NATIONAL STANDARDS COMMISSION

NATIONAL MEASUREMENT (PATTERNS OF INSTRUMENTS) REGULATIONS

REGULATION 9

PROVISIONAL CERTIFICATE OF APPROVAL No P10/1/10

This is to certify that an approval for use for trade has been granted in respect of the pattern and variants of the

LPG Engineering Model Stargas LPG Driveway Flowmeter

submitted by LPG Engineering Pty Ltd
52 Norcal Road
Nunawading VIC 3131.

CONDITIONS OF APPROVAL
General:

This approval is subject to review on or after 1/9/89.
This approval expires in respect of new instruments on 1/9/90.

Instruments purporting to comply with this approval shall be marked NSC No P10/1/10.

This approval may be withdrawn if instruments are constructed other than as described in the drawings and specifications lodged with the Commission.

The Commission reserves the right to examine any instrument purporting to comply with this approval.

Special:

The initial verification of each driveway flowmeter shall be carried out under the supervision of a government-licensed LPG installer or a person experienced in the design and installation of LPG systems.

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 submittor and supervised by the State or Territorial Weights and Measures Authority; the results of all tests are to be sent to the Commission.

In the event of unsatisfactory performance, or of suitable test results not being received by the Commission, this approval may be cancelled.

Signed

Executive Director

Descriptive Advice

Pattern: provisionally approved 12/4/88

- LPG Engineering model Stargas attendant-operated driveway flowmeter for the dispensing of liquefied petroleum gas.

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Variants: provisionally approved 12/4/88

1. With two flowmetering systems in one housing.

2. In an alternative "round" housing.

Technical Schedule No 10/1/10 describes the pattern and variants 1 and 2.

Filing Advice

The documentation for this approval comprises:

Provisional Certificate of Approval No P10/1/10 dated 12/9/88
Technical Schedule No 10/1/10 dated 12/9/88
Test Procedure No 10/1/10 dated 12/9/88
Figures 1 to 4 dated 12/9/88

NATIONAL STANDARDS COMMISSION

NOTIFICATION OF CHANGE

PROVISIONAL CERTIFICATE OF APPROVAL No P10/1/10

CHANGE No 1

The following changes are made to the approval documentation for the

LPG Engineering Model Stargas LPG Driveway Flowmeter

submitted by LPG Engineering Pty Ltd
52 Norcal Road
Nunawading VIC 3131.

1) In Provisional Certificate No P10/1/10 and its Technical Schedule both dated 12/9/88:

   a) Replace references to "attendant-operated" in the descriptions of the pattern, with "locally or remotely authorised".

   b) Remove references to "round" in the descriptions of variant 2.

2) In Technical Schedule No 10/1/10 dated 12/9/88, add the following to paragraph 1. Description of Pattern:

   "Instruments may be used with compatible control consoles which have been Commission-approved for use with the type of indicator fitted to the driveway flowmeter."

Signed

Executive Director

National Standards Commission

NOTIFICATION OF CHANGE

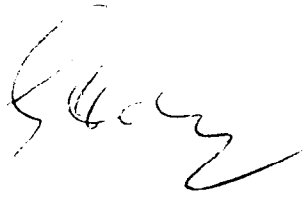
VARIOUS CERTIFICATES OF APPROVAL

The following changes are made to the approval documentation for various LPG flowmeter approvals as listed below:

In the approvals listed below, remove from the Certificate, Technical Schedule and Test Procedure, any Condition of Approval or clause that refers to instruments being verified, re-verified or calibrated at specific intervals. (Note that the re-verification period is determined by the Trade Measurement Authority in the State or Territory in which the instrument is located.)

APPROVAL NUMBER	PATTERN
10/1/2	Halco Neptune 32/38 mm LPG Flowmeter
P10/1/3	Acme Model LGD 100 LPG Driveway Flowmeter
10/1/3A	Acme Model LGD 105S LPG Driveway Flowmeter
P10/1/5	Batchen Model Mk II LPG Driveway Flowmeter
P10/1/6	Wayne Model ELC1 LPG Driveway Flowmeter
10/1/6A	Email Model ELC1 LPG Driveway Flowmeter
P10/1/7	Indeng Model MKO LPG Driveway Flowmeter
10/1/8	Gilbarco Model T093D LPG Driveway Flowmeter
10/1/8A	Gilbarco Model T093D LPG Driveway Flowmeter
10/1/9	Batchen Model Commander LPG Driveway Flowmeter
P10/1/10	LPG Engineering Model Stargas LPG Driveway Flowmeter
10/1/10A	LPG Engineering Model Stargas LPG Driveway Flowmeter
10/1/11	LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter
10/1/12	CleverHead Model 93 LPG Driveway Flowmeter
10/1/13	Batchen Model SCB Commander LPG Driveway Flowmeter
P10/2/2	Liquid Controls Model MA-7-GY-10 Bulk LPG Flowmeter
10/2/3	Neptune Model 4D 32 mm Bulk LPG Flowmeter
P10/2/4	Euromatic Model FL 11/2-125 Turbine Bulk LPG Flowmeter

