



NATIONAL STANDARDS COMMISSION

WEIGHTS & MEASURES (PATTERNS OF INSTRUMENTS) REGULATIONS

REGULATION 9

PROVISIONAL CERTIFICATE OF APPROVAL No P10/1/6

This is to certify that an approval has been granted by the Commission that the pattern and variants of the

Wayne Model ELC1 LPG Driveway Flowmeter

submitted by Kelvinator Australia Ltd
Abbotts Road
DANDENONG VICTORIA 3175

are suitable for use for trade.

The approval is subject to review on or after 1/1/84.

Instruments purporting to comply with this approval shall be marked NSC No P10/1/6.

The approval may be withdrawn if instruments are used other than as described in the drawings and specifications lodged with the Commission.

Conditions of Approval

1. Instruments installed under this approval and with a Schwelm P15557 gas purger must only be connected to pumps which will not pump vapour, ie centrifugal types (non-positive displacement). This restriction does not apply to instruments with a Neptune 32 mm gas purger.
2. The initial verification of each driveway flowmeter shall be carried out under the supervision of a government-licensed LPG installer (where such exists) or a person experienced in the design and installation of LPG systems.
3. Instruments installed under this approval are to be tested at six monthly intervals after the initial verification test. Such tests are to be arranged by the submitter and supervised by the State Weights and Measures Authority; the results are to be sent to the Commission.
4. The Commission reserves the right to inspect and test any installation covered by this approval at any time without notice.
5. In the event of unsatisfactory performance, this approval may be modified or cancelled.

Signed

Executive Director

Descriptive Advice

Pattern: approved 22/12/82

Wayne model ELC1 attendant-operated driveway flowmeter for dispensing liquefied petroleum gas.

25/1/84

...../2

Variants: approved 22/12/82

1. Wayne model ELS1 driveway flowmeter suitable for connection to an Epitronic MKI or MKII self-serve control console.
2. With an electromechanical totaliser.

Technical Schedule No P10/1/6 dated 28/1/83 describes the pattern and variants 1 and 2.

Variant: approved 21/11/83

3. With a Neptune 32 mm gas purger replacing the gas purger of the pattern.

Technical Schedule No P10/1/6 Variation No 1 dated 2/12/83 describes variant 3.

Variant: approved 19/12/83

4. In an alternative "round" housing.

Technical Schedule No P10/1/6 Variation No 2 dated 25/1/84 describes variant 4.

Filing Advice

Certificate of Approval No P10/1/6 dated 2/12/83 is superseded by this Certificate and may be destroyed. The documentation for this approval now comprises:

Certificate of Approval No P10/1/6 dated 25/1/84
Technical Schedule No P10/1/6 dated 28/1/83
Technical Schedule No P10/1/6 Variation No 1 dated 2/12/83
Technical Schedule No P10/1/6 Variation No 2 dated 25/1/84
Test Procedure No P10/1/6 dated 28/1/83
Figures 1, and 4 to 10 dated 28/1/83
Figures 2, 3 and 11 dated 2/12/83.



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No P10/1/6

Pattern: Wayne Model ELC1 LPG Driveway Flowmeter

Submittor: Kelvinator Australia Ltd
29 Anzac Highway
Keswick, S.A., 5035.

1. Description of Pattern

1.1 Detail

The pattern is a Wayne model ELC1 LPG driveway flowmeter (Figure 1) for the delivery of liquefied petroleum gas of density 0.500 kg/L to 0.515 kg/L at 15°C, at temperatures between -5°C and +45°C. The maximum and minimum flow rates are 60 L/min and 15 L/min respectively.

The hydraulic diagram for this driveway flowmeter is given in Figure 2.

Volume	999.99 L in 0.01 L increments
Unit price	99.9 c/L in 0.1c increments
Price	\$999.99 in 1c increments
Totaliser	99999 L in 1 L increments

1.2 Component Structure And Conditions For Installation*

The component parts of each driveway flowmeter are listed in Figure 3 and are detailed in 1.2.3 to 1.2.12 below.

1.2.1 Supply Tank

The supply tank is large enough to supply liquefied petroleum gas at a rate that does not cause the pressure in the supply tank to drop to the point where vapour is formed in the line between the supply tank and the pump. The capacity of the supply tank is such that the maximum delivery of the driveway flowmeter in one minute is not greater than approximately 2.5% of the tank capacity.

The supply tank is located higher than the pump so that the liquid level always creates sufficient pressure (that is, above the vapour pressure) at the pump inlet at maximum flow rate to prevent vapour being formed.

1.2.2 Pump

The only pumps permitted for use are centrifugal not positive displacement types.

The pump is positioned as close as possible to the supply tank, with short inlet connections, and having as few restrictions as possible. There are to be no restrictive fittings within ten pipe diameters of the pump's inlet. The inlet pipe to the pump is of a larger diameter than the outlet from the pump. The inlet line should, where possible, slope upwards towards the supply tank.

* This approval relates to the metrological performance of the metering system; inspectors are advised that the system must comply with the requirements of other statutory authorities relating to safety, handling, storage and transportation of liquefied petroleum gas.

The external pump by-pass relief valve is installed in a line returning to the supply tank; this line should have no low spots which could trap liquid, and where possible should slope upwards towards the supply tank. The external by-pass setting is 100 to 140 kPa LOWER than the internal pump relief valve setting, where such a valve is fitted.

1.2.3 Meter

Schwelm two-piston meter (part number 840039) for liquefied petroleum gas.

1.2.4 Gas Purger

The meter is protected from the measurement of vapour by correct installation including the use of a centrifugal pump and by a Schwelm gas purger (part number P15557) (Figure 4) which has a constant bleed hole in the top allowing the separated vapour to return to the vapour space of the supply tank via a vapour return line of not less than 20 mm diameter. The vapour return line is constructed without low spots or traps which could prevent the free flow of vapour in either direction. A non-return valve is fitted to the liquid outlet of the gas purger.

A thermometer pocket is situated in the lower portion of the gas purger.

1.2.5 Driveway Flowmeter Indicator

An Eclipse model MVR79S driveway flowmeter price-computing indicator is used and is driven from the output shaft of the meter.

The operating cycle is started by turning the key switch (see Figure 1) clockwise, and releasing.

The pump motor will start and the indicator will blank, display all 8's and then display all zeroes leaving only the current unit price displayed. The pump motor will then start. When the hose is full of liquid, the solenoid-operated latch holding the nozzle handle will release (after an automatically variable time of between 2 and 20 seconds) and the nozzle can then be withdrawn from its receptacle, and then be connected to the purchaser's tank.

If the nozzle is not removed within 20 seconds of the solenoid being actuated the pump motor and system will shut down and the sale will be terminated.

After fuel has been delivered and the flow of liquid has been stopped for 20 seconds, the whole system will shut down even though the nozzle may not have been returned to its receptacle. The sale is then terminated.

1.2.6 Temperature Compensator

Temperature compensation is achieved by means of an electronic compensator built in to the Eclipse MVR79S.

The probe for the compensator is located in the stream of liquid close to the meter's inlet. The electronic probe circuitry senses changes of temperature in the liquid, and the MVR79S adjusts the indicated volume to the equivalent volume at a temperature of 15°C. A switch is provided to de-activate the temperature compensating function for testing purposes (Figure 9).

Fifteen seconds after a sale has been terminated and with the nozzle held in its receptacle, pressing the TOTALS (or TOTES) button in the middle of the indicator will display the following:-

Cumulative Dollars Sold in whole Dollars
Cumulative Volume Sold in whole Litres
Temperature display.

On release of the button the display will revert to the previous sale information.

The temperature display is an indirect display of the current liquid temperature. This display can be converted into degrees celsius by the following:

$$\frac{\text{Temperature Display} - 20}{2} = \text{Liquid Temperature in } ^\circ\text{C}$$

Note: When the electronic temperature compensator is de-activated the temperature display will show 50.

