

Specification for

Interconnections in analogue data transmission systems in aircraft

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Foreword

This British Standard has been written to provide uniformity of interconnections in control and indicating systems in aircraft using analogue data transmissions. In general, the requirements of the standard are compatible with those of the synchro system manual of Aeronautical Radio Incorporated of America (ARINC), the handbook of the Electronic Engineering Association on a.c. systems for civil aircraft, the Ministry of Aviation publication EL.1790, Notes on manufacture and testing requirements for a.c. synchros, and the Aeronautical Recommended Practice in Synchros (ARP461A) of the Society of Automotive Engineers.

The standard covers the *use* of synchros, potentiometers and other analogue transducers in analogue data transmission systems for aircraft. It does not cover such things as energizing volts, transformation ratios, accuracy, volts per degree, etc, all of which data should be obtained from the relevant specification for the device being used.

The standard requires reference to BS 1523, “*Glossary of terms used in automatic controlling and regulating systems*”, Section 3: “*Kinetic control*”, and Section 5: “*Components of servo-mechanisms*”.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 13 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date of issue	Comments
2281	May 1977	Indicated by a sideline in the margin

This British Standard, having been approved by the Aircraft Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council of the Institution on 31 December 1963

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1 Scope

This British Standard relates to the interconnections in control and indicating systems in aircraft using analogue transmissions.

2 Definitions

For the purposes of this British Standard, the definitions in BS 1523, Sections 3 and 5, and the following apply:

error signal

desired (or command) signal minus actual signal equals error signal

NOTE This definition has not appeared previously in British Standards, but the term “error signal” has been used in this context because of its common usage and of its appearance in the ARINC synchro system manual. It should be noted that it differs from the terms “indication error” in BS 2643, Section 3, Term 311, and “deviation” in BS 152, Section 3, Term 3113.

Section 1. Basic principles

3 Sensing

The basic principle for sensing shall be: positive signal for an increasing function.

4 Error signals

For command signals the error signal shall be the desired (or command) signal less the actual signal. Thus, if the desired signal is greater than the actual signal, the error signal is positive, and vice versa. Hence, an error signal is positive if an increase in output function is required to bring the actual output signal up to the desired signal.

5 Reference voltage (A.C. or D.C.)

- The reference voltage shall be the standard to which other voltages in the system shall be referred in respect of phase and magnitude.
- The reference voltage shall be the voltage between two lines, or a line to neutral, of the power supply to the system.
- The reference voltage shall be stated and should preferably be phase AB.

NOTE 1 This reference voltage should not be confused with the motor fixed field voltage often referred to in text books as the Motor reference voltage.

NOTE 2 Any a.c. data transmission device should receive its excitation from the circuit employing the receiving device.

Section 2. Signal polarities of synchros

6 Synchro types and circuits

- The symbols and functions of synchros in common use are shown in Figure 1.
- Coarse-fine synchros shall be treated as two separate devices.

7 Pin (or terminal) lettering

It is not possible to use for this purpose the letters marked on the synchro terminals because these are associated with a standard direction of rotation which may not obtain in the equipment. The equipment terminals shall be lettered from P to Z (omitting V). This convention is the same as that suggested in the E.E.A. manual. In the ARINC system H is equivalent to P and C to Q.

Table 1 shows the equivalent connections for a synchro at electrical zero which have the same characteristic as a standard synchro zeroed by the method described in the Appendix.

Function	Abbreviations	Alternative symbols	Function	Abbreviations	Alternative symbols
A Torque transmitter Control transmitter Torque receiver	TX, TXB CX, CXB TR, TRB		F Resolver differential or computing 7 terminals	RS	
B Torque differential transmitter Control differential transmitter Torque differential receiver	TDX, CDX, CDXB TDR,		G Resolver control transformer	RS	
C Control transformer	CT, CTB		H Resolver control transmitter	RS	
D Resolver differential or computing 8 terminals	RS		J Feedback resolver	RSF	
E Resolver differential or computing 6 terminals	RS		NOTE Terminals marked "R" refer to the rotor; those marked "S" refer to the stator.		

Figure 1 — Functions and symbols of synchros