CERTIFICATE OF APPROVAL No 5/6D/5

VARIATION No 1

This is to certify that the following modification of the patterns of the

BP Mark III Flowmeter

approved in Certificate No 5/6D/5 dated 12 December 1969

submitted by BP Australia Ltd,
1-29 Albert Road,
Melbourne, Victoria, 3004,

has been approved under the Weights and Measures (Patterns of Instruments) Regulations as being suitable for use for trade.

ate of Approval: 14 October 1974.

The approved modification, described in Technical Schedule No 5/6D/5 — Variation No 1 and in drawings and specifications lodged with the Commission, provides for control of the pump motor and hose rewind motor by a radio-frequency control link.

The approval is subject to review on or after 1 November 1979.

All instruments conforming to this approval shall be marked with the approval number "NSC No 5/6D/5".

Signed

Executive Officer

14/10/74

COMMONWEALTH OF AUSTRALIA

NATIONAL STANDARDS COMMISSION

Weights and Measures
(National Standards)
Act 1960-1964

Weights and Measures
(Patterns of Instruments)
Regulations

Certificate of Approval

CERTIFICATE NUMBER 5/6D/5

In respect of the pattern of

BP Portable Heating Oil Metering Unit Mark III and Variants 1 to 5.

Submitted by: BP Australia Ltd.,
1-29 Albert Road,
Melbourne,
Victoria. 3004.

This is to certify that the pattern and variants of the instrument illustrated and described in this Certificate have been examined by the National Standards Commission under the provisions of the abovementioned Regulations and have been approved as being suitable for use for trade.

Approval was granted for:

1. The pattern and variants 1 and 2 on 26th June, 1967.
2. Variant 3 on 8th April, 1968.
3. Variant 4 on 3rd September, 1968.
4. Variant 5 on 9th December, 1969.

Approval was withdrawn for:

1. The pattern and variants 1 to 3 on 3rd September, 1968.

2. Variant 4 on 9th December, 1969.

Approval was granted on condition that all instruments made in conformity with the pattern or its variants:

1. are appropriately marked NSC No 5/6D/5; and

2. comply with the General Specifications for Weighing and Measuring Instruments to be Used for Trade.

This Certificate comprises:

Pages 1 to 7 dated 12th December, 1969.
Figures 5/6D/5 - 1 to 10 dated 12th December, 1969.

Signed

Date of issue 12th December, 1969.

DESCRIPTION OF PATTERN

The pattern is a wholesale liquid flowmeter known as the BP Portable Heating Oil Metering Unit Mark III (see Figure 1).

The unit consists of a steel framework on which is mounted the following equipment arranged as shown in Figures 2 and 3 and mounted on a road vehicle behind the supply tank:

1. Pump - positive displacement type with integral spring-loaded by-pass valve.

2. Pump hydraulic drive motor - direct coupled to the pump and supplied from a vehicle-mounted hydraulic unit through a solenoid-operated hydraulic control valve.

3. Brodie Model CE-2 Gas Separator (see Figure 4) - liquid passes into the chamber through a strainer basket with a decrease in velocity which allows gas to rise to the surface. If sufficient gas collects in the top of the chamber, the upper float valve opens and allows it to discharge through the vent. If excess gas is collected, the lower float closes a butterfly valve in the outlet pipe stopping the flow to the meter. The vent pipe is connected to the supply tank (see Figure 3).

4. Brodie B31 meter with ticket printer and preset quantity control valve (see Figure 5) - the meter is a positive displacement type with two meshing rotors, one with 3 and one with 4 helical lobes. The drive is taken to the register from the 3-lobe rotor through a variable-ratio drive used for calibrating the meter. This contains a main counter (9 999.9 gal by 0.1 gal increments), a totalizing counter (9 999 999 gal by 1 gal increments), a preset counter (999 gal by 1 gal increments) and a ticket printer capable of printing up to 9 999.9 gal by 0.1 gal increments. The main counter is resettable to zero while the totalizing counter is not. The ticket printer is operated by a handle which resets the counter to zero, locks the ticket in place and prints zero before delivery commences. On completion of delivery, the quantity delivered is printed by operating the handle; the ticket cannot be removed

until the quantity delivered has been printed. The preset counter can be set to any desired quantity by a knob on the side of the housing. When the predetermined quantity has been delivered (registered on the main counter) and the preset counter has returned to zero, a lever is tripped which allows a valve located immediately downstream of the meter to close and stop the flow of liquid.

5. Pressure gauge - mounted on the pipeline between the gas separator and meter.

6. Non-return valve - mounted in the pipe between the meter and hose.

7. Hose - 200 feet by 1 inch bore Nylex PR plastic hose with control wires moulded into the casing of the hose.

8. OPW type 1190 ASDG nozzle (see Figure 6) - the main nozzle valve is opened manually and closed either manually or by means of the automatic shut-off device in the spout. The closing rate of the main valve is controlled by an adjustable dashpot. An anti-drain valve is fitted downstream of the main valve. A fully-enclosed microswitch is fitted to the nozzle and is actuated by the valve handle. The control wires from this switch and the hose-rewind switch are enclosed in a flexible metal conduit (see Figure 7) attached to the hose and soldered to the wires embedded in the hose casing. The connection is protected by insulation tape. The two microswitches operate solenoid valves which control the pump hydraulic motor and the hose-reel hydraulic drive motor.

The flow through the meter can be stopped in three ways:

1. By manually closing the nozzle valve which stops the pump.

2. By the automatic closing of the nozzle valve which stops the pump.

3. By closing the preset quantity control valve, in which case the

pump is not stopped until the nozzle trigger is released manually.