1.2.7 Differential Valve

A Schwelm spring-loaded differential valve maintains pressure in the metering chamber to prevent the formation of vapour. A pressure-equalising pipe is connected from the differential valve to the supply tank, through the vapour return line from the gas purger. The differential valve is set at 100 kPa (i.e. 100 kpa ABOVE the vapour pressure).

An excess flow valve is incorporated in the outlet of the differential valve and will function at a flow rate of 80 L/min.

1.2.8 Vapour Indicator

A sight glass is fitted in the pipe between the gas purger and the meter so that it may be seen if vapour is being metered. A pressure gauge is fitted adjacent to the pressure differential valve (Figure 10).

1.2.9 Outlet piping

The pipe connection from the differential valve to the hose is fitted with a bleed screw to enable the pressure in the hose to be lowered for reassembly of the hose break coupling.

1.2.10 Hose

The dispenser is fitted with a hose of 20 mm bore, complying with the SAA code for hoses for use with liquefied petroleum gases, which is supported on a hose mast. A hose break coupling is fitted in the hose assembly to break apart in the event of an excessive pull on the nozzle with a loss of no more than 15 mL of liquid.

1.2.11 Nozzle

The nozzle used is a REGO model A7197 (Figure 5).

1.2.12

To facilitate pressure equalisation when the driveway flowmeter is being tested with a pressure prover, provision is made for a vapour line from the prover to the vapour space of the supply tank either directly or via a tee in the vapour return line from the gas purger using a 1 3/4" Acme male adaptor.

During normal customer delivery there is no vapour return connection between the receiving container and the supply tank.

1.3 Marking

The instrument data plate permanently fixed to the external housing of the driveway flowmeter is marked with the following:

Manufacturer's name or mark	
Year of manufacture	
Serial number	
NSC approval number	P10/1/6
Maximum flow rate	60 L/min
Minimum flow rate	15 L/min
Liquid temperature range	-5°C to +45°C
Approved for LPG of density	0.5 kg/L to 0.515 kg/L
Density for which temperature compensator is set kg/L
Maximum operating pressure	2450 kPa

1.4 Sealing

The MVR79S indicator and meter calibration adjustments are sealed by lead and wire seals (Figure 6).

Alternatively, paper seals may be used to seal the computer calibration adjustments (Figures 7 and 8). Only one side of the computer is sealed.

Sealing of the temperature compensator switch is as illustrated in Figures 9 and 10.

2. Description of Variants

2.1 Variant 1

Wayne model ELS1 LPG driveway flowmeter in which the computer of the pattern has been modified to facilitate connection to an Epitronic MKI or MKII console (approved in NSC No 5/6A/70).

The operating sequence is as detailed in paragraph 1.2.5; turning the key switch signals the console for authorisation, after which the cycle is the same as for the ELC1.

2.2 Variant 2

The pattern and variant 1 with an electromechanical totaliser (Line model MGU). The totaliser range is 9999999 L in 1 L increments.

TEST PROCEDURE No P10/1/6

The following test procedure is to be used at each six-monthly reverification test. The tests are to be arranged so that one is carried out in the hotter period of each year and the other in the cooler period. One test should also be arranged when there is a low liquid level in the supply tank to ensure that there is still sufficient pressure at the inlet to the pump to avoid vapour being formed.

1. Visual Inspection

Visually inspect the complete installation to ensure that the pump, supply tank, dispenser and pipework are installed in accordance with the description given in Technical Schedule No P10/1/6. If the system is not installed correctly (for example, if a restrictive valve or fitting is installed in the pipeline), vapour may be generated and will show in the sight glass when the purger does not eliminate all the vapour.

2. Meter Test With Temperature Compensator De-activated

Maximum Permissible Error $\pm 1.0\%$

- (i) Carry out at least three runs into the prover at the normal flow rate at which the meter is used. Read the temperature and pressure at the meter and at the prover. Correct for the changes in volume of the liquid due to any difference in pressure and temperature between the meter and the prover and for changes in the volume of the prover due to any difference in pressure and temperature from the reference temperature and pressure at which it was calibrated.
- (ii) Repeat the above test at the minimum flow rate of the meter or 15 L/min, whichever is the greater.
- (iii) During the test runs, note whether any vapour is showing in the sight glass.

3. Meter Test With Temperature Compensator Activated

Maximum Permissible Error $\pm (1.2\% + 0.02\% \text{ per } ^\circ\text{C difference from } 15^\circ\text{C})$.

- (i) Carry out at least three runs into the prover at the normal flow rate. Read the temperature and pressure at the meter and the prover. After correcting the prover volume reading to its calibration temperature and pressure, reduce the volume to its equivalent volume at 15°C using the temperature indicated at the meter and the appropriate table for the density of the liquid for which the meter temperature compensator is set.* Compare the calibrated volume with the meter indicated volume.
- (ii) Repeat the above test at the minimum flow rate of the meter or 15 L/min, whichever is the greater.

4. Price-computing

The Eclipse MVR79S price-computing indicator is "inhibited", which means it does not display volume and price below 0.05 L. This can be observed by making a slow delivery and observing that the volume and price displays are inhibited until the volume delivered reaches 0.05 L.

*ASTM-IP Petroleum Measurement Table 54 - Volume Reduction to 15°C (Metric Edition)

- (i) Note the price per litre set on each driveway flowmeter under test, and for the model ELS1, the mode of operation (that is, CONSOLE or ATTENDED mode).
- (ii) For model ELS1 only - At the driveway flowmeter set the mode of operation to ATTENDED via the selection switch.
- (iii) For models ELC1 and ELS1 - Wait 5 seconds from the last delivery and turn keyswitch 90° clockwise and release. The computer displays should blank, show all 8's and then show zeros in the price and volume displays and the unit price display will show the unit price setting for that flowmeter as noted in (i).

The pump motor will start and the nozzle-latch solenoid will activate after a period of 2 to 20 seconds. Remove the nozzle and turn the keyswitch and release. The pump motor will stop and the nozzle-latch solenoid will de-activate. Replace the nozzle in its receptacle.

- (iv) Wait 15 seconds and with the nozzle fully positioned in the nozzle receptacle, press and release the TEST button on the driveway flowmeter indicator. The word TEST will appear on all displays. The unit price indicator will show the unit price setting for that driveway flowmeter as recorded in (i).

Note: The nozzle-latch solenoid will activate at this time.

- (v) Change the unit price to 30.0 cents per litre (the price may be changed by simultaneously pressing the PRICE and the UP or DOWN buttons).
- (vi) Press the FAST or SLOW TEST button to display a volume of between 7.49 litres and 7.54 litres. The price will be \$2.25 for 7.49, 7.50 or 7.51 litres, or \$2.26 for 7.52, 7.53, or 7.54 litres. If an indication beyond this volume is achieved by mistake, reset the price and volume indicators to zero by turning the keyswitch and releasing.

Repeat test for the required number of runs.

- (vii) Alter the unit price to 30.9 cents per litre; "ERROR 2" should flash in the price indicator, indicating a multiplication error.
- (viii) Change the unit price back to the value as recorded in (i).
- (ix) Press the TEST button once and release. The word TEST on the displays will now clear. The nozzle-latch solenoid will de-activate.
- (x) Turn the keyswitch and release. The computer will reset and the pump motor will start (the solenoid may activate). Turn the keyswitch again and release, and the pump motor will stop.
- (xi) Press the TOTES button on the driveway flowmeter indicator, and check the decimal markers on the price indicator. If they show between each figure, the batteries need immediate replacement.
- (xii) For model ELS1 only - Return the driveway flowmeter to the mode recorded in (i).

5. System With Epitronic MKI Or MKII Consoles - MVR79S Eclipse (Self-serve Post-pay model) For ELS1 Models Only

The following test procedure will check whether the system is operating in accordance with the approved design.

