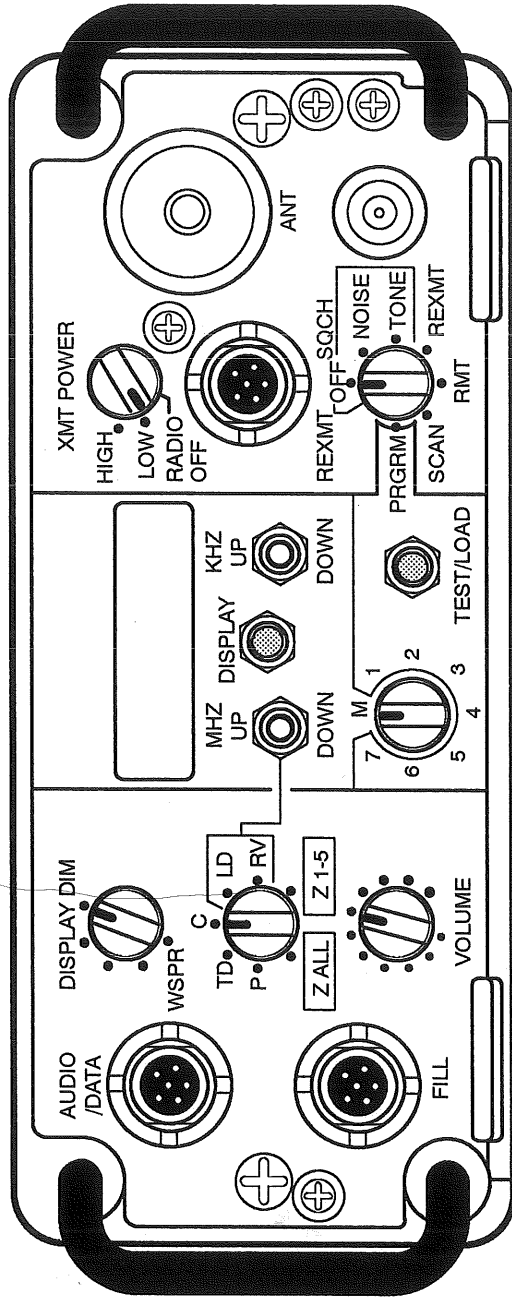


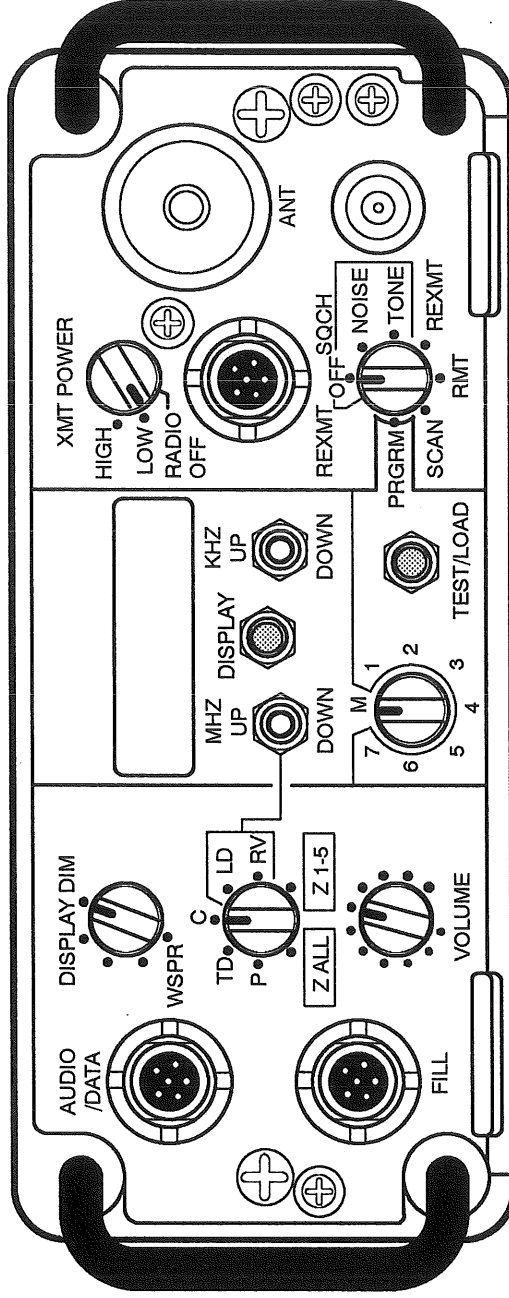


# AN/PRC-117D(C) Manpack Radio



## Operator Training Instructor Guide

# AN/PRC-117D(C) Manpack Radio



## Operator Training Instructor Guide

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## COURSE DATA

**Course Title:** AN/PRC-117D(C) Manpack Radio Operator Level Training Course.

**Course Objective:** To provide operators the knowledge and skills needed to operate the AN/PRC-117D(C) Manpack Radio

**Prerequisites:** Experience with communications equipment.

**Course Scope:** This course includes both lecture and practical exercises.

**Content:** Operation

**Length:** 16 Hours – 2 Days

**Publications:** Student Guide  
Instructor Guide  
AN/PRC-117D(C) Instruction Manual

**Student Evaluation:** Student progress will be monitored at intervals throughout the course. Multiple choice written exams and laboratory performance exercises will be given. Each student will pass before progressing to the next lesson.