In all three cases liquid continues flowing from the nozzle until the hose pressure reaches the anti-drain valve pressure (minimum 8 psi).

Thus, provided the pump by-pass pressure and the closing time of the nozzle valve remain unchanged, the anti-drain valve pressure is maintained in the hose before and after a serve is made under all operating conditions.

The pump by-pass pressure is set at a maximum of 50 psi on the pressure gauge with the pump operating and the preset control valve closed.

The nozzle valve dashpot is set so that after any delivery no liquid can be drained from the hose when the valve is just opened but not sufficient to start the pump.

The pattern is approved for flow rates from 15 to 20 gal/min, that is with the nozzle valve fully open.

The pattern is sealed at the following points:

(a) Pump by-pass valve pressure adjustment by a wire passing through the head of the adjusting screw and the valve body.

(b) Nozzle valve dashpot speed adjustment by a lead plug over the adjusting screw.

(c) The meter and register at five points:

(i) By a lead plug over one screw securing the cover of the printing mechanism.

(ii) By a wire passing through the heads of two screws securing the register to the preset control valve mechanism.

(iii) By a wire passing through the heads of two screws securing the preset control valve mechanism to the

meter body.

(iv) By a cover over the meter calibration adjustment.

(v) By a wire passing through a castellated nut securing the front cover plate of the meter.

SCHEDULE OF VARIANTS

1. Without the ticket printer.

2. Without the preset quantity control valve, in which case a stop valve is fitted in the pipe downstream of the pressure gauge to enable the pump by-pass pressure to be set.

3. Having the Brodie B31 meter of the pattern replaced by a Neptune $1\frac{1}{4}$ inch Type 4 meter fitted with a Model No 434 register, auto stop valve and Print-O-Matic ticket printer (see Figure 8).

   The meter is of the positive displacement, ring-piston type in which a hollow piston oscillates inside an annular cylinder between the outer and inner walls of which is a radial partition. In the sidewall of the piston is a slot only wide enough to fit the partition without binding. Liquid enters and leaves the cylinder through ports covered and uncovered by the piston which oscillates and drives the output shaft of the meter.

   The meter output shaft drives a Model No 434 register which contains a change gear calibrating mechanism, a main counter (9 999.9 gal by 0.1 gal increments), a totalizing counter (9 999 999 gal by 0.1 gal increments) and a ticket printer capable of printing up to 9 999.9 gal by 0.1 gal increments. The main counter is resettable to zero while the totalizing counter is not. The ticket printer is operated by a handle which resets the counter to zero, locks the ticket in place and prints zero before delivery commences. On completion of delivery, the quantity delivered is printed by movement of the handle; the ticket cannot be removed until the quantity delivered has been printed. The preset counter can be set to any desired quantity by press buttons on the front of the register. When the predetermined quantity has been delivered

(registered on the main counter) and the preset counter has returned to zero, a lever is tripped which closes a valve located immediately downstream of the meter and stops the flow of liquid.

The meter and register are sealed as described in Certificate No 5/6D/6.

4. Having the pattern and variants 1 to 3 with the control wires from the pump switch and the hose-rewind switch soldered to the wires embedded in the hose casing with a plastic shroud moulded over the connections (see Figure 9). An aluminium tube encloses the shroud and is fixed to the hose-rewind switch adjacent to the nozzle (see Figure 10).

5. Having variant 4 with the vent pipe from the gas separator of $\frac{1}{2}$ inch outside diameter copper tube, maximum length 6 feet, discharging into a container open to atmospheric pressure (see Figure 3), and with the hose of any length up to 200 feet provided that verification of an instrument shall apply only for hose lengths within 10 feet of that fitted when the instrument was verified.

GENERAL NOTES

Notice of approval of the original pattern and variants 1 to 3 was given in the following Memoranda of Approval:

No 77 dated 28th June, 1967
No 114 dated 11th April, 1968

Notice of approval of variant 4 was given in Memorandum of Approval No 134 dated 9th September, 1968.

No previous notice of approval has been given for variant 5.

NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 5/6D/5

VARIATION No 1

Pattern: BP Mark III Flowmeter

Submittor: BP Australia Ltd,
1-29 Albert Road,
Melbourne, Victoria, 3004.

Date of Approval of Variation: 14 October 1974

The modification described in this Schedule applies to the patterns described in the following pages and figures of Certificate No 5/6D/5 dated 12 December 1969:

Pages 3 to 7 dated 12 December 1969
Figures 5/6D/5 - 1 to 10 dated 12 December 1969

Condition of Approval:

