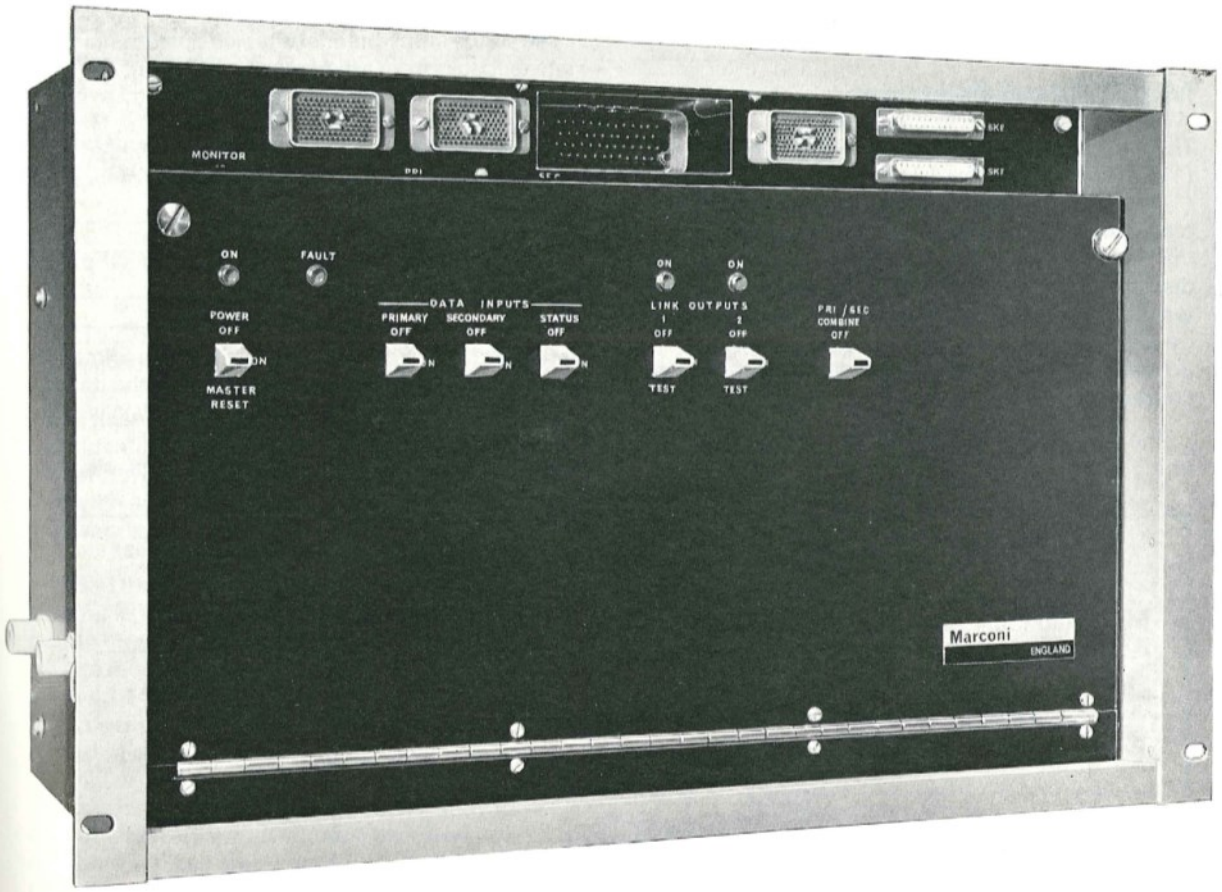
Marconi Radar Data Sheet C5

Link Buffer Unit Type S7210



- Accepts data from primary and secondary plot extractors
- Drives one or two narrow band links
- System status transmission
- Plot combining facility

The Link Buffer Unit Type S7210 accepts radar plot data from the Primary Radar Plot Extractor Type S7200 (data sheet C4) or from the Secondary Radar Plot Validation Unit Type S7300 (data sheet D3) or from both units. The incoming plot data is passed to a buffer store which smooths the data rate, prior to being output in a serial form to one or two data modems for transmission via narrow band digital data links.

