



**Serial Number Tracking
AIT Demonstration
User Manual**

**February 2000
DRAFT**

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Terms and Abbreviations

AIDC	- Automatic Identification and Data Collection
BUNO	- Bureau Number
ButtonReader	- a portable and programmable contact memory button read/write device
CAGE	- Commercial and Government Entity
CMB	- Contact Memory Button
Contact Memory	- a type of automatic identification and data collection system consisting of storage devices that are read by touching with programmable readers
Contact Memory Button	- the storage device employed within a contact memory system
FlexLink	- a ButtonReader extension that allows access to CMB in tight locations
FOD	- Foreign Object Damage
KB	- Kilobyte
MB	- Megabyte
NALCOMIS	- Naval Aviation Logistics Command Management Information System
NAWC-ADPR	- Naval Air Warfare Center - Aircraft Division Patuxent River
OOMA	- Optimized Organizational Maintenance Application
PC	- Personal Computer
SRC	- Scheduled Removal Component

Chapter 1

Introduction

1.1. System Overview

Intermediate and organizational maintenance activities identify and manage aircraft maintenance components using Commercial and Government Entity (CAGE) codes, part numbers, and serial numbers. This identification data is used with Maintenance Work Orders (MWO), Aeronautical Time Cycle Records, requisition transactions, and aircraft inventory reports. The Serial Number Tracking Automatic Identification Technology (AIT) Demonstration (referred to throughout this manual as the SYSTEM) augments the current manual methods of collecting and reporting this data. This assistance comes from using barcode and Contact Memory Button (CMB) Automatic Identification Data Collection (AIDC).

In this application, CMBs or barcode labels are attached to designated aircraft components. They facilitate automatic collection of material management data. Specifically, these devices store, electronically or in print, asset identification data, such as CAGE, part number, and serial number.

Aircraft maintenance activities will have the capability to identify assets using portable Contact Memory Read/Write devices, called ButtonLaser, to touch the CMBs or scan the labels and:

- Immediately view asset identification data
- Collect asset identification data to complete Maintenance Work Orders (MWO)
- Collect asset identification data for uses such as aircraft inventories
- Collect asset removal/replacement transactions

Inventory control points identify assets using the same portable Contact Memory Read/Write ButtonLasers to touch CMBs or scan the labels to obtain:

- Immediately view asset identification data
- Collect asset identification data for use with warehouse inventories
- Collect asset transfer/receipt records and transactions

The SYSTEM design supports Naval Aviation Maintenance activities. The SYSTEM has three primary objectives, each of which has a major impact on the mission capability and effectiveness of all levels of maintenance . These objectives are:

- Reduction of man-hours expended for data collection and maintaining required forms
- Improved accuracy of collected data
- Increased confidence of up-line reports

Meeting these objectives translate into:

- Improved mission capability
- Improved maintenance and supply support
- Improved up-line reporting of maintenance data
- Improved management reporting and analysis tools

1.2 System Description

The SYSTEM is an automatic identification and automatic data collection tool. It provides aviation maintenance and material personnel with the means to electronically record accurate component identification data just by the touch of a CMB or scan of a label. The SYSTEM design facilitates the data entry requirements of standardized maintenance information systems, and provides immediate access to a component's identification data. Once tagged, a component's data can be electronically retrieved and transferred to standard information systems such as Optimized NALCOMIS OOMA. Custom interfaces may be created easily. Updated identification data is written back to a component's tag, allowing the latest information to be available wherever the component is found. This process eliminates or significantly reduces most keyboard entry actions.

1.3 Application Summary

The SYSTEM uses Contact Memory Buttons (CMB) or barcode labels to tag components and store their identification data. ButtonLasers, the portable CMB reader/writers/scanners, are the interface mechanism to read, write and update the CMB, or scan the barcode labels, and transport data between the CMB or barcode labels, and the primary information system NALCOMIS OOMA.

The ButtonLaser software provides the functions to read identification data for input as identification, inventory, and remove/replace transactions.

1.4 Project References

Program management responsibility for the SYSTEM exists with Naval Air Warfare Center Aircraft Division NAWCAD ILS 3.6 Patuxent River, MD. If technical support is required during initial prototype demonstration concerning the following:

- The ButtonLaser and its attachments
- The PT400 Portable Barcode Printer
- Interfacing the ButtonLaser with Optimized NALCOMIS OOMA
- Use and handling of barcode stock or CMBs
- Marking of components

Contact NAWCAD Patuxent River, MD for assistance between the hours of 0700 – 1700 EDT. Points of Contact are as follows:

- Ms. Janet Shaw, Comm: (301) 757-0976 DSN: 757-0976
- Mr. David Bruns, Comm: (301) 757-1031 DSN: 757-1031
- CWO2 Larry Eminger, Comm: (301) 757-0733 DSN: 757-0733
- AEC Bill Jacoby, Comm: (301) 757-0973 DSN: 757-0973

Program management and technical support for NALCOMIS OOMA is with Space and Warfare Command (SPAWAR) Systems Center Chesapeake, VA . Point of Contact is:

- Mr. Jeff Devine, Comm: (757) 523-8146 or DSN: 565-8146.

Program management and technical support for Serial Number Tracking (SNT) Automated Information System (AIS) is with Naval Supply Command (NAVSUP) Code 4B1V. Point of Contact:

- LCDR Bill Hayes. Comm: (717) 605-2254 or DSN: 430-2254.

1.5 Hardware and Software Documentation

Various vendor documents provide information required for setup, power up, operations, and maintenance of the hardware. At installation time, each site receives these vendor documents for the specific hardware. Information pertaining to Commercial Off The Shelf (COTS) software is also in the associated vendor's manual.

1.5.1 Related Documentation

Documents containing information relating to the SYSTEM design and development are:

- DoD-STD-7935A (Department of Defense (DoD) AIS Documentation Standards) dated 31 October 1988.
- SECNAVINST 5233.1B (Department of the Navy (DoN) ADS AIS Documentation Standards) dated 25 January 1979.
- OPNAVINST 4790.2 series (Naval Aviation Maintenance Program (NAMP)).
- NALCOMIS OOMA End User Manual, dated 1 February 1996.
- MacSema Wand Reference Guide
- Zebra PT400 Printer User's Guide
- Serial Number Tracking AIT Demonstration User Manual (Draft) dated September 1999

1.5.2 NAWC-AD, ILS Documentation

Documents containing information relating to the SYSTEM planning and testing are:

- Contact Memory Test Plan, NAWC-AD, ILS 3.2 report, dated 1 November 1997.
- Contact Memory Test Results, NAWC-AD, ILS 3.2 report, dated 1 February 1998.
- Serial Number Tracking AIT Demonstration Test Plan, NAWCAD, dated September 1999
- Serial Number Tracking AIT Demonstration Test Report, NAWCAD, dated September 1999

1.6 Performance Requirements

The SYSTEM provides the following performance requirements:

- CMB will store up to 1800 bytes of identification data.
- ButtonLasers will provide low-battery warnings when recharging is required. However, batteries should be charged frequently as per 2.2.1.1 Pg. 15 to avoid complete power loss or erratic operation.
- ButtonLasers will interface with approved information systems within Naval Aviation..
- ButtonLasers will store more than 100 maintenance transactions.

1.7 System Configuration

1.8.1 Hardware Requirements

The SYSTEM implementation requires one or more computers with the following minimum characteristics:

- IBM compatible 80386 or better PC
- RS-232 serial port
- 500KB of available hard disk space for communication and utility program storage
- 18KB RAM for communication and utility software operation

1.8.2 Software Requirements

The SYSTEM implementation requires one or more software components of the following characteristics:

- MS-DOS, version 3.0 or greater, or
- MS-Windows 3.x , or
- MS-Windows 95/98, or
- MS-Windows NT 3.x or greater, and
- ButtonLaser program file (BZHS15.HEX)
- ButtonLaser format file (BZHS15.FMT)
- ButtonLaser communication utility (ENGINE.EXE)
- Optimized NALCOMIS OOMA ver 03.01 (mandatory)

Chapter 2 System Use

2.1 Hardware Identification

2.1.1 ButtonLaser

The ButtonLaser scans barcodes from a distance of 2 to 20 inches. It also reads, writes and updates CMBs. The ButtonLaser provides audio and visual cues to aid the user during its operation. Information seen by the user displays on a 4-line pixel graphic screen.

2.1.1.1 Physical Layout

Figure 1 depicts a typical ButtonLaser used by this implementation of the SYSTEM.



Figure 1
ButtonLaser

A typical keypad layout is in Figure 2:

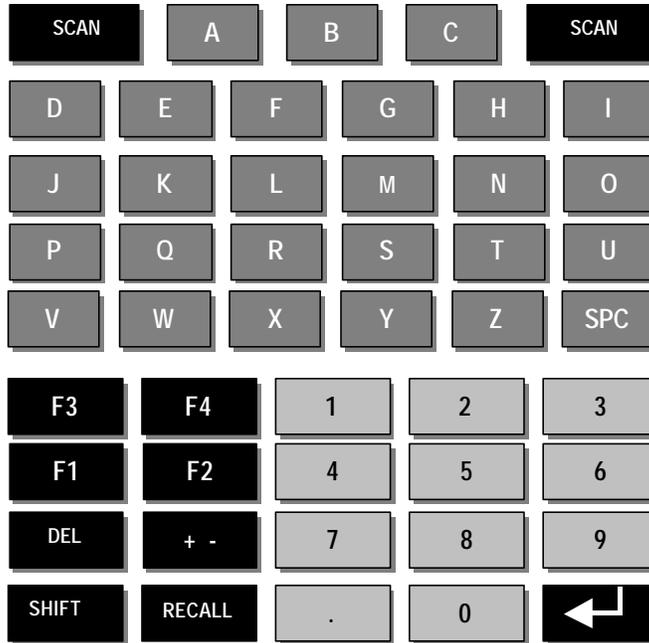


Figure 2
ButtonLaser Keypad

2.2.1.2 Controls

Keypad descriptions for the ButtonLaser are in Table 1. Refer to Figures 1 and 2 for their identification and locations.