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 10/1/10

Pattern: LPG Engineering Model Stargas LPG Driveway Flowmeter.

Submittor: LPG Engineering Pty Ltd
52 Norcal Road
Nunawading VIC 3131.

1. Description of Pattern

The pattern is an attendant-operated LPG Engineering model Stargas driveway flowmeter (similar to that shown in Figure 1) for the delivery of liquefied petroleum gas of density 0.500 kg/L to 0.540 kg/L at 15°C, at temperatures between 0°C and 45°C. The maximum and minimum flow rates are 75 L/min and 15 L/min respectively.

Volume	999.99 L in 0.01 L increments
Unit Price	999.9 c/L in 0.1 c increments
Price	$999.99 in 1 c increments
Totaliser Volume	9999999 L in 1 L increments

1.1 Component Structure

The component parts of each driveway flowmeter comprise those components detailed in (iii) to (xi) below. The hydraulic diagram for the flowmeter is shown in Figure 2.

(i) Supply Tank

The supply tank is located above the pump and where suitable pumping equipment is provided, the tank may be below ground. The capacity of the supply tank is such that the maximum delivery of the driveway flowmeter in one minute is greater than approximately 2.5% of the tank capacity.

(ii) Pump

The pump is positioned as close as possible to the supply tank and shall always be in a state of flooded suction. There shall be no restrictive fittings within ten pipe diameters of the pump inlet. The inlet pipe to the pump is larger then the outlet from the pump. The external pump by-pass relief valve is installed in a line returning to 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.

(iii) Meter

A Neptune type 4D 32 mm LPG meter (Figure 3).

(iv) Gas Purger

The meter is protected from the measurement of vapour by correct installation and by a Neptune 32 mm gas purger (Figure 4) which has been modified so that the liquid outlet is at the bottom. The purger, which incorporates a strainer and a float valve, 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. A thermometer pocket is situated in the strainer cover.

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(v) Driveway Flowmeter Indicator

A Production Engineering model Retron 80 electronic driveway flowmeter indicator is used. This indicator, which has been modified to incorporate electronic automatic temperature compensation, is made up of the computer and power supply units, and two liquid crystal digital display units. The computer is mounted in the top of the flowmeter housing and is driven directly by the meter output shaft (Figure 1).

The unit price change/test button is located on the computer unit.

The operating cycle is started by removing the nozzle. The display will be cleared of the previous sale, all the horizontal segments will be displayed, and then the remote pump will start. After a delay of 6 seconds the display will show all 8's for one second then go blank for one second, then all 0's leaving only the unit price displayed. At the end of this cycle a solenoid valve opens. Provided that the nozzle has been attached to the purchaser's tank, which may be done at any time during the cycle, filling can now commence. Replacement of the nozzle stops the remote pump but allows the display to remain until the next cycle.

(vi) Electronic Temperature Compensation

Temperature compensation is achieved by means of an electronic compensator built into the Retron 80 indicator.

The probe for the compensator is located in the stream of liquid in the measuring chamber. The electronic probe circuitry senses changes of temperature in the liquid, and the Retron 80 adjusts the indicated volume to the equivalent volume at a temperature of 15°C.

For testing purposes a switch is provided to deactivate the temperature compensating function; this is indicated by the display of an extra decimal point before the whole cent digit on the unit price display, whenever the nozzle is removed from its receptacle.

Fifteen seconds after the nozzle has been returned into its receptacle, pressing the price change/test button 16 times will cause the indicator to display the standard Retron 80 diagnostics. This display will be repeated four times and then change to the special diagnostic display for LPG; the top display is the EPROMS calibration factor, the centre display is the liquid density for which the temperature compensator is set and the bottom display is the temperature that the probe is reading in degrees Celsius.

Removing the nozzle from its receptacle cancels the diagnostic display, and begins the normal operating cycle.