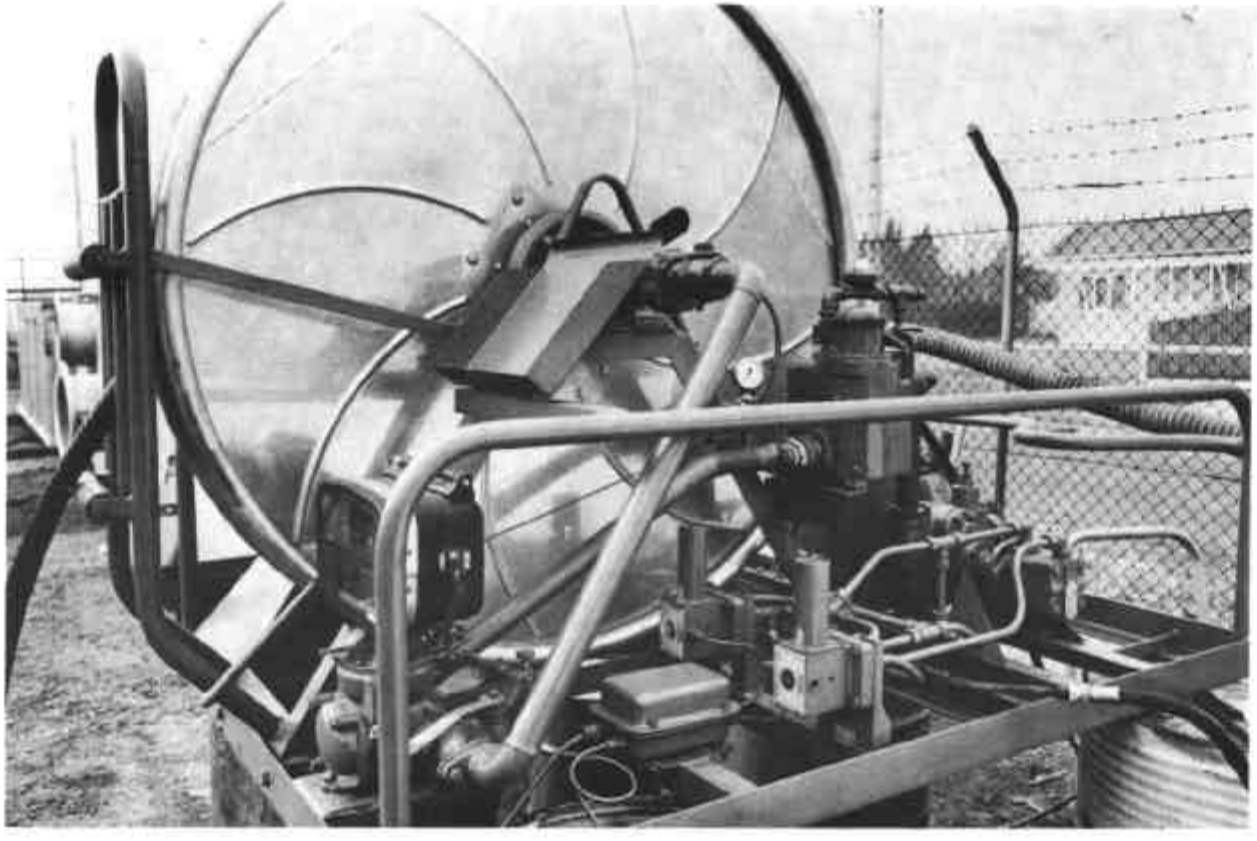
All instruments conforming to this approval shall be marked "NSC No 5/6D/5".

Description:

The approved modification provides for the replacement of the control wires in the delivery hose by a radio-frequency control link consisting of a transmitter clamped to the hose near the nozzle and a receiver fitted near the solenoid valves controlling the pump hydraulic motor and the hose-reel hydraulic motor (see Figures 11 and 12).

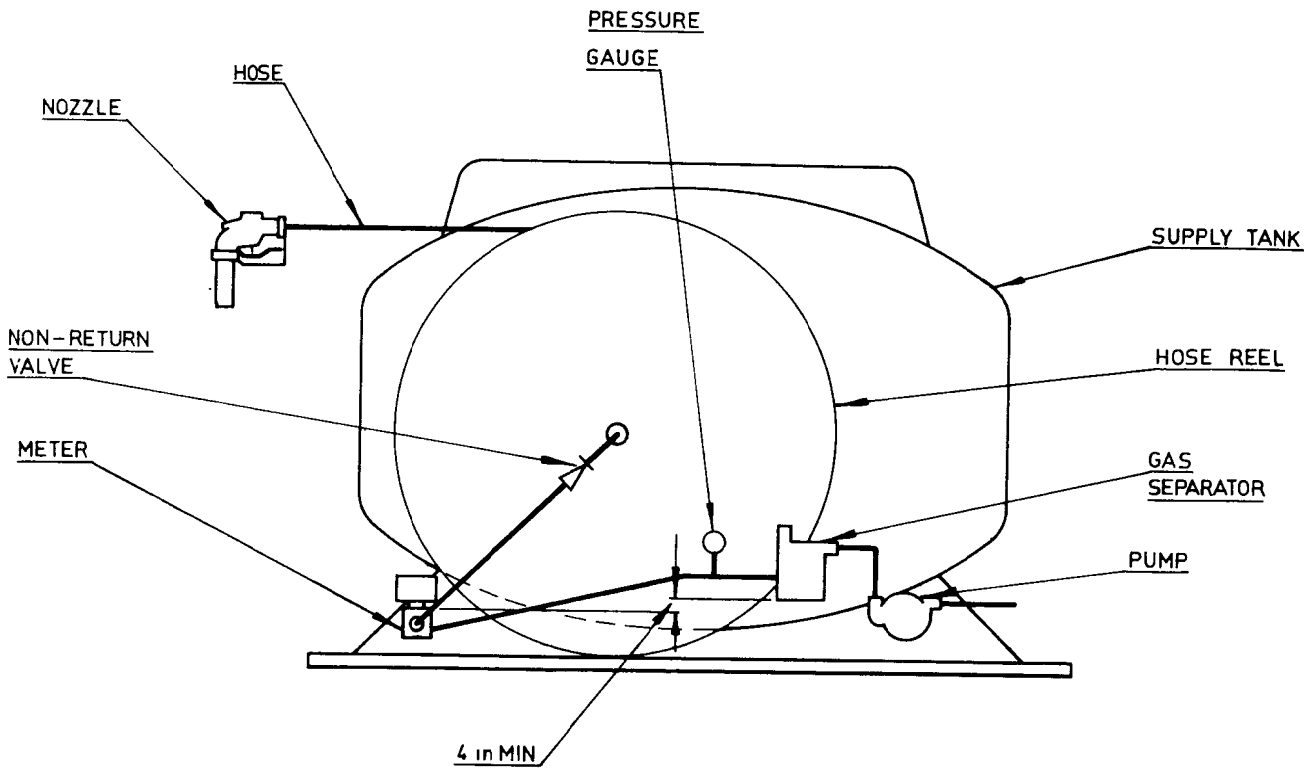
The setting of the pump by-pass pressure and the closing time of the nozzle valve are as described in the pattern.

