ALTIMETER, ENCODING MK.31 AND CODE CONVERTER PART No. L83101-00-000

GENERAL AND TECHNICAL INFORMATION (-1)

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence

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Prepared by Meggitt Avionics

Publications authority: CTS/TD

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AMENDMENT RECORD

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RECORD OF SERVICE TEMPORARY AMENDMENT LEAFLETS (STAL)

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*Insert specific identity of STAL

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PRELIMINARY MATERIAL

GENERAL AND TECHNICAL INFORMATION (-1)

Chapter

MODIFICATION RECORD

The conents of this publication cover equipment incorporating the following modifications:

MANUFACTURERS MOD NUMBER	SERVICE MOD NO	CLASS	BRIEF DESCRIPTION

Chapter 1

ALTIMETER MK. 31, PART NO. L82875-04-600

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ILLUSTRATIONS

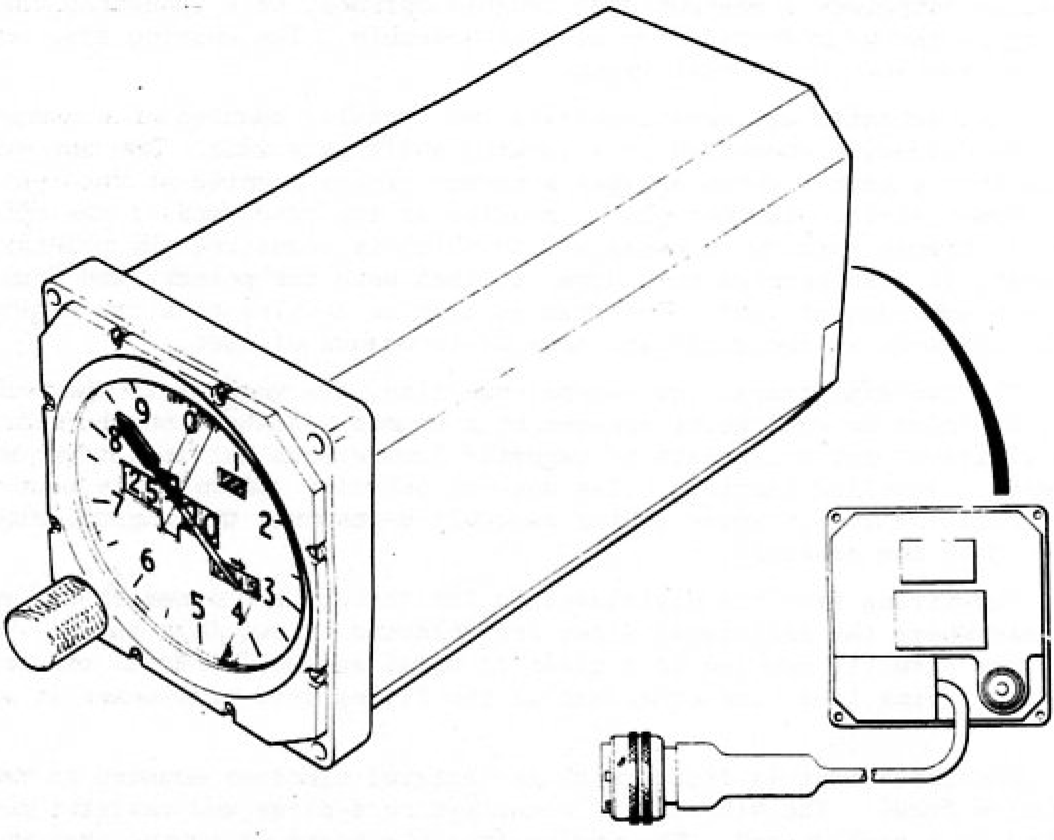

Fig.1 Altimeter, general view

INTRODUCTION (fig.1)

1. The altimeter Mk. 31, (Part No. L82875-04-600) (Ref. No. 6A/1158379), is a capsule operated instrument displaying pressure altitude over the range of -1000ft to +45,000ft and producing a coded electrical output of altitude. Indication of altitude is given by a counter-counter-drum-pointer displayed and coded output is provided by two digitizers. The encoded output is fed to a code converter which converts the digitized code into an I.C.A.O. Gillham code for use by an IFF transponder. Modification 1 introduces plug and socket connectors, and an improved wiring loom to the coarse and fine digitizers.

