition. This can result from a shutter that sticks or a faulty drive assembly.

Corrective Action:

See the Diagnostic and Replacement Guidelines.

5. Sample count is zero



### Corrective Action:

The head window pulse has become very narrow and no reference pulses were counted. This could be the result of either a drive or shutter assembly malfunction or an electrical transient on the head window signal generating a false signal.

See Diagnostic and Replacement Guidelines for drive and shutter assembly.

If electrical transient is creating the error condition, see D, supplemental.

## D. Diagnostic and Replacement Guidelines

When an error condition occurs, it is necessary to isolate the mechanical problem. Many times it will be in the head assembly and could require replacement of either the shutter or drive assembly or both.

To gain access to the components which should be checked, remove the three 6-32 screws on the base of the Flo-Meter assembly and slide the flowhead assembly from the base.

### 1. Drive Assembly

To check the drive assembly you will need an LCD volt meter or similar instrument.

**NOTE:** Check all solder and pin connections before further testing to verify operation.

- a. With power on, check rotation of shutter assembly. It should be clockwise. If rotation is jerky or counterclockwise, replace drive assembly.
- b. Set LCD meter to low voltage DC. Place negative lead of meter on black wire connection on top P.C. board. (Fig. 12) Place the positive lead to the blue connection on either the top or bottom P.C. board. The reading should be between 1.05 and 1.20 V DC. If reading is zero or erratic, check connections or replace drive assembly.

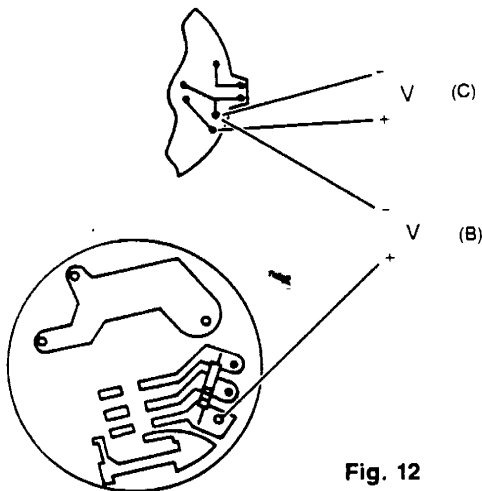


Fig. 12

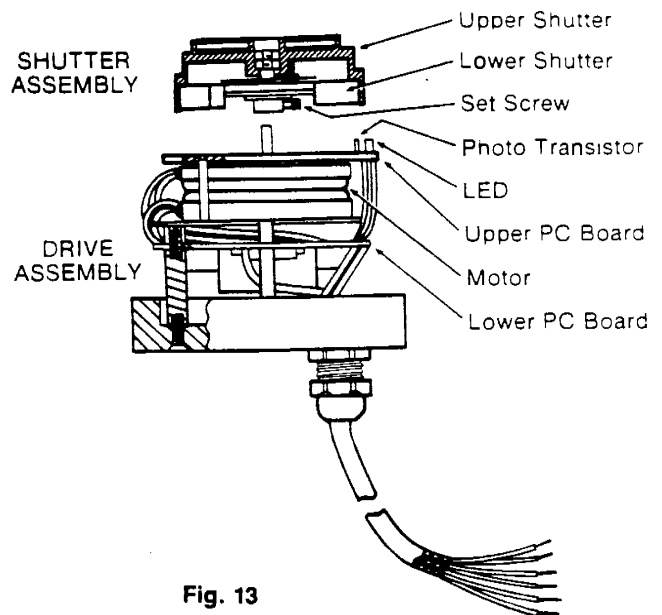


Fig. 13

- c. Place negative lead of voltmeter to black wire connection on top P.C. board and positive lead to white wire connection also on top P.C. board. Meter reading should be between 0.00 and 1.6V DC. Replace drive assembly if reading is above 1.6V DC.

Place a black tube over the photo transistor on the top P.C. board. Meter reading should range from 4.80 to 5.10V DC. If reading is below 4.8V or erratic, replace drive assembly. (See Fig. 13)

**NOTE:** This should be done away from direct light.

### 2. Shutter Assembly

A visual inspection of the shutter assembly should be sufficient. The following are things to check as this is conducted:

- a. Check to see if set screw is loose.
- b. Retract shutter assembly to see if spring oscillates and dampens properly.
- c. Turn EWM power on and check for wobble or off-center rotation of shutter.

