



National Standards Commission
Cancellation
Provisional Certificate of Approval No P5/1/4

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

SAAB Model TankRadar L/2 Liquid Level Measuring Device

submitted by Honeywell Limited Australia
5 Thomas Holt Drive
North Ryde NSW 2113

has been cancelled in respect of new instruments as from 1 April 2000.

Instruments which were verified/certified before that date may, with the concurrence of the relevant verifying authority, be submitted for reverification.

Signed and sealed by a person authorised under Regulation 63 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

A handwritten signature in black ink, appearing to read 'J. Burch', written in a cursive style.



National Standards Commission

Provisional Certificate of Approval

No P5/1/4

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

SAAB Model TankRadar L/2 Liquid Level Measuring Device

submitted by Honeywell Limited Australia
5 Thomas Holt Drive
North Ryde NSW 2113.

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 April 1998, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No P5/1/4 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.

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: (For provisional approval)

Instruments purporting to comply with this approval shall be marked NSC No P5/1/4 prior to verification/certification.

Instruments installed under this approval are to be re-verified at six-monthly intervals. The submittor is to arrange such tests and is to send the results to the Commission.

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of unsatisfactory performance or of suitable test results not being received by the Commission, this approval may be withdrawn.

DESCRIPTIVE ADVICE

Pattern: approved 7 March 1997

- A SAAB model TankRadar L/2 liquid level measuring device for use in fixed tanks up to 40 metres high.

Technical Schedule No 5/1/4 describes the pattern.

FILING ADVICE

The documentation for this approval comprises:

Provisional Certificate of Approval No P5/1/4 dated 20 November 1997
Technical Schedule No 5/1/4 dated 20 November 1997 (incl. Test
Procedure)
Figures 1 to 3 dated 20 November 1997

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.

A handwritten signature in black ink, appearing to read "J. Bish". The signature is written in a cursive style with a large initial "J" and a long, sweeping underline.

TECHNICAL SCHEDULE No P5/1/4

Pattern: SAAB Model TankRadar L/2 Liquid Level Measuring Device

Submittor: Honeywell Limited Australia
5 Thomas Holt Drive
North Ryde NSW 2113.

1. Description of Pattern

A SAAB model TankRadar L/2 liquid level measuring device for measuring the liquid level in fixed tanks up to 40 metres high.

1.1 Measuring Principle

The level gauging system is based on Frequency Modulated Continuous Wave radar. Signal transmission and reception is achieved by means of a waveguide projecting into the tank and a parabolic reflector type or cone type antenna.

Microwaves are transmitted towards the surface of the liquid in the tank. The returning echo from the surface is mixed with the transmitted signal, the frequency difference is determined, normalised with a reference signal and mathematically converted into a distance value (tank liquid level). The level is determined periodically (≤ 0.5 seconds) and the value output is displayed in millimetres.

1.2 Component Structure

The model TankRadar L/2 (Figure 1) consists of a radar tank gauge (RTG) and a data acquisition unit (DAU).

The radar tank gauge is a distance measuring device which continuously calculates the liquid level in the tank and sends the information to the data acquisition unit.

1.3 Radar Tank Gauge (RTG)

The radar tank gauge consists of a transmitter head (also called a radar unit) and a tank connection unit.

1.3.1 Transmitter Head

The model RTG 2900 transmitter head (Figures 1 and 2) consists of an electronic unit and a waveguide unit in a safety enclosure; a weather protection hood may also be fitted.

(i) Electronic Unit

The electronic unit includes a microwave unit, a radio-frequency (RF) head with a waveguide output, a signal processor, data communication components and a power supply.

(ii) Waveguide Unit

The waveguide unit (also known as an antenna feeder) is mounted in the base of the safety enclosure and connects directly to the microwave window of the safety enclosure.

(iii) Safety Enclosure

The safety enclosure is flame and explosion proof and includes a cover, a microwave window and cable entries. The microwave window is in the form of a PTFE plug, which connects directly to the waveguide output from the RF-head and to the outside waveguide unit.