(vii) Differential Valve

A Neptune 32 mm spring-loaded diaphragm 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 vent (Figure 2).

The pressure-equalising pipe incorporates a 3-way solenoid valve which is also connected to the pump supply via an excess-flow valve. This solenoid valve is controlled by the Retron 80 indicator and closes the differential valve during the reset cycle so that delivery is not possible before the reset cycle is completed.

(viii) Vapour Indicator

A sight glass flow indicator and provision for a pressure gauge are provided downstream of the meter outlet after the internal safety check (ISC) valve, so that it may be seen if vapour is being metered.

(ix) Outlet Piping

The pipe from the meter to the hose is fitted with an ISC valve immediately after the pressure differential valve. The ISC valve incorporates an excess-flow and positive shut-off valve. An air ram fitted to the ISC valve is linked to the emergency stop system and provides a positive shut-off at the hose in an emergency.

(x) Hose

The dispenser is fitted with a hose complying with the SAA code for hoses in use with liquefied petroleum gases, with a bore of either 12.5 mm or 20 mm. The hose is fitted with a hose break coupling which will break with a loss of no more than 15 ml of liquid in the event of an excessive pull on the nozzle.

(xi) Nozzle

The nozzle used is a Gilbarco model 102-ZVG 1.3, also known as an Elaflex, as described in the documentation of NSC approval No S158. There is a small loss of liquid whenever the nozzle is released.

(xii) Pressure Equalisation

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 via a tee in the vapour return line from the gas purger using a 1 3/4" Acme double back-check filler valve. This provision is sealed OFF when not in use. During a normal delivery there is no vapour return connection between the receiving container and the supply tank.

1.2 Markings

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	NSC No P10/1/10
Maximum flow rate	75 L/min
Minimum flow rate	15 L/min
Liquid temperature range	0°C to 45°C
Approved for LPG of density 0.500 to 0.540 kg/L only	
Maximum operating pressure	3450 kPa

In addition, these markings shall include a notice stating that the density for which temperature compensator is set may be displayed using the diagnostic display of the flowmeter indicator.

1.3 Sealing

The indicator and temperature compensator switch are sealed.

2. Description of Variants

2.1 Variant 1

With two flow metering systems in one housing (Figure 1).

2.2 Variant 2

In an alternative "round" housing.

NATIONAL STANDARDS COMMISSION

TEST PROCEDURE No 10/1/10

The following test procedure is to be used at each six-monthly test, in addition to any tests specified in the Inspector's Handbook. 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 generated.

The maximum permissible errors are specified in Document 118, Second Edition, October 1986.

1. Meter Test With Temperature Compensator Deactivated

(i) Carry out at least three runs at the normal flow rate at which the meter is used.

(ii) Repeat the above test with the flow rate set at 15 L/min.