FIGURE 5/6D/5 - 1



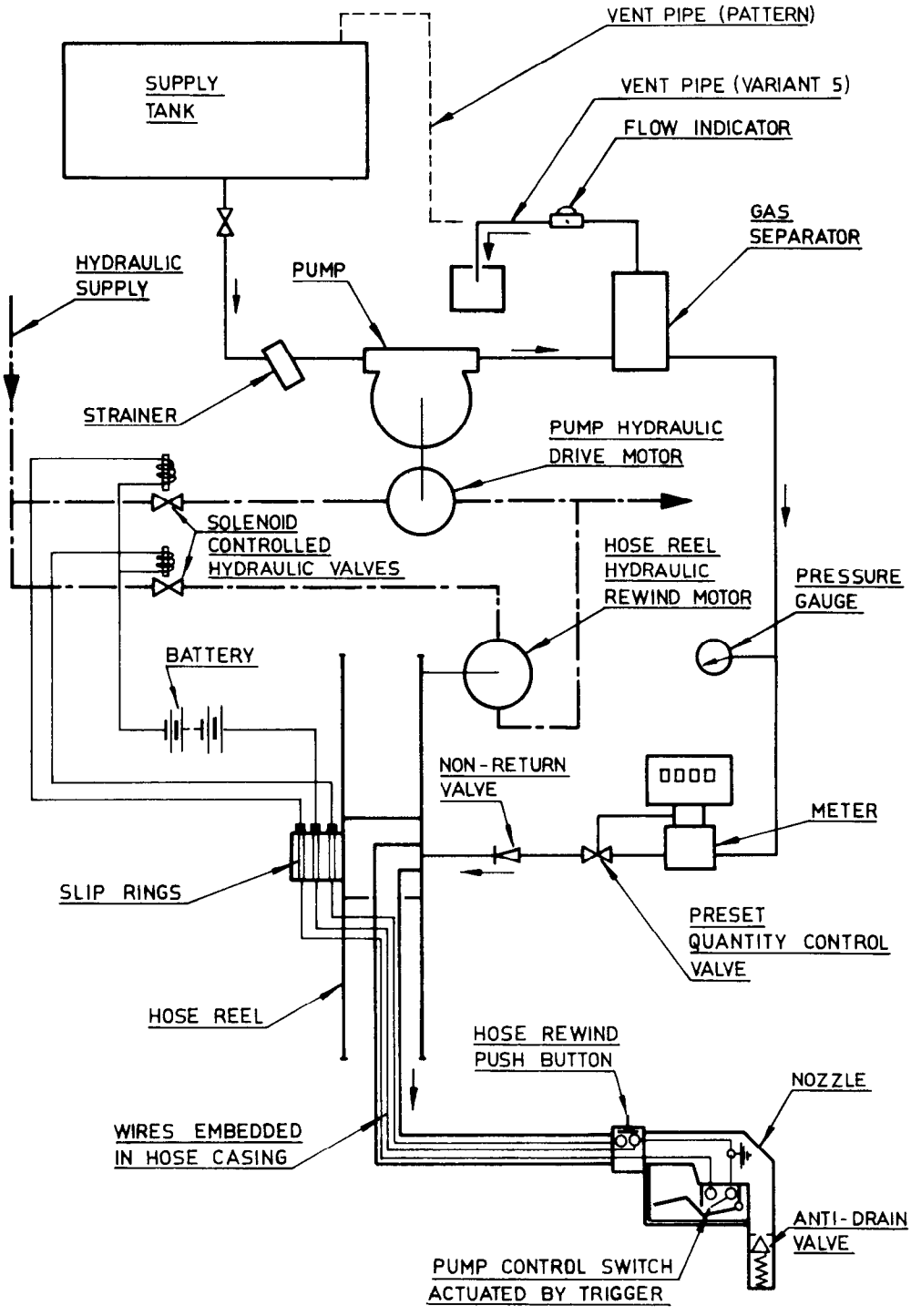
BP Portable Heating Oil Metering Unit Mark III

FIGURE 5/6D/5 - 2



Arrangement of Components

FIGURE 5/6D/5 - 3.