**NOTE:** Shutter should rotate in a clockwise direction.

Replace shutter if malfunction occurs. To re-insert a new shutter assembly back onto the motor shaft, align set screw on shutter to the flat on motor shaft. Press firmly down and tighten set screw. Check for proper rotation.

Upon completion of Diagnostics and Replacement, carefully insert the Flowhead assembly into the Flo-Meter base aligning the protruding port of upper P.C. board to the recessed port of the Flo-Meter base.

Secure the three 6-32 screws through the base plate of the head into the inserts of the Flo-Meter base. Tighten screws so that only a slight compression of the gasket occurs. Be sure each screw is tightened uniformly.

### 3. Impeller

Although typically rare, a malfunctioning impeller may cause error conditions. It is recommended that an impeller inspection be done prior to the diagnostic tests. The following are things to check for improper impeller operation:

- a. Impeller shows noticeable wobble. This may be due to misseating of impeller or improper factory assembly.
- b. Impeller shaft is bent or binds at the point of insertion into the body splash ring (See 350015 parts list for reference).
- c. Insufficient magnetic coupling.
- d. Step on impeller shaft is rubbing on splashing ring or point on shaft is touching C.I.P. tube.

In all three cases, it will be necessary to replace the impeller assembly.

Failure due to these conditions typically results in erratic meter readings and are not sometimes visually evident as part of the malfunction. It is advised that these areas be checked upon initial installation.

**NOTE:** Upon replacement of any of the previously discussed component parts (with the exception of the P.C. board) a recalibration of the unit is necessary. Refer to B Calibration Procedure.

### 4. Supplemental

Electrical transients can occur when arcing is present in switches that operate gate or door openers, feeder motors, crowd gates, etc. This usually occurs from switches that are located in a close radius to the EWM and may not effect all of the units.

**NOTE:** Before searching for electrical transients, be sure to determine that the Err 5 condition is NOT DUE to Flowhead malfunctioning.

Isolate the switch that is causing the problem by operating all possible switches in the parlor in rotation while observing the EWM display for an Err 5 condition readout.

Once the switch(es) causing the problem have been isolated, it will be necessary to suppress the transient with a transient suppressor. A MOV (Metal Oxide Varistor) is the least expensive and can do a good job in low level transients of this type. Ratings on MOV are as follows:

**RMS Voltage:** Should be typically between 20-30% above the switching voltage.

**Clamping Voltage:** Is typically 2.8 times the RMS voltage.

**EXAMPLE:** Switch activating the entrance gate solenoid creates sufficient transient to create Err 5 on EWM next to switch.

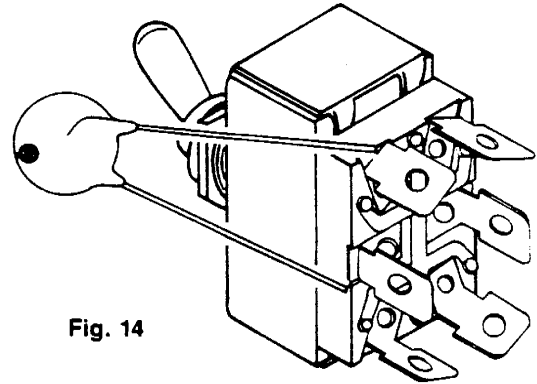


Fig. 14

SELECTED MOV (Metal Oxide Varistor)  
150VRMS 420V CLAMP VOLTAGE

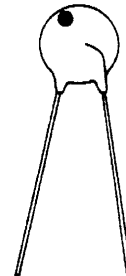


Fig. 15

TYPICAL EXAMPLE:  
GE TYPE V150PA20A

- a. Connect one lead (they are bi-directional) to the 120V AC side of the switch and the other lead to the solenoid side (see Fig. 14).
- b. Transient suppressors are readily available at any electronics supply center.
- c. If problem persists, contact Universal for corrective action.