KEY	Function Name	Function Description
Scan	Initiates barcode scanning	Turns on a red scanner light, prompting the user to aim the unit at a barcode.
A - Z	Characters as labeled	Generates the marked characters on the display and in the data
SPC	Space	Generates Space character on the display and in the data
F3	Show Previous Field	Show/selects the previous collected data field.
F4	Show Next Record	Show/selects the next collected field.
F1	Show Previous Record	Show/selects the last collected record. Active/used only on "Select Record" Screen.
F2	Show Next Record	Show/selects the next collected record. Active/used only on "Select Record" Screen.
Del	Delete character	Erases the last character in the data field shown on the display
+ / -	Characters	Generates a dash (-) or plus (+) character on the display
Shift	-----	Toggles use of the dash (-) or plus (+) character key
Recall	About	Displays ButtonLaser version info and date/time
0 - 9	Numbers as labeled	Generates marked numbers on the display and in the data
Enter	Action Initiate	Advances the program to the next screen/display

Table 1
ButtonLaser Controls

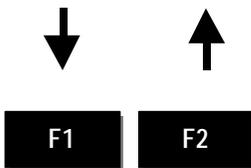


The function keys are the primary means for navigating through the different screens and making appropriate selections. The function keys F3 and F4 are used to TAB through a entire data record from one data field to another.

The order of display views present to you when using the F3/F4 keys are:

Data Control View
 CAGE Field View
 Part Number Field View
 Serial Number Field View
 Work Unit Code Field View
 Position Code Field View
 Dialog View

An explanation of each view occurs later in this chapter.



The function keys F1 and F2 allow the user to scroll through the data records stored in the ButtonLaser. You can only select a different data record while displaying the Data Control View. Using the F1/F2 keys while looking at other views has no effect and performs no other operations

Below and to the left of the display screen, is a status LED. The small light flashes to signal programmed events of the ButtonLaser. For this implementation of the SYSTEM, the following explains the meaning associated with the flashes a user may see:

- *1 Flash* - The ButtonLaser has successfully decoded a barcode, or read from, or written to a button. A single beep tone is also heard.
- *3 Flashes* - The ButtonLaser's memory is full. A download and clearing of the memory's content is required before any additional data may be stored.
- *10 Flashes* - The ButtonLaser has reset to the default monitor program. The unit must be initialized with the SYSTEM program to continue operation. There are no audio tones during this condition.
- *20 Flashes* - The battery charge level is low. Recharge the ButtonLaser to avoid data loss. The unit will also emit "tick" sounds while the LED flashes.

2.1.2 Zebra Printer

The Zebra PT400 is a portable/thermal transfer label printer designed for the barcode industry. The PT400 offers the ability to create a variety of barcode formats based on inputs from an external data source. For this implementation, the external source is the ButtonLaser.

2.1.2.1 Physical Layout

Figure 3 depicts the typical PT400 portable printer used by this implementation of the SYSTEM.



Figure 3
PT400 Printer

2.1.2.2 Controls

Printer control descriptions are in Table 2. Refer to Figure 3 for their locations.

Control	Function Description
Power	Turns the printer on and off
Feed	Advances the label stock by one
Power Indicator	Lights green when power is applied
Error Indicator	Lights amber and flashes during error conditions
Communication Port	Connection point for receiving commands and data from an external source
Recharge Connector	Receptacle for attaching the AC recharging unit when the internal battery requires charging

Table 2
PT400 Controls

2.1.3 Accessories/Cables

The SYSTEM requires several ancillary pieces in order to operate. The following paragraphs briefly describe their role with the SYSTEM.

2.1.3.1 Flexible Finger Tip Button Probe

The Flexible FingerTip Button Probe permits reading and writing to CMBs mounted in tight spaces. Figure 1 shows the Flexible FingerTip Button Probe attached to the bayonet connector located on the right side of a ButtonLaser. There are no controls or indicators on this item.

2.1.3.2 Downloader/Charger

The Downloader/Charger provides two very essential services for the SYSTEM. When connected to a desktop PC, it allows the transfer of programs, data, and operational commands between the PC and ButtonLaser. The other function of the Downloader/Charger is to maintain the ButtonLaser battery voltage level when the ButtonLaser is not in use.

There are indicators available for monitoring tasks performed with the Downloader/Charger:

- Charge LED - Emits either red or green color light depending on battery charge level of ButtonLaser. If the battery charge is below 50 percent, the light turns red and remains red until the charge level reaches 50 percent. Above 50 percent, the LED lights green.
- Incoming Command/Data LED - lights red (flashes) while receiving data and commands from an external source.
- Outgoing Command/Data LED - lights red (flashes) while sending data and commands to an external source.

Figure 4 depicts the Downloader/Charger.



Figure 4
Downloader/Charger

2.1.3.3 Printer Interface Cable

The Printer Interface Cable provides connection to an external source for accepting data and commands needed to generate barcode labels. There are not controls or indicators for the cable.

Figure 5 depicts the Zebra Printer Interface Cable.

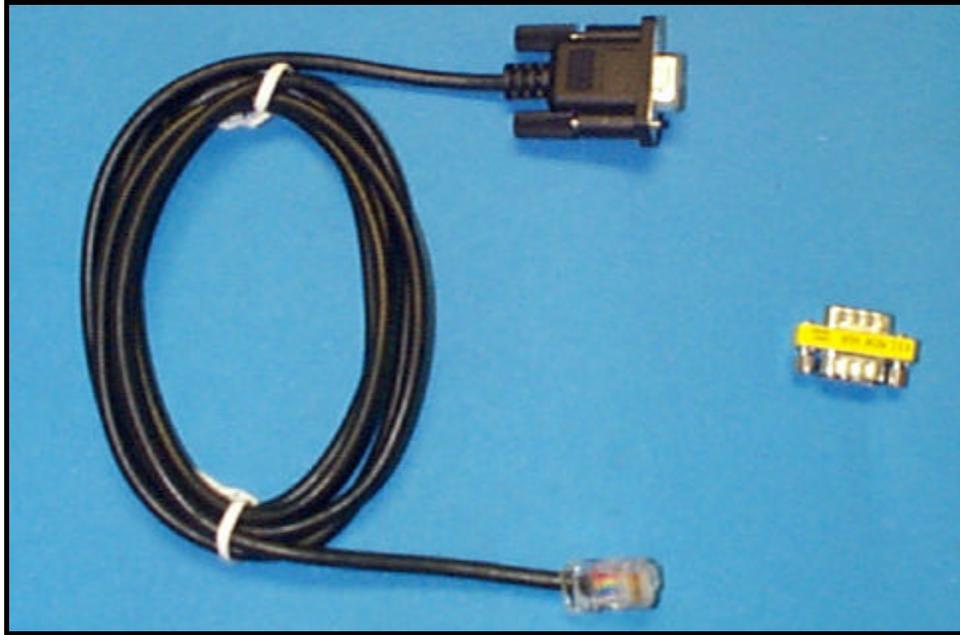


Figure 5
Printer Interface Cable

2.1.3.4 ButtonLaser Interface Cable

The ButtonLaser Interface Cable enables connecting external serial devices to the ButtonLaser. As used in the SYSTEM, the ButtonLaser Interface Cable attaches to the Zebra Printer Interface Cable to complete the data path for printer information contained in the ButtonLaser. There are not controls or indicators for the cable.

Figure 6 depicts the ButtonLaser Interface Cable.

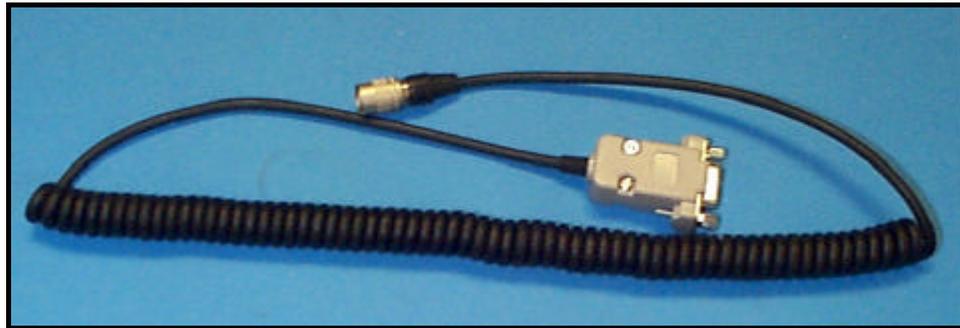


Figure 6
ButtonLaser Interface Cable

2.2 First Time Use

Before using the ButtonLaser or PT400 printer for the first time, steps must be taken to ensure successful operations.

2.2.1 ButtonLaser

2.2.1.1 Battery Charge

When shipped, the ButtonLaser is set in a deep sleep mode with the keypad locked to prevent inadvertent activation and excessive battery drain. Before use, the ButtonLaser keypad must be enabled and the internal battery charged/recharged. Any command issued via the *engine.exe* utility will unlock the keypad. To recharge the internal battery:

- Ensure the download/charge unit is connected to AC power.
- Place the ButtonLaser in the download/charger. The charge status light may be either red or green. Red indicates the battery charge level is less than 50 percent of capacity and green represents a charge level greater than 50 percent.
- After the charge light changes from red to green, recommend the ButtonLaser remain in the download/charge unit for 8 - 10 hours.
- battery maintenance.

More information is available in the MacSema Wand Reference Guide.

2.2.1.2 Software load

From the manufacture, the ButtonLaser contains a standard program for testing the basic functions of the hardware. Steps are required to install the application specific to the SYSTEM. See Software Setup paragraph 2.4 for details.