Hydraulic Diagram and Control Circuit

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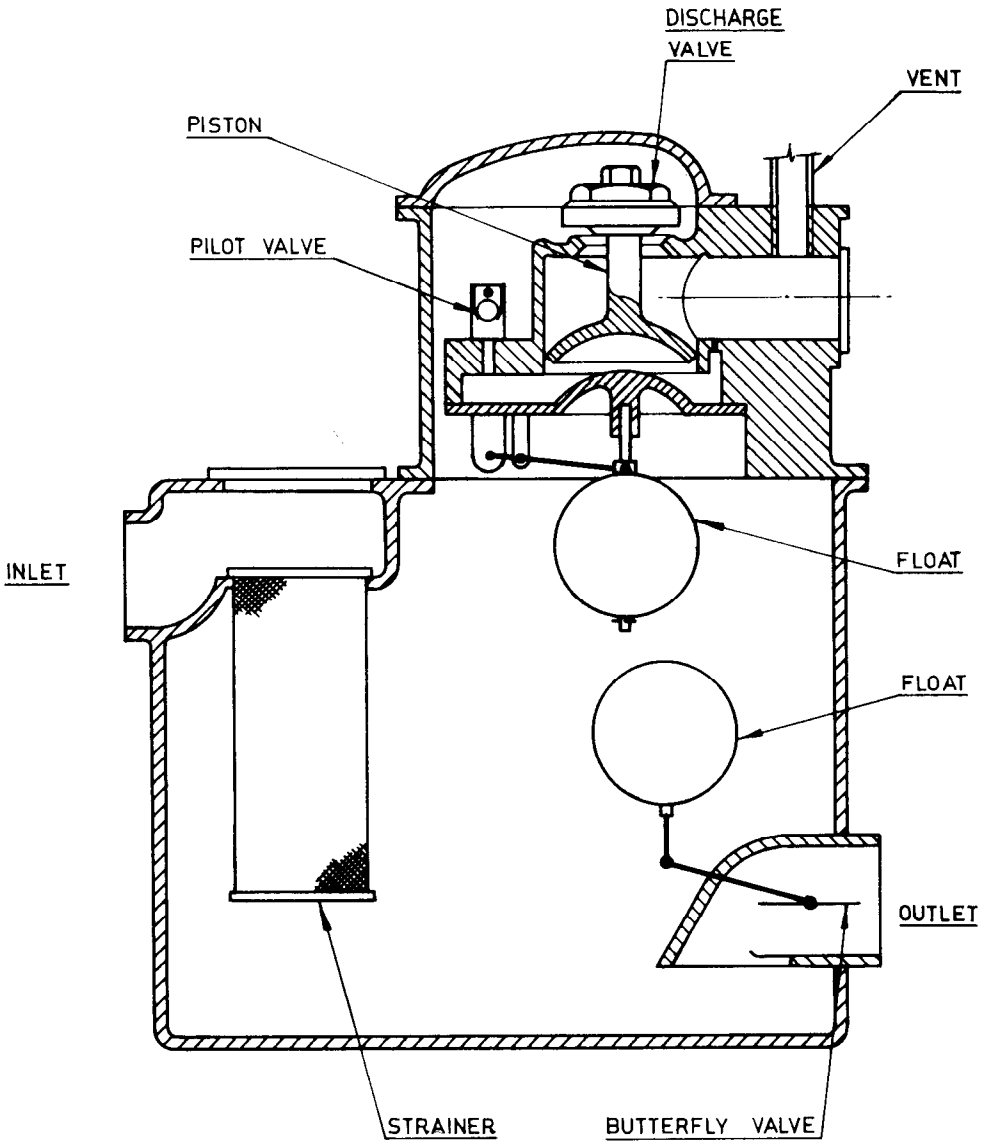
FIGURE 5/6D/5 - 4