The RF-head is mounted in the bottom of the electronic unit and has a waveguide output for the microwaves to and from the tank connection unit.

(iv) Weather Protection Hood

A weather protection hood may be used. The hood is made of anti-static plastic and may be in two versions.

1.3.2 Tank Connection Unit

The tank connection unit is a mechanical connection between the tank mounting surface and the transmitter head. It includes a microwave connection, such as an antenna or a waveguide transition, partially integrated in the mechanical connection.

One of the following tank connection units (Figure 2) is utilised:

(i) Model RTG 2920 - Horn Antenna Gauge

The model RTG 2920 gauge is used on fixed roof tanks, without a still pipe.

(ii) Model RTG 2930 - Parabolic Antenna Gauge

The model RTG 2930 gauge has a parabolic reflector of 450 mm diameter and is used on fixed roof tanks.

(iii) Model RTG 2940 - Still Pipe Gauge

The model RTG 2940 gauge is used on tanks with still pipes and is mounted on a stand on the still pipe flange. A transition cone, which has a rubber collar to seal against the inside of the pipe, is mounted onto the lower end of the stand. An angular shaped waveguide connection is used and is mounted between the waveguide unit and the transition cone.

(iv) Model RTG 2945 - Still Pipe Gauge

The model RTG 2945 gauge is similar to the RTG 2940 gauge, but is used on pressurised tanks.

(v) Model RTG 2960 - LPG/LNG Gauge

The model RTG 2960 gauge contains an LPG/LNG adapter, which includes an optional pressure transducer, a device to switch from operation mode to test mode and back, an optional ball valve and a high pressure seal.

1.4 Data Acquisition Unit

The model DAU 2100 (Figure 3) is an independent data acquisition unit, which consists of a printed circuit board housed in a weather proof box with cable outputs. The DAU has an LCD display for displaying the liquid level in millimetres received from the radar tank gauge. The unit is equipped with interfaces for pressure transducers, digital and frequency inputs, and relay outputs.

The model DAU 2130 data acquisition unit performs the same functions as the model DAU 2100, and also has its own power supply unit.

1.5 Markings

Instruments are marked with the following, together in one location:

Manufacturer's name or mark	
Model number	
Serial number	
NSC approval number	NSC No P5/1/4
Maximum height (*) m
Minimum height (*) m
Liquid (*)

(*) Determined at verification/certification.

1.6 Sealing and Verification/Certification Provision

Provision is made, outside the safety enclosure, for sealing the activating rod in the transmitter head (for the electronic unit enabling switch).

Provision is also made for the enabling switch in the data acquisition unit to be sealed.