Note: In order to allow the service station to continue to function while these tests are carried out, a number of the driveway flowmeters may be isolated by switching to ATTENDED (MANUAL) mode at the flowmeter while the remainder are left in CONSOLE mode.

- (i) Ensure that the CONSOLE mode is selected at those driveway flowmeters to be tested.
- (ii) At the control console select CONSOLE (POST-PAY) mode of operation by use of the keyswitch.
- (iii) In turn, press each STATUS button and check that all 8's are displayed.

For one driveway flowmeter (or more if thought to be necessary):

- (iv) Turn the keyswitch and release - the AUTHORISATION light should flash at the console; authorise the driveway flowmeter by pressing AUTHORISATION button for that flowmeter.
- (v) Deliver sufficient liquid to cause the price and quantity indicators on the driveway flowmeter to move significantly off zero.
- (vi) Stop the pump motor by returning the nozzle to its receptacle.
- (vii) Record the driveway flowmeter number and the price indicated on the driveway flowmeter.
- (viii) Turn the keyswitch and release, and check that the price-computing indicator does not reset to zero and that the pump motor does not start (AUTHORISATION and STATUS lights will be illuminated).
- (ix) At the control console press the STATUS button for the driveway flowmeter and check the display price against the price recorded at the driveway flowmeter (refer (vii)).
- (x) Authorise the driveway flowmeter by pressing the AUTHORISATION button.
- (xi) After a minimum of 20 seconds the STATUS light for that flowmeter will flash. Press the STATUS button; the price and volume indicators, on both the console and the driveway flowmeter, should zero.



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No P10/1/6

VARIATION No 1

Pattern: Wayne Model ELC1 LPG Driveway Flowmeter

Submitter: Kelvinator Australia Ltd
Abbotts Road
DANDENONG VICTORIA 3175

1. Description of Variant 3

With a Neptune 32 mm gas purger replacing the Schwelm P15557 gas purger of the pattern, in which case positive displacement type pumps may be fitted (Figure 3).

The gas purger incorporates an inlet non-return valve and internal hydrostatic relief valve, a strainer and a float chamber (Figure 11). The gas purger is vented through a non-return valve, via a vapour return line not less than 20 mm in diameter to the vapour space in the supply tank (Figure 2). The vapour return line is constructed without low spots or traps which could prevent free flow of vapour in either direction.

A thermometer pocket is situated in the strainer cover.



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No P10/1/6

VARIATION No 2

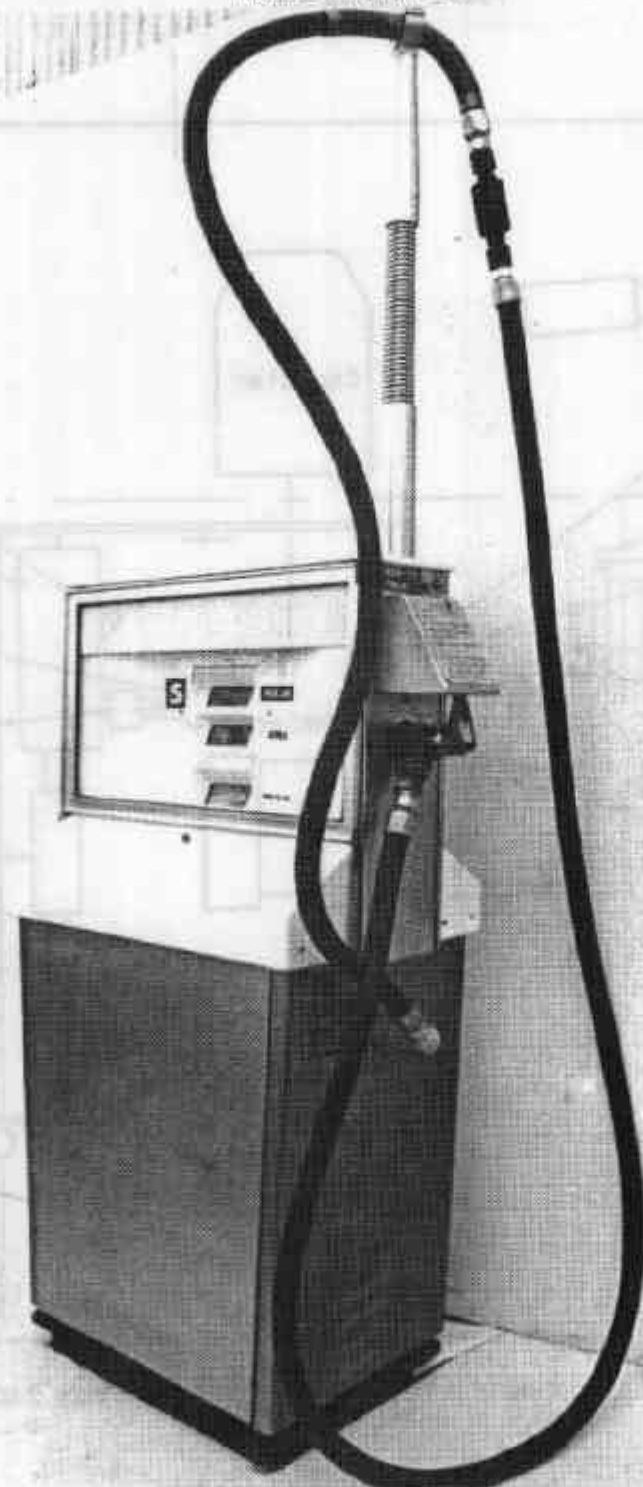
Pattern: Wayne Model ELC1 LPG Driveway Flowmeter

Submittor: Kelvinator Australia Ltd
Abbotts Road
DANDENONG VICTORIA 3175

1. Description of Variant 4

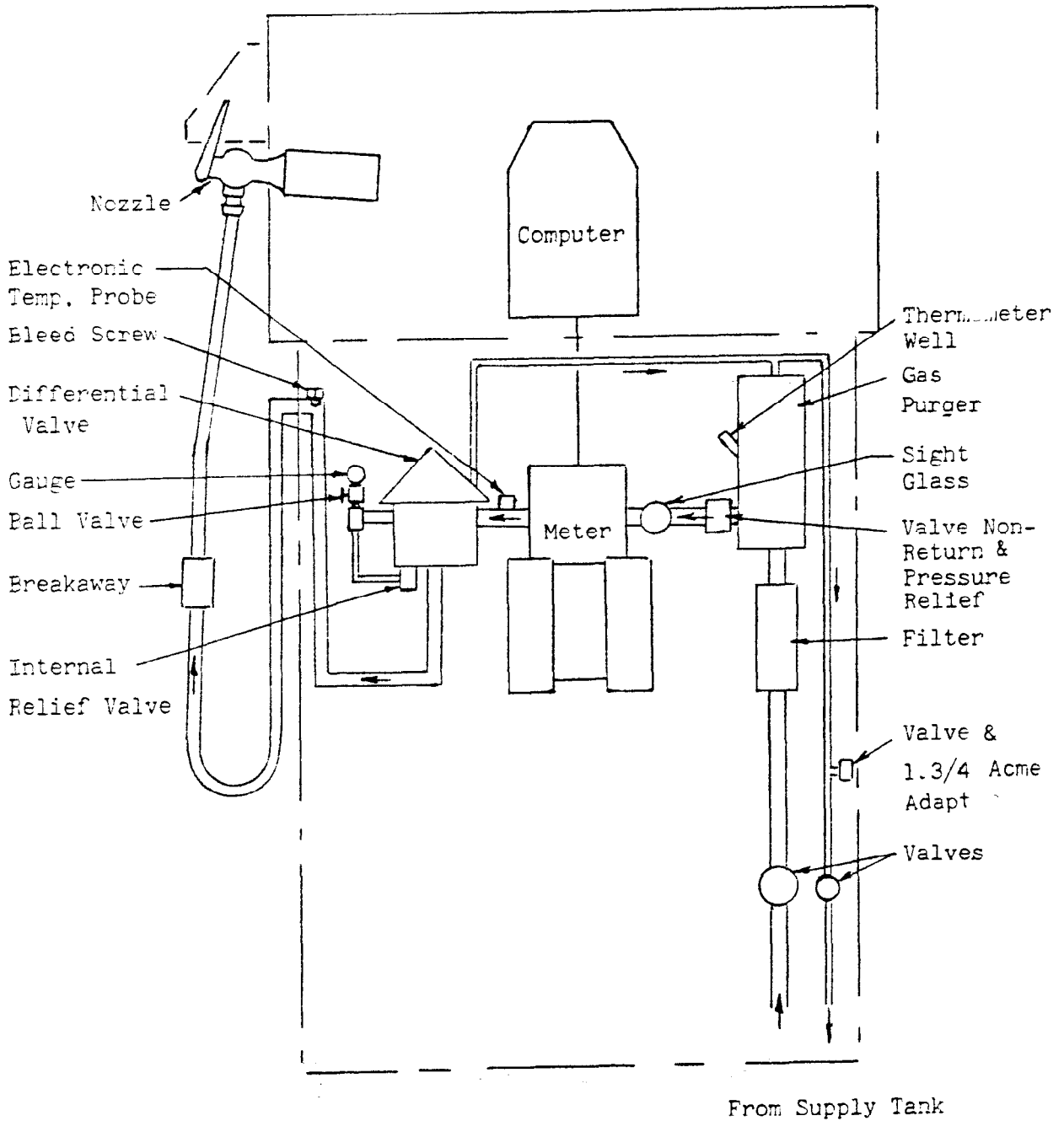
In an alternative "round" housing in which case the prefix E of the model number is replaced by M (eg ELC1 becomes MLC1).