Brodie Model CE-2 Gas Separator

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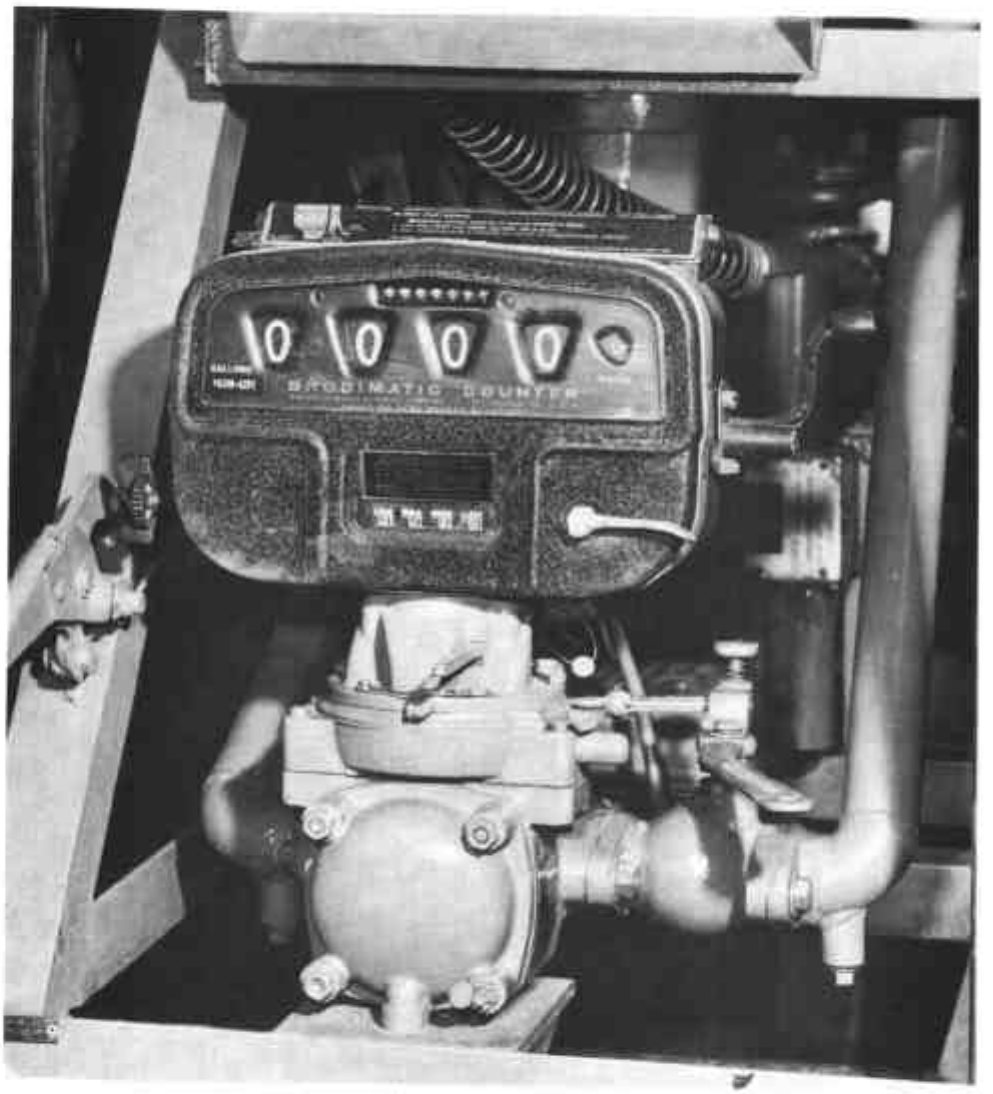
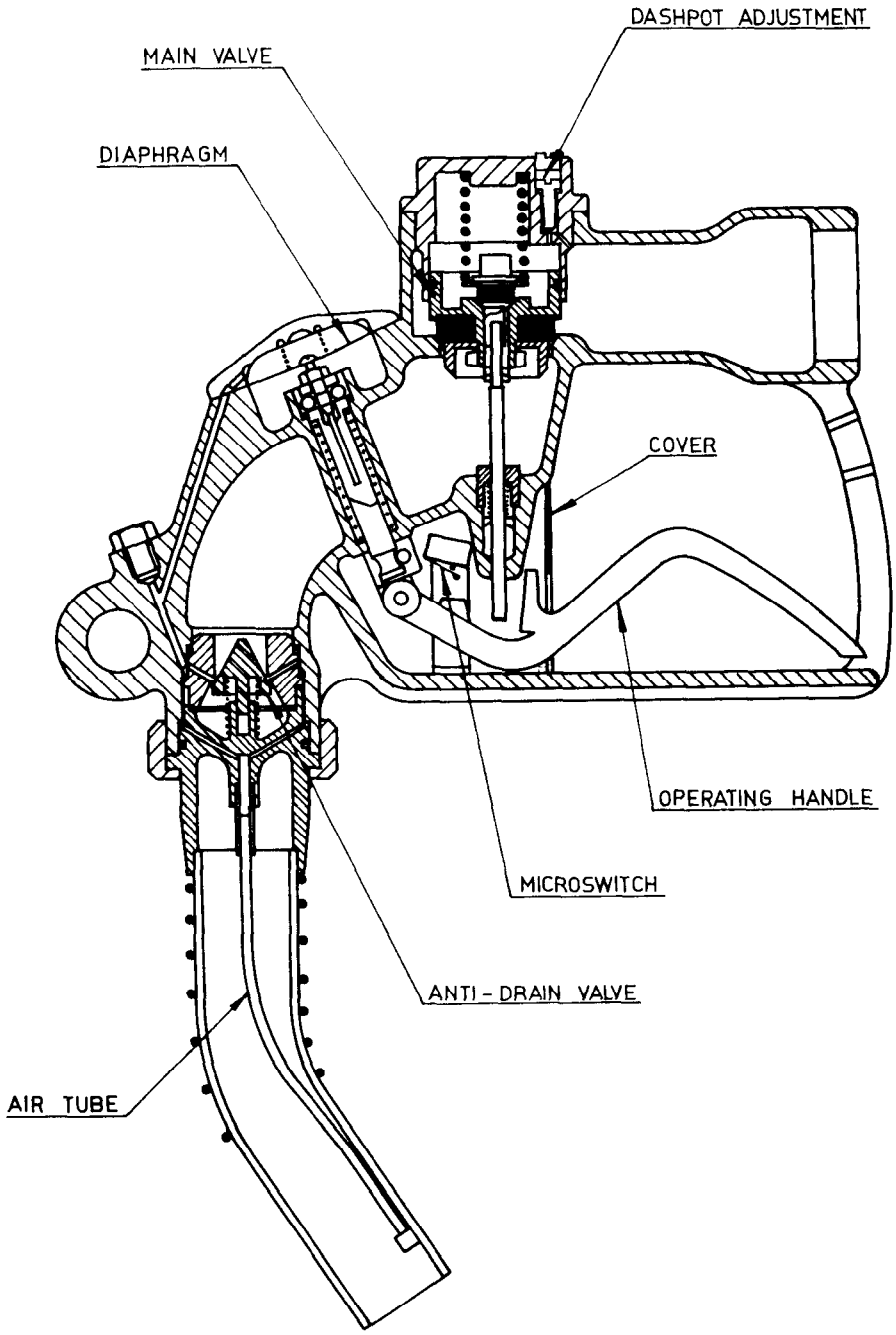


