Display and Mission Computer Software Loading

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Abstract— Hindustan Aeronautics Limited designed and developed Advance Light Helicopter (ALH), is fitted with various Navigational and Avionics systems. In the Glass cockpit setup of ALH, four basic units viz. Cds, DIU, MFD and DMC are coordinated and assume a significant job in helping the flight route. At present the Display and Mission Computer (DMC) programming is stacked by manual association. Additionally the Digital Moving Map is stacked through manual connection as it were. It includes a devoted expert to go through over 4 hours during the activity. This undertaking is planned for making the procedure of programming stacking and Moving guide stacking in the DMC, programmed. This mechanization will bring about maintaining a strategic distance from the nearness of the specialist for doing the activity physically and it likewise decreases the working time. Once, the appropriate programming is stacked and the necessary Digital Moving Map is additionally stacked through this mechanization set-up, the activity of this DMC can be checked just on the off chance that it is interconnected with different modules viz. Cds, DIU and MFD. Henceforth equipment will be created to interconnect all the units for reenacting the Helicopter condition.

Keywords— Display System , DMC, Information interface unit, Control and Display System

I. INTRODUCTION

The Integrated Architecture and Display System (IADS) supplant the regular Cockpit on the helicopter. The principle segments of the coordinated engineering and show framework are show and mission PC (DMC), control and show framework (CDS), multifunction show (MFD) and information interface unit (DIU) [1].

One of the basic units in IADS is the showcase and mission PC (DMC) which gets information from the sensors on the helicopter. The information is gained both in advanced just as simple structure and is shown on the MFD and CDU. There are fouralterations in an ALH helicopter. They are MK I, MK II, MK III and MK IV. MK I has the simple arrangement in the cockpit which doesn’t give precise route and flight subtleties. So we have gone for a superior design by making the entire arrangement of the cockpit computerized. In this manner from MK II onwards it is completely digitized and has the glass cockpit [2].

Further improvement has been finished by including weapons in the MK IV helicopters. Our task can be utilized from MK II, MK III and MKIV. IADS additionally offers yields to different helicopter frameworks in the necessary arrangement [3]. The IADS engineering is repetitive and contains the accompanying Components: Two Display and Mission Computers (DMC) situated in the nose cone, Two Data Interface Units (DIU) have been set in the lodge toward the back Two Control and Display Systems (CDS) situated in the inside support and Four Multi-Function Displays (MFD) situated on the primary instrument board. The IADS square chart for armed force utility setup is given in the accompanying Fig.1.

Fig. 1. IADS square

Push in the accompanying CBs on OH board: DMC1 and DMC2, DIU1 PWR, DIU1 CONT, IADS CONT, DIU2 PWR, DIU2 CONT, CDS1, CDS2, MFD1, MFD2, MFD3 what’s more, MFD4. The framework sets aside some effort for introduction (for finishing the individual test/Built-in Test (BIT)) the framework experiences power on individual test (Built-in-Test - (BIT)) when the DMCs are fueled. The BIT takes around one moment. At whatever point an alert/cautioning are set off the accompanying will happen: Master Warning light will streak [5]. The applicable framework head bunch subtitle is flashed on the ADI showed on the PFD. Relevant cautioning/alert inscription is shown on SYS page in the individual notice window (right window for RH regular frameworks, left window for the LH frameworks on the helicopter).

II. LITERATURE SURVEY

K.Engel in his paper "The Advanced Mission Computer and Display framework for maritime aeronautics" clarifies about...
the new shows which will include business high-goals shading computerized shows adjusted for the military condition. An additional component to this framework was the information transport. This update brings a Fiber Channel organize running on fiber-optic media to the F/A-18E/F. another significant element was making of a strategic that could be dealt with in a product situation which diminishes the expense of upkeep for the product.

Y. Zhuangyuan and W. Jiayun, in their paper, "Exploration and execution of show framework in an aeronautics coordinated reproduction framework," talk about the structure and acknowledgment of the showcase framework in a flying incorporated recreation framework. There are likely not very many contrasts between a coordinated showcase framework and different subsystems in flying. On profound examination we could discover that the flight data must be shown in incorporated presentation framework.

B. Sutterfield, J. A. Hoschette and P. Anton, introduced a paper, "Future coordinated particular flight for fly contender strategic," clarifies the requirement for exceptionally adaptable and flexible registering structures to meet the ever-changing plane warrior airplane crucial with practical processors. Thick multiplexing transports (optical innovation) are required for interconnecting multi-center secluded processors. Staggered security will be required to give shields to guarantee the uprightness of the system. Frameworks must have a structure that supports open principles yet at the same time permits ultra high thickness bundling. Backplanes comprise of mix of electrical and optical signs, and the development in secluded programming improvement and inheritance programming reuse is important to augment the effectiveness for building another equipment. All advancements existing today can be joined to give a quantum increment in preparing capacity. It at that point turns out to be profoundly solid with reasonable expenses.

