National Standards Commission

Certificate of Approval

No 10/1/8A

Issued under Regulation 9
of the
National Measurement (Patterns of Measuring Instruments) Regulations

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

Gilbarco Model TO93D LPG Driveway Flowmeter

submitted by Gilbarco Aust. Ltd
12-38 Talavera Road
North Ryde NSW 2113.

CONDITIONS OF APPROVAL

This approval is subject to review on or after 1/7/94.
This approval expires in respect of new instruments on 1/7/95.

Instruments purporting to comply with this approval shall be marked NSC No 10/1/8A and only by persons authorised by the submittor.

It is the submittor's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the Commission and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with the Commission's Document 106.

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The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0/A.

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 calibrated at intervals not exceeding 6 months.

DESCRIPTIVE ADVICE

Pattern: approved 6/6/89

- Gilbarco model TO93D locally or remotely-authorised single driveway flowmeter for the dispensing of liquefied petroleum gas.

Variant: approved 6/6/89

1. T093 series flowmeters approved for locally-authorised operation only.

2. TO94 series dual flowmeters approved for locally or remotely-authorised operation.

Technical Schedule No 10/1/8A describes the pattern and variants 1 and 2.

Variant: approved 27/9/90

3. Without the solenoid-operated nozzle latch.

Technical Schedule No 10/1/8A Variation No 1 describes variant 3.

Variant: approved 18/6/92

4. With a Gilbarco vapour elimination system.

Technical Schedule No 10/1/8A Variation No 2 describes variant 4.

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FILING ADVICE

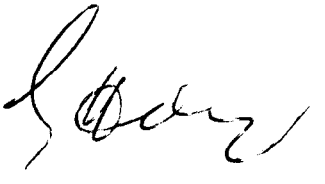
Certificate of Approval No 10/1/8A dated 18/1/91 is superseded by this Certificate and may be destroyed.

Figure 5 dated 26/7/89 is replaced by the Figure attached herein (#).

The documentation for this approval now comprises:

Certificate of Approval No 10/1/8A dated 19/10/92
Technical Schedule No 10/1/8A dated 26/7/89
Technical Schedule No 10/1/8A Variation No 1 dated 18/1/91
Technical Schedule No 10/1/8A Variation No 2 dated 19/10/92
Test Procedure No 10/1/8A dated 26/7/89
Figures 1 to 4 dated 26/7/89
Figure 5 dated 19/10/92 (#)
Figure 6 dated 26/7/89
Figure 7 dated 18/1/91
Figure 8 dated 19/10/92

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.



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10/1/8A
26/7/89

NATIONAL STANDARDS COMMISSION

NATIONAL MEASUREMENT (PATTERNS OF INSTRUMENTS) REGULATIONS

REGULATION 9

CERTIFICATE OF APPROVAL No 10/1/8A

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

Gilbarco Model TO93D LPG Driveway Flowmeter

submitted by Gilbarco Aust. Ltd
12-38 Talavera Road
North Ryde NSW 2113.

This Certificate is issued upon completion of a review of NSC approval No 10/1/8.

CONDITIONS OF APPROVAL
General:

This approval is subject to review on or after 1/7/94.
This approval expires in respect of new instruments on 1/7/95.

Instruments purporting to comply with this approval shall be marked NSC No 10/1/8A.

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 calibrated at intervals not exceeding 6 months.

Signed

J Birch

Executive Director

Descriptive Advice

Pattern: approved 6/6/89

- Gilbarco model TO93D locally or remotely-authorised single driveway flowmeter for the dispensing of liquefied petroleum gas.

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Variants: approved 6/6/89

1. T093 series flowmeters approved for locally-authorised operation only.

2. TO94 series dual flowmeters approved for locally or remotely-authorised operation.

Technical Schedule No 10/1/8A describes the pattern and variants 1 and 2.

Filing Advice

The documentation for this approval comprises:

Certificate of Approval No 10/1/8A dated 26/7/89
Technical Schedule No 10/1/8A dated 26/7/89
Test Procedure No 10/1/8A dated 26/7/89
Figures 1 to 6 dated 26/7/89

NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 10/1/8A

Pattern: Gilbarco Model TO93D LPG Driveway Flowmeter.

Submittor: Gilbarco Aust. Ltd
12-38 Talavera Road
North Ryde NSW 2113.

1. Description of Pattern

The pattern is a Gilbarco model TO93D single driveway flowmeter (Figures 1 to 3) for the delivery of liquefied petroleum gas of density 0.510 to 0.560 kg/L (at 15°C), at temperatures between −5°C and +45°C. The maximum and minimum flow rates are 50 L/min and 15 L/min respectively.

The instrument may be fitted with a hose mast in which case it is known as a model TO93B.

Models TO93D and TO93B are approved for locally and remotely-authorised operation and may also be connected to a compatible Commission-approved driveway card acceptor terminal. Instruments may be fitted with a "dead-man" switch.

