

HARM PART TASK TRAINER

1.0 BACKGROUND

The F-18 Part Task Trainer (PTT) was developed by MCA Engineers, Inc. for the Naval Warfare Center, China Lake as an interactive training tool to train pilots in the detailed launch procedures for the HARM Weapon System.

The major components of the PTT include a set of database files that contain configuration data on the aircraft and weapon system, and an active cockpit that is distributed to the pilot.

A database contains specific data on the aircraft, pylons, HARM weapon configurations and the relationship of these systems. Variable files are included for each CLC, ELINT and RWR version used by the Operational Flight Program (OFP) software.

Initialization procedures permit the user to select an operating configuration from the options available in the PTT.

Options include aircraft configuration, OFP, CLC and RWR versions and weapon load-out requirements. This data is used to configure PTT and initialize the system. Once the selections are made, the appropriate OPF version is selected and the cockpit is displayed.

Cockpit displays are provided for OFP versions such as 91C, 92A, 09C, and 11C. All control panels and switches that are needed to launch HARM are activated, using a pointing device such as a mouse, trackball or touch-screen.

The PTT is composed of the four major components shown in Figure 1. These include

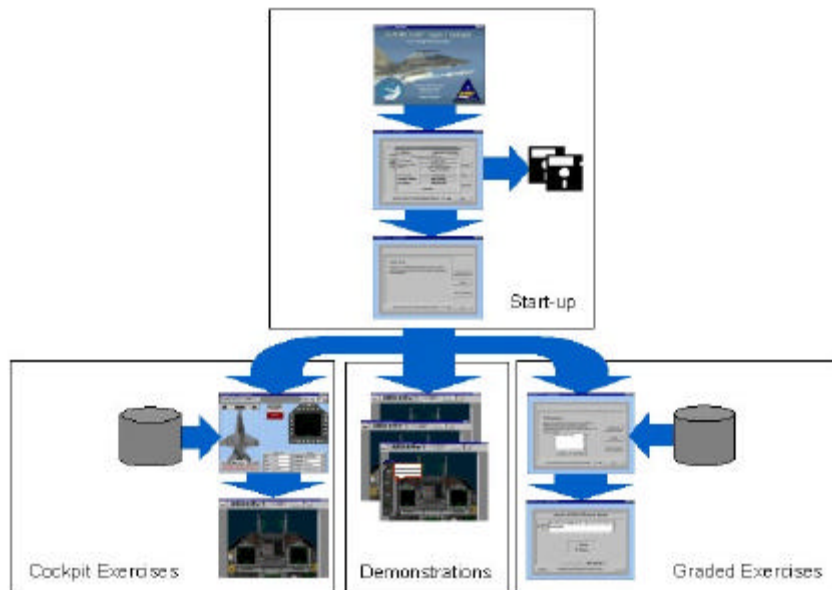


Figure 1 - Major Components of the PTT

Start-up, Cockpit Exercise, Demonstrations, and Graded Exercises. These components are discussed in the following sections.

2.0 PTT START-UP

The PTT Start-up programs, (Figure 2) display an initial “Splash” screen and perform two primary functions.

On initial use of the PTT a registration screen is displayed. During this registration process, the user inserts a 3.5-inch floppy disk and records information such as name squadron and mailing address on to the disk.

The data recorded on the disk is used to establish configuration management and software version control, so that updates of the software can be distributed.

After registration, the PTT presents an option screen showing the three functions available to the user. These include Demonstrations, Cockpit Exercises and Graded Exercises. Figure 3 shows the Opening Menu screen presented to the user.

2.1 PTT DEMONSTRATION MODE

The purpose of the Demonstrations are to provide the user with detailed instructions on major tasks that must be performed by the aircrew to ensure that a successful launch occurs. Typical demonstrations included in the PTT for HARM on the F-18 include the following:

- How to use the PTT
- Built in Test
- Self-Protect (SP) Mode
- Target of Opportunity (TOO) Mode
- Pre-Brief (PB) Mode
- Equation of Motion (EOM) Mode
- Manual File Modification