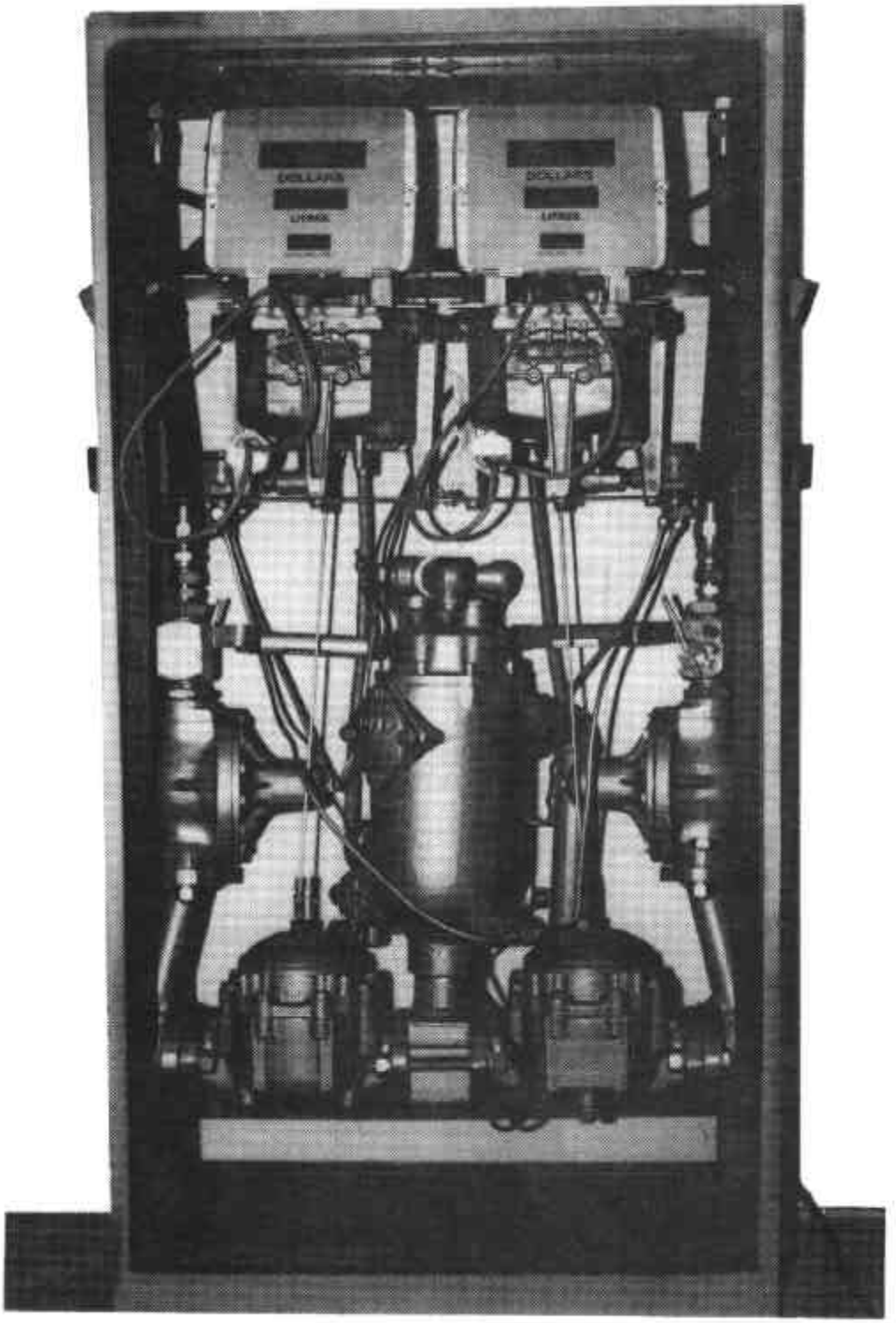
2. Meter Test With Temperature Compensator Activated

Repeat the above tests and calculate the equivalent volume that would have been delivered at 15°C using the temperature indicated at the meter and the appropriate ASTM-IP Petroleum Measurement Tables, for the density of the liquid for which the temperature compensator is set.

The following information shall be recorded and sent to the Commission:

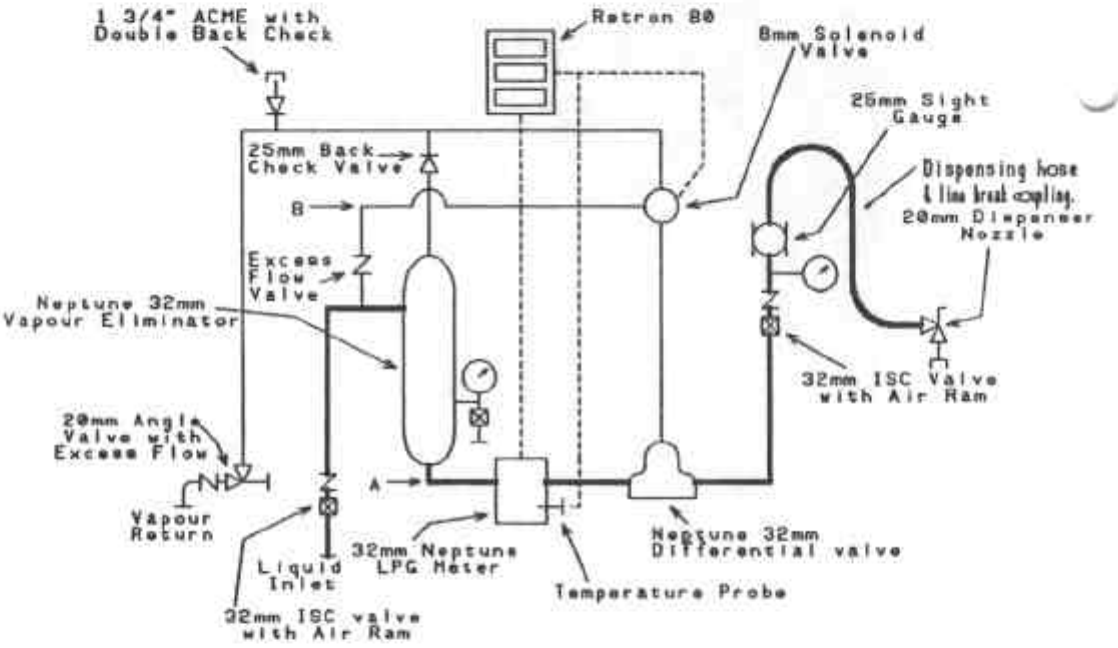
(a) NSC approval number
(b) Installation address
(c) Meter serial number
(d) Identification of the instrument in terms of the pattern and variants
(e) Totaliser reading at the beginning (or at the end) of the test
(f) Markings and notices as set out in the Technical Schedule
(g) Density for which the temperature compensator is set
(h) Results of all tests