2.2.2. Zebra Printer

2.2.2.1 Battery Charge

After inserting the battery into it's compartment, the Power and Error LEDs should light for approximately 2 seconds and then go

off indicating a fully charged battery. If the LEDs fail to go on then off, recharge the battery before use:

- Insert the round connector of the battery charger into the receptacle located on the side of the printer.
- Plug the other end of the battery charger into an AC electrical outlet. The battery charging LED next to the battery recharge connector will light amber and remain on until the battery is fully charged. This should take approximately one (1) hour.
- As long as the charger is connected, it will continue to maintain a maintenance charge on the battery.

More information is available in the Zebra PT400 User's Guide.

2.2.2.2 Media load

For this SYSTEM, the media (label material) dispenses from the printer in tear-off mode. From the manufacturer, the printer is set to use the tear off mode. You can detect the tear off mode by observing the media-backing path. Both the label and backing exit the printer from the same opening. Should the printer be set to use the peel off mode, instructions for establishing this mode are in the Zebra PT400 user's Guide.

Next is a general guide for loading label stock in the printer:

- Power off unit.
- Open the front media access panel and lift the top cover.
- Raise the printhead.

CAUTION

The printhead uses heat to generate labels and may be hot. Never touch the print elements on the underside of the printhead assembly.

- Place the media roll in the hangers and thread the media through the print path.

- Close the top cover and lift the access door until it latches close.
- Reapplying power may cause the printer to feed from 3 to 10 blank labels as it realigns and senses the new media.

More information is available in the Zebra PT400 User's Guide.

2.2.2.3 Ribbon Load

The Zebra PT400 is capable of producing labels using direct thermal or thermal transfer modes. For this application, the SYSTEM uses the thermal transfer mode. Thermal transfer operation requires a ribbon for marking the labels.

Next is a general guide for loading the ribbon cartridge in the printer:

- Open the front media access panel and lift the top cover.
- Raise the printhead.

CAUTION

The printhead uses heat to generate labels and may be hot. Never touch the print elements on the underside of the printhead assembly.

- Position the ribbon cartridge so the placement arrows on the crossbar are pointing toward the printer.
- Insert the lower portion of the ribbon cartridge between the raised printhead and the label print roller.
- Rotate the top portion of the ribbon cartridge over the printhead.
- Close the top cover and lift the access door until it latches close.
- Reapplying power may cause the printer to feed from 3 to 10 blank labels as it realigns and senses the new media.

More information is available in the Zebra PT400 User's Guide.

2.3 ButtonLaser Hardware Setup/Connections

There are several components working together for SYSTEM operation. The following steps briefly outline the connections and setup needed to place the SYSTEM in a ready for use condition:

- Connect the power supply to the Download/Charger Unit
- Connect Download/Charger Unit power supply to AC power source
- Connect the serial cable from the Download/Charger Unit to the desktop PC
- Connect either the Flexible Finger Tip Probe or the printer interface cable to the ButtonLaser
- Insert ButtonLaser into the Download/Charger Unit

Equipment operation occurs during the setup procedures. Table 3 below identifies which component is used during each of the setup procedures. An 'X' in a given column indicates the test and equipment verification performed during the procedure.

Procedure	ButtonLaser				Downloader Charger Unit	Power Supply	Print Cable	Serial Cable	Flexible Finger Tip Probe
	Keys	Disp	Comm	Batt					
Load software into ButtonLaser		X	X	X	X	X		X	
Touch a CMB with the Flexible Probe		X		X					X
Touch a CMB with the ButtonLaser		X		X					
Touch each ButtonLaser key	X	X		X					
Scan barcode label	X	X		X					
Print barcode label	X	X	X	X			X		

Table 3
Procedure Cross Reference

Table Notes:

- The ButtonLaser should emit a single beep each time it successfully reads a button and a single beep with each successful scan/decode of a complete barcode.
- The display should be bright at all times, rather than initially dim and then bright after a button is touched.
- The Downloading Station charge light should be green for fully charged batteries. If buttons are touched while the ButtonLaser is in the Downloading Station, the light should turn red and then back to green.
- During software loads, the charge light will turn red, and the communication lights will light red as data transfers take place.

2.3.1 ButtonLaser to Zebra Printer

A standard setup with all connections is shown in Figure 7. It requires using the DIN to nine- (9) pin cable from MacSema and the nine- (9) pin to RJ cable from Zebra. The nine- (9) joint requires using a nine- (9) pin male to nine- (9) pin male adapter.

The DIN connector attaches to the ButtonLaser and the RJ connector mates with the Zebra Printer. The DIN connector uses a sliding retainer ring for lock and unlocking the cable. Attaching the cable requires aligning the key tabs between the connector and receptacle, then gently pushing the connector onto the receptacle until the outer ring locks. Removing the cable involves first sliding the outer lock ring back from the ButtonLaser and then pulling the cable connector away from the receptacle.

The RJ connector makes use of a locking tab for securing the connector to the printer. Removing the RJ connector involves pressing the locking tab down and keeping the tab down as you pull the connector away from the printer receptacle.



Figure 7
ButtonLaser to Printer Connection

2.3.2 ButtonLaser to PC

This requires using a power pack and a nine- (9) pin to RJ12 cable, both from MacSema. The nine- (9) plug attaches to an open communications port on the desktop PC. This may need a nine- (9) pin female to twenty-five (25) pin female adapter (not included with the SYSTEM). The other end of the cable mates with the Download/Charger Unit using the RJ12 connector. To complete the setup, the power pack plugs into the power receptacle on the Download/Charger Unit and an AC wall outlet.

2.3.3 ButtonLaser Flexible Finger Tip Probe

Attaching the Flexible FingerTip Probe involves one step. The DIN plug connects to the ButtonLaser's DIN receptacle. Figure 1 shows the probe mated to a ButtonLaser. The connector uses a sliding retainer ring for lock and unlocking the cable. Attaching the cable requires aligning the key tabs between the connector and receptacle, then gently pushing the connector onto the receptacle until the outer ring locks. Removing the cable involves first sliding the outer lock ring back from the ButtonLaser and then pulling the cable connector away from the receptacle.

2.4 Software Setup

A communications program for the desktop PC is included with the SYSTEM. This program, *ENGINE.EXE*, provides easy-to-use protocols for sending and receiving files between the desktop PC and ButtonLaser. *ENGINE.EXE* works from the command line prompt in DOS, Windows 3.x, Windows 9x and Windows NT. Initial installation sets the required configuration for using *ENGINE.EXE*. The user normally will not need to use the utility directly. Contact NAWC-AD Patuxent River for further information on using the *ENGINE.EXE* program.

2.4.1 ButtonLaser Application

2.4.1.1 Functions/Features

The ButtonLaser application presents a series of screens the user navigates through using the keypad. Each screen displays data entry fields or function selections for performing various processes. Collectively the screens are referred to as "views". Sample representations of each view the user sees follows with a

brief description of its purpose. Details on using the program functions are contained in Chapter 3 - Operation.

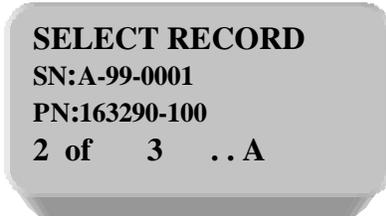


Figure 8
Data Control View

Data Control View: Also termed “SELECT” view. Displays Serial Number (SN) and Part Number (PN) for the records stored. Using the F1 and F2 keys scrolls forwards and backwards through each record one at a time. You can only navigate from one record to another in the Data Control view. You cannot enter data here. This prevents accidentally typing data when carrying the handheld. Format etc....

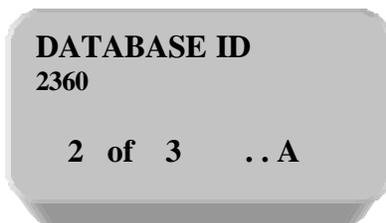


Figure 9
DATABASE ID Field View

DATABASE ID Field View: Shows the Database ID number. The number comes from:

- a scanned barcode label.
- a CMB read
- the user via the keypad

This view allows you to enter data. You may edit this field with this view only. The format file in the ButtonLaser controls the field size.

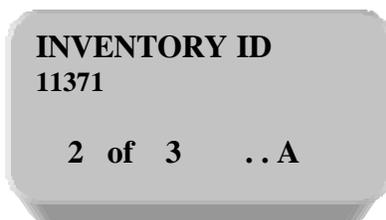


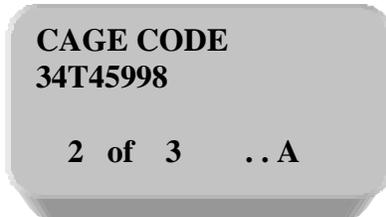
Figure 10
INVENTORY ID Field View

INVENTORY ID Field View: Shows the Inventory ID number. The number comes from:

- a scanned barcode label.
- a CMB read
- the user via the keypad

This view allows you to enter data. You may edit this field with this view only. The format file in the ButtonLaser controls the field size.

CAGE Code Field View: Shows the CAGE Code number. The number comes from:

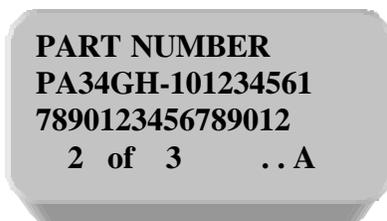


- a scanned barcode label.
- a CMB read
- the user via the keypad

This view allows you to enter data. You may edit this field with this view only. The format file in the ButtonLaser controls the field size.

Figure 11
CAGE Code Field View

Part Number Field View: Shows the Part Number. The number comes from:

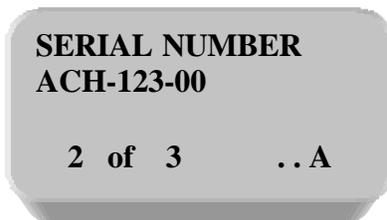


- a scanned barcode label.
- a CMB read
- the user via the keypad

This view allows you to enter data. You may edit this field with this view only. The format file in the ButtonLaser controls the field size.