FIGURE P10/1/6 - 1



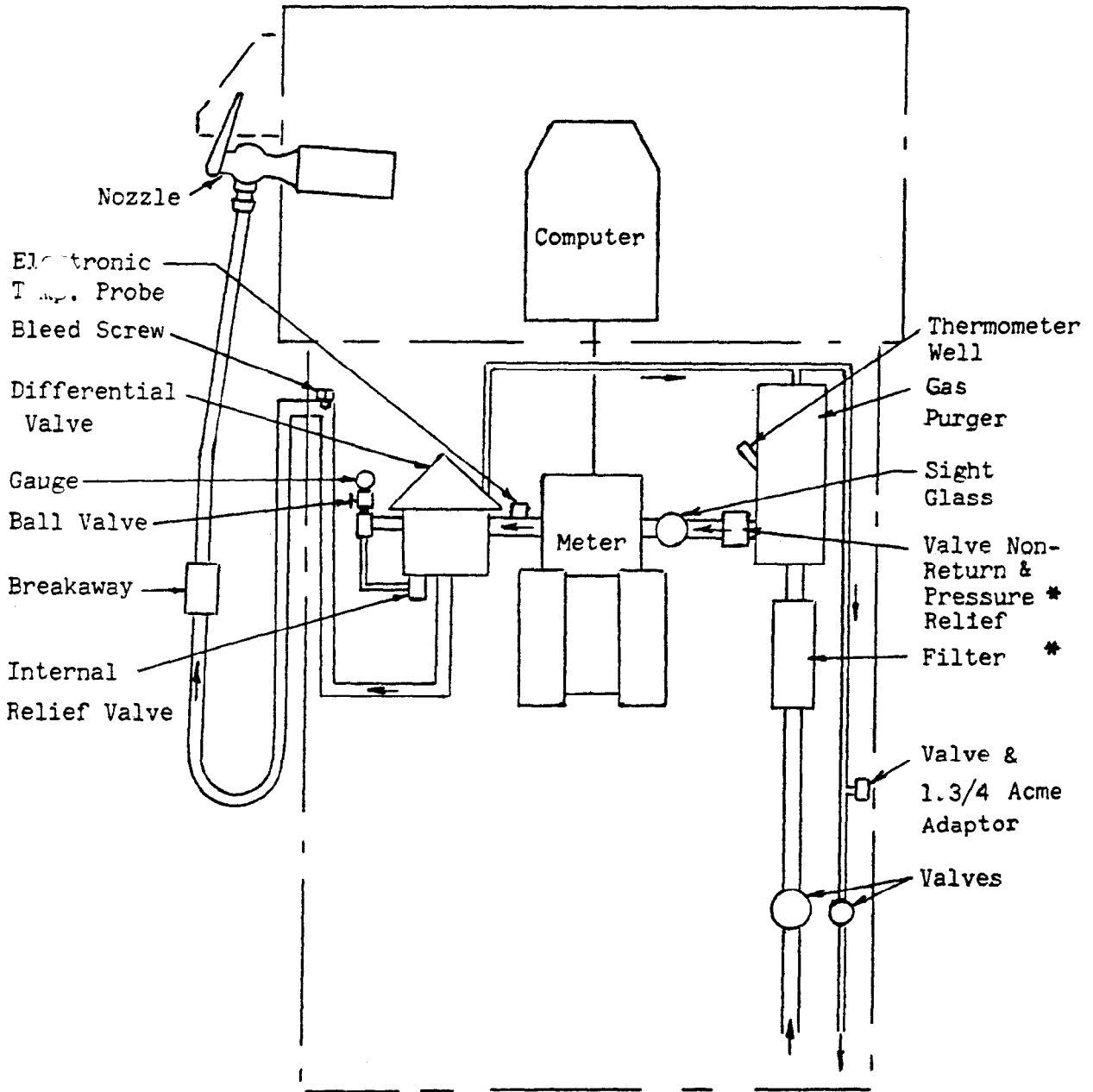
Wayne Model ELC1 LPG Driveway Flowmeter

FIGURE P10/1/6 - 2



Hydraulic Diagram Models ELS1 And ELC1

FIGURE P10/1/6 - 2



From Supply Tank

* For Neptune Gas Purgers These Are Internal Parts

Hydraulic Diagram Models ELS1 And ELC1

FIGURE P10/1/6 - 3

		<u>Model ELC1</u>	<u>Model ELS1</u>
Meter:	Schwelm two-piston (part no 840039)	*	*
Gas purger:	Schwelm part number P15557 or Neptune 32 mm	*	*
Computer:	Eclipse MVR79S with electronic temperature compensation	*	
	Eclipse MVR79S with electronic temperature compensation capable of communicating with an Epitronic MKI or MKII Console		*
Nozzle:	Rego A7197	*	*
Vapour Indicator:	Sight glass	*	*
Delivery Hose:	Standard commercial hose of 20 mm bore approved for LPG	*	*
Ball Valves:	Cast iron or steel construction standard commercial product approved for LPG.	*	*