Brodie B31 Meter, Ticket Printer
and Preset Quantity Control Valve

FIGURE 5/6D/5 - 6



OPW Type 1190 ASDG Nozzle

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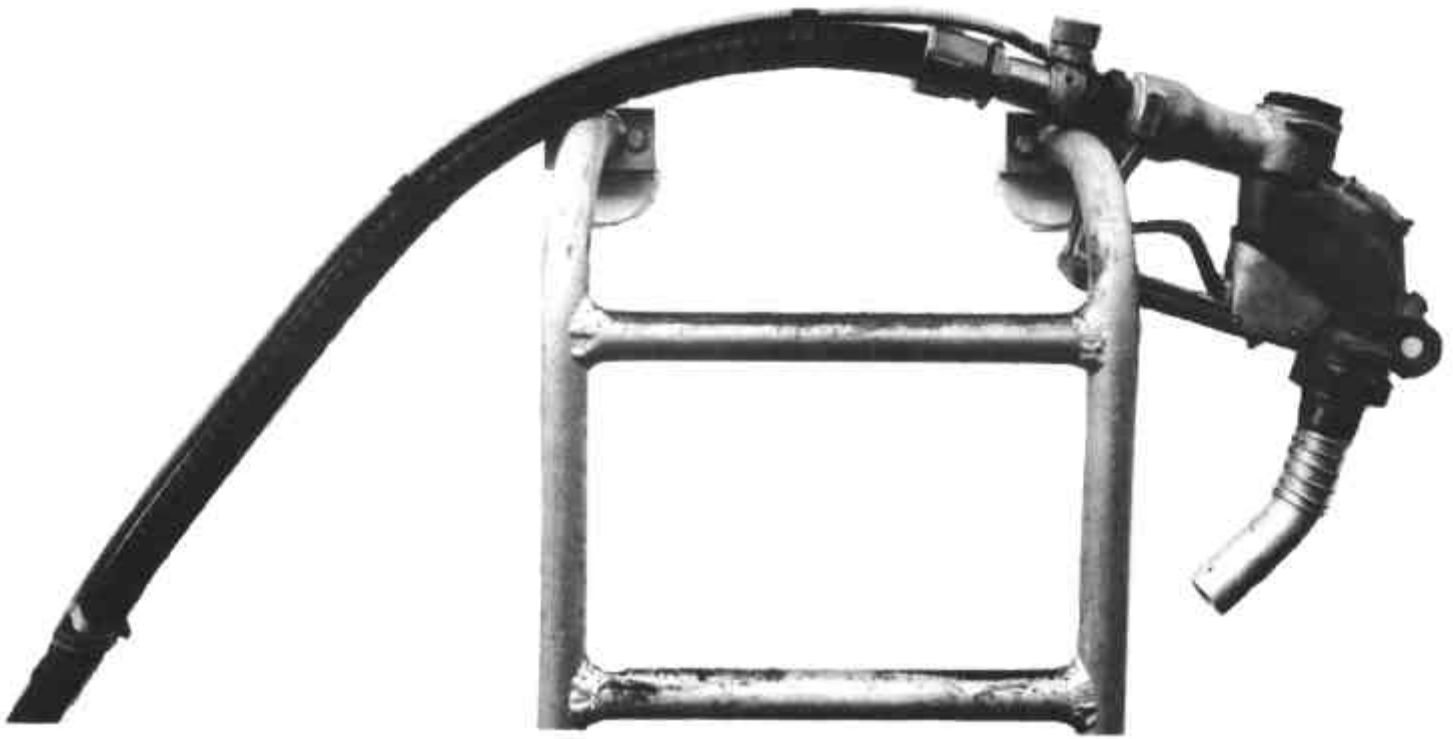
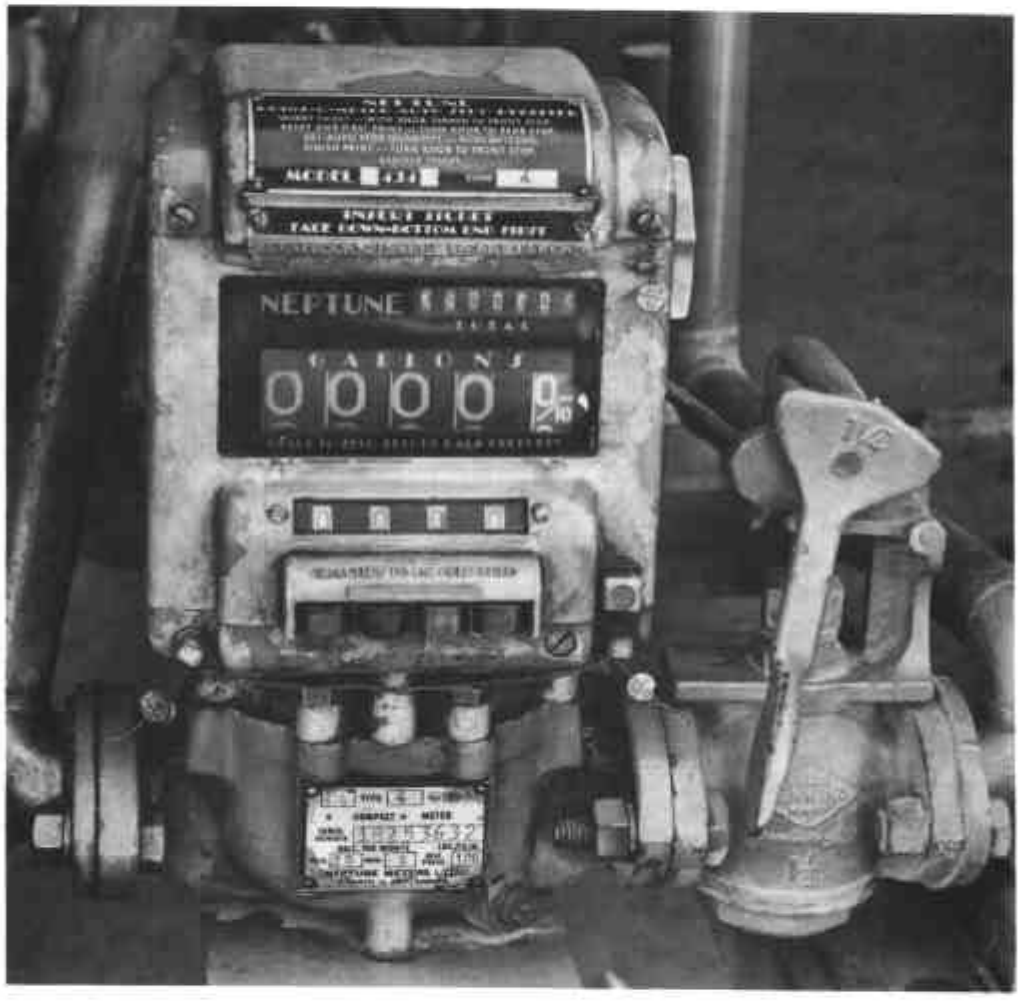
FIGURE 5/6D/5 - 7