Figure 12
Part Number Field View

Serial Number Field View: Shows the Serial Number. The number comes from:

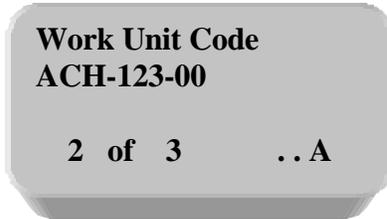


- a scanned barcode label.
- a CMB read
- the user via the keypad

This view allows you to enter data. You may edit this field with this view only. The format file in the ButtonLaser controls the field size.

Figure 13
Serial Number Field View

Work Unit Code Field View: Shows the Work Unit Code.
The number comes from:

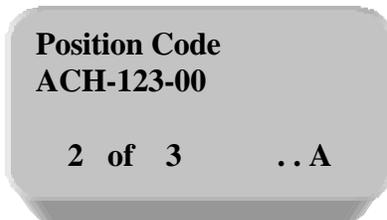


- the NALCOMIS OOMA system.
- a CMB read
- the user via the keypad

This view allows you to enter data. You may edit this field with this view only. The format file in the ButtonLaser controls the field size.

Figure 14
Work Unit Code Field View

Position Code Field View: Shows the Position Code. The number comes from:

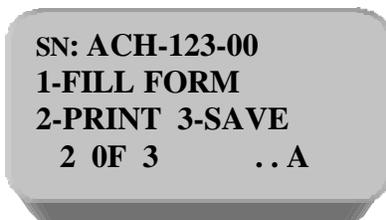


- the NALCOMIS OOMA system.
- a CMB read
- the user via the keypad

This view allows you to enter data. You may edit this field with this view only. The format file in the ButtonLaser controls the field size.

Figure 15
Position Code Field View

Dialog View: Presents the user with the current DB ID and available actions:



- FILL FORM
- PRINT BARCODES
- SAVE RECORD

The operation of each is in table 4

Figure 16
Dialog View

Key	Action	Comment
1	FILL FORM	This sends data to the Softwedge software via the desktop computers serial port. Directives in the format file control the format of the data, including the order of the data fields.
2	PRINT	Prints three (3) barcode labels. This merge the data record with print commands in the format file and prints them.
3	SAVE	This saves the NEW data record. You can only save a data record that has no empty data fields.
Return	ENTER	Same as "SAVE". From this view pressing ENTER is the equivalent to pressing "3".

Table 4
 Dialog View Actions

Record Status Information : This is not separate or unique view or screen, but an example of how the record status indicators appear:

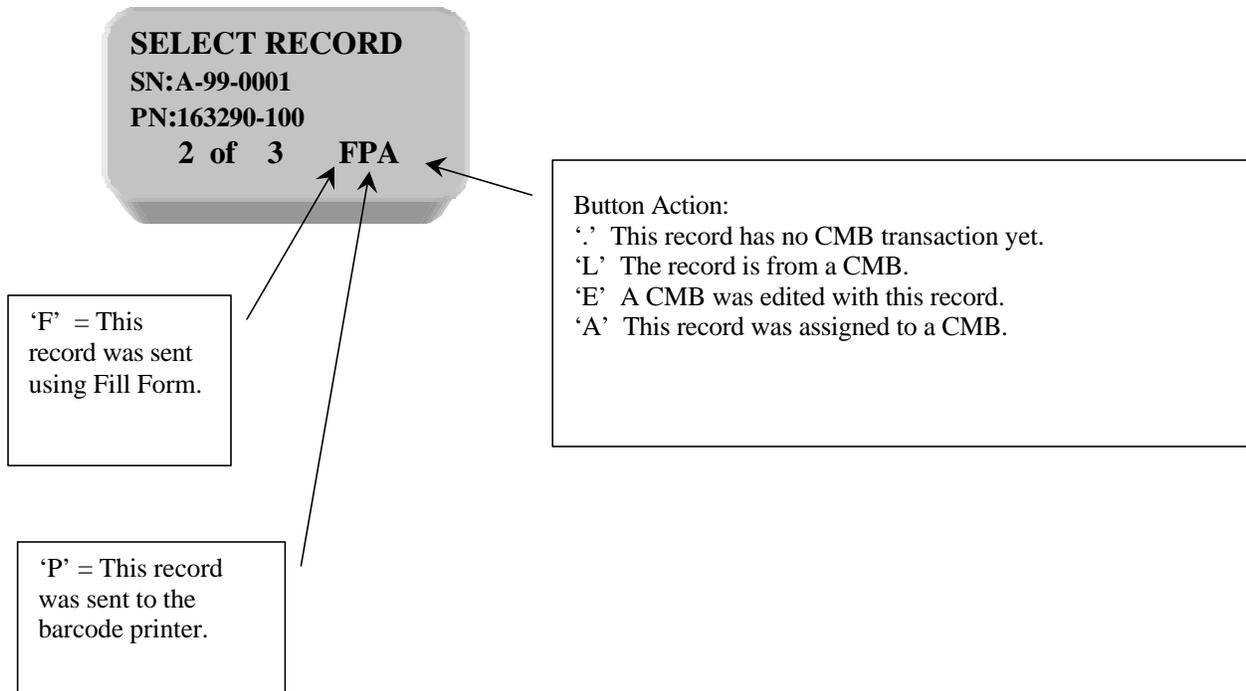


Figure 17
 Record Status Information

2.4.1.2 Installing

Before installing the program in a ButtonLaser, the steps outlined in paragraph 2.2 are necessary. Then insert the ButtonLaser into the Downloader/Charger Unit. At the desktop PC:

- Open a command window or start a DOS prompt.
- Enter the following command

```
ENGINE -Px -I BZHS15.HEX BZHS15.FMT
```

Where *x* represents the number of the communications port the Downloader/Charger Unit connects to on the desktop PC.

- Press [ENTER] and observe the communication lights flashing and the ButtonLaser display filling with asterisks (*).
- The operation is complete when the ButtonLaser displays "APPLICATION INSTALLED".

The ButtonLaser is now ready to scan barcodes, read and write CMBs, and/or send information to Optimized NALCOMIS OOMA.

NOTE

Transfers to/from the ButtonLaser and PC require:

- No devices attached to the ButtonLaser's DIN receptacle or
- Complete attachment of the barcode printer or
- Attachment of the Flexible Finger Tip Probe

Transfers will fail with the ButtonLaser/printer interface cables attached to the ButtonLaser and not attached to the printer.

Chapter 3

Operation

Each of these paragraphs outlines the typical steps for performing actions as a part of the SYSTEM. Unless otherwise noted, following these steps assures the operation attempted is successful.

3.1 Generating Barcode Labels

For each record, you can TAB (F3/F4) to the view showing you the option to PRINT. This will print the data record selected previously at the Data Control view. In this view, the Serial Number of the record being acted on is shown in the top line. This action produces barcodes on three labels. You cannot print a data record if any of the data fields are empty, you can only print a data record that has at least one character in each data field. If you choose the Print Option with any empty data fields, you will see an alert message, hear an audio beep and the display will automatically change to the view with the empty data field. With a successful print, the status for the record will show a 'P' in the lower right corner and the printer feeds three labels out with the information printed.

NOTE

No checks are made for cable connections to the Zebra printer. Errors encountered by the printer while generating barcode labels do not affect the status shown for that record.

With all conditions met, issuing the 'PRINT' command from the Dialog View will cause the PT400 printer to produce three labels. One label will contain the static data elements: DB ID, Inventory ID, and CAGE. A second label will contain the static data element Serial Number. The final label will contain the dynamic data element Part Number.

3.2 Affixing Barcode Labels

Step-by-step instructions for affixing bar code labels are presented in Appendix A. Refer to Appendix C for the location of the bar code label on a specific component.

3.3 Writing Data to CMB

Normally, the user does not have to assign data to a CMB; however, you use this program to assign data to a new CMB that does not have a data file on it. If performing this task for the first time, contact NAWC-AD Patuxent River, MD for additional information or assistance.

Do not confuse editing an existing record on a CMB with assigning data to a “clean” CMB.

Edit - If you touch a button with a SYSTEM file on it, you can only update (edit) the data if you have a record in the ButtonLaser matching the data on the CMB. After a successful edit operation, part of the data shown to the user is the status indicator "E". It appears in the lower right corner of the display. If you touch a button with an existing record, you can “edit” the button by writing data to it only if the identification data in the record matches the identification data on the button. The handheld will try writing the NEW record first, but if it does not match, the ButtonLaser will automatically look in the scan file for other matches. If it finds one that has not already been written to a button, it will write the matching record to the button. The record in the scan file is updated with the CMB Serial Number, data edited status, and time of the write.

Sounds complicated, but what it means is that when you send new information to the ButtonLaser from Optimized NALCOMIS OOMA, the user only has to touch a CMB. The ButtonLaser takes care of finding the matching record and performing the update of the CMB data. This makes it impossible for the user to write data to a wrong button.

Assignment - As a precondition to this operation, the CMB must NOT contain any exiting SYSTEM files. After a

successful assignment operation, part of the data shown to the user is the status indicator "A". It appears in the lower right corner of the display. After selecting the data record at the Data Control view, touching a 'clean' CMB writes the data record to the CMB, updates the ButtonLaser file with the CMB Serial Number, data status, and time of assignment.

3.4 Affixing CMB

Step-by-step instructions for affixing contact memory buttons are presented in Appendix B. Refer to Appendix C for the location of the contact memory button on a specific component.

3.5 Collecting Data from Barcode Labels

The SYSTEM design makes use of a unique multi-line barcode that allows you to store long data fields (32 characters for Part Number and 15 characters for Serial Number) on small labels. Just one sweep of the multi-line barcodes will pick up the data. As the ButtonLaser decodes each barcode in the series, it emits a single low volume, low tone beep. After the ButtonLaser has captured all the barcodes making up the data, a louder, higher pitched beep is heard.