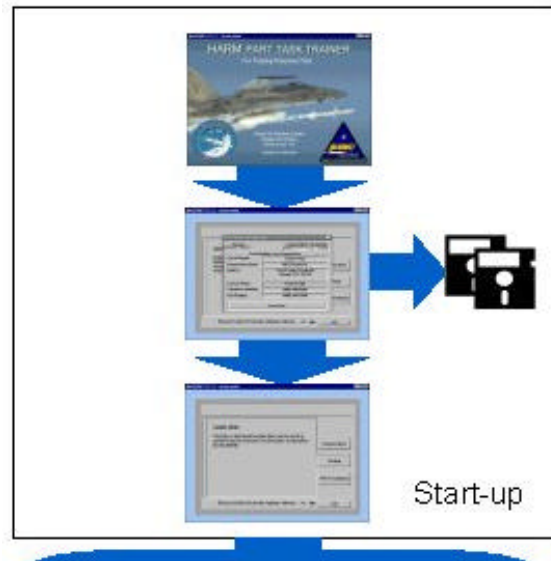


Figure 2 – Start-up Programs

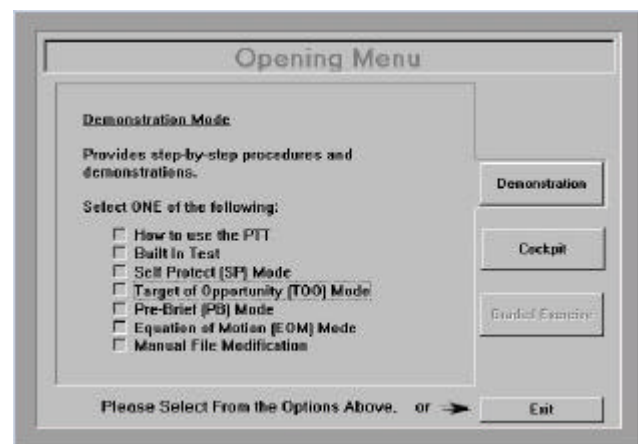


Figure 3- PTT Options

In a typical demonstration the user is guided through all of the steps required to perform a task required to either prepare or launch the HARM weapon. A dialog box permits the user to review the demonstration in one of two modes, either automatic or manual mode. In the automatic mode, the demonstration steps the user through the process without user intervention. In the manual mode, the demonstration pauses after each step and waits for the user to perform the required operation before proceeding to the next step in the procedure.

2.2 PTT COCKPIT MODE

After the user goes through the demonstrations and is familiar with the HARM launch process, the PTT cockpit mode is used.

The PTT cockpit mode is started by selecting the cockpit mode from the from the PTT Opening Menu shown in Figure 4.

Figure 5 presents an overview of the how the cockpit mode functions.

In order to access the cockpit mode, the PTT must be configured. During this configuration process, a database is accessed that contains the following types of information for HARM:

Avionics Software

- OFP Version
- CLC Version
- ELINT Version
- RWR Version

Missile Configuration

- Model
- Block Number
- NALC
- Part Number

Based upon the configuration selections (Figure 6) made by the user, the PTT the database is searched. Any conflicts that exist between the equipment and software configurations are flagged and a warning message is displayed.

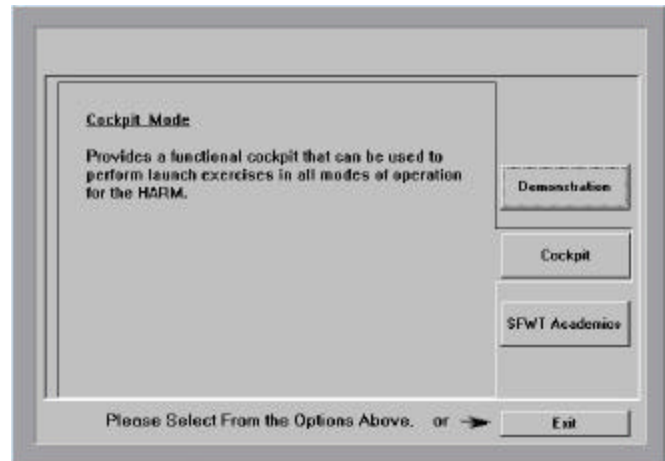


Figure 4 – Cockpit Mode Selection

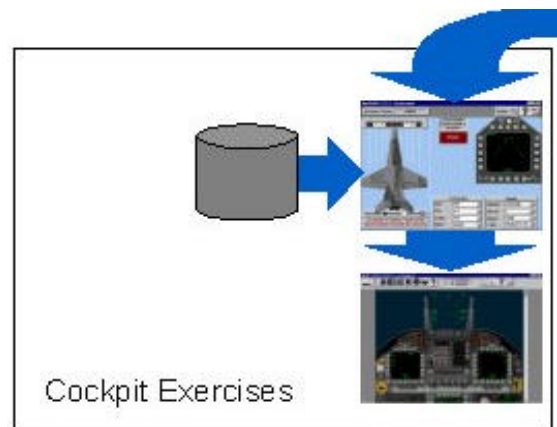


Figure 5 - PTT Exercise Mode

CLC/ELINT		Missile	
OFP	09C	Model	AGM-88B
CLC	4.2	Block	3
ELINT	402	NALC	PV08
RWR	w520	P/N	704AS113-30

Figure 6 – Configuration Selections

The final action that is required to configure the PTT is to assign missiles to the available aircraft stations. This is accomplished by selecting a station(s) from those available in the aircraft. Stations 2,3, 7 and 8 are currently available for use with HARM on the F-18. Figure 7 illustrates how a load-out of two Block

4 missiles, installed on stations 2 and 8 will appear on the configuration screen.