1.1 Component Structure

The hydraulic diagram of the flowmeter is shown in Figure 4.

(I) Supply Tank

The supply tank is located above the pump and, where suitable pumping equipment is provided, the tank may be below ground.

(II) Pump

The pump is positioned as close as possible to the supply tank and must 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 than the outlet from the pump. The external pump by-pass relief valve is installed in a line returning to the supply tank.

(III) Meter

A Sllea type LUX 60 four-piston LPG meter is used.

(Iv) Gas Purger

The meter is protected from the measurement of vapour by correct installation and by a Sllea continuous-bleed gas purger (Figures 4 and 5). The purger incorporates an inlet non-return valve with soft seat, an internal hydrostatic relief valve and a strainer. The purger is vented via a line which incorporates a venturi, through a vapour return line not less than 19 mm in diameter to the vapour space in the supply tank.

Two thermometer pockets are situated at the lower end of the purger.

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(v) Driveway Flowmeter Indicator

A Gilbarco LPG Electroline CD module is used and is mounted in a separate housing atop the main housing. The pulse transmitter is driven from the output shaft of the meter through a gear assembly on which is mounted a checking (peripheral) pulser. A weights and measures (W & M test) switch is located within the module.

Unit prices may be changed either by buttons within the module, or centrally if connected to a control console which is Commission-approved with that facility.

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 increment
Totaliser Volume	9999999 L in 1 L increments

Upon actuating the start lever, the pump motor will start immediately. When the hose is full of liquid the solenoid-operated latch holding the nozzle will release. The nozzle may then be removed from its receptor and connected to the purchaser's tank; during this time the reset cycle will have been completed and delivery can commence.

(vi) Electronic Temperature Compensation

Temperature compensation is achieved by means of an electronic compensator built into the CD indicator/computer module.

The probe for the compensator is located in the gas purger. The electronic probe circuitry senses changes of temperature in the liquid, and the CD module adjusts the indicated volume to the equivalent volume at 15°C.

For testing purposes, the uncompensated volume is displayed whenever the W & M test switch is depressed; the probe temperature is also displayed instead of the unit price. In this mode the price is blank. The display will revert to the previous sale information if the switch is depressed again.

(vii) Differential Valve

A Silea spring-loaded-piston pressure 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 vent (Figure 4).

The differential valve is set at 100 kPa for regenerative turbine type pumps or 300 kPa for vane type pumps (i.e. 100 kPa or 300 kPa ABOVE the vapour pressure).

(viii) Vapour Indicator

A sight glass flow indicator and a pressure gauge are fitted in the pipe between the meter and the differential valve so that it may be seen if vapour is being metered (Figures 2 and 4).

ix) Outlet Pipe

The pipe connection from the differential valve to the hose is fitted with an excess-flow valve and a stop valve (Figure 4).

(x) Hose

The dispenser is fitted with a hose not exceeding 20 mm bore, complying with the SAA code for hoses in use with liquefied petroleum gases.

The hose, which may be supported on a hose mast (model TO93B), is fitted with an Elaflex model ARK 19 dry-break hose 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.

The nozzle can only be removed from the purchaser's tank once the trigger has been released, at which time a small loss of liquid will be evident.

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 10/1/8A
Maximum flow rate	..... L/min
Minimum flow rate	..... L/min
Liquid temperature range	-5°C to +45°C
Approved for LPG of density range	0.510 to 0.560 kg/L
Density for which temperature compensator is set	..... kg/L
Maximum operating pressure	2400 kPa

1.3 Sealing

The meter calibration adjustments, W & M test switch and the density adjustment switches are sealed.

The vapour return line provided for pressure equalisation during testing with a pressure prover is also sealed.

2. Description of Variants

2.1 Variant 1

A model T093F driveway flowmeter which is similar to the pattern but is only approved for locally-authorised operation. The instrument may be fitted with a hose mast in which case it is known as a model T093H.

2.2 Variant 2

The T094 series dual driveway flowmeters with two single flowmetering systems in one housing. The dual system incorporates a single temperature probe, a common liquid inlet connection, a common vapour return connection and two flow control valves (Figure 6).

Models T094D and T094B (with hose mast) are approved for locally or remotely-authorised operation and may also be connected to a compatible Commission-approved driveway card acceptor terminal.

Models T094F and T094H (with hose mast) are only approved for locally-authorised operation.

The operating sequence is similar to that for the pattern.

NATIONAL STANDARDS COMMISSION

TEST PROCEDURE No 10/1/8A

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

3. Price-computation

Carry out any additional tests detailed in the original approval documents for the indicator and control console and/or driveway card acceptor terminal, where appropriate.

National Standards Commission

TECHNICAL SCHEDULE No 10/1/8A

VARIATION No 1

Pattern: Gilbarco Model TO93D LPG Driveway Flowmeter.

Submittor: Gilbarco Aust. Ltd
12-38 Talavera Road
North Ryde NSW 2113.