When collecting data for transfer to Optimized NALCOMIS OOMA or a CMB, the order for scanning the barcode fields is not important. Specific codes embedded in the SYSTEM generated barcodes work with the application in the ButtonLaser to match the correct data to the appropriate field. These codes tell the ButtonLaser the data field scanned and places it in the correct screen view for display.

The Button Laser will read barcodes at anytime. There is no requirement for a certain view on the display. You merely press either one of the "SCAN" keys and aim the ButtonLaser perpendicular to the barcode of interest.

After collecting the information from the barcodes, the data is available to:

- Edit and save as a new record

- Transfer to Optimized NALCOMIS OOMA
- Print barcode labels

3.6 Collecting Data from CMBs

Touch the CMB on the item you wish to review. The CMB information appears on the display and is automatically logged in the ButtonLaser's file. The CMB's Serial Number is recorded for extra data security and integrity in the ButtonLaser. In addition, the time of the CMB read is recorded. The time will allow synchronization of data from other remote sources and make sure Optimized NALCOMIS OOMA reflects the current status of an item.

Once you read a CMB, part of the data shown to the user is the status indicator "L". It appears in the lower right corner of the display.

After collecting the information from a CMB, the data is available to:

- Edit and save as a new record
- Transfer to Optimized NALCOMIS OOMA
- Print barcode labels

3.7 Receiving Data from Optimized NALCOMIS OOMA

The SYSTEM is capable of receiving data from the personal computer. The Optimized NALCOMIS OOMA system has been designed to download data to the ButtonLaser. Refer to the Optimized NALCOMIS OOMA documentation for the specific NALCOMIS OOMA procedures.

During a download, any data stored within the ButtonLaser is erased. Before attempting to download data from Optimized NALCOMIS OOMA, ensure any data currently stored within the ButtonLaser is either downloaded or otherwise not needed. The ButtonLaser must be seated firmly in the Downloading Station for a successful download.

3.8 Sending Data to Optimized NALCOMIS OOMA

The SYSTEM is capable of sending the collected data to a personal computer. The Optimized NALCOMIS OOMA system has been designed to receive data from the ButtonLaser. Refer to the Optimized NALCOMIS OOMA documentation for the specific NALCOMIS procedures.

Before attempting to send data to the Optimized NALCOMIS OOMA ensure the ButtonLaser is seated firmly in the Downloading Station.

3.9 Editing Data Within the ButtonLaser

Using its alphabetic and numeric keys, the ButtonLaser is capable of editing the data it is storing. For this implementation, only the serial number can be modified, and it can only be modified if two conditions are met: the current serial number value is “XXX”, and the user has typed in the correct password. Within NALCOMIS OOMA the “XXX” value indicates an unknown serial number.

To modify the serial number, use the F1/F2 keys to select the record. Then use the F4 key to view the serial number. Press any alphabetic or numeric key and you will be prompted to enter the password. Enter the password and press the Enter key. Once the password is successfully entered, the serial number can be modified. Type in the new serial number and press the enter key. Be sure to print a new bar code label or write the new data to the contact memory button.

Chapter 4 Troubleshooting

4.1 Installing ButtonLaser Application

When experiencing problems with installing the application in a ButtonLaser, use this listing to assist in resolving the problem:

	Check ButtonLaser Battery Charge level (charge indicator light on Downloader/Charger is green)
	Check ButtonLaser is firmly seated in DownLoader/Charger
	Ensure all cable connections <ul style="list-style-type: none">- Desktop PC to Downloader/Charger- Power Pack to an AC wall outlet
	Check stored location of files on desktop PC - the full path to the file is required if the engine command is being run from a different directory than the location of the files
	Verify command being issued from the desktop PC has: <ul style="list-style-type: none">- Correct number parameters- Correct spelling of file names- Parameters match setup (connected to Com2 but using Com1 parameter).

4.2 Printing Barcode Labels

When experiencing problems printing barcode labels, use this listing to assist in resolving the problem:

	Check Printer Battery - the only indication of a weak charge on the printer battery is a flashing Power LED. Recharge per instructions in the Zebra printer manual.
	Check Cable connections - Review chapter 2, paragraph 2.3 Hardware Setup/Connections, verify all cable connectors are firmly attached.
	Check Ribbon/Media load - Verify both the label stock and ribbon are installed correctly.
	Verify 'fmt' file is installed in ButtonLaser -
	Inspect for any error lights on Zebra printer - match any light patterns with the troubleshooting chart found in the Zebra printer manual page 29 for associated corrective action.

4.3 Reading/Scanning Barcode Labels

When experiencing problems scanning barcode labels, use this listing to assist in resolving the problem:

	Check ButtonLaser Battery Charge level - Place in Downloader/Charger until charge indicator is green.
	Check for low battery faults <ul style="list-style-type: none">- Retrieve version information using the MacSema engine tool. Review information obtained.- Watch for "Battery Low" warning messages on ButtonLaser display. Recharge if seen.
	Check Presence of Scanner light beam - Place your hand in the light beam path of the ButtonLaser and press the 'SCAN' key. A red light beam should be visible on your hand.
	Label being scanned is SYSTEM generated – Unique characteristics of SYSTEM labels make them compatible only with other portions of the SYSTEM. Attempts to use barcodes NOT generated by the SYSTEM may not produce successful reads.

4.4 Reading CMB

When experiencing problems reading CMBs, use this listing to assist in resolving the problem:

	<p>Check for low battery faults</p> <ul style="list-style-type: none">- Retrieve version information from the ButtonLaser using MacSema engine tool. Review information obtained.- Watch for "Battery Low" warning messages on ButtonLaser display. Recharge if seen.
	<p>Test using Flexible Finger Tip Probe – Make contact with the CMB in question and observe whether the data from the CMB appears on the ButtonLaser display.</p>
	<p>Confirm a data file is on the CMB – If available, use another ButtonLaser or ButtonWand and the MacSema engine tool to extract the data</p>

4.5 Writing CMB

Under normal conditions, other than updating the data on a CMB, writing data to a CMB is not a planned function for the user under the scope of the SYSTEM. For further information or assistance with writing to CMBs, contact: NAWC-AD Patuxent River, MD.

When errors occur during updates, use this listing to assist in resolving the problem:

	<p>Check for low battery faults</p> <ul style="list-style-type: none"> - Retrieve version information from the ButtonLaser using MacSema engine tool. Review information obtained. - Watch for "Battery Low" warning messages on ButtonLaser display. Recharge if seen.
	<p>Test using Flexible Finger Tip Probe - Make contact with the CMB in question and observe whether the data from the CMB appears on the ButtonLaser display.</p>
	<p>Ensure the correct record is selected for the target CMB. The ButtonLaser compares the data on the CMB with the record in view. A mismatch prevents updates to the CMB.</p>
	<p>Confirm a data file is on the CMB - If available, use another ButtonLaser or ButtonWand and the MacSema engine tool to extract the data.</p>

4.6 Data transfers

When experiencing problems performing data transfers, use this listing to assist in resolving the problem:

Check all cable connections <ul style="list-style-type: none">- Desktop PC to Downloader/Charger- Power Pack to an AC wall outlet
Check ButtonLaser is firmly seated in DownLoader/Charger
Verify communications settings (port, baud rate)
Verify command being issued from the desktop PC has: <ul style="list-style-type: none">- Correct number parameters- Correct spelling of file names- Parameters match setup (connected to Com2 but using Com1 parameter).
Verify ButtonLaser program operation by pressing the Recall key to view the program name and version.

Appendix A. Application Instructions For Bar Code Labels

1. Materials Required.

- A. Bar Code Label
- B. Cleaning Solvent (One of the below listed recommended)
 - Trichloroethylene (preferred)
 - Perchloroethylene
 - Methylethylketone
 - Isopropyl Alcohol
- C. Lint Free Cloth
- D. Latex Type Gloves

2. Safety Precautions.

- A. Use cleaning solvents in a ventilated area.
- B. Wear protective clothing, gloves, and safety glasses as required.
- C. Refer to Material Safety Data Sheets for cleaning solvents for safe handling and use.

3. Surface Cleaning and Preparation.

- A. Find Manufactures nameplate on component and choose an area near to it for placement of the Bar Code Label. If the Manufactures Name Plate is not accessible when component is installed on the aircraft, then locate an area for placement of the Bar Code Label that is accessible. If there is no Manufactures nameplate on the component, then locate an area that is accessible when component is installed on aircraft for Bar Code Label placement.
- B. Clean the selected location using one of the cleaning solvents listed in 1.B., preferably Trichloroethylene.
- C. Use a lint free cloth to apply the cleaning solvent. Remove all oil and/or solids.

4. Application of Bar Code Label.

- A. Print the bar code label.
- B. Peel the protective backing from the label.
- C. Lightly press the bar code label onto the component, ensuring no air pockets are created.
- D. Have a Quality Assurance Representative (QAR) inspect area for FOD in flight critical area or on safety of flight critical components. Have a Collateral Duty Inspector (CDI) inspect area for FOD in non-flight critical area or non-safety of flight critical components.

Appendix B. Application Instructions for Contact Memory Buttons

1. Materials Required.

- A. Contact Memory Button
- B. Adhesive HYSOL EA 9394
- C. Cleaning Solvent (One of the below listed recommended)
 - Trichloroethylene (preferred)
 - Perchloroethylene
 - Methyleneethylketone
 - Isopropyl Alcohol
- D. Medium Grit Emery Paper
- E. Lint Free Cloth
- F. Latex Type Gloves
- G. Safety Glasses
- H. Heat Lamp (to speed curing time)
- I. Scotch Brite

2. Safety Precautions

- A. Use cleaning solvents and HYSOL EA 9394 in a ventilated area.
- B. Wear protective clothing, gloves, and safety glasses as required.
- C. Refer to Material Safety Data Sheets for cleaning solvents and HYSOL EA 9394 for safe handling and use.

