Communication between the Control and Display Unit and the Remote Control Panels using Mil Spec 1553B Data Bus

Introduction

The control and display unit (CDU) function as the master control unit that controls and tunes the three navigation system. The CDU has an alpha numeric keypad along with software defined keys that are used to select and interact with the installed navigation systems.

The navigation system installed include the following

1. VHF Nav Radio (VOR, Localizer and Guild Slope)
2. TACAN
3. ADF

The CDU selects the nav system using soft keys and then send out standby frequency tuning data. The frequency data is entered using the numeric key pad. The information is sent out in NMEA 0183 format.

Each nav system has its own remote control panel (RCP) that controls and tuned its respective nav system.

When the CDU tunes, for example the Nav Radio then the CDU send out the tuning commands along with the tune frequency information to the NAV Radio through the RCP. The RCP update its active frequency information so that it matches the active frequency set on the CDU and passes on the tuning commands and frequency information to the Nav Radio. This is also done when a new standby frequency in tuned and when frequencies along with their header are stored in the memory of CDU. In case of stored frequencies the data is not sent to the Nav Radio, only the internal memory of the RCP is updated.

Similarly when an RCP tune its nav system it sends out to the tuning information to the Nav system it is connect to and to the CDU, and the CDU may update its tuning frequency information for that particular Nav system.

Both CDU and RCP are maintained in sync, and have same active, standby and stored frequencies. Along with volume control information and other such setting unique to each Nav system.

CDU Hardware Specs

The CDU is designed around a ST32 MCU; it has 2MB of flash memory, along with four serial ports, one CAN BUS connection and four GPO switches.

The display is a 4.3 inch LCD TFT with a resolution of 480 x 272 pixels. A 55 keys keypad that includes alpha and numeric keys along with special function keys provides user interface. Further there are two keypad located on each side of the display. These software programmable keypads have 4 keys each.

The four GPO switches may be programmed to facilitate any custom requirement, which may include simulating a system fault etc.

RCP Hardware Specs

The RCU is designed around the STM32 MCU and has a 3 inch 128 x 64 graphic LCD. There are 3 soft buttons on each side of the display and 2, twin co-centric encoders with push button. Each encoder is placed on either side of the display under the soft buttons. There are three serial ports for communication.

Mil Spec 1553 B Interface

As discussed above the CDU and RCP communicate with each other. This communication is done through a Mil Spec 1553B connection. The CDU connects to the 1553 Bus Controller (BC) which in turn connects to 3 Remote Terminals (RT). Each remote terminal connects to its RCP.

The RCP in turn connects to its respective nav system. A data format converter is being used in case of ADF and TACAN to convert NMEA 0183 format messages to BK serial format for tuning. The RCP that is connected to the Nav Radio send out tuning commands in NMEA 0183 format.