



## Tabular Display System Type S 3101/S 3201

THIS IS A fixed-coil display which gives, in tabular form on a cathode ray tube, changing information read out from a digital computer (see page 379). It can also function independently of the computer if fed with information in analogue form, using a manual keyboard. Used in this way it is a useful means for conveying written information instantly to a number of points.

In addition to its many applications in civil and military aviation it can be used for numerous other purposes, for example in industrial process control, account servicing, stock and financial information systems. It may be used anywhere, in fact, where the display of changing information is required without time delay.

### Features

**High speed.** The system is capable of writing 50,000 characters per second.

**'On line' operation.** High speed permits full advantage to be taken of modern computers.

**Modification of displayed characters by direct addressing can reduce computer loading.**

**Transistors are used throughout, in well proved circuits, ensuring the highest standards of reliability.**

### EQUIPMENT

The equipment comprises:

(a) Display Unit Type S 3101.

(b) Rack (Tabular) Type S 3201.

#### Display Unit Type S 3101

The display is built into a simple rectangular box. A rectangular cathode ray tube gives an overall picture size of approximately 7 in. x 5 in. (18 x 13 cm). The controls for brilliance, focus, etc., are mounted on the

front panel. Provision is made for fitting an edge-illuminated graticule for use where a pre-determined format is to be used.

The picture displayed on the screen is made up of a number of characters arranged in horizontal lines. These lines of data are read out in sequence and vertical shift signals give the displacement necessary to produce a tabular form. One character is written in a period of 20  $\mu$ s; thus the system is capable of writing 50,000 characters per second. In order to avoid flicker the picture is repeated 10 times per second which in conjunction with the after-glow of the tube produces a steady picture.

#### Rack (Tabular) Type S 3201

The central character store, control equipment, and power units are contained in a separate rack away from the display unit itself. The majority of circuits are on printed boards assembled in rows on withdrawable frame assemblies.

The control equipment accepts the data from the computer (or from a manually operated keyboard) and performs the necessary sequencing and conversion from coded digital information to analogue waveforms for distribution to the displays. The common deflection waveforms are fed to all displays but independently controlled bright-up waveforms are generated for each display or groups of displays which are presenting different information. Alterations to displayed data can be effected by directly addressing the appropriate store location, thus reducing computer output loading to a minimum. The format and information to be displayed is controlled completely by the input instructions and can therefore be set up or modified as required from the keyboard or by a change in programme.

The store capacity of 4096 words is arranged to match the writing rate and continuous cycling occurs at approximately 12 times per second. The storage capacity considerably exceeds that required on one display. This makes it possible to feed a number of individual displays with completely different messages. For example, 10 displays, each using approximately 400 characters, may be controlled from one central rack. Any one display may have up to 16 lines of information with up to 60 characters in a line, depending upon the format required. Three different sizes of character are produced, and the sizes may be mixed at will.

The central rack equipment will accept data either from a computer or keyboard at a random rate and is arranged to give out one instruction every 20  $\mu$ s. It is capable of working either as an independently connected peripheral unit or as an addressable unit on a common highway from the computer.

### Data Summary

#### Input data:

Form: 20-bit parallel message.

Data: 6 bits.

Address: 12 bits.

Data and address/data only: 1 bit

Ready signal: 1 bit.

Additional 1 bit for common highway operation. '1' = 0 volts, '0' = -10 to -15 volts.

**Storage capacity:** 4096 8-bit words.

**Store cycle time (read/write):** 10  $\mu$ s.

**Character writing period:** 20  $\mu$ s.

**Data code:** Arranged to suit computer code.

**Display outlets:** 12 (further displays may be paralleled to each output and will show the same picture).

**Number of lines of displayed data:** 16.

**Display rate:** 50,000 characters per second.

**Display repetition rate:** 12 per second.

**Character sizes:** 3, medium size approx.  $\frac{1}{8}$  in. x  $\frac{3}{16}$  in. (3.1 x 1.1 mm).

**Number of characters per line:** Adjustable 20-60.

**Picture size:** Approx. 7 in. x 5 in. (17.8 x 12.7 cm).

**Phosphor:** Magnesium-fluoride, medium persistence.

**Power supplies:** 220, 230 or 240V AC ( $\pm 6\%$ ) 45-65 c/s single-phase AC.

#### Ambient temperature range:

Rack: Up to 35°C (without cooling air).

Displays: Up to 45°C (without cooling air).

#### Dimensions:

	Height	Width	Depth
<i>Display Unit Type S 3101</i>	9½ in.	11 in.	2 ft
	(23 cm)	(28 cm)	(61 cm)
<i>Rack (Tabular) Type S 3201</i>	7 ft	2 ft 6 in.	2 ft
	(213 cm)	(76 cm)	(61 cm)

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