



'Autoplex' Equipment HU 120 Series

AUTOPLEX is a time-division multiplex system with automatic error detection and correction. A seven-unit error-detecting code is employed in conjunction with a repetition cycle in accordance with CCIR Recommendation No. 242 (Los Angeles 1959). The system is synchronous, transmission speed being controlled by a highly stable crystal oscillator.

Autoplex has been continuously developed over several years and the HU 120 series equipments are up-to-date transistor versions of the original HU 20 series. Operation is in accordance not only with Recommendation 242, but also Report 108 (Los Angeles 1959), permitting automatic phasing in traffic without loss or multiple printing of characters.

The basic terminal operates with a tape reader (or similar) input but, in conjunction with auxiliary units, Telex and leased private circuits may be provided.

Features

Two independent 2-channel circuits, each accepting two 50-baud channels, are accommodated by the basic equipment, with facilities for operation as one 4-channel circuit.

Transistors and semi-conductor diodes are used throughout the equipment, with ferrite-core matrices in the storage and coding circuits.

Synchronizing circuits ensure continuous, accurate synchronization under all conditions by examining each transition of the incoming signal.

Marking of the aggregate signal may be brought into operation by means of switches. This introduces an additional one-in-four inversion pattern on each channel, which in conjunction with a 'tested repetition' system prevents loss of characters when phasing in traffic. The relationship of the inversions on the main channels is in accordance with CCIR Report No. 108 (Los Angeles 1959).

An 8-character repetition cycle, with one-in-eight marking as set out in Report 108 is available as an alternative to the 4-character repetition cycle by changing links in the equipment.

Sub-channel or Telex operation can be provided by means of auxiliary units, sub-

dividers being mounted in the main equipment cabinet.

Phasing is automatic, as a result of employing the 'marked' cycle in conjunction with the fully tested repetition cycle on each channel.

Error detection, with error indication, can be provided where no return path is available for requesting repetitions.

Modular construction, using printed-wiring circuits, has been used throughout to produce a compact and reliable equipment.

THE SERIES

The HU 120 series comprises the main terminal equipment, Type HU 121, and a range of auxiliary units offering additional facilities.

Error Detection and Correction Terminal Type HU 121

The basic 2+2-channel terminal is housed in a single front-access cabinet and is built-up from a number of narrow units arranged in rows, book-shelf fashion. Each book unit contains a number of small printed-wiring modules. Each module performs a basic logic function and the equipment is made up of a large number of modules of comparatively few types. One shelf contains book units on which are mounted most of the operational controls. Also on this shelf are two units which provide visual indication, switched on a channel basis, of 5-unit and 7-unit signals being transmitted or received.

Any unit may be withdrawn and operated in an extension frame for servicing. Numerous test points are provided.

FEATURES

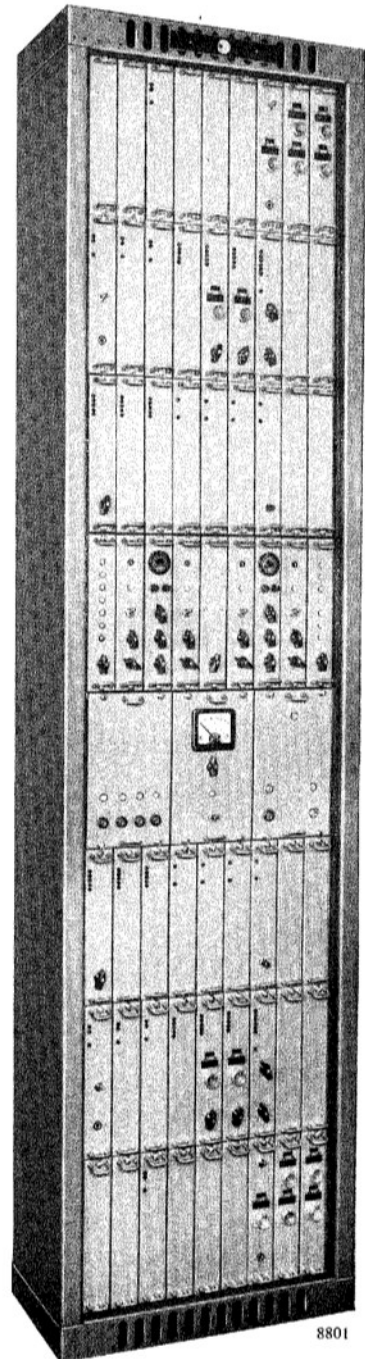
Transistors and semi-conductor diodes ensure operational stability, long life, low power consumption and low heat dissipation.