MODIFICATION STANDARD

2.

Modification number	Description	Classification
K1/2 (M1649) (MOD 1 on instrument)	Improved wiring loom to digitizers	c/o

DESCRIPTION

3. The instrument is housed in a 3.1/4in square case, the static pressure connection being made through a 1/2-20 UNF 2B tapped port and electrical connection made via a flying lead with a 19-pole plug. The instrument mechanism comprises a conventional capsule operated unit connected through gearing to the pointer and drum counter assembly. The gearing also engages with the two low torque digitizers.

4. The mechanism assembly comprises two capsules mounted on a common frame, each capsule being connected to a rocking shaft by a link. The two rocking shafts have a sector which engages a common pinion mounted at the rear end of a common shaft. Another pinion mounted at the other end of the main shaft, engages through gearing, a handstaff to which is connected the pointer. The handstaff is also coupled to a drum, so that both the pointer and drum indicate hundreds of feet. The drum in turn is coupled to a two digit counter which registers in thousands and tens of thousands of feet.

5. The two digitizers, one coarse, one fine, are mounted to the mechanism body, a pinion on each being engaged by a common gearwheel on the main shaft. Each digitizer rotor consists of magnetic laminations set in a rotor shaft mounted in jewelled bearings. The angular position taken up by each rotor shaft relative to its wound stator assembly determines the digital signal produced by the assembly.

6. The wiring from the digitizers is fed through two looms to the rear of the case where the individual wires are soldered to two film tapes. The film tapes are directly coupled to a glass to metal seal which forms the instrument end of a flying lead, the other end of the flying lead terminates in a 19-pole plug.

7. The instrument is fitted with an integral vibrator mounted to the mechanism frame. The vibrator is connected to a diode and resistor circuit mounted on a small board. The wiring from the board is routed through the looms to one of the film tapes at the rear of the instrument. Wired in parallel to the vibrator is a warning flag, which is visable through an aperture in the dial when the power supply is removed.

8. The millibar counter movement is adjusted by the rotation of a barometric setting knob at the front of the instrument. A pinion on the end of the setting knob shaft engages through gearing, a large gearwheel which displaces the pointer gear train relative to the main shaft. Another pinion on the setting knob shaft engages with a large variable pitch gearwheel, which in turn engages with the millibar counter. This rotation of the barometric setting knob causes the pointer to rotate and also alters the millibar counter setting. The digitized height signal will not be affected however, as this is always referenced to a datum pressure of 1013.25 mb.

9. The front of the case is sealed by a bezel assembly comprising a bezel with a plain glass, gaskets and sealing rings. The counters and drum, millibar counter and warning flag are viewed through apertures in the dial. The tens of thousands of feet counter is marked with diagonal black and white hatching in place of the conventional zero figure to bring attention to altitudes below 10,000ft. The presentation markings fluoress when exposed to ultra violet lighting.

OPERATION

MECHANICAL (fig.2)

10. The interior of the case is connected to the static system of the aircraft via the static port at the rear of the instrument. A change in air pressure causes a deflection of the capsules which is transmitted through temperature compensating components to two rocking shafts and sectors. Both sectors engage with a common pinion mounted on the main shaft. By design, the rocking shaft linkage produces a pinion rotation which is linear with height. The main shaft drives a stepping up geartrain which actuates the pointer drum assembly.

11. Changes in height cause the pointer and drum to rotate, the drum being directly coupled to the pointer gearing. Counter changes, at every thousand feet, take place when the pointer traverses the intervals between 900 and 1000ft.

12. To alter the millibar setting, the setting knob is rotated, which, through gearing, displaces the altitude gearing relative to the main shaft, thereby altering the indicated height. The relationship between the rotation of the setting knob and the movement of the altitude presentation is indicated by the setting of the millibar counter.

ELECTRICAL (fig.3)

13. The pressure altitude gear train is used to drive the two low torque digitizers. Each digitizer receives a pulse train from an oscillator within the code converter. The pulses are applied to the stator of each digitizer where they are modified according to the position of the magnetic laminations within the rotor relative to the stator. Thus the pulses produced by each digitizer are dependent upon the relative angular position of the rotor which in turn is dependent upon pressure altitude.