Aerial bearing and system status data is also accepted, for transmitting bearing marker and status messages at regular intervals. In order to reduce the loading on the data links when data is being accepted from both primary and secondary extractors, a plot combining facility is available which associates the plot reports on those targets which have been extracted by both extractors, prior to transmission of the plot data. The unit is completely self-contained, generating all the necessary timing and control waveforms required to perform the various functions.

Mechanical Features

The unit is rack mounting, measuring 312mm (12¼in) high, 482mm (19in) wide and 280mm (11in) deep. It is constructed using double-sided plated-through printed-circuit boards carrying dual-in-line integrated-circuit packages and discrete components. The boards plug in to 136-way edge connectors linked by a printed-circuit back wiring board of similar type. Signal and power connections are made by multiway connectors.

The power supplies are housed in a separate unit.

Electrical Features

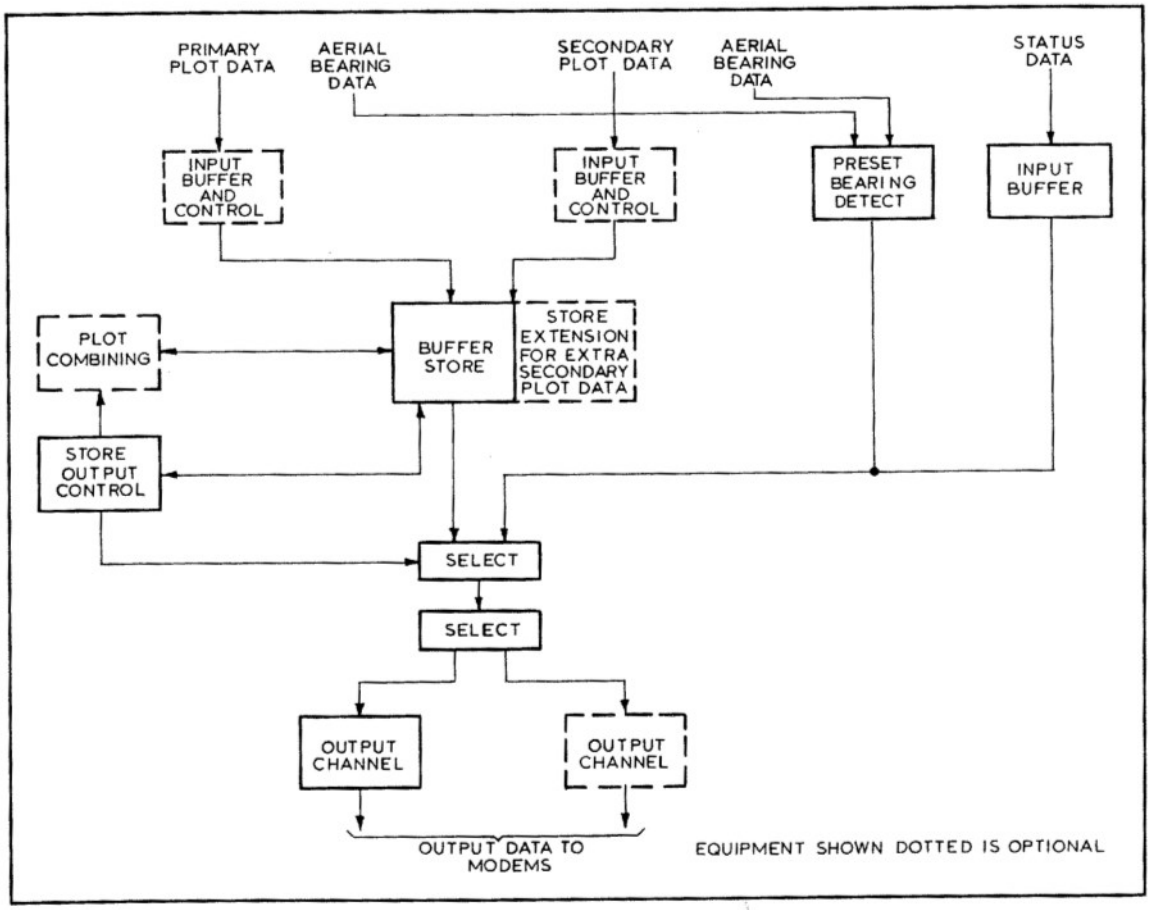
Inputs

Three separate input channels are provided, having individual front panel controls enabling data appearing at any input to be inhibited during maintenance or fault conditions. The two inputs from the plot extractors are identical, each providing a 12-bit data input highway, interface controls and aerial bearing highway. The primary plot data is accepted as three 12-bit transfers, with eight 12-bit transfers for secondary plot data. In each case, the data is assembled in an input buffer of appropriate length prior to being loaded into the buffer store. The input buffers and control circuits associated with each input are separate, enabling the unused input circuits to be omitted if used in a single extractor configuration.

The status input channel enables operational state tellbacks from associated transmitter/receivers, signal processing equipment, etc. to be scanned and transmitted over the data links. The status data is held in a buffer which is unloaded at intervals determined by the aerial bearing detect circuits.

Aerial Bearing Detect

Aerial bearing data is input from either the primary or secondary extractor, as determined by the data input switches. When the aerial bearing data is coincident with one of a number of preset bearings, the aerial bearing and status data are



Link Buffer Unit Type S7210 functional block diagram

output when an output channel becomes available. This facility enables a remote data handling system to assess the rotation rate of the radar aerial (a parameter required in automatic target tracking programs) and assessment to be made of the operational state of other equipment at the radar site.

Buffer Store