FIGURE 10/1/10 - 1



LPG Engineering Model Stargas Dual Dispenser

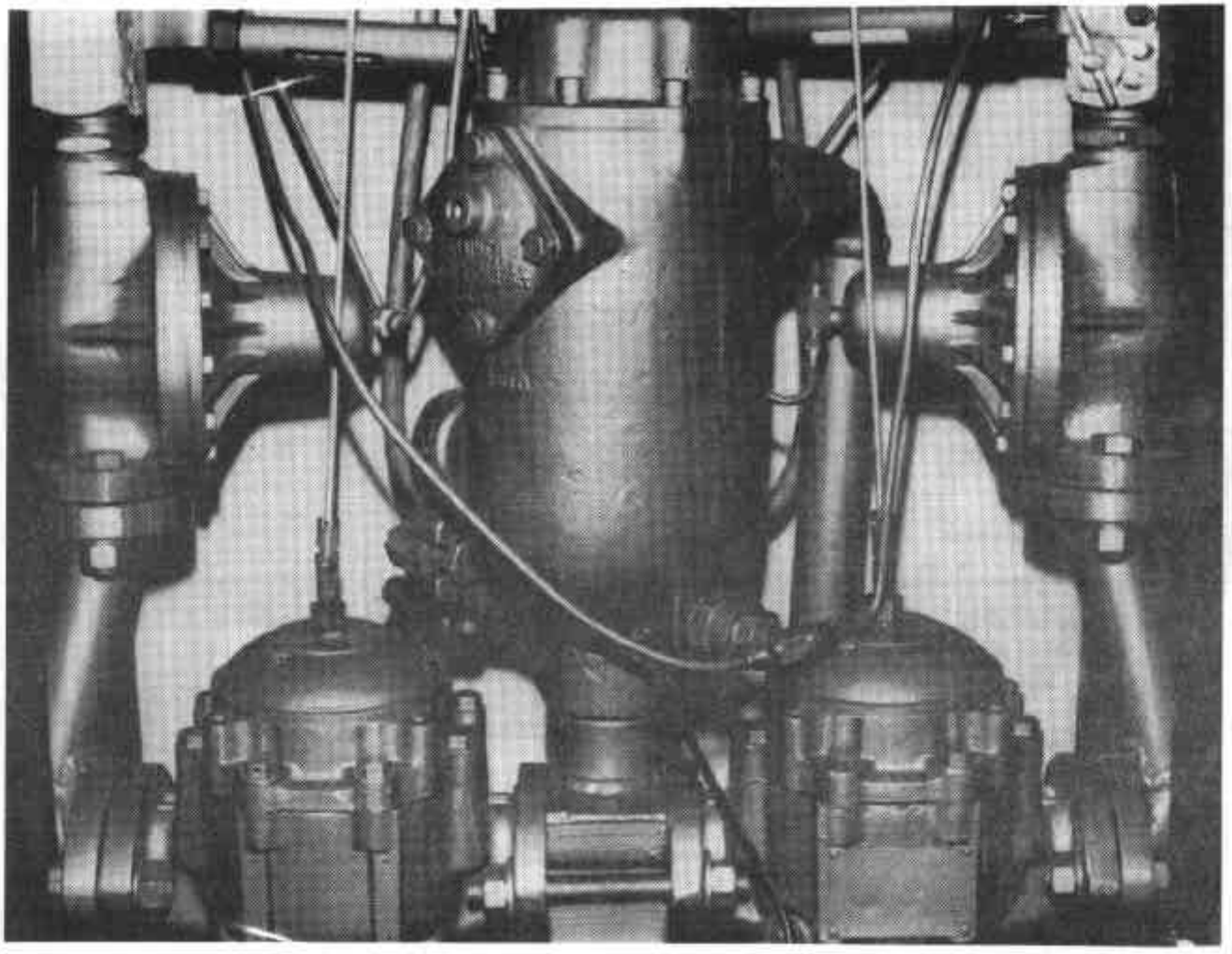
FIGURE 10/1/10 - 2



Variant 1. -Liquid and Vapour Connections to A and B