1. Description of Variant 3

Gilbarco model T093J or T094J LPG driveway flowmeters which are similar to the pattern and variants but with a solenoid valve located immediately upstream of the hose inlet (Figure 7) and without the solenoid-operated nozzle latch.

The operating sequence is similar to that described in Technical Schedule No 10/1/8A cl. 1.1 (v), except that the nozzle is not latched; upon lifting the nozzle the pump motor will start immediately. After a delay to compress any vapour in the system, the reset cycle commences, with the solenoid valve opening at the end of the cycle to allow delivery to commence.

National Standards Commission

TECHNICAL SCHEDULE No 10/1/8A

VARIATION No 2

Pattern: Gilbarco Model TO93D LPG Driveway Flowmeter.

Submittor: Gilbarco Aust. Ltd
12-38 Talavera Road
North Ryde NSW 2113.

1. Description of Variant 4

Any model flowmeter of this approval fitted with a Gilbarco vapour elimination system which consists of a Silea double-spring-loaded-piston differential valve (Figure 8) and a Silea continuous-bleed gas purger which is vented via a line incorporating a venturi (Figure 5).

Instruments may be used with the pump positioned above the supply tank, in which case the pump shall be a multi-stage regenerative turbine LPG pump specifically designed for use in suction lift installations.

The installation shall be in accordance with the relevant requirements of the Commission's Code of Practice No 2 for the *Installation and Calibration of Driveway Flowmeters Diispensing Liquefied Petroleum Gas.*

NOTIFICATION OF CHANGE

Figure 5 dated 26/7/89 is replaced by the attached Figure.

In Technical Schedule No 10/1/8A dated 26/7/89, clause 1.1 (vii) Differential Valve is amended by changing the 1st paragraph to read, in part;

"A Silea **double**-spring-loaded-piston differential valve (Figure 8) ..."

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.