The buffer store consists of shift registers (MOS Static Devices) arranged to give storage for up to 128 words and extendable in width to allow the store to be optimized for handling primary and/or secondary plot data. Data is loaded into the store from the primary or secondary input buffer, when an empty store location is found, and then shifted down the store. The shift action is carried out continuously, data appearing at the bottom of the store being recirculated back to the input, unless it is to be unloaded for transmission. Plot data is read out of store for transmission in plot bearing order, the plot with the lowest bearing being identified by a 'flag' so that it is readily detected at the store output.

Store Data Output Control

When a plot has been unloaded from the store, the data output control circuit scans the bearing data of all the plots then left in store, to determine again the plot with the lowest bearing, which is then identified with a 'flag'. At any instant, only one plot in store is 'flagged', the output control starting to search again only on unloading of the 'flagged' plot from store.

When the plot has been unloaded, it is passed to a buffer in the output channel. Either one or two output channels can be specified, dependent upon system requirements. A front panel control allows the selection of channel 1 only, channel 2 only, or channels 1 or 2 whichever is ready for the output of data.

If the aerial bearing detect circuit is ready for output when an output channel becomes available, it takes precedence over plot data from the store.

Plot Data Combiner Option

In order to reduce the amount of data for transmission in a system comprising both primary and secondary radar plot extractors, a plot combining circuit can be included. The combiner attempts to associate the plot data from the two extractors by looking for coincidence within preset limits of the range and bearing of the plots. If coincidence is detected, it is assumed that the two plot reports refer to the same real target and therefore the plot data can be combined to form a single plot.

The combining process is carried out on that plot which has been 'flagged' by the store output control and a search is made in the store of the plot data extracted from the other extractor, i.e, if the plot with lowest bearing is a primary plot, a search is made of secondary plots and vice-versa.

Due to the possibility of reports on the same target being output by the extractors at different times, the 'flagged' plot is not allowed to be output in the normal manner but is held in store until it is 'historic' by a preset azimuth relative to current aerial bearing.

If a plot is sufficiently historic but has still not been combined, it is assumed that that target failed to be extracted by the other extractor and it is output. A combined plot is identified as such by a special bit in the plot identity part of the data format.