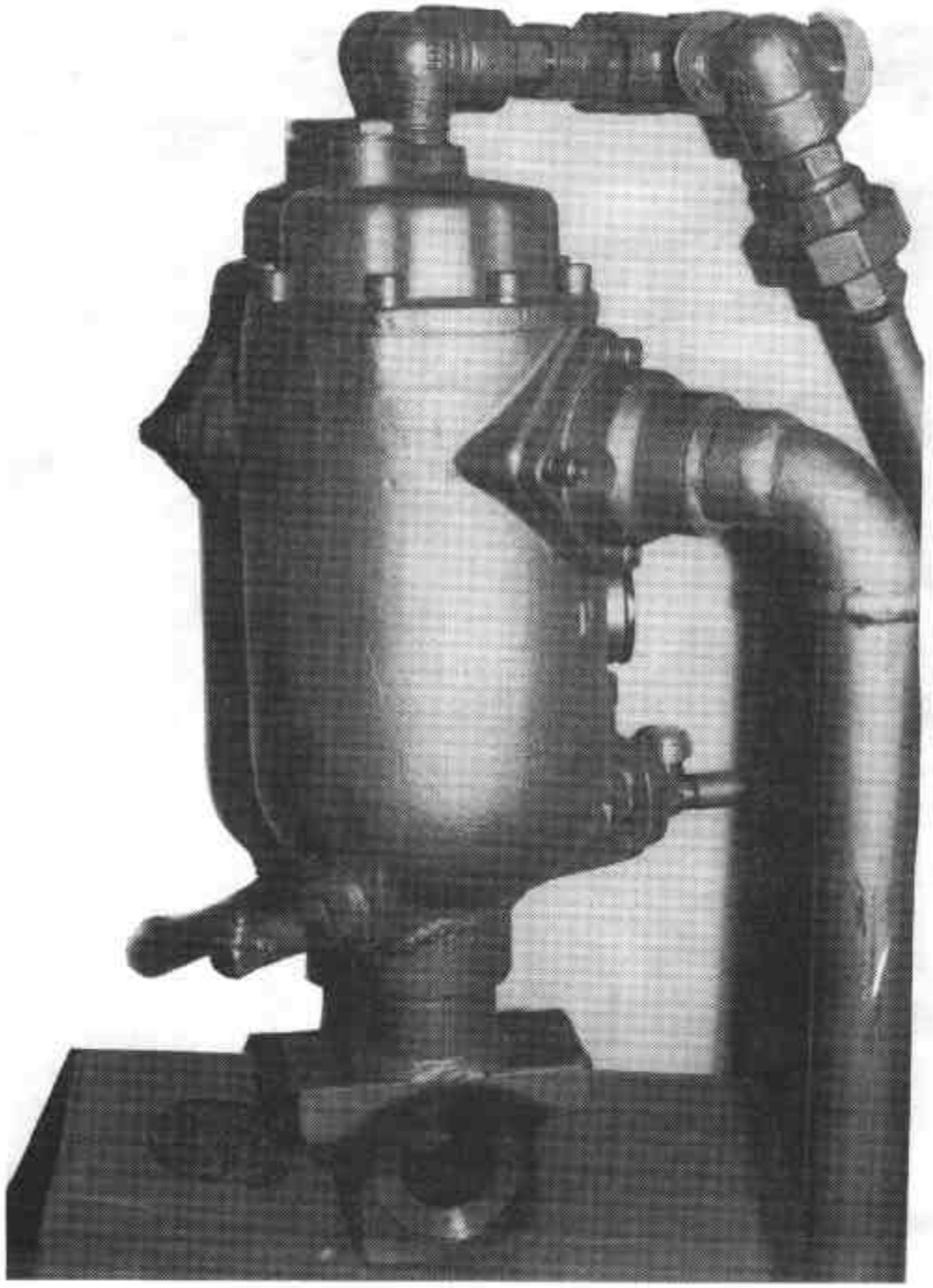
Stargas Schematic Diagram

FIGURE 10/1/10 - 3



Neptune LPG Meters

FIGURE 10/1/10 - 4



Modified Neptune Gas Purger