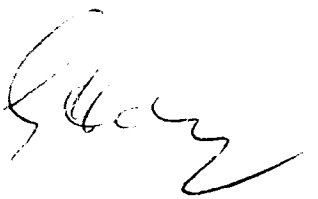
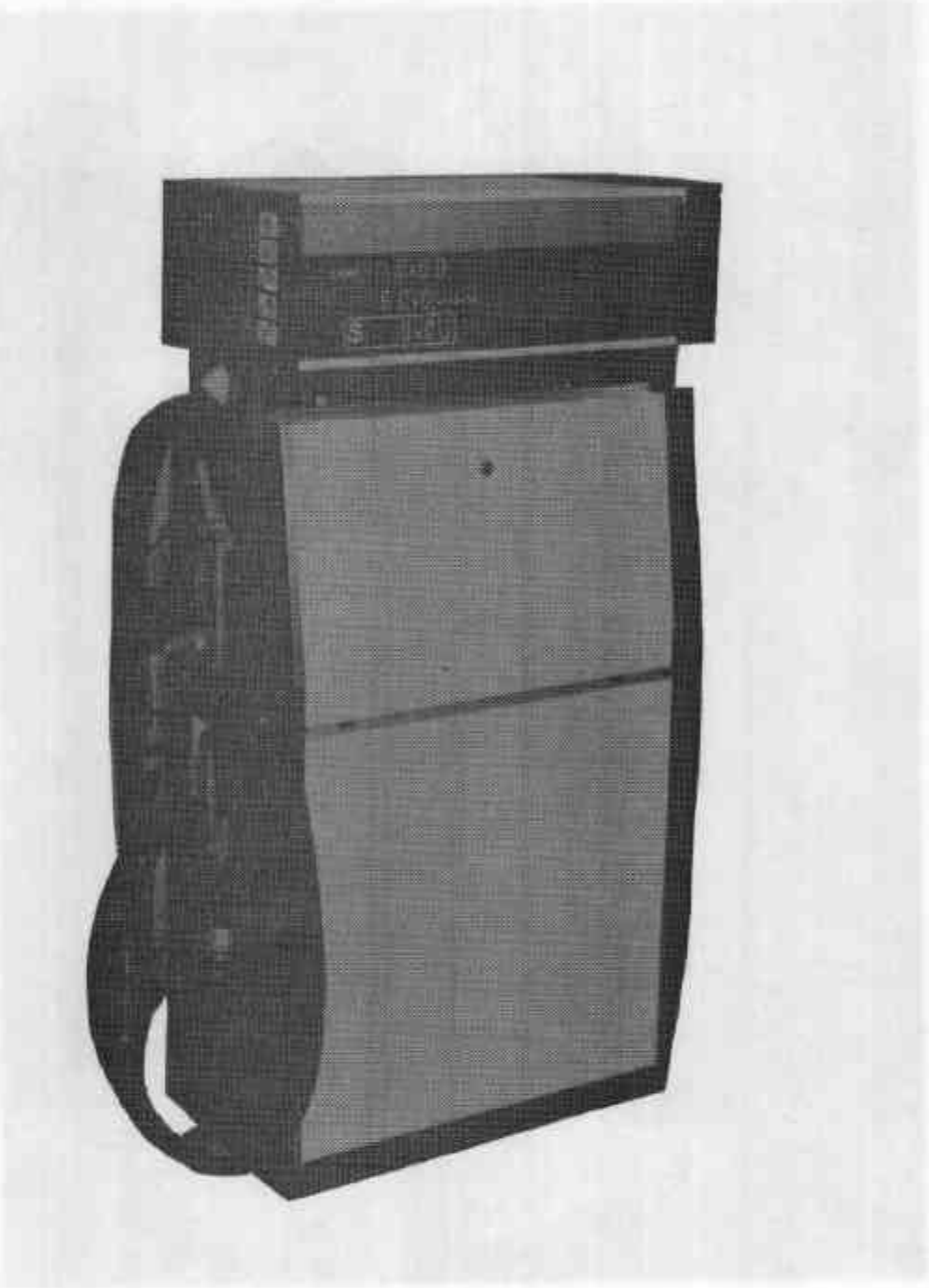
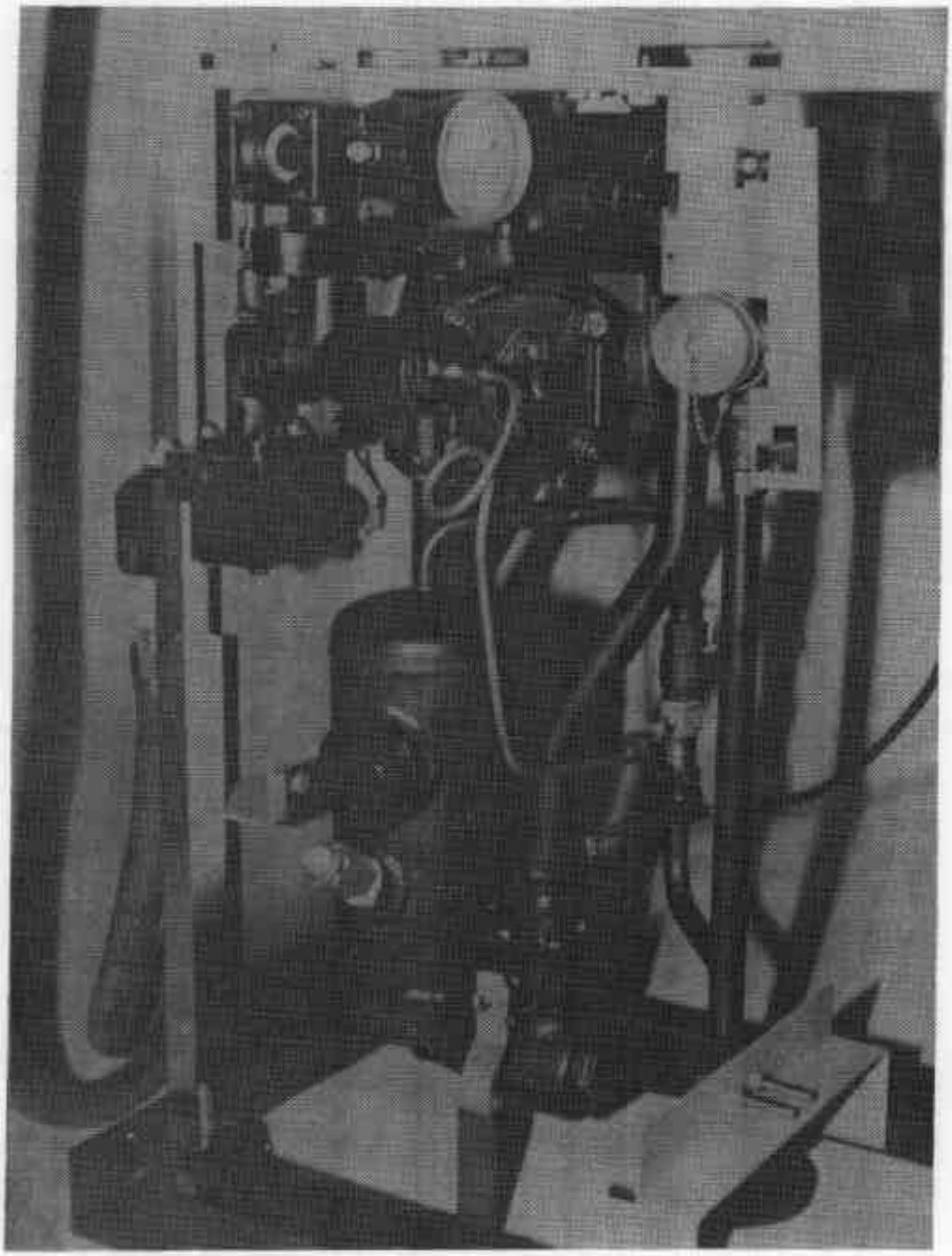