Once all configuration selections are made and HARM weapons are assigned to the stations, the user clicks on the Red Start Button to begin a cockpit exercise.

2.3 COCKPIT VIEW

The cockpit view of the PTT is fully operational. All switches and controls including the two MDI, MPCD, HUD, Arming Panel, Up Front Control Panel, RWR, Throttle, and Stick are active.

All the MDI navigation and launch switchology emulates the OPF version selected from the configuration screen prior to pressing the start button. Figure 8 shows a typical view of the F-18 cockpit.

The user exercises the PTT by performing all tasks required to successfully launch a HARM weapon, based upon the actions shown in the Demonstrations. (See to Paragraph 1.2 above).

To facilitate PTT use, large pop-up views of the instrumentation are provided. The large views are accessed, by selecting the required view(s) from the icon toolbar shown above the cockpit. Figure 9 presents a segment of the toolbar showing the Icons for the:

- HUD
- Arming Panel
- Left MDI
- Up-front Control Panel
- Right MDI
- MPD
- Radar Warning Receiver
- Throttle and Stick

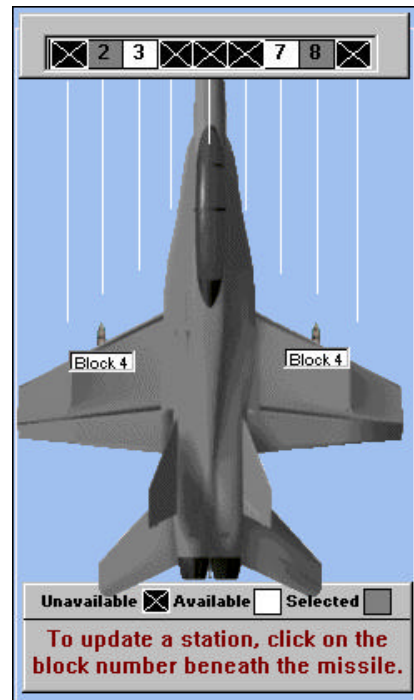


Figure 7 – Station Load-out



Figure 8 – Typical Cockpit View



Figure 9 - Pop-up Icon Toolbar

The navigation buttons to the right of the toolbar, Figure 10, permits the user to reset the load-out, return to the PTT configuration setup screen, access PTT help or exit the PTT.

2.4 PTT HELP FUNCTIONS

The PTT contains two On-line Help functions that can be accessed by the user while in the cockpit mode of operation. These help functions are discussed below.

2.4.1 PTT Help

The PTT contains a comprehensive help function describing how to the PPT. Figure 11, shows a typical PTT Help screen. Clicking on the large question mark Icon in the PTT Icon Toolbar accesses PTT Help.

2.4.2 MDI Help

In addition to the PTT help, a comprehensive MDI help is also provided.

The MDI help function is accessed, by clicking on the small “Red” question-mark icon shown in the upper left corner of the MDI popup window. A typical MDI pop-up window is shown in Figure 12.

The MDI help (See Figure 13) provides detailed information on the functionality of each push tile displayed on the MDI and the associated mnemonic.

3.0 GRADED EXERCISES

Integrated into the final component of the PTT, the Graded Exercises, is a comprehensive Course Management System (CMS).

The CMS provides instructors at the Strike Fighter Training Schools with the ability to create and manage a complete, multi-level training curriculum that can be tailored to the school’s individual requirements.