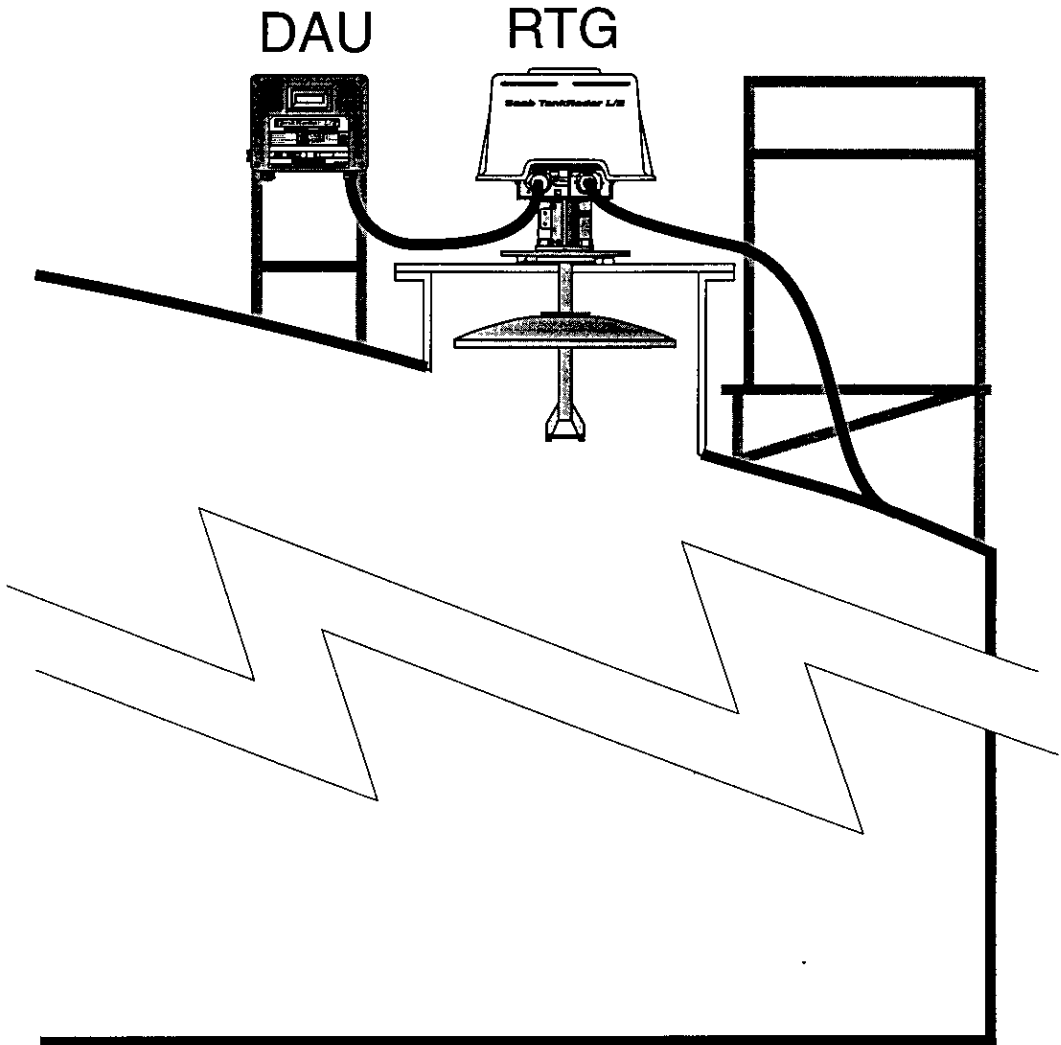
Provision is made for the application of a verification/certification mark.

TEST PROCEDURE

The maximum permissible error at verification/certification is $\pm 0.04\%$ of the liquid level measured or ± 2 mm, whichever is greater, i.e. ± 2 mm up to 5 m of the liquid level measured and $\pm 0.04\%$ over 5 m.