14. The reply pulses are fed to the code converter where any ambiguity between the coarse and fine digitizers is resolved by means of a secondary interrogation pulse derived from the fine digitizer reply pulse. The total reply pulse group is modified from a pure binary pattern to the I.C.A.O. Gillham Code for use as an output by an IFF transponder.

15. A 28V d.c. supply is fed to an oscillator which produces a pulsed output. This 28V d.c. supply is also routed to the instrument to energise the warning flag solenoid, and a coil which drives a spring/iron mass vibrator. In the event of a power supply failure the solenoid will be de-energised to allow the warning flag to appear. The encoder output will revert to the fail safe ALL ZEROS condition.

SERVICING

16. The only routine servicing to be applied to the instrument is an examination for damage and corrosion. If serviceability of the altimeter is suspect, it is to be tested as detailed in Chapter 2 (R.N.) or Chapter 2-1 (R.A.F.) as appropriate. Servicing, where appropriate, is covered in Chapter 3, Servicing Instructions.

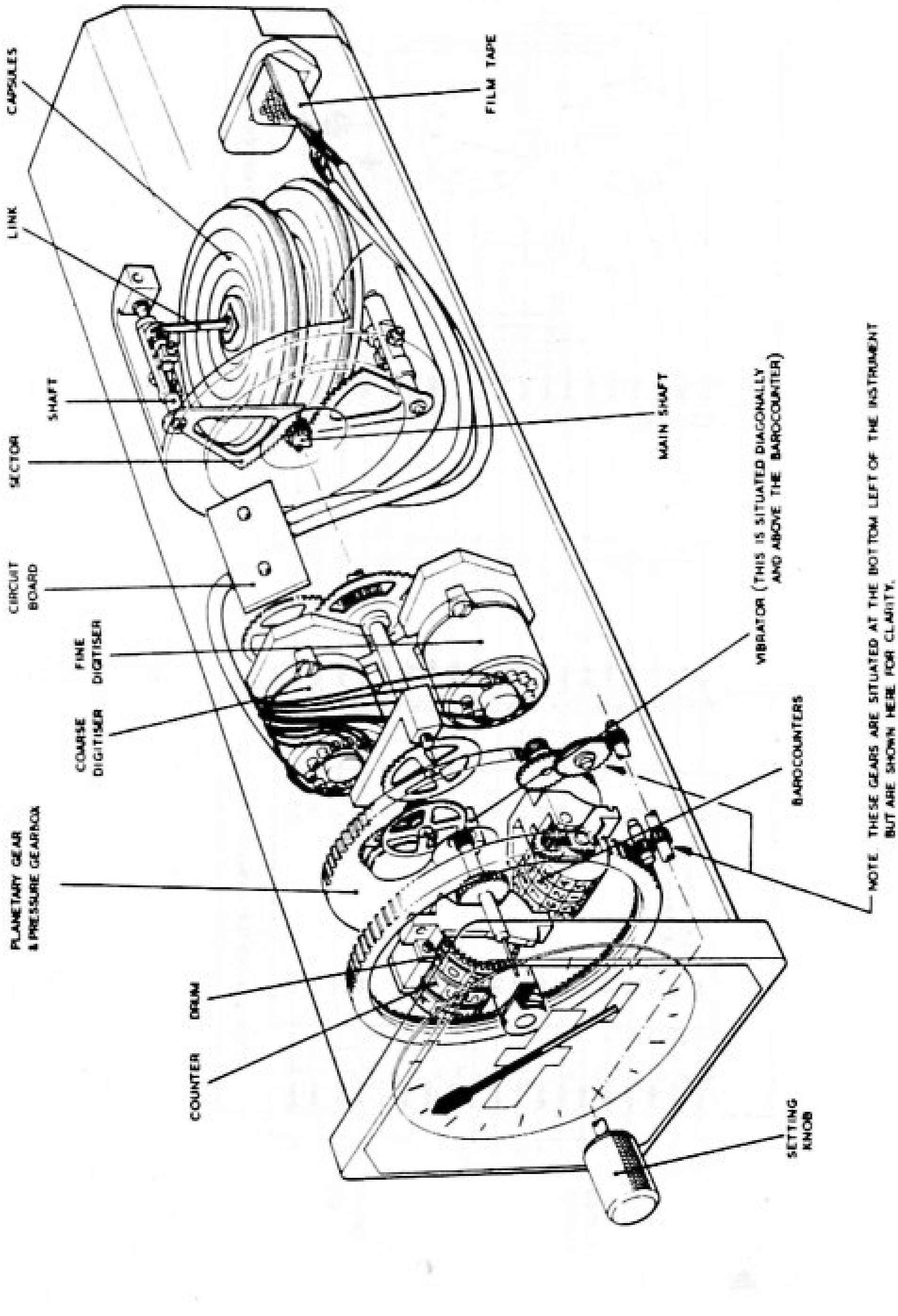

Fig.2 Altimeter, Internal View

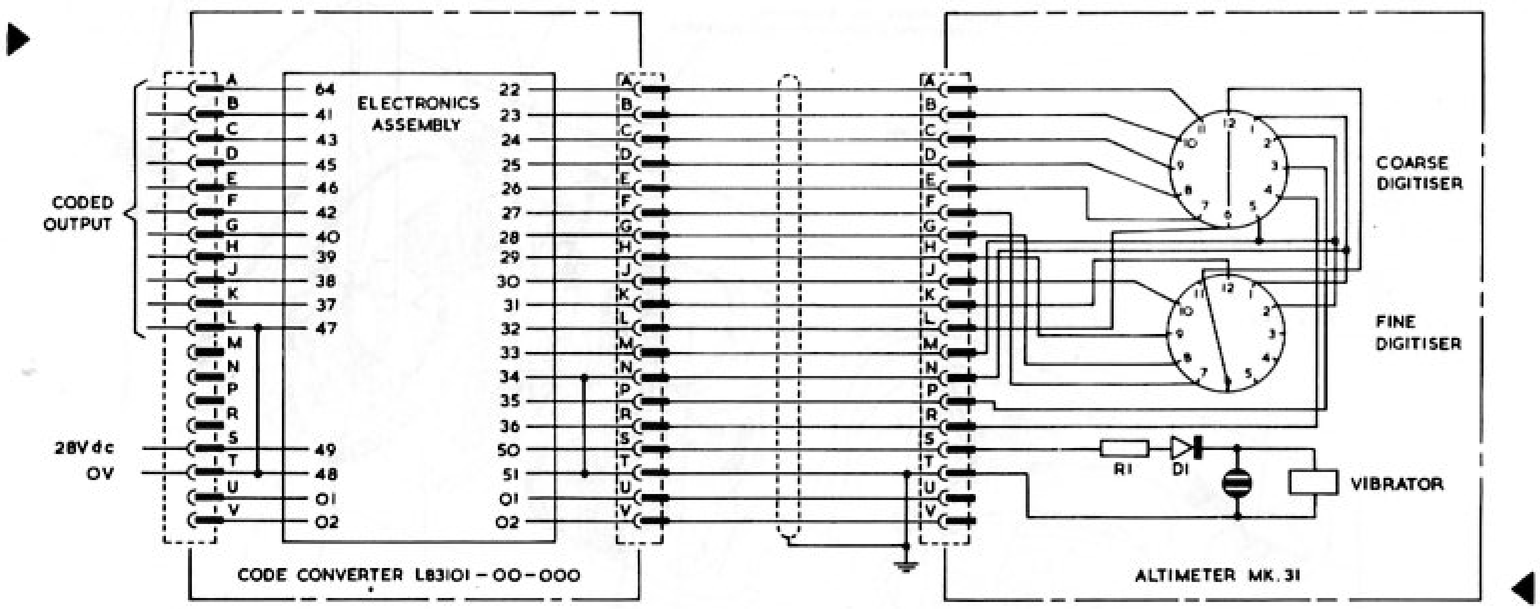

Fig.3 Circuit Diagram of Altimeter & Code Converter Pre Mod. 1

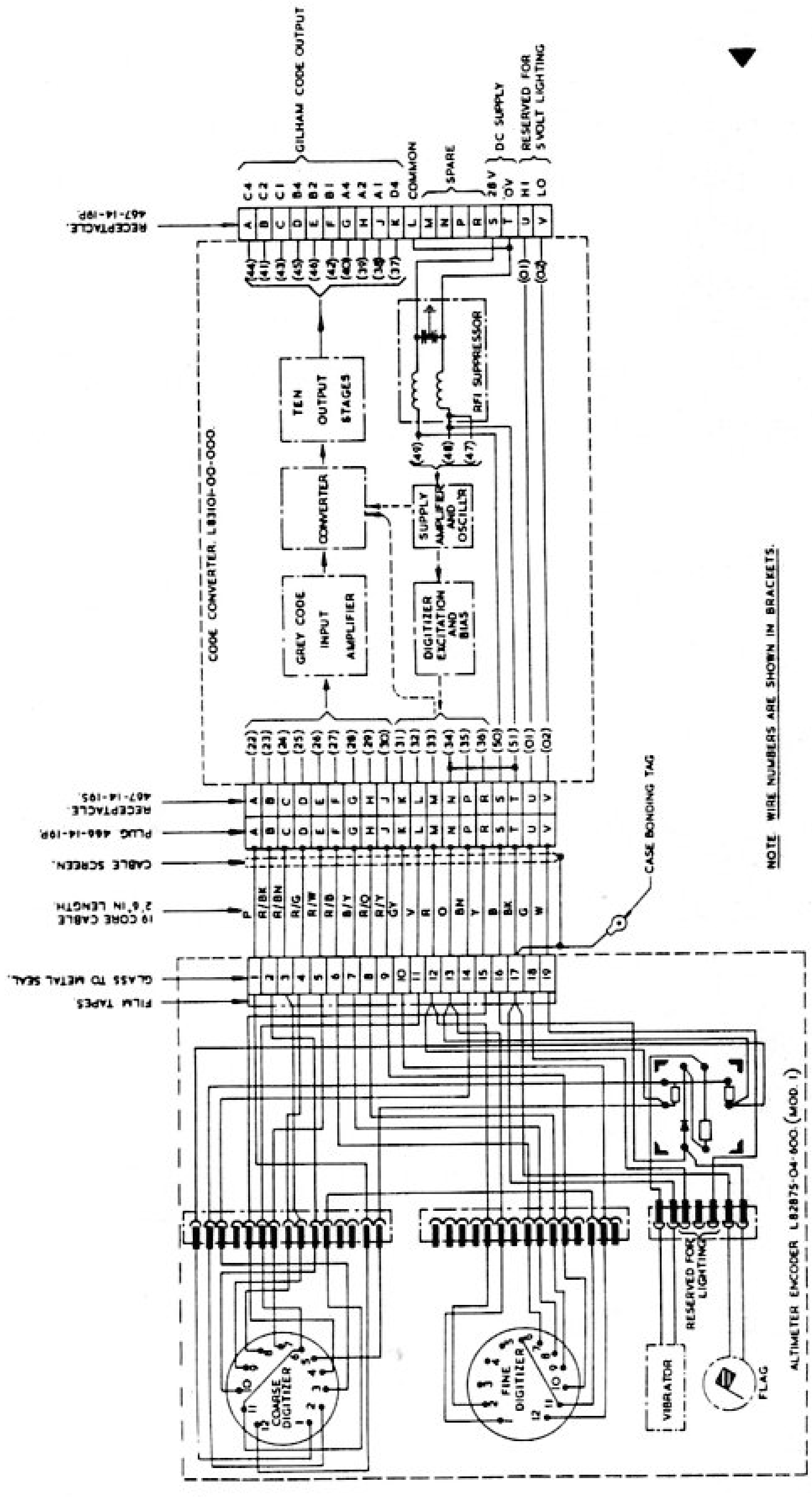

Fig.4 Circuit Diagram of Altimeter & Code Converter Post Mod. 1

Chapter 1-1

CODE CONVERTER PART NO. L83101-00-000

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ILLUSTRATIONS

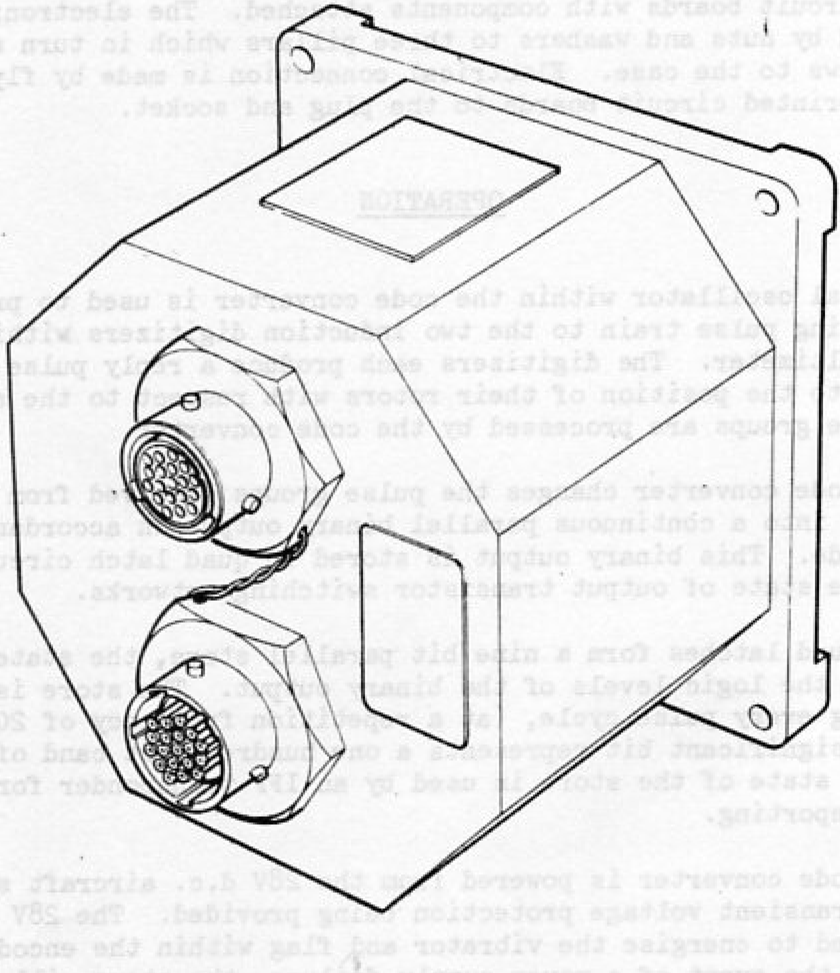

Fig. 1 Code Converter

INTRODUCTION

1. The code converter, Part No.L83101-00-000, (6A/6200064) is used in conjunction with an encoding altimeter to provide a coded height output for use by an IFF transponder for automatic altitude reporting. The code converter changes the induction digitized altitude information received from the altimeter into an I.C.A.O. Gillham code. The code is then in a form acceptable by an IFF transponder.

DESCRIPTION

2. The code converter consists of an electronics assembly mounted within a 3¼in square case. The case has a separate mounting flange with four feet and may be mounted in