Figure 10 – PTT Navigation Icons

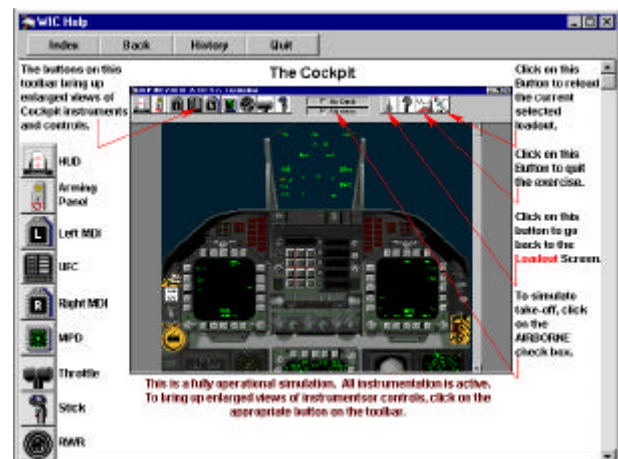


Figure 11 – Typical PTT Help Screen



Figure 12 – MDI Pop-up Window

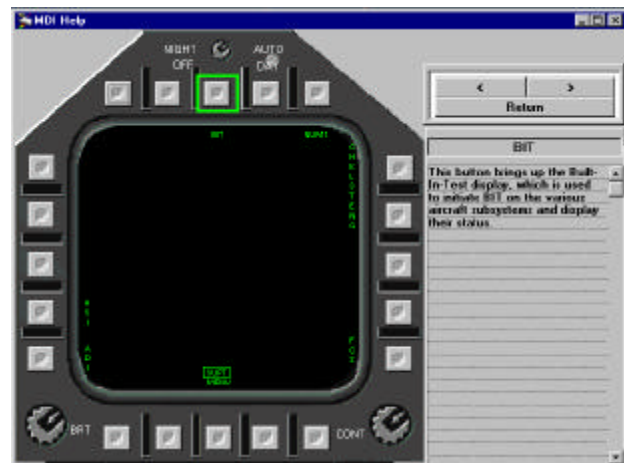


Figure 13 – Typical MDI Help Screen

As shown in Figure 14, the heart of CMS is a relational database that keeps track of the following information:

- Student Identification Data
- Student Progress
- Course Curriculum by Proficiency Level
- Test Database

The test database can be developed and maintained by individual weapon system so that it is easily expanded for other uses beyond just Harm.

Figure 15 presents a typical student progress screen. Progress is color coded to identify which tasks have been successfully completed. It also indicates what additional tasks must be accomplished in order to obtain the required level of proficiency.

To use the CMS, the student selects a task from the scrolling list of topics. The CMS brings up a randomized series of questions from the test database. The questions are presented to the student in the format shown in Figure 16.

Based upon student response, the test is graded as pass or fail and logged as progress in the student database.

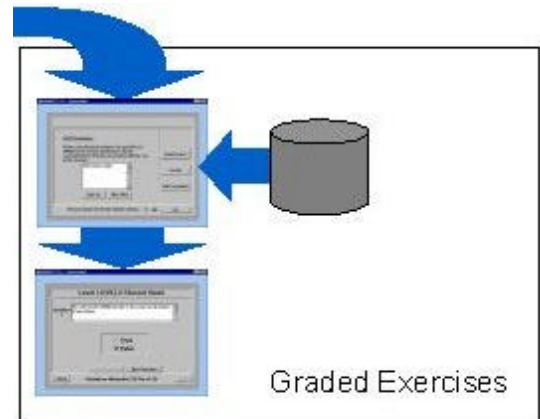


Figure 14 – Graded Exercises

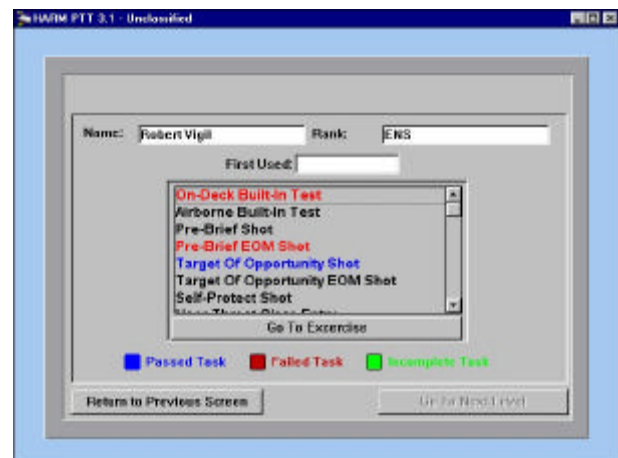


Figure 15 – Student Progress Screen

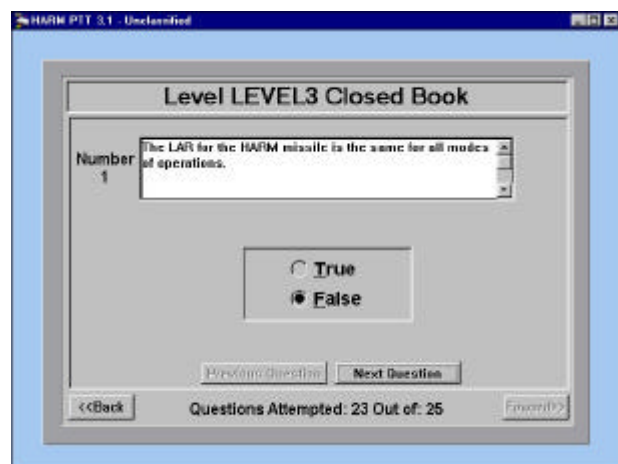


Figure 16 – Typical Student Test Screen