R. Rancher, "The crucial/electronic presentation subsystem for the C-17A flight suite," clarifies the cockpit show and strategic elements of the C-17A which is given the crucial/hardware show subsystem (MC/EDS).

The MC/EDS comprises of 15 individual parts. There are four multifunction show (MFD) units introduced in the essential cockpit instrument show territory. The middle support contains two multifunction show controllers (MFC), two strategic/consoles (MCKs), and four crucial/show (MCD) units. Three Delco Magic V Mission PCs are introduced in the gadgets straight at the back of the cockpit. The gear has been intended to help airplane activity by a flight team of two, and the cockpit reflects mission thinking [6].

J. W. Dickerson, clarifies in the paper "ATE and Avionics Display Systems," that modern aeronautics show frameworks are quickly supplanting the large number of demonstrating board meters and CRT showcases of the past. As the aeronautics show framework is getting refined there without a doubt exists a necessity to improve the testing methods for the presentation. This paper tends to the sorts of frameworks to be tried notwithstanding over a significant time span testing techniques.

G. Sinaki, in the paper "C-17A crucial interior implicit test and I-level flaw logging," depicts the C-17A strategic (MC) inside inherent test (BIT) and middle level (I-Level) issue logging procedures. The MC/EDS is proposed to give flight the board capacities to the C-17A airplane notwithstanding show handling and show of strategic, motor, airplane status and other related data to the flight group. The mission PC has been structured with the goal that it is exceptionally solid. The subsystem utilizes triple measured excess and casting a ballot procedures which distinguishes the disappointment and detaches the unit with line replaceable unit (LRU) [7]. The issue recognition circuits in the MC recognize the deficiencies simultaneously with the ordinary activity and report them to the MC CPU. The individual test program contains independently executing programming/firmware modules. A serious extent of issue recognition inclusion is accomplished by joining these modules with the BIT equipment [8].

III. HARDWARE IMPLEMENTATION

Before A DMC is a multi-job, continuous airborne focal preparing unit for aeronautics applications. It gives the center to flight the executives, strategic and show capacities. The DMC framework is an exceptionally coordinated framework giving elite and multi I/O - computerized, simple, and video interfaces incorporated in a solitary nook. It is planned as a solitary processor framework dependent on Aitech's C106 SBC. All framework assets are planned to this processor and are peripherals to it. Two DMC frameworks are introduced in an airplane, each playing out its appointed capacities, and each is equipped for playing out the elements of the other if there should be an occurrence of breakdown (repetition).

A. USB Port Description

The DMC incorporates a USB port; ISP1561 model of the USB PCI Host Controller produced by Philips that utilizes the USB availability of the DMC framework. The USB PCI Controller coordinates in it four USB downstream ports, two of which are utilized in the SBC. The two ports give USB particular help and in reverse similarity with USB 1.1. The USB controller incorporates three separate free controllers: two Open Host Controller Interface (OHCI) controllers and one Enhanced Host Controller Interface (EHCI). Each downstream port can be directed to one of the OHCI centers or to the EHCI center.

The USB controller coordinates in it a DMA motor and FIFO cradles to help high information move between the controller and framework memory over the PCI transport. The USB PCI Host Controller is situated on the SBC neighborhood PCI transport and planned into PCI framework 1memory space through programming. The USB PCI Host Controller has a solitary intrude on line (INTA#) directed to the SBC optional interfere with controller. MIL BUS 1553:

The DMC incorporates a double MIL-STD-1553B office. MIL-STD-1553B is executed by a segment of PCI Micro ACE MIL-STD-1553B controller (model BU-65864B3) produced by Data Device Corporation (DDC). The PCI Micro ACE utilizes the MIL-STD-1553B interface of the DMC framework. Two of these interfaces are accessible in the framework; each incorporates its own devoted controller.

B. RS-232/422/485

The DMC system provides ten serial correspondence ports. Nine of the ports are standard UART ports (supporting the RS-232/422/485 interface) and one is a non-standard aeronautics RS-232 UART which is situated in
the IOM. All standard UART controllers are situated on the SBC and partitioned between two sequential correspondence controllers.

Two ports are utilized through the Multi-Protocol Serial Controller (MPSC) incorporated in the Discovery™ framework controller. Seven of the rest of the ports are utilized through the Enhanced Serial Communication Controller (ESCC), model SAF82538 fabricated by Siemens. The non-standard flying RS-232 (inside the IOM load up) is changed over into a standard RS-232 physical layer and drives it to the SBC.