Data Output Channel

Either one or two channels may be specified. They are identical and operate completely independently. Data accepted for output is assembled in a buffer. The control circuit initiates the output of 'start of text' (STX) code and then outputs the data from the buffer 8 bits at a time. Each 8-bit word is preceded by a logic '0' identifying it as data and is followed by a parity bit (odd or even parity) as required, thus forming a 10-bit byte in the message as output. When the contents of the buffer have been output, the control circuit initiates the output of 'end of text' (ETX) code and also signals the store output control that it is ready for the next plot. If another plot is not ready for output by the time the ETX has been output, the control circuits initiate the output of 'idle' codes until the next plot is ready. The output is in serial form and the serializer operates at any preset rate up to 9·6 kilo-baud. The output circuits drive any data modem conforming to the requirements as specified in the data summary.

Automatic Test Facilities

A fault indication is given on the failure of the unit to pass any of the following checks :

1) Store test – check for all logic '0's on all unused locations in the buffer store.
2) Control test – check for failure to detect on two successive revolutions of the aerial at either output channel the north mark or test target message from either or both plot extractors.
3) Output channel test – check for transmission of data or idle codes on the outputs of each output channel by a watchdog timer circuit.

Manual Test Facilities

A test control panel is accessible behind the hinged front panel of the unit. A range of test control and manual data input switches is provided to facilitate the input of known test data

to the unit and to give override capability on the unit control circuits. A set of monitor lamps is also provided to enable the state of the data to be checked at various key points in the unit.

Thorough checks can thus be made to assist in fault diagnosis without recourse to external test equipment.

Data Summary

Power input:
110V or 220V or 240V ±10%
or
100 to 125V or 200 to 250V ±10%, 45 to 65Hz;
1-phase, 250VA maximum.

Inputs
Primary plot extractor
All inputs at standard logic levels.
Plot data (range, bearing and miscellaneous data):
12-bit highway, three-word transfer and controls.
Aerial bearing data:
13-bit highway, binary coded aerial position.
Secondary plot extractor
All inputs at standard logic levels.
Plot data (range, bearing, modes, codes and miscellaneous data):
12-bit highway, eight-word transfer and controls.
Aerial bearing data:
12-bit highway, binary coded aerial position.
Status
16 bits, functions may be specified for individual system requirements.
Two inputs per bit are provided, enabling inputs to scan either
1) standard logic levels
2) clean contacts
3) levels of −28V (G.P.O. standard signalling).

Controls
Front Panel
Power:
on/off.
Primary input channel:
inhibit.
Secondary input channel:
inhibit.
Status input channel:
inhibit.
Output channel 1:
off/on/test.
Output channel 2:
off/on/test.

Internal patch links on printed boards
Primary channel:
number of words.
range significance.
Secondary channel:
number of words.
range significance.
Plot combining criteria:
range and bearing acceptance limits.
Message format:
composition of message – idle, start, end of text coding.
Output data rates:
up to 9·6k baud maximum.

Output Data
Interface to modems, designed to meet the following requirement specifications:
1) **C.C.I.T. Recommendations:**
V23 and V24 from Blue Book Vol. VIII.
2) **G.P.O. Specifications:**
TG.2269 for customer's data terminal equipment for use with Datel Modem No.1 (or similar).
3) **G.P.O. Specification:**
TG.2327A for customer's data terminal equipment for use with Datel Modem No. 7 (or similar), Facility 1 Option a) only.
4) **Memorandum:**
A2524 on the connection of privately owned equipment to Post Office circuits.

Environment
Temperature:
Operational: 0 to +50°C.
Survival: −40°C to +65°C.
Relative humidity:
Operational: 95% at 25°C.
Survival: 95% at 40°C.
Pressure:
Operational: 750mb.
Survival: 420mb.

Dimensions
Height:
312mm (12¼in).
Width:
482mm (19in).
Depth:
280mm (11in).
Weight:
14·1kg (31lb).

Marconi Radar Systems Limited
A GEC–Marconi Electronics Company
Crompton Works, Chelmsford, England CM1 3BN
Telephone: Chelmsford (0245) 67111. Telegrams: Marstor Chelmsford Telex.
Telex: 99108 and 99449.

C5
ISSUE 2

 Printed in England by Lund Humphries, London and Bradford.
121073/2000+3500