Fully tested repetition cycle.

Continuous-cycling facility, locally or remotely initiated.

Speedy synchronizing and phasing.

Automatic or manual phasing; manual phasing can be effected from a remote point.



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HU 121 Terminal Equipment.

Supervisory signals can be sent without mutilation of traffic characters.

Variable phasing delay (approx. 10 secs. or 5 mins.).

Alternative units are available to provide simultaneous outputs from the receiver instead of the normal sequential outputs.

Data Summary

5-unit input: Multi-wire simultaneous, controlled by stepping pulses; ± 6 V on five traffic wires, on 6th wire for 'no traffic' and on 7th wire for supervisory condition.

5-unit output: ± 6 V or ± 80 V start/stop; distortion less than 3%.

7-unit aggregate input: ± 6 V into 1k Ω or ± 80 V into 4 k Ω sequential; margin better than $\pm 45\%$.

7-unit aggregate output: ± 6 V or ± 80 V sequential; distortion less than 3%.

Polarities of signals are reversible to conform to any desired convention.

Working speeds (bauds):

5-unit signal	7-unit aggregate signal	
	2-channel	4-channel
50	96	192
50 or 45.45	85 $\frac{1}{2}$	171 $\frac{1}{2}$

Storage: One store per channel, capable of storing the 3 or 4 characters required for 4 or 8 character repetition cycles (idle beta used for 'packing' characters).

Power supplies: 100-125 V or 200-250 V 40-60 c/s, single-phase AC. 80-0-80 V DC if required.

Power consumption (AC): Less than 100 VA.

Dimensions:

Height	Width	Depth	Weight
7 ft 6 in.	1 ft 11 $\frac{1}{2}$ in.	1 ft	270 lb
(228.6 cm)	(59.7 cm)	(30.5 cm)	(123 kg)

Sequential-to-Simultaneous Converter

In order to apply a start/stop input signal to a radio channel using Autoplex it is necessary to convert the sequential input to the simultaneous form required by the HU 121. The input is normally from an auto-sender, the characters being released by pulses sent from the converter but timed by the HU 121.

The converter comprises three book units, each containing printed-wiring modules, designed for mounting in an auxiliary cabinet matching the main equipment.

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Means are included for detecting the supervisory conditions, continuous start and stop polarity, and translating them to idle-alpha and idle-beta signals.

Short start-element rejection, to avoid the possibility of short interference pulses causing false starts.

Choice of two keying speeds by switch selection.

Input loop delay of up to 290 milliseconds can be accommodated.

Data Summary

Input: ± 6 V into 1 k Ω or ± 80 V into 4 k Ω start/stop.

Output: Multi-wire simultaneous; ± 6 V on five traffic wires, on 6th wire for no traffic and on 7th wire for supervisory condition.

Keying speed: 45.45 or 50 bauds.

Auto-transmitter release pulse: ± 6 V or ± 80 V double current, with or without 40 ms delay.