Figure 10/1/8A - 1



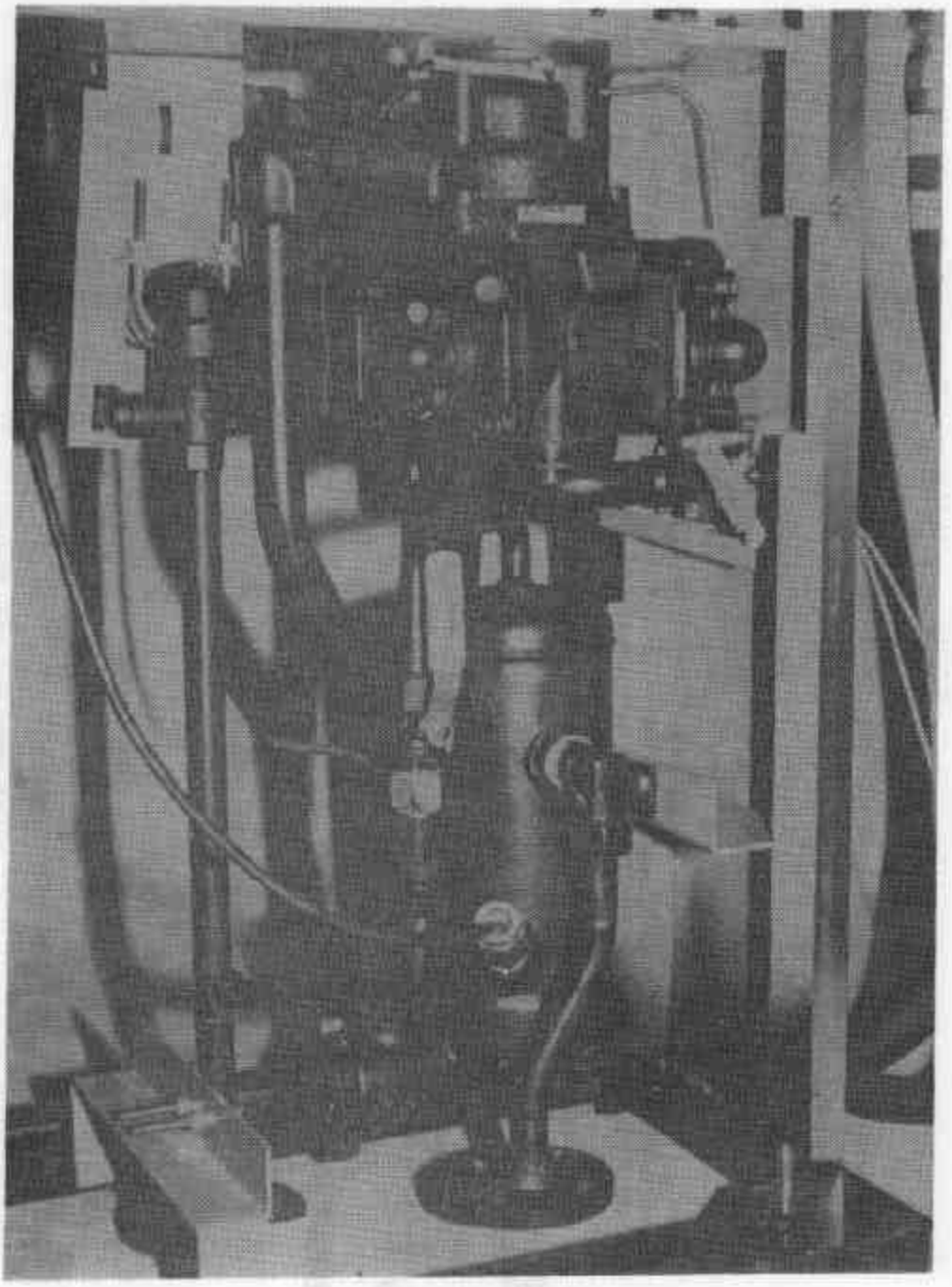
Gilbarco T093D LPG Driveway Flowmeter

Figure 10/1/8A - 2



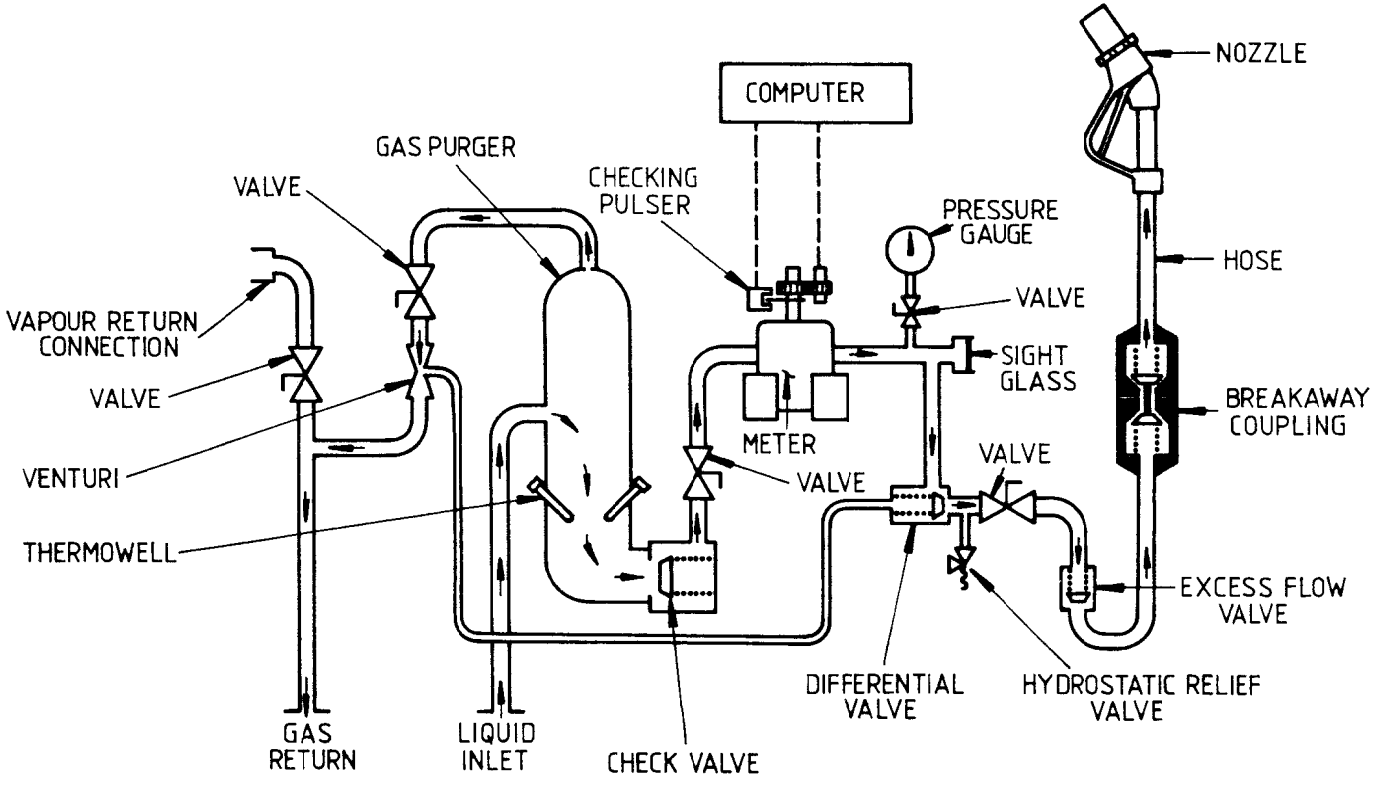