## How To Use This Guide

### **Introduction:**

This Instructor Guide is designed to provide quality training in the operation of the AN/PRC-117D(C) Manpack. The Course has been written for 10 students but can be easily adapted for more. The Instructor Guide was developed in conjunction with the Operator Student Guide. References for both Instructor and Student are provided throughout.

### **Equipment:**

The course has been designed for 6 Lab stations with the Instructor having one for demonstration purposes. The Stations should include: 1 – AN/PRC-117D(C) Transceiver, 1 – Data Terminal and 1 – Dummy Load. The course does not require any specific training aids, but it is recommended that all training aids be used.

### **Task List:**

The separate Task List is provided for the Instructor as a convenience. The instructor may want to copy these pages for each student to keep track of their progress. The Student Guide also contains a section for tracking task completion.

## **Lesson Plans**

### **Lessons:**

At the start of each lesson plan is a description of the lesson which can be used as an introduction. The corresponding Task Numbers are included in the margin.

### **Materials:**

The required materials for each Lesson, i.e. Manuals etc., are listed and should be used for preparation.

- Equipment:** The required equipment for each Lesson are listed and should be used for preparation.
- Method:** The Training method suggested for each Lesson is listed. The Time interval for each is supplied in the margin.
- Theory:** This section provides the Instructor with the information that should be passed onto the students. The theory is written in a format the instructor can easily follow. Additional notes are written in the margins. The theory section contains enough information so an instructor with minimal experience can deliver the Lesson.
- Lab:** The Lessons that have a Lab Assignment contain a suggested demonstration that should be performed by the instructor. The instructor may want to use different values than the ones listed in the Lab Assignment for the students.
- Review:** Give the students time to look over the notes in their student guides before attempting the Review Questions. The standards and student guide references are also included in the margin.
- Practical:** Give the students sufficient time to practice the lab assignment for each lesson. The time limits are only a guideline for the students. Further practice may be needed if the student can not achieve these time standards.
- Page Reference:** Unless otherwise specified, all page references are for the AN/PRC-117D(C) Instruction Manual
- Display Overhead:** Overheads should be displayed where indicated, but are not necessary.

# Unit #1

## System Overview

**Purpose:** Learn the capabilities and limitations of the AN/PRC 117D(C) Manpack.

**Instructor Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:** AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna  
Backpack Harness



**Method:**

Lecture

**Task:**

State the capabilities and limitations of the AN/PRC-117D(C).

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 6 of 8 summary questions on the capabilities and limitations of the AN/PRC-117D(C).

Instructor Theory

Instructor Activity

**I. General Information**

- A. Operates over the 30.000 to 419.995 MHz frequency range.
- B. VHF-LO
  - 1. 30.000 – 89.975 MHz
  - 2. WB Only
  - 3. FM only
  - 4. 25 kHz channel spacing
- C. VHF-HI
  - 1. 116.000 – 173.995 MHz
  - 2. WB Only
  - 3. AM orFM
  - 4. 5 or 6.25 kHz channel spacing (6.25 is the default)
- D. UHF
  - 1. 225.000 – 419.995 MHz
  - 2. WB or NB (Narrowband is automatically selected when the frequency is in the 243.9 to 244.21 MHz portion of the SATCOM region).
  - 3. AM or FM (AM is allowed only when wideband is selected).
  - 4. 5 kHz channel spacing

Refer to Section 1.3 of  
the AN/PRC-117D(C)  
Instruction Manual

Instructor Theory	Instructor Activity
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**II. Features**

**A. Integrated COMSEC Capability**

1. Allows the transceiver to process signals so that their information content can be extracted only by those authorized and equipped to do so.
2. Compatible with TSEC/KY-57 (VINSON) Communications Security Equipment in the voice and data modes.
3. The AN/PRC-117D(C) provides full KY-57 capabilities:
  - Five traffic variables
  - One rekey variable
  - Saville Advanced Rekey (SARK)
  - Zeroize
  - Secure, and plain text retransmission

**B. Data Capability**

1. Compatible with data devices that meet MIL-STD-188-114A specifications.
2. Data rates up to 16 kbps

Refer to Section 1.4 of the AN/PRC-117D(C) Instruction Manual

Instructor Theory	Instructor Activity
-------------------	---------------------

- C. Front Panel Menu Programming
  - RADIO OP – Sets the operational parameters for all channels and modes.
  - CH SETUP – Sets the parameters for the individual channel selected by the CHANNEL Control.
- Display Menu Sets frequency, modulation, power output and encryption variables
- D. Self-Identity Test
- E. Self Test
- F. Fault Reporting
- G. Simplex/Half-Duplex Operation
- H. ECCM: Frequency-hopping
- I. Answer-Back Scan
- J. Zeroize Feature
  - 1. Radio zeroize
  - 2. COMSEC zeroize