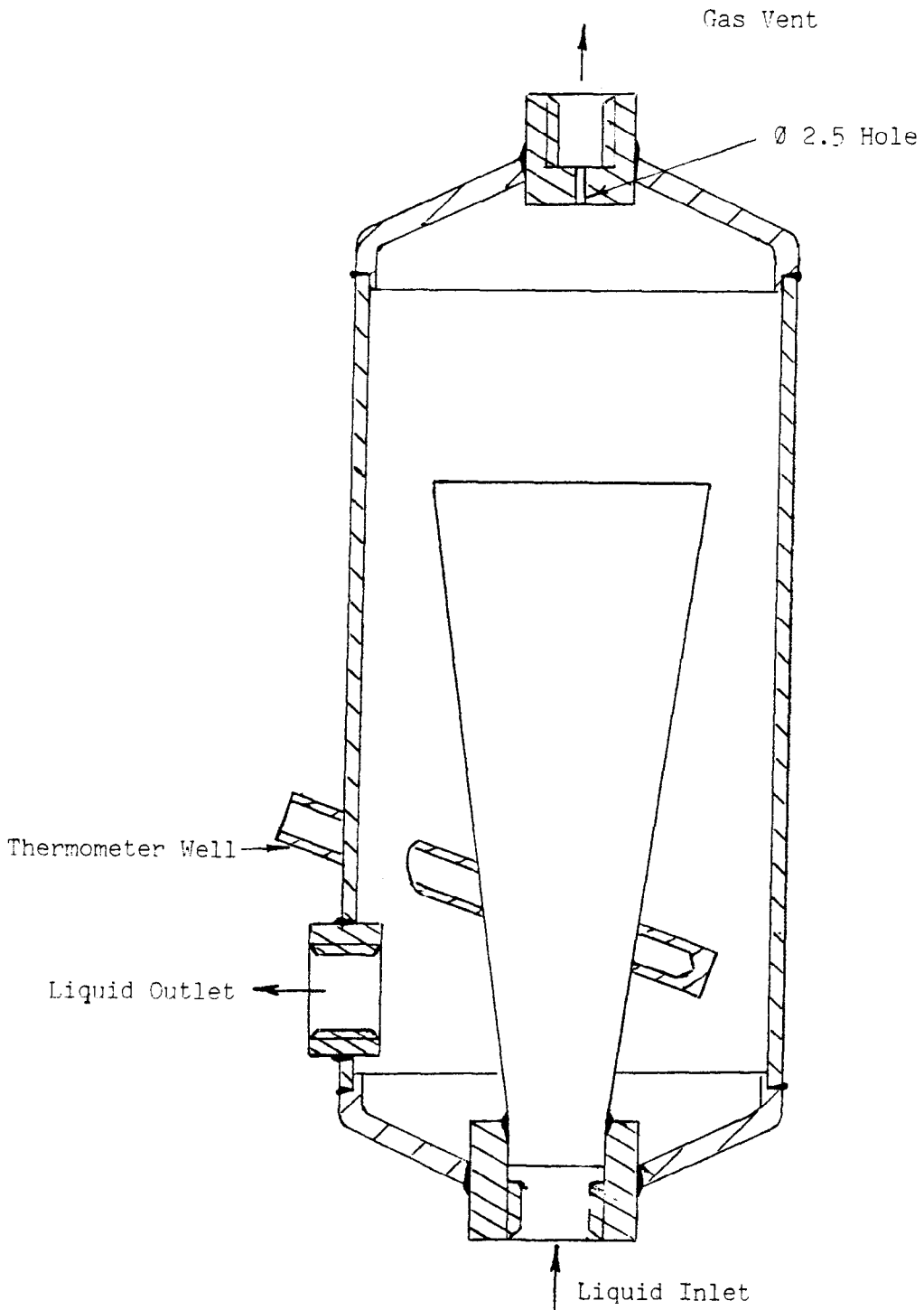
Component Parts Table

FIGURE P10/1/6 - 3

		<u>Model ELC1</u>	<u>Model ELS1</u>
Meter:	Schwelm two-piston (part no 840039)	*	*
Gas purger:	Schwelm part number P15557	*	*
Computer:	Eclipse MVR79S with electronic temperature compensation	*	
	Eclipse MVR79S with electronic temperature compensation capable of communicating with an Epitronic MKI or MKII Console		*
Nozzle:	Rego A7197	*	*
Vapour Indicator:	Sight glass	*	*
Delivery Hose:	Standard commercial hose of 20 mm bore approved for LPG	*	*
Ball Valves:	Cast iron or steel construction standard commercial product approved for LPG.	*	*