Model T0930 With Covers Removed (View A)

Figure 10/1/8A - 3



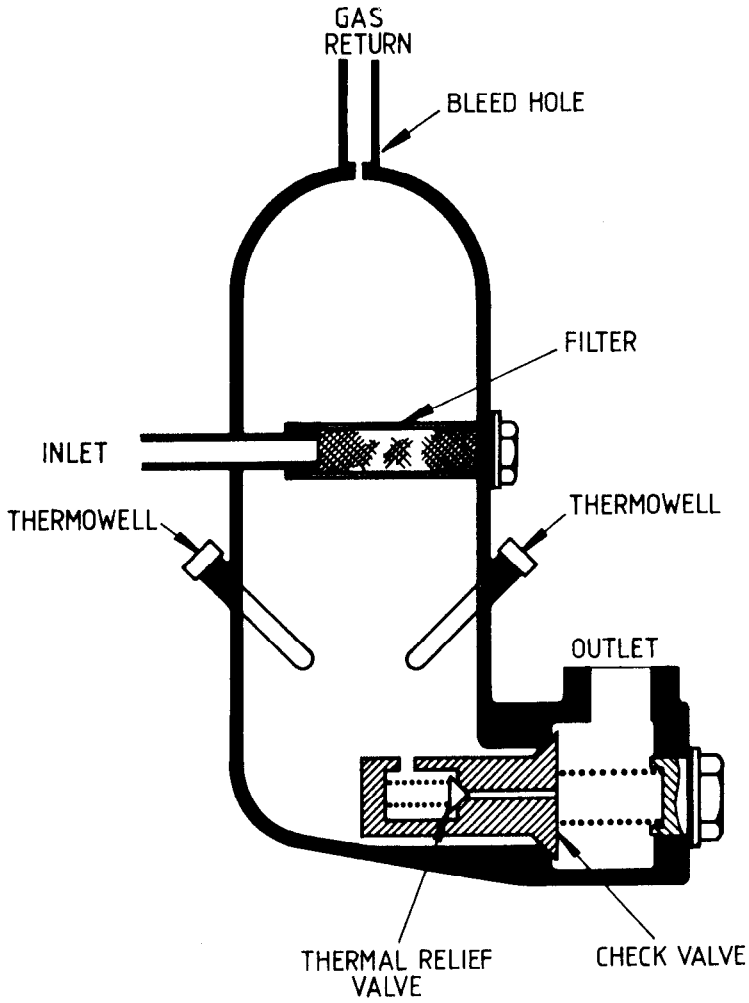
Model T093D With Covers Removed (View B)