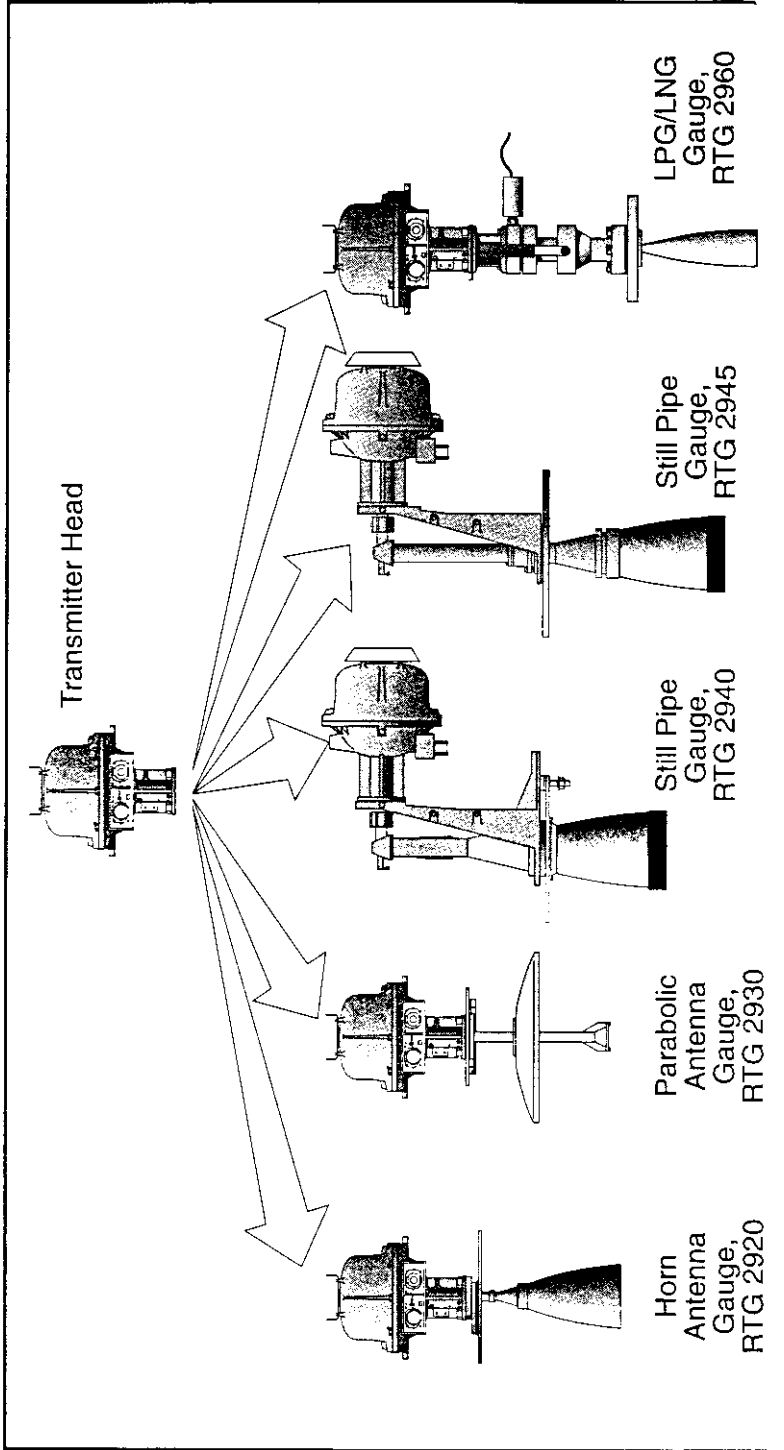
1. Verification should be carried out at static conditions following a period of normal operation at normal filling and discharge rates, using a verified dip-tape as a reference standard.
2. A series of comparative readings should be taken over a number of level changes. Readings should be taken following filling as well as emptying operations in approximately equal number. Mixers and/or heaters should be switched off in sufficient time to prevent errors arising from turbulence or convection currents when the readings are taken.
3. Three dip-tape readings should be taken at each level, at closely timed intervals by the same person using the same tape. The dip-tape readings should not differ by more than 1 mm. Failure of either group to be within this limit indicates a procedural error or faulty equipment. The tests should be repeated after corrective action has been taken.
4. For each level, an average of three dip-tape readings and an average of the three indicated by the instrument should be calculated. The difference between these two averages is referred to as the test difference, and should be within the maximum permissible errors.
5. The difference between dip-tape and the instrument readings at all levels should be randomly distributed. A close check of the trend of readings should be made over the period of tests as any tendency for the test differences to increase is indicative of a faulty gauge or installation, which should be corrected before proceeding. It will be found helpful to use graphical or control chart techniques to detect trends.

FIGURE 5/1/4 - 1



Typical SAAB Model TankRadar L/2 Installation

FIGURE 5/1/4 - 2



Showing Transmitter Head and Various Tank Connection Units

FIGURE 5/1/4 - 3

LCD display for
local readout



Model DAU 2100 Data Acquisition Unit