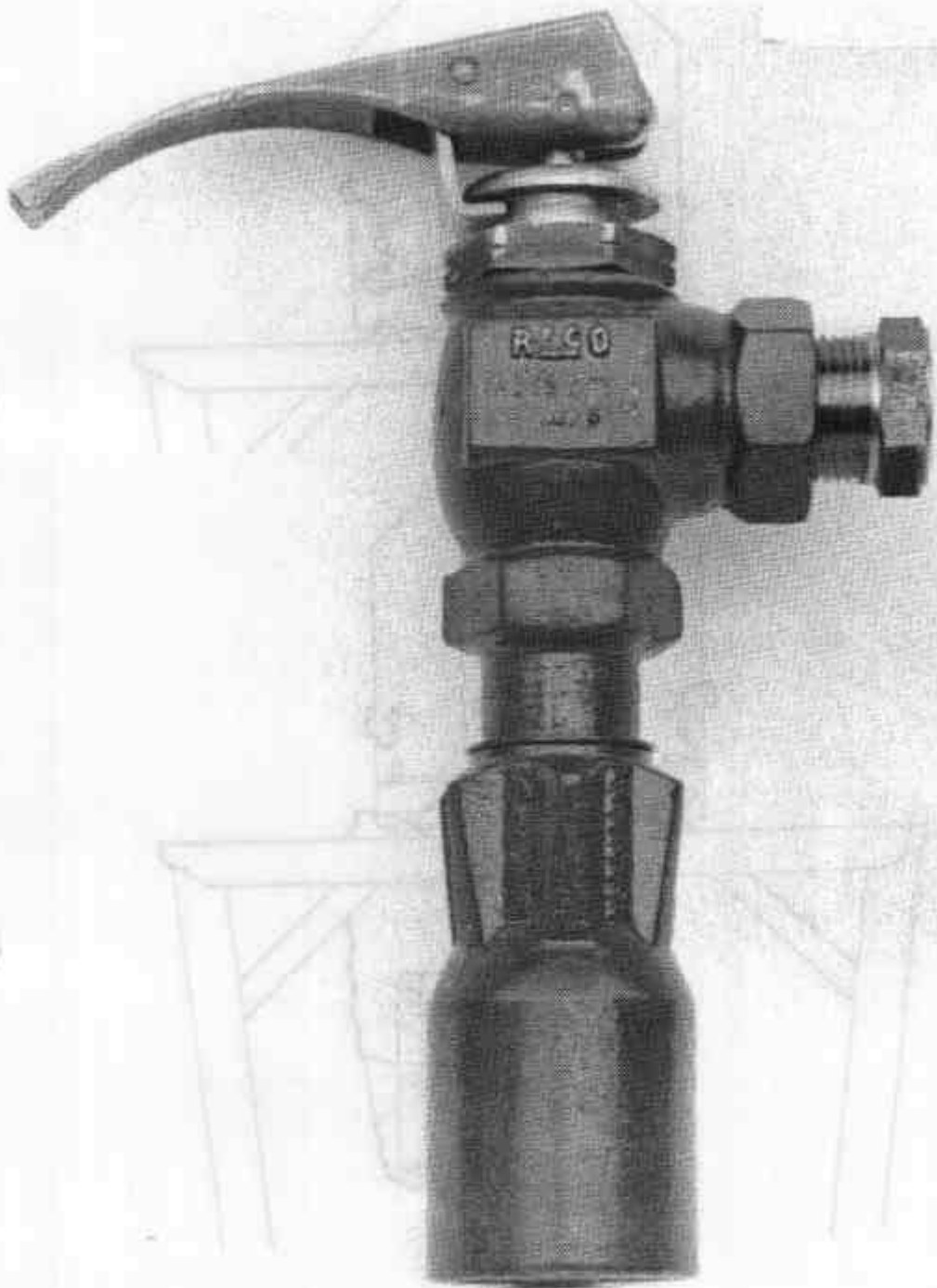
Component Parts Table

FIGURE P10/1/6 - 4



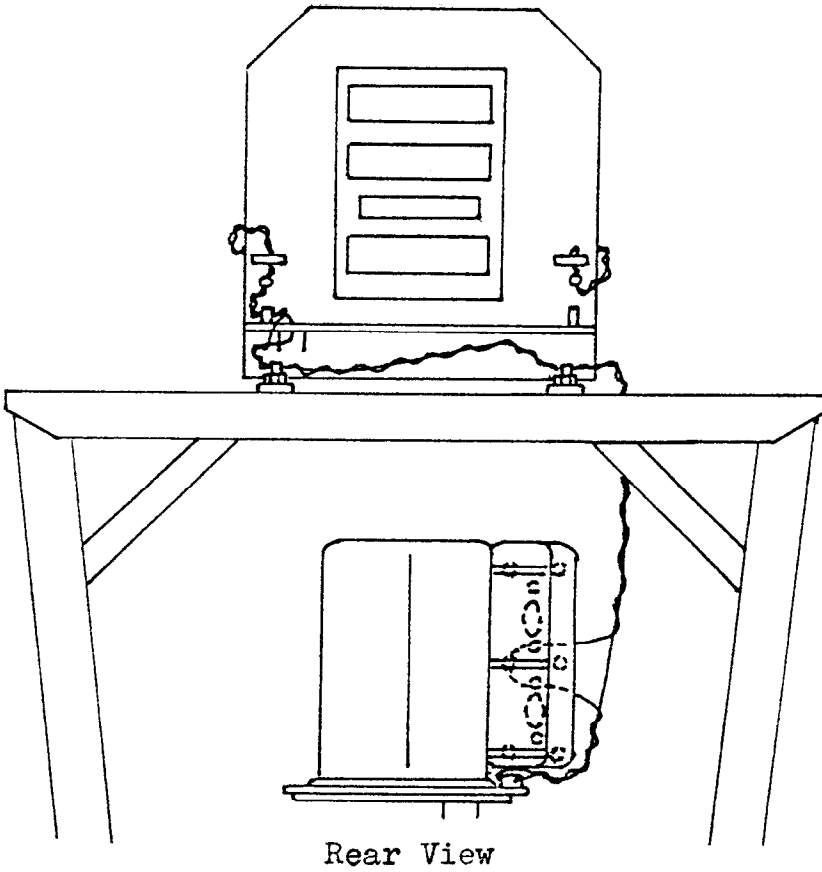
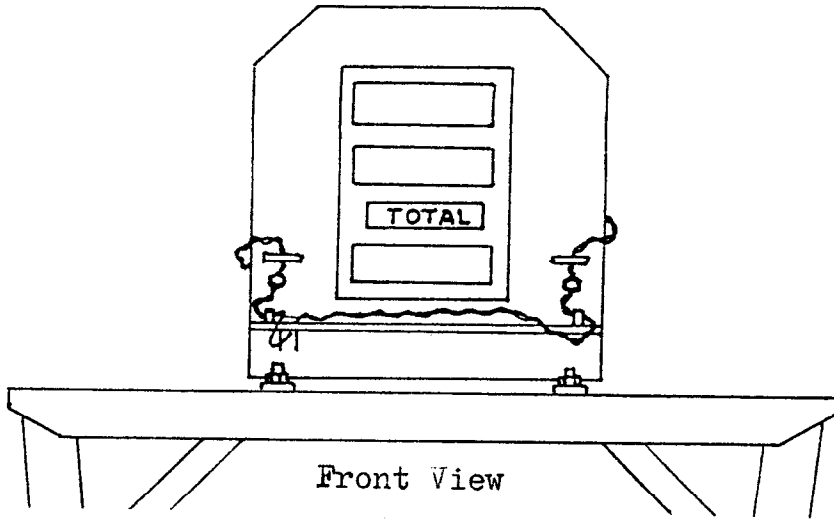
Gas Purger - Schematic Diagram