Figure 10/1/8A - 4



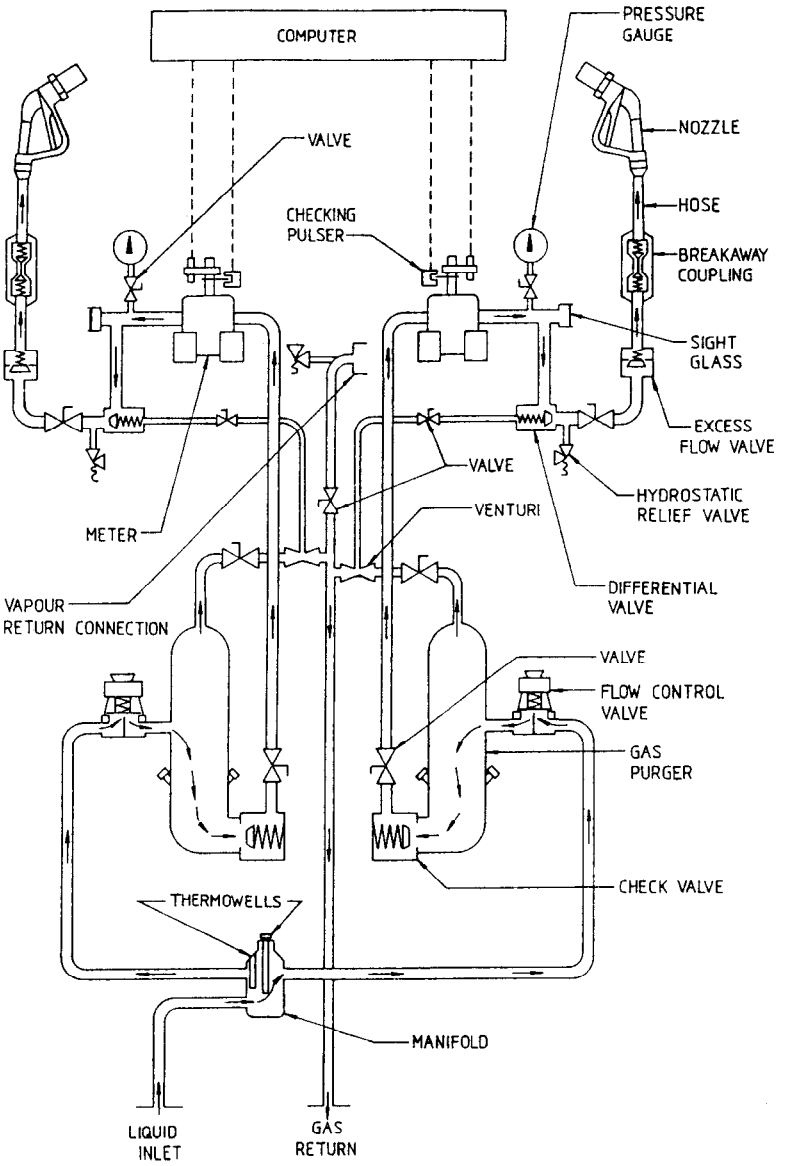
Model T093D Hydraulic Diagram

Figure 10/1/8A - 5



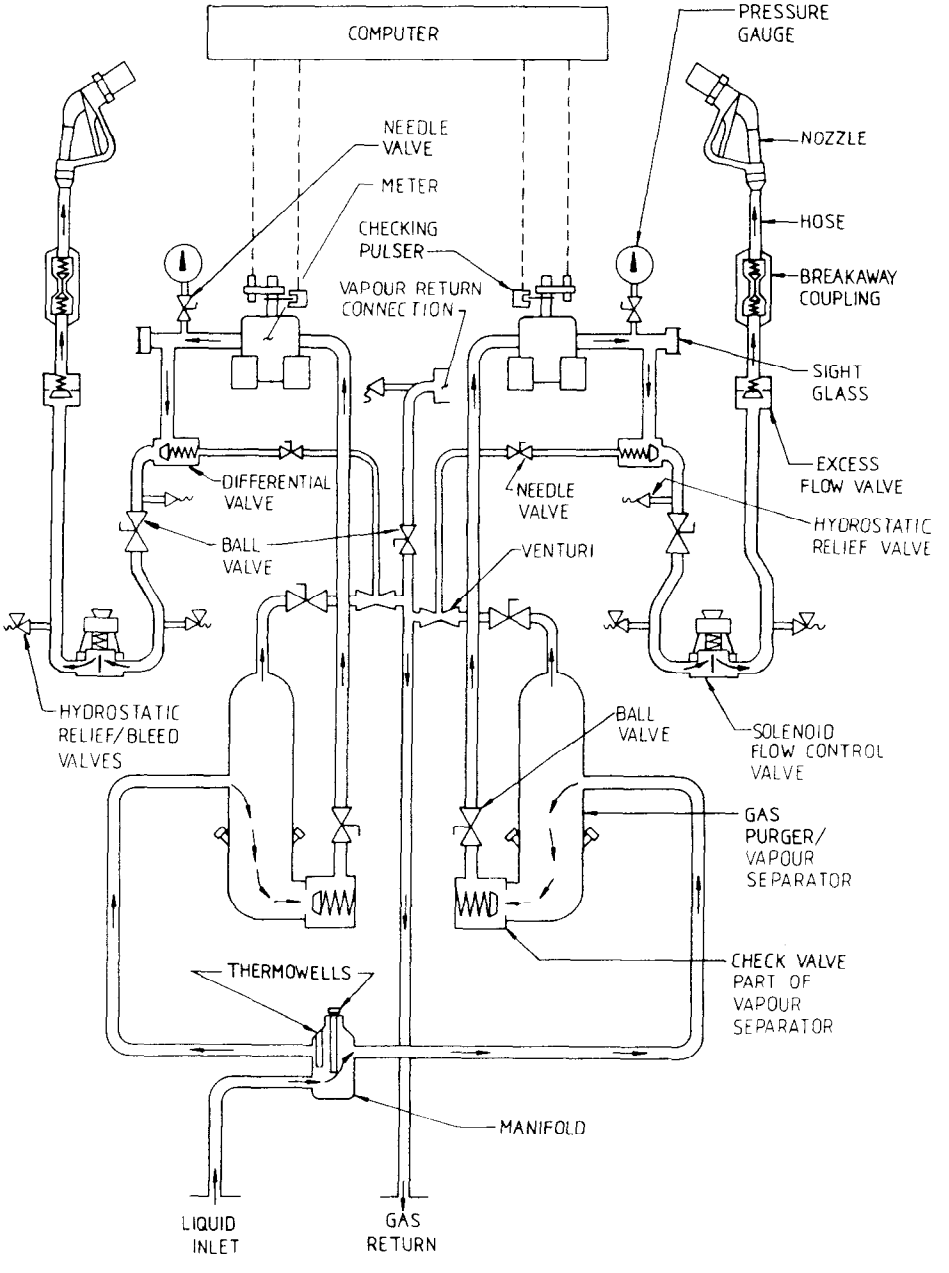
Gas Purger

Figure 10/1/8A - 6



