

# THE AERONAUTICAL JOURNAL

JULY 1970

NOTICES

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An Improved Blade Root Design for Axial Flow Compressors (and Turbines)

**H. Shaw**

A Note on Stratford's Method

**W. M. Lister**

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SYMPOSIUM ON VAI

DEVELOPMENT OF THE BENDIX/AIR EQUIPMENT RDR-IDM RADAR AS AN  
APPROACH AID FOR HELICOPTERS

**R. J. Van der Harten**

THE ROYAL AERONAUTICAL SOCIETY

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Editor: G. R. WRIXON, ARAeS.

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JULY 1970

# Electronic displays from Smiths Industries

## The new technique of electronic head-down display is well advanced at Smiths Industries

The unretouched photo taken on long exposure shows a  $5\frac{1}{2}$ " c.r.t. display of engine pressure ratio and emphasises the clarity and stability of the symbology. Virtually any type of information can be presented on this type of head-down display on a sequential or selective basis.

The head-down unit receives information from the new Smiths digital waveform generator, which represents a major advance in symbol generation for electronic displays.

Small, light and entirely new in concept, this generator greatly increases the flexibility of the display system by use of plug-in modules for re-programming. It employs M.O.S. chips and multi-layer circuit boards for greater reliability and will accept digital and/or analogue input signals—other features include failure monitor capability, press-to-test facility and a predicted MTBF in excess of 1000 hours.

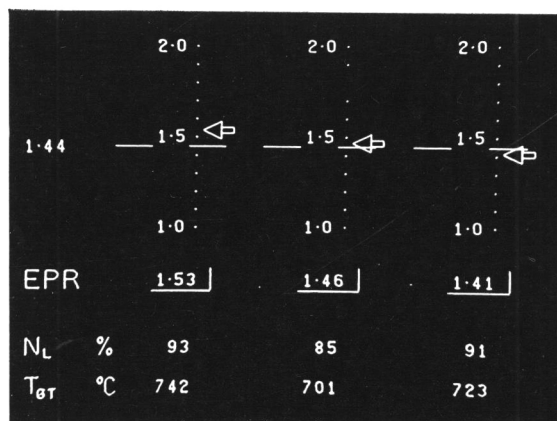
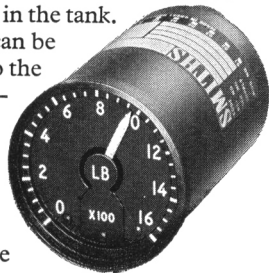
### Head-up

Smiths Industries advanced head-up display systems have been specified for the Harrier and Jaguar aircraft—development is also taking place on a head-up system for civil applications.

## 28 Capacitance Fuel Gauge

The Type 7 Capacitance Fuel Gauge has been specifically designed by Smiths Industries for feeder-liner, executive and light aircraft requiring a simple and inexpensive fuel measurement system. Operating directly from a 28 V dc supply, Type 7 is accurate, uncomplex and compact. Basically it consists of a 2 inch indicator, a small converter unit and a probe or probes in the tank.

The installation can be tailored exactly to the needs of the particular application. Typical accuracy figures for a basic system in normal temperature and fuel conditions are  $\pm 1.15\%$  tank empty to  $\pm 1.30\%$  tank full.



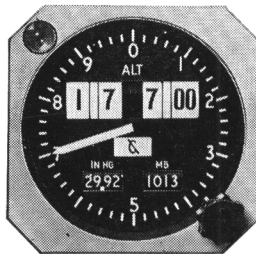
Compensation for variations in fuel permittivity is easily incorporated by the addition of an immersed capacitance reference unit.

While primarily designed for aircraft fuels, Type 7 can also be applied to oil contents measurement.

## Altitude alerting meets FAA mandatory requirements

By March 1971 a sequence of audio/visual signals to warn pilots of approach to a selected flight level will be a mandatory FAA requirement for U.S. civil airliners. Smiths Type 3B Self-Sensing Servo Altimeter with an Altitude Alerting Unit is the simple answer.

An output of indicated height (baroset corrected) from the type 3B is fed to the Altitude Alerting Unit to produce any sequence of audio/visual warnings. The system also signals departure from the selected flight level. The altimeter has a contact type digitiser for automatic height reporting, an integral servo amplifier and a full five-figure height readout. A servo repeater version is also available.



The Altitude Alert Unit, in a  $\frac{1}{2}$ -3ATI case, has integral lighting with front replaceable lamps, automatic reset, press-to-test facility and an accuracy better than 50ft. at all warning levels.

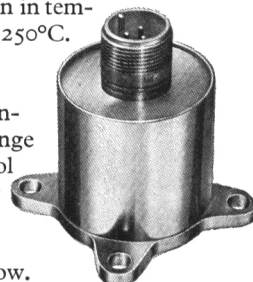
## Engine health—taking the pulse

Accurate detection of shaft-speeds, gas temperatures and oil, fuel and air pressures is vital for monitoring the health and performance of aircraft gas turbines. On the RR Olympus 593 in the Concorde, for example, Smiths Industries supplies no less than 18 units per engine for sensing these vital parameters.

For speed measurement Smiths Tachometer Generators employ advanced materials technology to achieve maximum performance and long life. And we have a range of small magnetic pulse speed probes for severe environments or where multi-signal outputs are required.

Smiths thermocouples have been specially developed to provide maximum protection to the bi-metal junction without impairing its response to temperature changes in the gas stream. Single thermocouple probes or complete high-strength harnesses can be supplied.

Constant modulus alloy steels and argon-arc welded construction are the main features of the capsules in Smiths Pressure Switches and Transmitters and they can withstand an overload of up to ten times the working pressure. Stainless steel bodies and ceramic insulation permit operation in temperatures up to 250°C. Full details of these high performance sensors, and our range of engine control and monitoring equipment, are available from the address below.



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