3. Surface Cleaning and Preparation.

- A. Find Manufactures nameplate on component and choose an area near to it for placement of the Contact Memory Button (CMB). If the Manufactures Name Plate is not accessible when component is installed on the aircraft, then locate an area for placement of the CMB that is accessible. If there is no Manufactures nameplate on the component, then locate an area that is accessible when component is installed on aircraft for CMB placement.
- B. Clean the selected location using one of the cleaning solvents listed in 1.C., preferably Trichloroethylene.
- C. Use a lint free cloth to apply the cleaning solvent. Remove all oil and/or solids.
- D. Lightly sand a 1/2 inch diameter selected area with medium grit emery cloth or until all surface paint and primer is removed. Use Scotch Brite to remove fine particles.
- E. Clean sanded area with cleaning solvent.
- F. Allow area to dry completely.

4. Application of Contact Memory Button.

- A. Thoroughly mix HYSOL EA 9394 as per manufactures mixing instructions.

- B. Apply only enough HYSOL EA 9394 to the area, so that when the CMB is installed a small bead will form around the outer edges of the CMB. Be sure to use latex type gloves when handling HYSOL EA 9394.
- C. Lightly press the CMB on to the HYSOL EA 9394. Ensure a small bead of adhesive forms around the edges of the CMB.
- D. Hold the CMB in place with slight pressure for about 5 to 10 minutes. If any adhesive gets on the top of the CMB, then wipe clean gently with the cleaning solvent.
- E. Handling strength for HYSOL EA 9394 will occur in 8 hours at 77°F/25°C. HYSOL EA 9394 maybe cured for 3 to 5 days at 77°F/25°C to achieve normal performance. Curing can be accelerated by placing a heat lamp on the area for 1 hour at 150°F/66°C. When using heat lamp for curing, be sure to follow heat lamp manufacture instruction for safe operations. Ensure all flammable materials are clear of the area to be heat soak.
- F. Have a Quality Assurance Representative (QAR) inspect area for FOD in flight critical area or on safety of flight critical components. Have a Collateral Duty Inspector (CDI) inspect area for FOD in non-flight critical area or non-safety of flight critical components.
- G. Clean and paint any exposed component surface area after curing of the HYSOL EA 9394. Follow proper maintenance procedures in type aircraft Maintenance Instruction Manuals. Do not get primer or paint on top portion of CMB, because this could affect the reading and writing to the CMB.

**Appendix C.
SH-60B Component Selection and Marking Locations**

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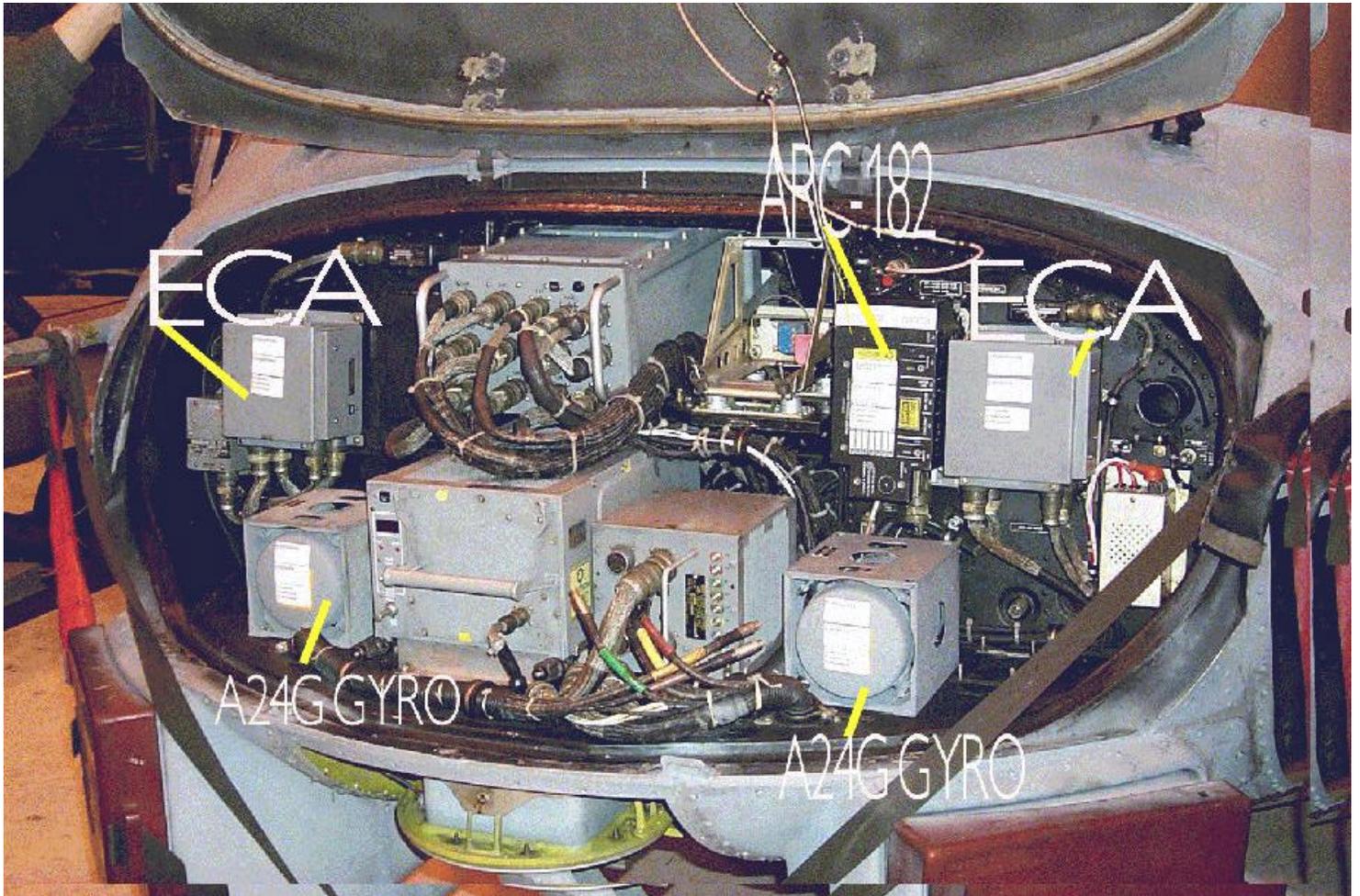
**Serial Number Tracking AIT
Demonstration User's Manual**

DRAFT

HSL-40 Serial Number Tracking
AIT User's Manual

Nomenclature	Part Number	NIIN	Ship Code F059	DOP F016	Company / Location	Item Manager	Phone
A24G GYRO SCOPE (2 ea)	8KD9AF6	6615-00-159-2298	N46433	N00244	Fisc, North Island	Luciana Kramarenko	215-697-2106
AFCS COMPUTER (1 ea)	70600-01810-106	7021-01-334-5509	C24780	Q95105	Hamilton Standard, Farmington, Ct	John Bonfini	215-697-3728
APU-ESU	163290-100 or 160200-600	2995-01-169-5291	W24347	W45G19	Red River Army Depot, Texarcana, Tx	Matt Cosgrove	215-697-9091
CP-1500C/AYK-14V	14889000-05	7021-01-266-1709					
CP-1878F/AYK-14V	1097AS1004-03	7021-01-366-0352					
ECA	8KE63AZ2	6615-01-079-6685	N46433	N00244	Fisc, North Island	Ida Swallow	215-697-5436
MAD REELING MACHINE (CMB)	819781-2	00-116-6139	C21048	Q96214	Texas Instruments, Texarcana, Tx	James McKelvey	215-697-3813
MAIN ROTOR BLADE (CMB) (4 ea)	70150-29100-041	01-158-9679	C24846	Q78286	Sikorsky, Bridgeport, Ct	Linda Fitzpatrick	215-697-6297
RADIO ARC-159 (2 ea)	622-1365-002	010-018-4240	N46433	Q13499	Rockwell Int, Cedar Rpds, Ia	Victor Bond	215-697-2673
RADIO ARC-182 (2 ea)	622-7655-001	5821-01-266-1002	C24913	Q13499	Rockwell Int, Cedar Rpds, Ia	Monica Bagley	215-697-3612
RESCUE HOIST C/P	70850-22111-121	1680-01-346-8299	C23083	Q08484	Breeze Eastern, Union, NJ	Linda Fitzpatrick	215-697-6297
STAB AMP	70902-22001-044	6615-01-256-7324	C24903	Q78286	Sikorsky, Shelton, Ct	John Bonfini	215-697-3728
TAIL ROTOR BLADE ASSY(CMB) (2 ea)	70101-31000-046	01-158-9678	C24846	Q78286	Sikorsky, Bridgeport, Ct	Linda Fitzpatrick	215-697-6297