FIGURE P10/1/6 - 5



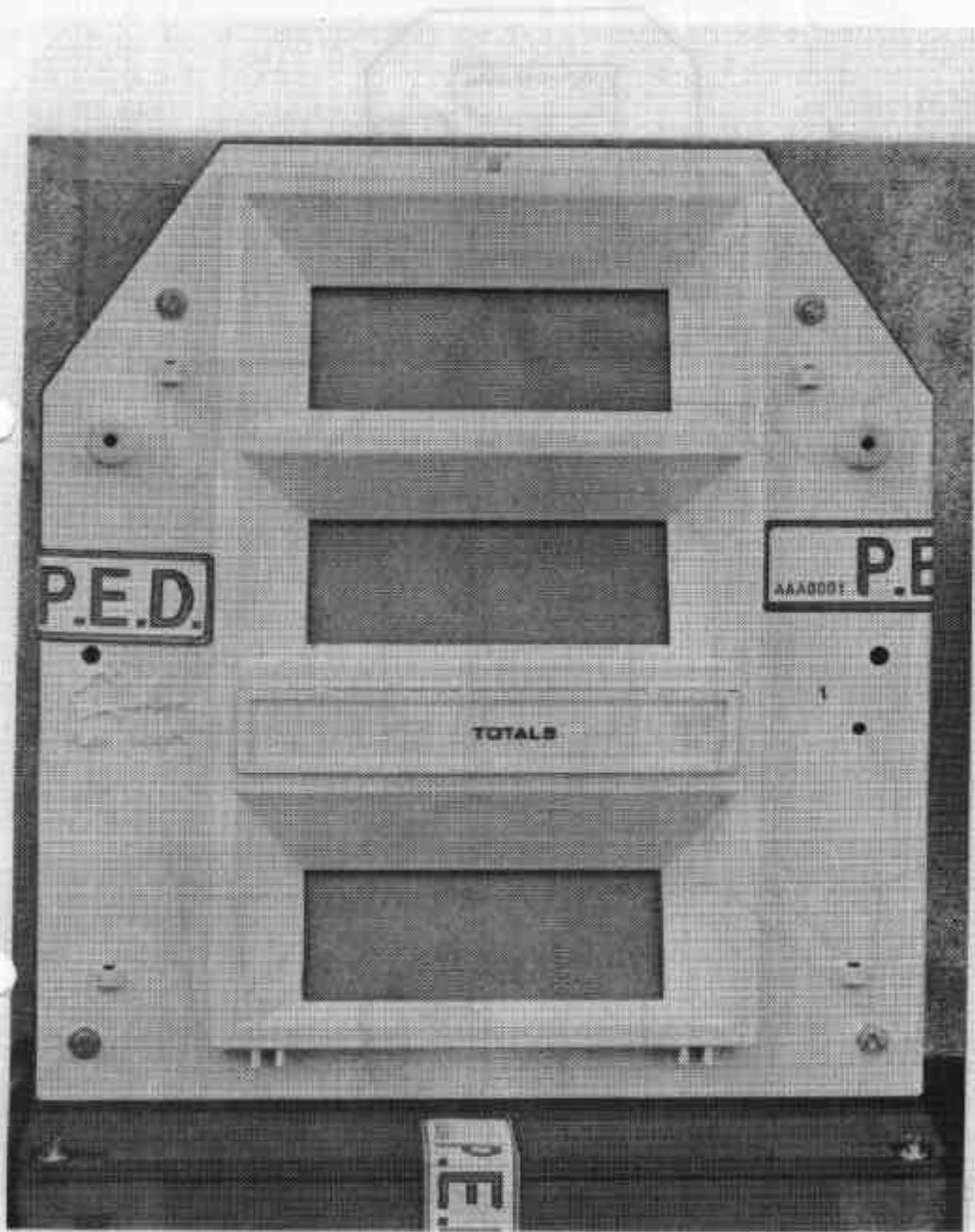
Rego Model A7177 Nozzle

FIGURE P10/1/6 - 6



Sealing Of Eclipse MVR 79S And Meter Calibration Adjustments

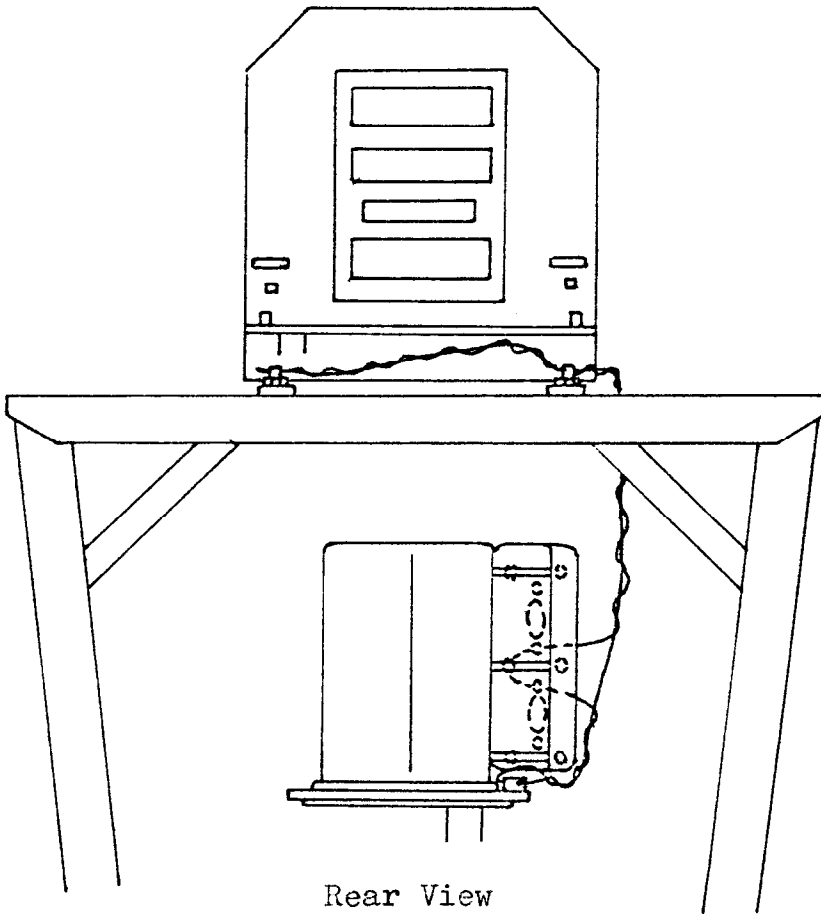
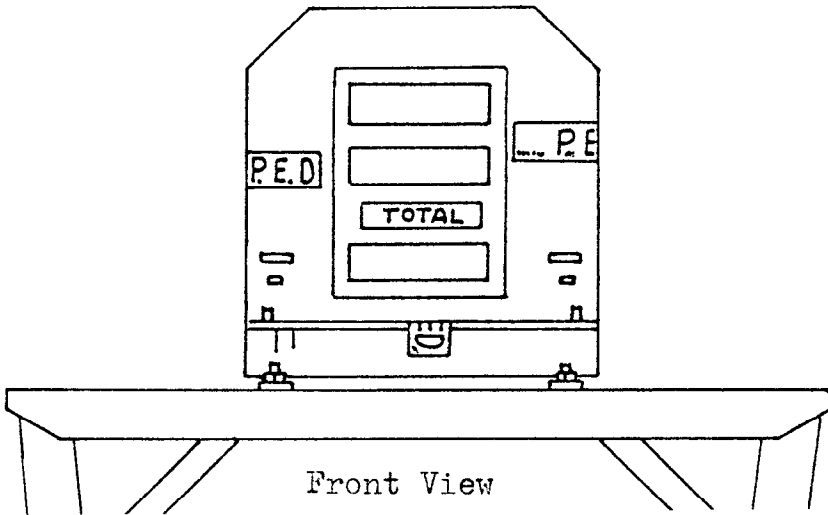
FIGURE P10/1/6 - 7