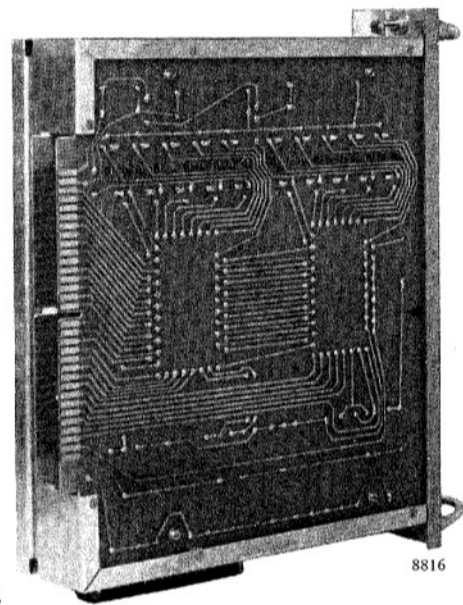
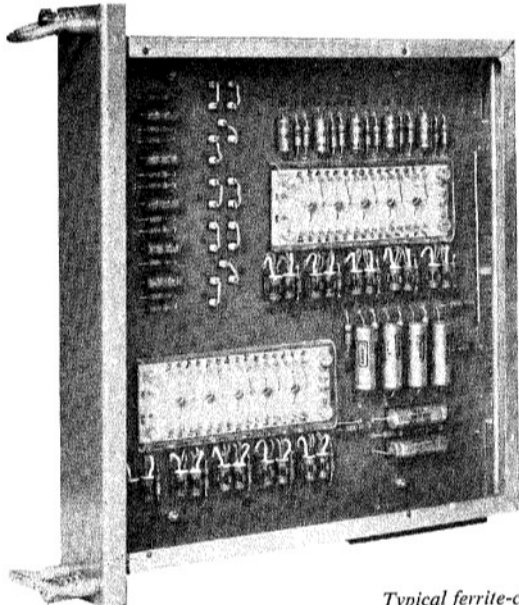
Power supplies: 10-0-10 V from supply units in auxiliary cabinet.

Channel sub-divider

When the volume of traffic on a private or leased circuit does not warrant full-time occupation of an Autoplex channel, a number of customers may share the channel by means of a channel sub-divider.

This divides the main channel into two, three or four sub-channels. One sequential-to-simultaneous converter must be used for each sub-channel.

The channel sub-divider comprises two book units and facilities are provided in the HU 121 equipment for one sub-divider to be added for each of the four channels.



Typical ferrite-core book units.

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Sub-channel distribution is entirely electronic, switched selection of sub-channel combinations arranged in accordance with CCITT recommendations as follows.

- (a) 4 quarter-speed channels
- (b) 2 quarter-speed channels and 1 half-speed channel
- (c) 2 half-speed channels
- (d) 1 quarter-speed channel and 1 three-quarter-speed channel

Automatic phasing in conjunction with the marking pattern set out in Report 108 has been used to provide correct sub-channel phase automatically.

Data Summary

Sub-channel inputs: Multi-wire simultaneous from up to four sequential-to-simultaneous converters.

Sub-channel outputs: ± 6 V or ± 80 V start/stop.

Auto-transmitter: ± 6 V or ± 80 V double-current.

Power supplies: 10–10 V from supply units in main equipment cabinets.

Seven-unit Monitor Type HU 126

The seven-unit monitor is a piece of test equipment which has been designed to permit monitoring of any 7-unit sequential signals using the CCITT recommended code. It can be used with the Autoplex equipment Type HU 121 and provides a printed tape copy of the applied signals.

The equipment can be supplied either for console mounting or in a trolley complete with printer.

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Built-in power supply units, master clock and phasing circuits.

Operates independently of the equipment being monitored.

Facilities for printing the following:

- (a) Any one channel of a two- or four-channel system.
- (b) Any sub-channel or combination of sub-channels on the channel being monitored.

Data Summary

Input: 7-unit sequential aggregate signal; ± 6 V to ± 80 V into 40 k Ω .

Keying speed: 85 $\frac{5}{8}$, 96 or 100 bauds aggregate signal for 2-channel; 171 $\frac{5}{8}$, 192 or 200 bauds aggregate signal for 4-channel.

Output: Printing on paper tape using a 7-unit printer.

Power supplies: 100–125 V or 200–250 V, 40–60 c/s, single-phase AC.

Marconi

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Typical modules.