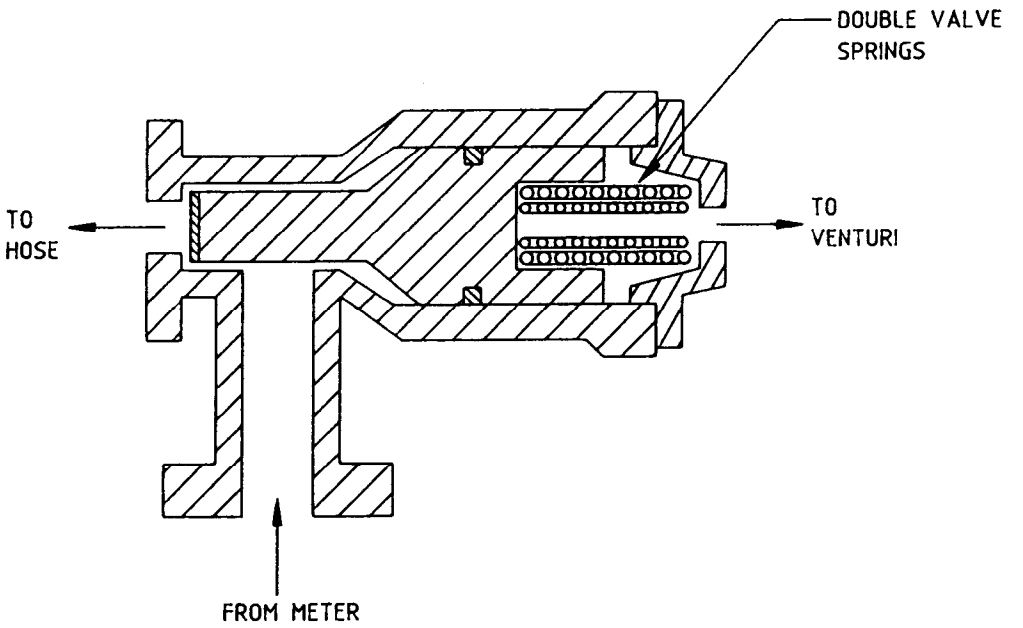
Dual LPG Hydraulic System

FIGURE 10/1/8A - 7



Typical Model T094J (Variant 3) Hydraulic System

FIGURE 10/1/8A - 8



Silea Double-spring Differential Valve