any attitude using any three feet if one of the four feet is not conveniently accessible. Two electrical connectors are fitted, a 19-pole socket which mates with the output plug from the encoding altimeter, and a 19-pole plug for the code converted output and 28V d.c. input.

3. The case contains an electronics assembly consisting of three circular printed circuit boards with components attached. The electronics assembly is secured by nuts and washers to three pillars which in turn are secured by three screws to the case. Electrical connection is made by flying leads from the printed circuit boards to the plug and socket.

OPERATION

4. A local oscillator within the code converter is used to provide an interrogating pulse train to the two induction digitizers within the encoding altimeter. The digitizers each produce a reply pulse group according to the position of their rotors with respect to the stators. These pulse groups are processed by the code converter.

5. The code converter changes the pulse groups received from the two digitizers into a continuous parallel binary output in accordance with the Gillham code. This binary output is stored in quad latch circuits which control the state of output transistor switching networks.

6. The quad latches form a nine bit parallel store, the state of which represents the logic levels of the binary output. The store is updated once during every pulse cycle, (at a repetition frequency of 20-100 Hz). The least significant bit represents a one hundred foot band of altitude. The binary state of the store is used by an IFF transponder for automatic altitude reporting.

7. The code converter is powered from the 28V d.c. aircraft supply, integral transient voltage protection being provided. The 28V d.c. supply is also used to energise the vibrator and flag within the encoding altimeter. In the event of a power supply failure, the store will revert to a recognised failure pattern of all zeros, the flag within the altimeter will indicate a power failure and the vibrator will also cease working. A circuit diagram of the code converter and encoding altimeter is shown in Chapter 1, figure 3.