Forward Avionics Bay



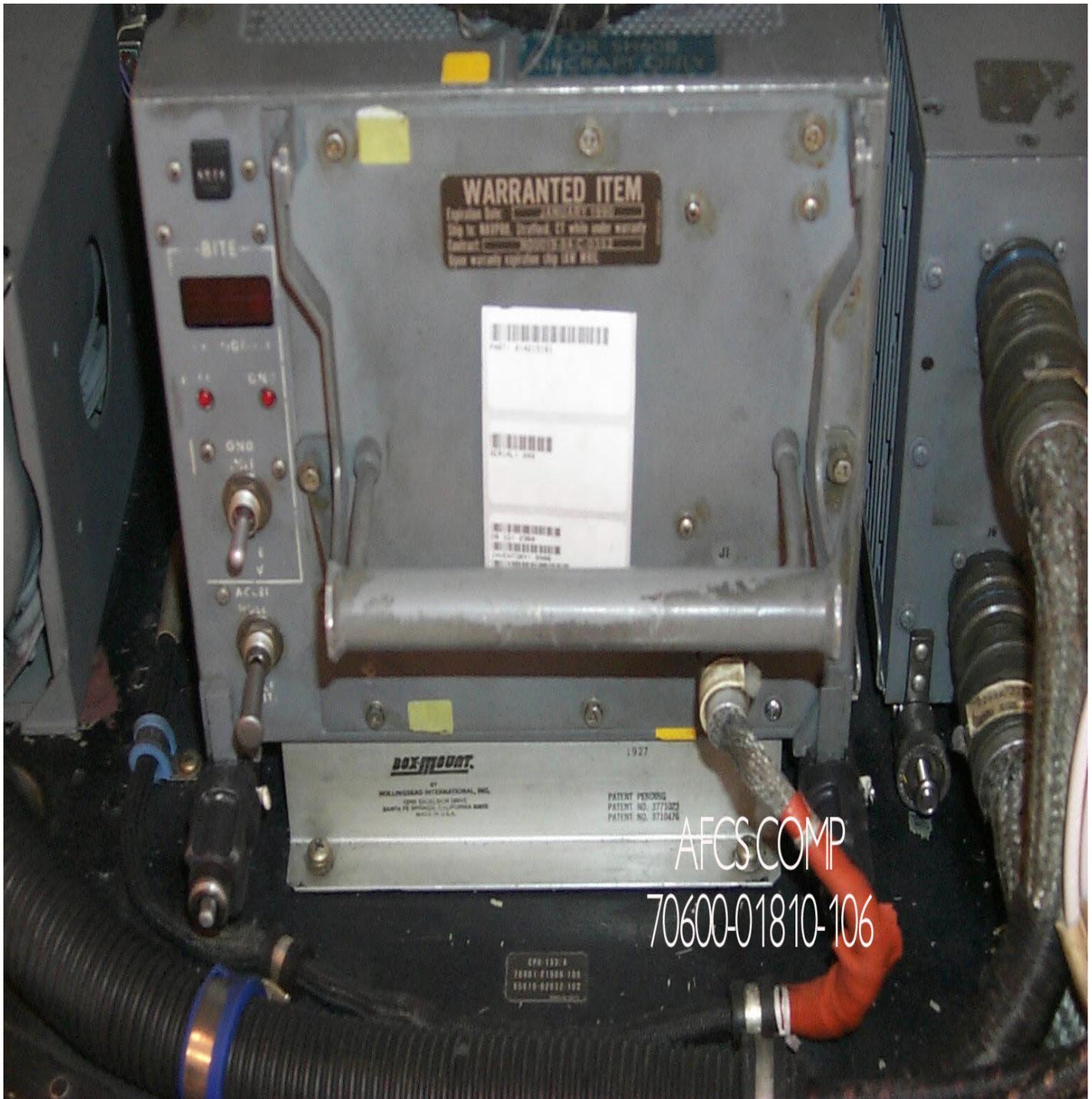
A24G Gyroscope

8KD9AF6



AFCS Computer

70600-01810-106



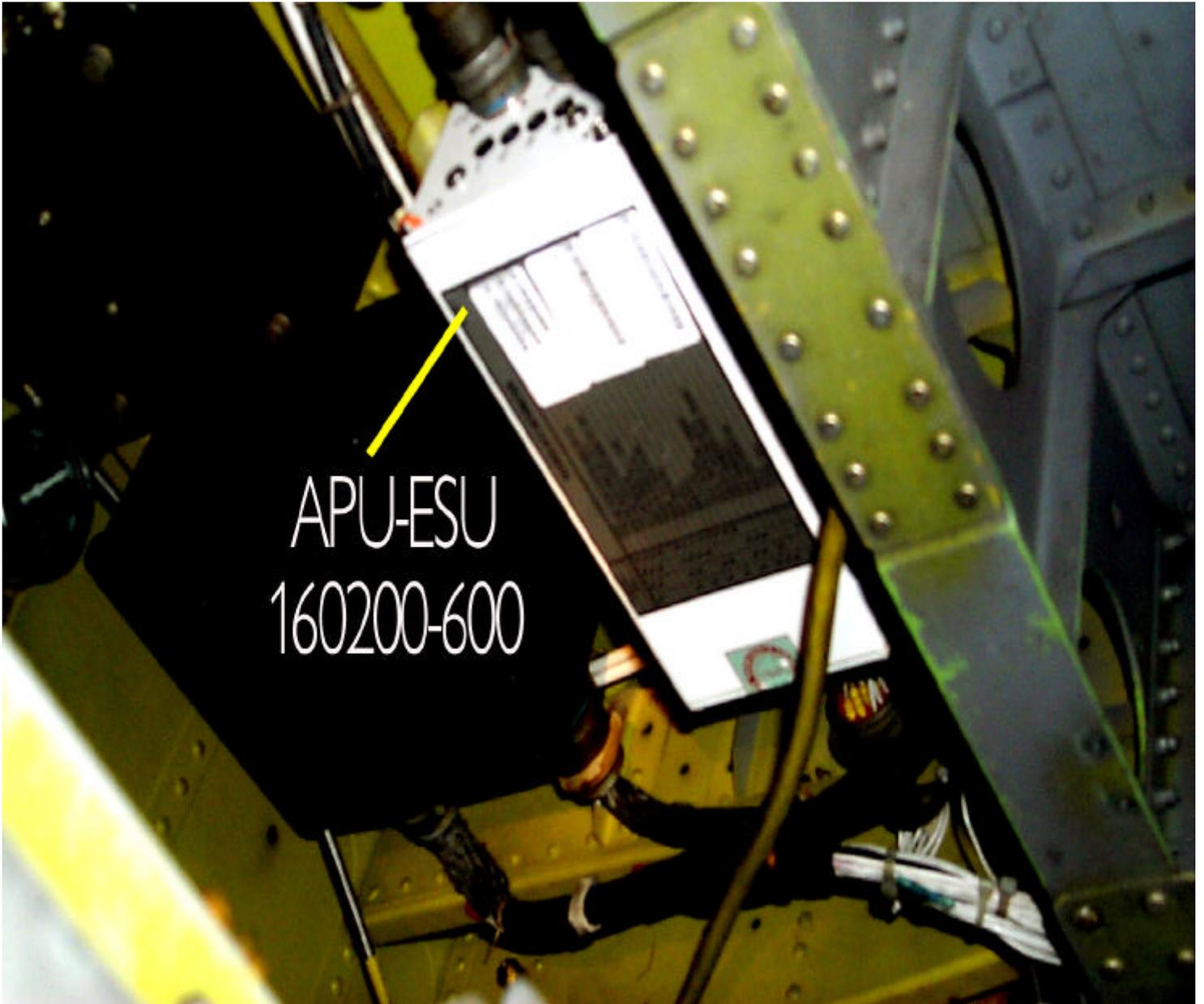
APU-ESU

163290-100



APU-ESU

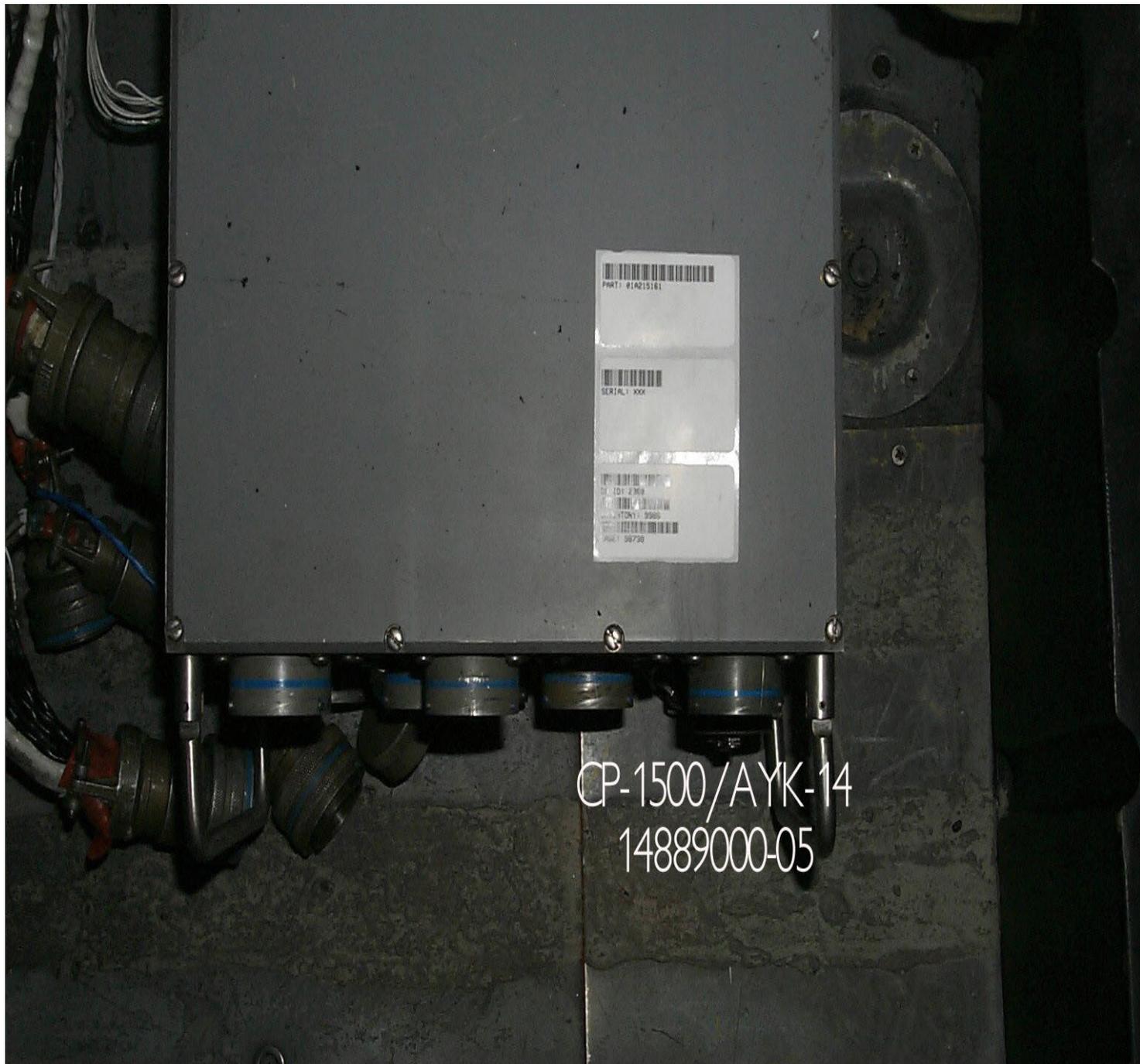
160200-600



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CP-1500C/AYK-14V

14889000-05



CP-1878F/AYK-14V

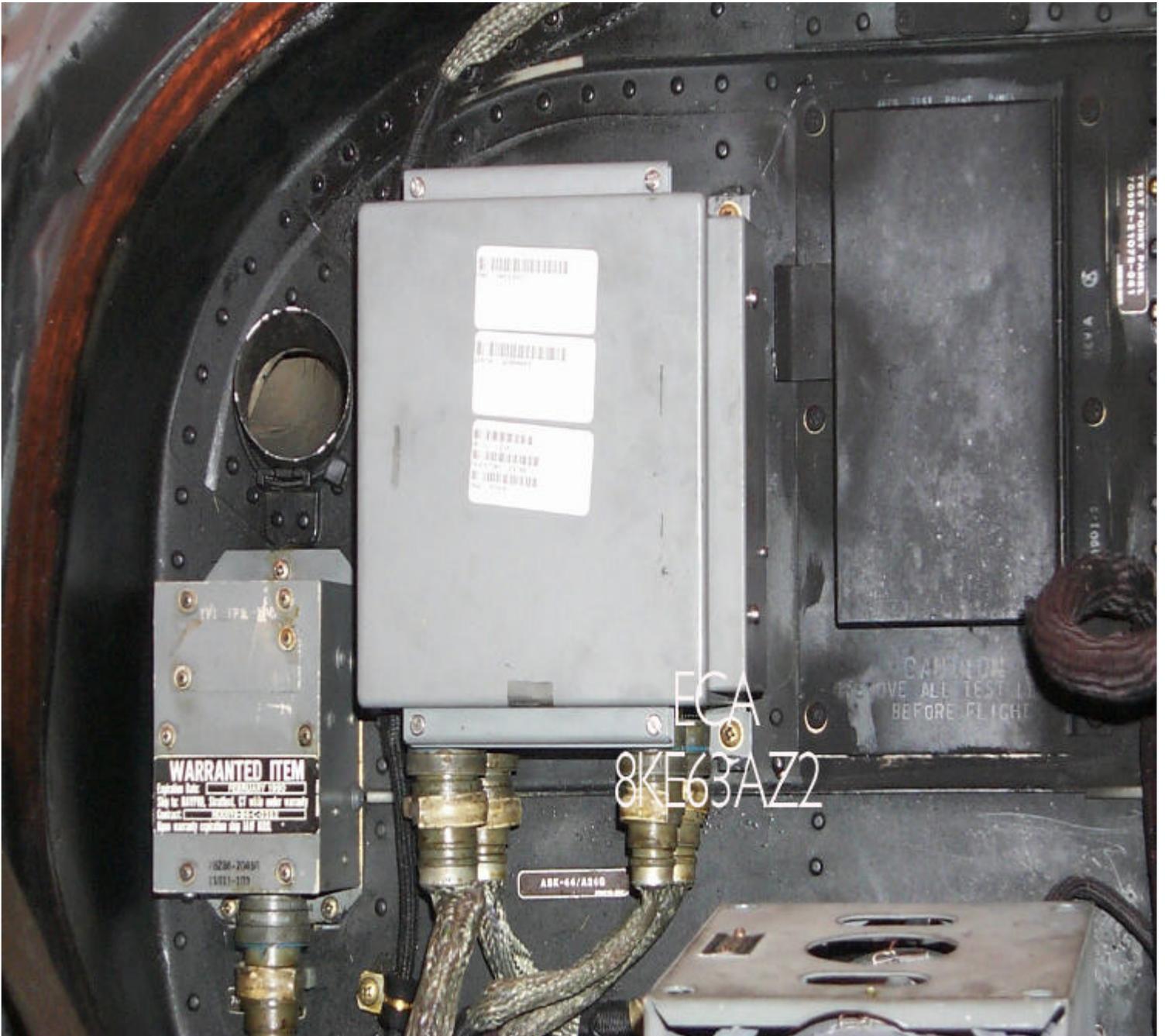
1097AS1004-03



CP-1878F/AYK-14V
1097AS1004-03

ECA

8KE63AZ2