Hose, Nozzle and Control-wire Conduit

FIGURE 5/6D/5 - 8



Neptune Meter, Ticket Printer
and Preset Quantity Control Valve

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FIGURE 5/6D/5 - 9

Plastic Shroud over Control-wire Connection

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FIGURE 5/6D/5 - 10

Nozzle, Hose and Control-wire Connection

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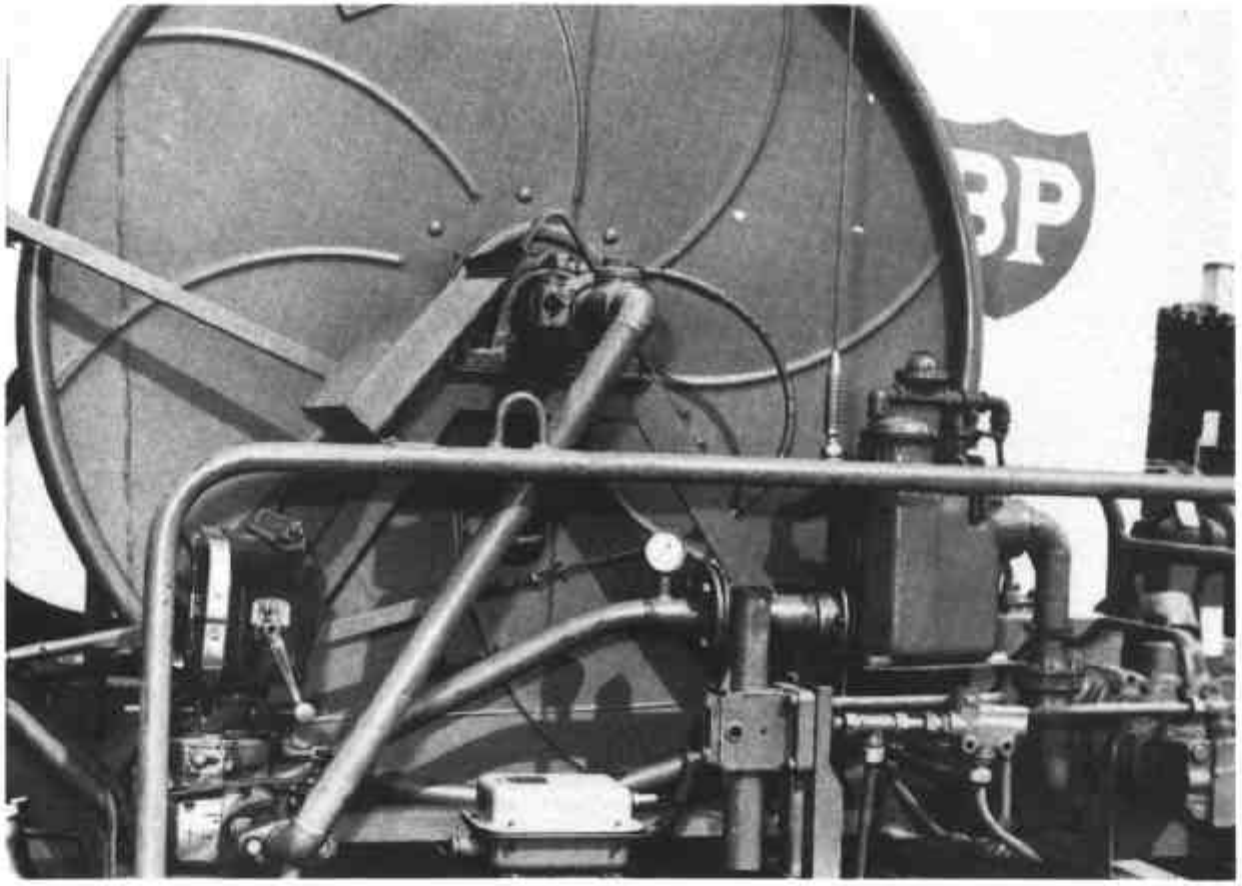

BP Mark III Flowmeter with Radio Control Unit

FIGURE 5/6D/5 - 12

Nozzle, Hose and Radio Transmitter