Alternative Sealing Of MVR 79S

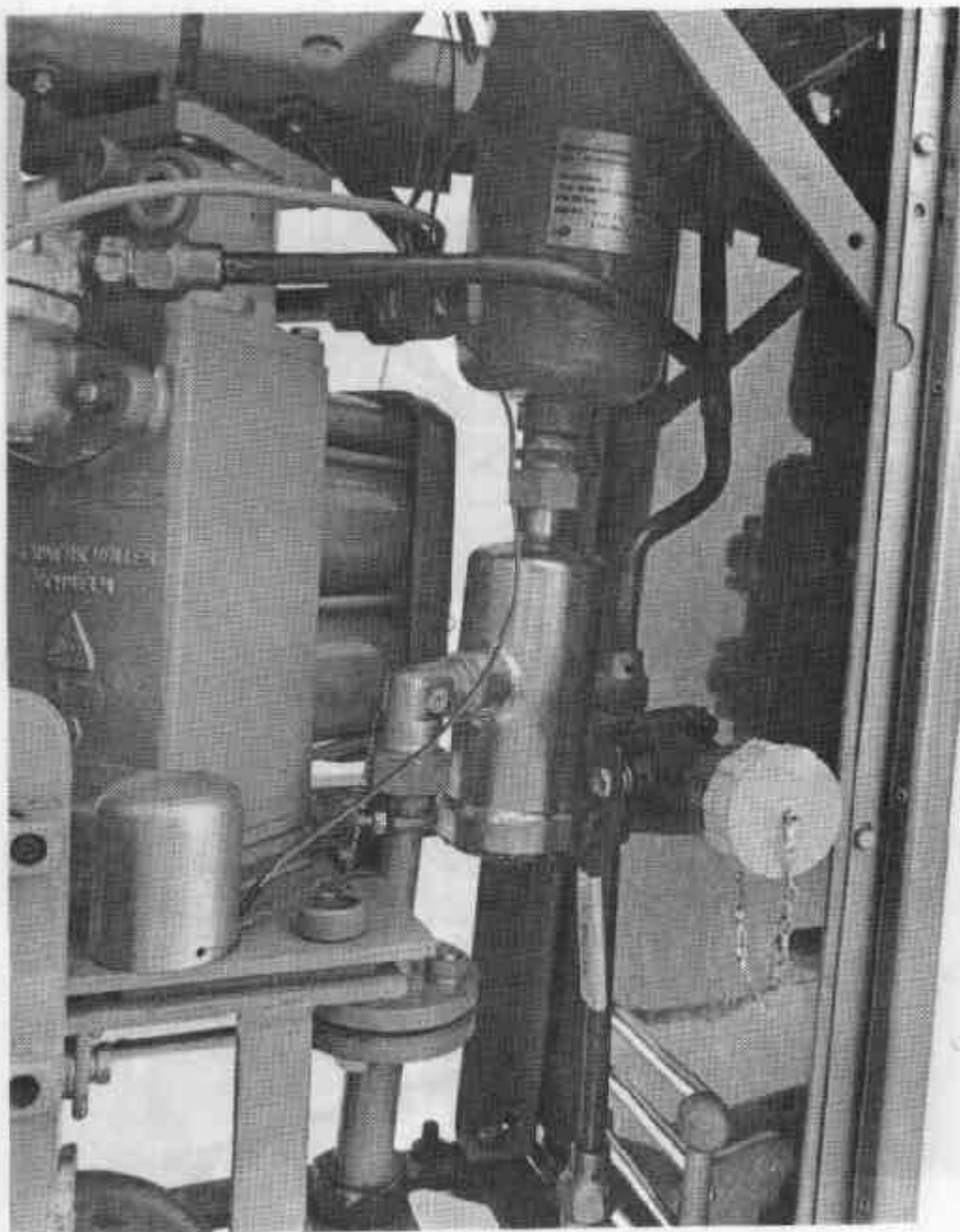
28/1/83

FIGURE P10/1/6 - 8



Alternative Sealing Including Paper Seals

FIGURE P10/1/6 - 9

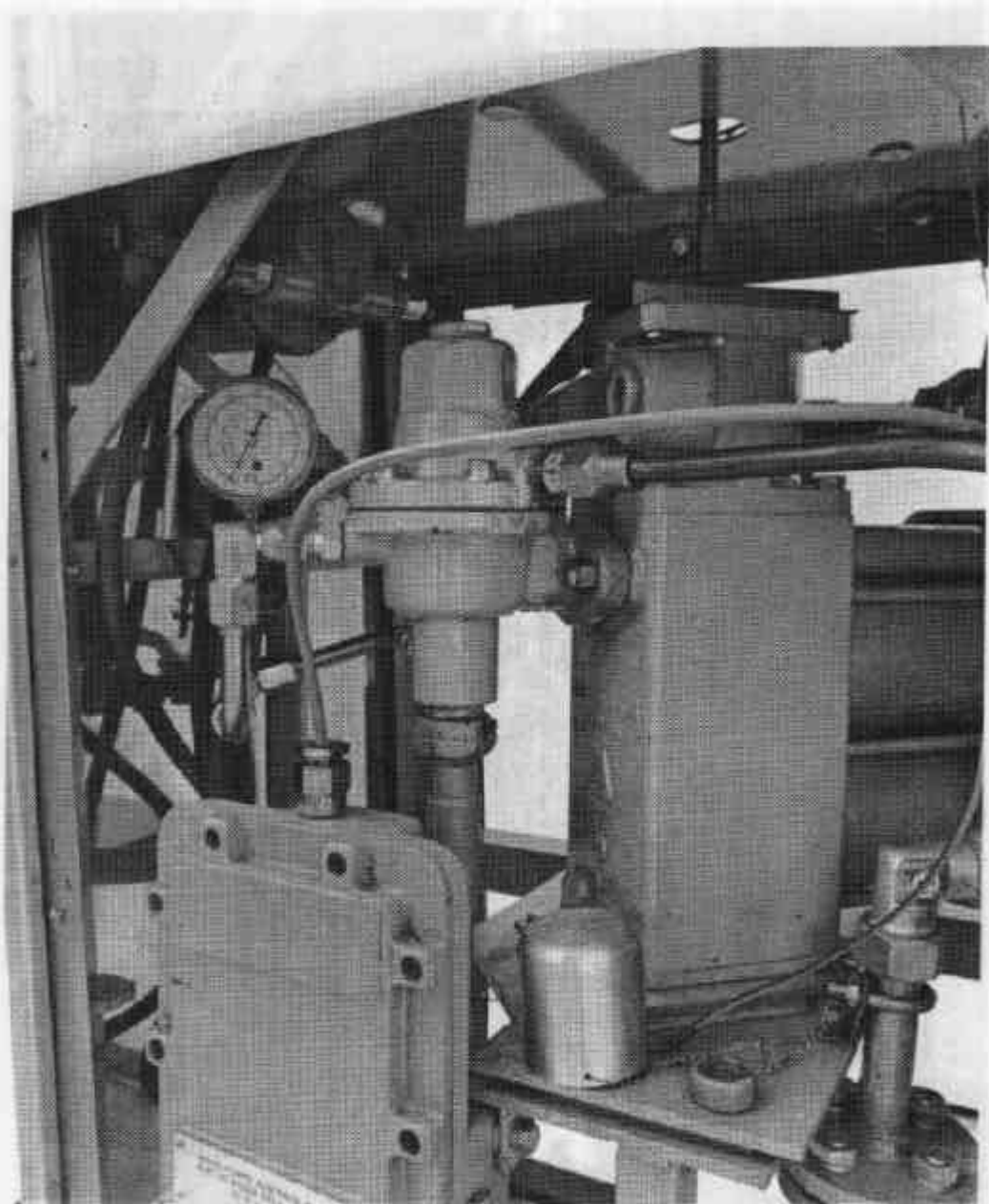


Sealing Of Meter Calibration Adjustments
And Temperature Compensator Switch

28/1/83

88/1/83

FIGURE P10/1/6 - 10

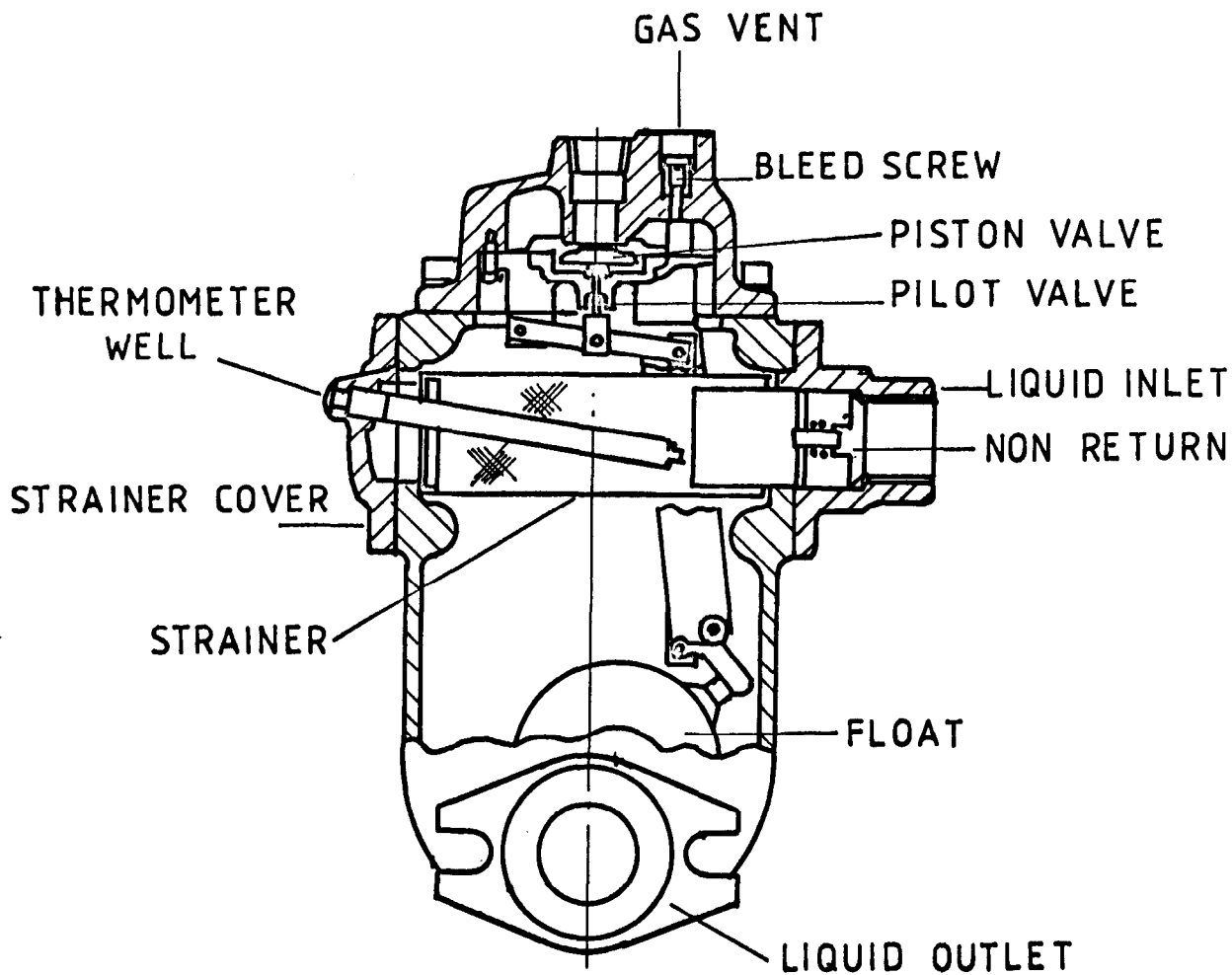


Piping Arrangement For Pressure Gauge And
Sealing Of Temperature Compensation Switch Cover

28/1/83

28/1/83

FIGURE P10/1/6 - 11



Neptune Gas Purger - Schematic Diagram

2/12/83