MAD Reeling Machine

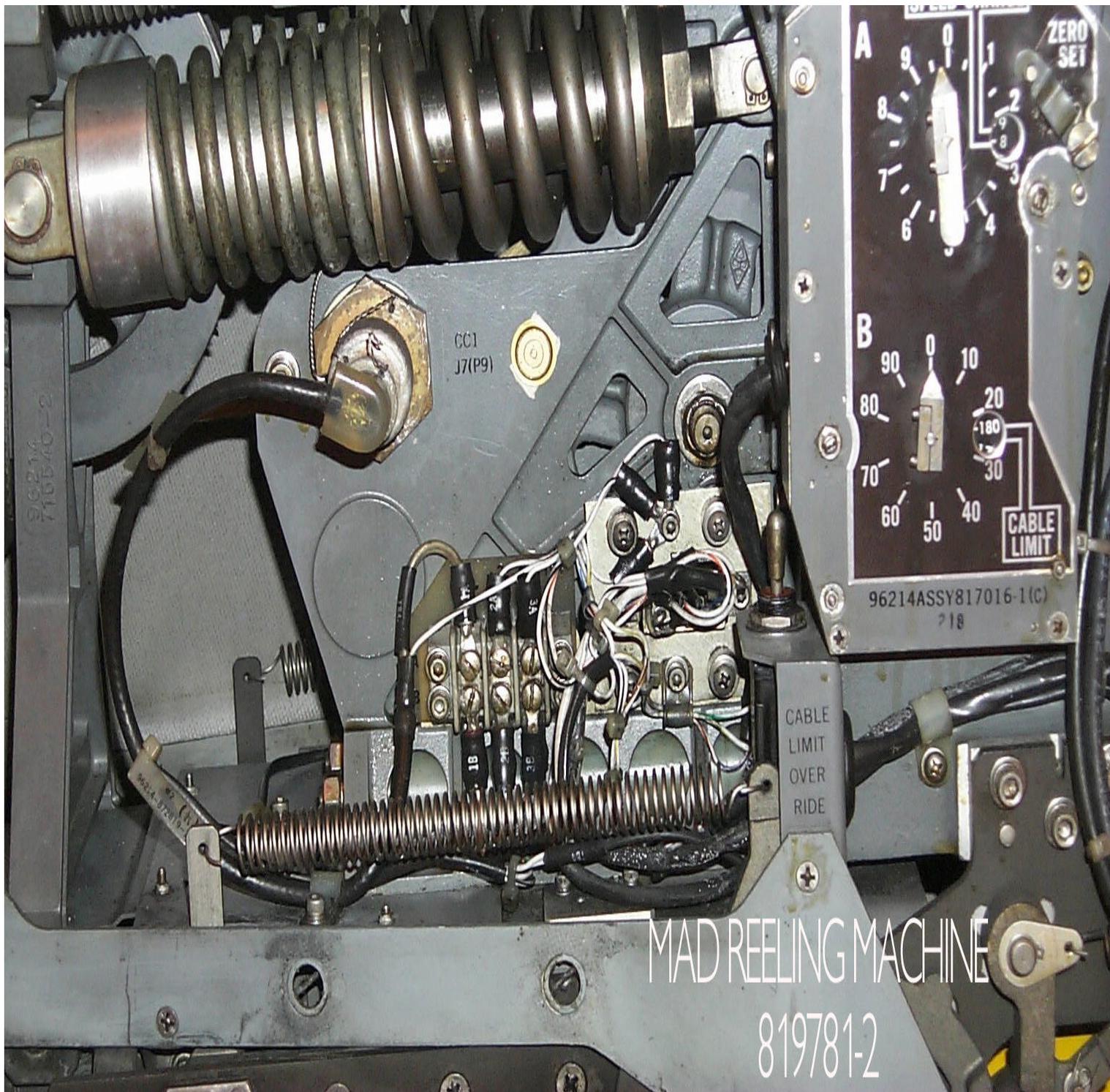
819781-2



MAD REELING MACHINE
819781-2

MAD Reeling Machine

819781-2



Main Rotor Blade

70150-29100-041



MAIN ROTOR BLADE
70150-29100-041

Radio ARC-159

622-1365-002



Rescue Hoist Control Box

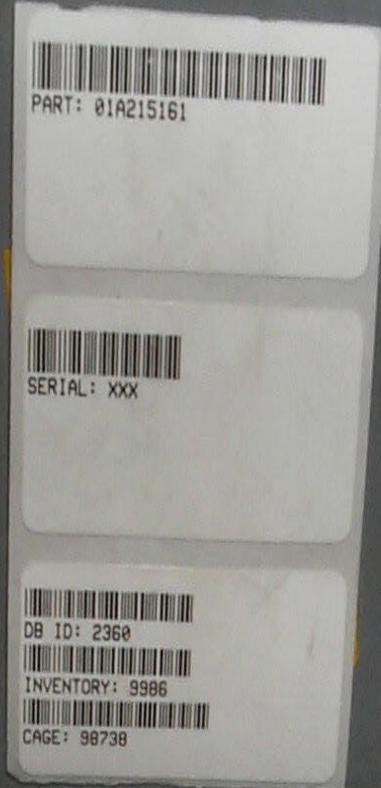
70850-22111-113



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Stabilizer Amplifier

70902-22001-044



STAB. AMP.
70101-21913-104

Tail Rotor Blade

70101-31000-046