C. Multifunction Display

The Multi-Function Display is the fundamental terminal presentation arrangement of the helicopter's flight and route PC. Every helicopter incorporates four 10.4” MFD units through which the administrator can show flight information on programming pointers, route information on computerized map, continuous video and some other application characterized by the focal PC. The MFD gives setting and update of information and interfacing with two Mission and show processors.

DMC by means of RS-485 full duplex sequential connections. The MFD gets computerized video signals from DMC and presentations it as indicated by the PC's prerequisites on the LCD screen. The MFD can manage different kinds of video organizations and correspondence conventions just as review characters on screen show and video preparing capacities. The MFD has two arrangements; scene establishment and picture establishment, both in the size of 8x6 inches. The administrator can control the brilliance of the LCD screen just as changing from ON to Stand-By and the other way around by working OSS on bezel.

The pixels inside the fluid are organized from upper left to bring down right in a network of lines and segments. Every intersection of the grid incorporates a Thin Film Transistor (TFT) empowering dynamic and quick brightening modification of the pixels. The pixels and sub pixels are taken care of by drivers from auxiliary ORG card in CDS (and not part of the LCD framework like in MFD).

The drivers work like move enrolls that get and store sequential information and constrained by a pixel clock. Every pixel is made out of three hued sub pixels (red, green and blue; RGB). So as to show the image, it is important to enlighten a white light behind the glass, while opening and shutting the subpixels acquires a sharp and hued picture.

The luminesce transmission is low and requires a solid enlightenment source at the back (backdrop illumination). This brightening source is multiple times higher than the required luminesce level at the showcase's front.

D. LCD Description

The LCD is a high caliber, completely daylight decipherable showcase. The LCD module gives among different highlights, Anti-Reflective (A/R) covering covered on the front presentation surface and ecologically toughness. The ostensible showcase region of the LCD is 3 creeps by 4 (5 inches corner to corner) crawls with picture goals of 234 x 320 RGB pixels and 64 levels for every shading. The pixels in the LCD orchestrated in a grid of lines and segments. Every intersection of the lattice empowers light change of the pixels, adjustment of the pixels.

IV. SOFTWARE IMPLEMENTAION

The following are the steps that has to be followed for loading the software onto DMM in the existing method:

1. Connect 28V DC power supply to the DMC J1 connector.
2. Connect the software loading kit to the DMC J5 connector.
3. Connect the Ethernet cable of DMM to the laptop Ethernet port and the RS232 cable of DMM to laptop RS232 port. Open ProComm Plus terminal in the dedicated laptop. Select PRESET button on the software loading kit. Select FLOAD in the terminal. Choose the input device as Ethernet. Enter the IP address of DMM. Enter the net mask as 255.255.255.0. Enter the TFTP server address as on TFTP server. Enter the file name. Enter the directory name. Save the network configuration. Configure the path in the TFTP server. Quit and save Load files to flash. Save. Wait for the software to get loaded. Check the checksum for the software loaded.

The steps has to be followed for loading the map in the existing method is given as follows. Connect 28V DC power supply to the DMC J1 connector. Connect the software loading kit to the DMC J5 connector. Connect the Ethernet cable of DMM to the laptop Ethernet port and RS232 cable of DMM to laptop RS232 port. Open ProComm Plus terminal in the dedicated laptop. Select PRESET button on the software loading kit. Select MSL LOADER in the terminal. Format the existing data in the flash memory by giving the command “format full”. Load the files path.dat and heli_128.raw in the flash. Create a new directory for the current map to get loaded by using the command “mkdir army/airforce/ navy". Link the file that has the script for loading the particular map to the terminal. Load the dttlist.txt file to the code. Wait till the map gets loaded. Once the map gets loaded the DMC is integrated with the test bench to check for the proper working.

V. DRAWBACK OF THE EXISTING METHOD

In the current strategy a devoted professional is required to sit alongside the framework to stack the product and guide. This isn't exact as there are such huge numbers of order to run the documents. There can generally be batches while entering the orders the three may be disarray in the arrangement of steps that must be entered. So our undertaking will decrease or simply expel all the mistakes caused because of human carelessness and cooperation. For programming to get stacked it takes around 7-8 hours. So via robotizing it can decrease the opportunity to 60 minutes.

DMC is a profoundly flawed unit. Many number of LRU's continue wanting fix from time to time. So it gets wild for the professional to fix the DMC's. As we have decreased the working time in our undertaking the professional would now be able to check and fix many number of DMC's.

VI. CONCLUSION

The test pack is equipped for transferring programming and it is compact which is straightforwardly utilized in helicopter. This test pack can be conveyed to Bases i.e., army installation, maritime base And so forth. There is no need of expulsion and
transportation of DMC from helicopter by which it lessens cost and men power. It likewise diminishes harm happening to the DMC during transportation.

REFERENCES