Instructor Theory	Instructor Activity
-------------------	---------------------

**III. Compatibility with other radios**

Refer to Section 1.5 of the AN/PRC-117D(C) Instruction Manual

A. The AN/PRC-117D(C) is compatible with the following fixed-frequency radio systems:

- AN/VRC-12 Series • AN/VRC-83
- AN/VRC-94A(V) Series • AN/PRC-128
- AN/PRC-77 • AN/ARC-182
- AN/URC-94 • AN/ARC-164
- Harris RF-280 • Racal Jaguar
- AN/PSC-3 Series • SINGARS
- AN/PRC-113 Series • AN/PRC-138
- HST-4A • LST-5C
- AN/PRC-112(V) • AN/URC-100 Series

**NOTE**

When OPERATING with other tactical radios, ensure FM deviation and squelch type are programmed the same.

Instructor Theory	Instructor Activity
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**IV. The standard parts of the manpack transceiver are as follows:**

- A. R/T Assembly – Radio receiver, transmitter, control logic, and embedded communication security (COMSEC) module.
- B. Handset (P/N H-250/U).
- C. Lithium Disposable Battery (P/N BA-5590/U).
- D. Battery case (10012-0330). Provides capability to use BA-5590/U Lithium Disposable Battery.
- E. VHF-Low Manpack Blade Antenna (10012-0201) – 44 inch (1.12 m) blade antenna with flexible neck.
- F. VHF-Low Manpack Antenna Kit (10012-0240) – Standard antenna kit including a 10 foot (3.1 m) collapsible whip antenna and flexible base, whip adapter, and canvas antenna bag.
- G. VHF-Hi/UHF Manpack Antenna (10369-0205) – Antenna kit for using the radio in the 116 MHz to 420 MHz frequency range.

Refer to Section 1.3 of the AN/PRC-117D(C) Instruction Manual

Instructor Theory

Instructor Activity

### Review Questions

1. 30-000 – 89.975 MHz, 116.000 – 173.995 MHz, and 225.000 – 419.995 MHz
2. 30-000 – 89.975 MHz
3. 5
4. ECCM (Quick Look)
5. Display, CH SETUP, and RADIO OP
6. 8
7. VINSON compatible
8. 12

## Unit #2

### Startup

**Purpose:** Learn the procedures to startup the AN/PRC 117D(C) Manpack.

**Instructor Materials:** Overhead projector with Projection Screen  
Overhead Displays 2-1 thru 2-10  
Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:** AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna



**Method:**

Lecture, Demo, Lab

**Task:**

Learn the procedure to startup the AN/PRC 117D(C) to include controls and indicators, power up, zeroizing, COMSEC initialization, self identity test, and self test.

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 7 of 9 summary questions on the start-up of the AN/PRC 117D(C).
2. Perform a start-up of the AN/PRC 117D(C).

Instructor Theory	Instructor Activity
-------------------	---------------------

**I. AN/PRC-117D(C) Front Panel**

**A AUDIO/DATA connector.**

Connection for handset or data cable

**B DISPLAY DIM/WSPR**

Controls intensity of LED display. In the WSPR position, the display is turned off and a 10 dB amplifier is placed in the microphone audio path.

**C COMSEC mode control**

**P Plain text operations**

**TD Cipher-text operation with a time delay after PTT (push-to-talk)**

**C Cipher-text operation**

**LD Load crypto variable**

**RV Receive crypto variables over the air as part of a manual key**

**Z ALL Zeroize all crypto variables and programmable information**

**Z 1 - 5 Zeroize crypto variables 1 to 5**

**D LED Display**

Display current operational and/or programmed information

**E MHZ and KHZ toggle switches/ DISPLAY pushbutton**

Used to select and view all programmed information. MHZ and KHZ toggle switches are active only when display is lit.

Refer to Section 3.2 of the AN/PRC-117D(C) Instruction Manual

Display Overhead 2-1

Display Overhead 2-2

Instructor Theory	Instructor Activity
-------------------	---------------------

- F XMT POWER  
Controls on/off and power output. LOW selects programmable power level; HIGH selects a 10 W (20W in SATCOM) transmit power level.
- G REXMT Connector  
Connection for REXMT, SAC, or narrowband COMSEC device
- H ANT Connector (30–90 MHz)  
Connection for antenna base; i.e., VHF-LO Whip Antenna
- I ANT BNC Connector (116–420 MHz)  
50-ohm antenna connection, Used for VHF/UHF Antenna.
- J RADIO Mode Control
- |               |   |
|---------------|---|
| SQUELCH OFF   | Squelch off   |
| NOISE SQUELCH | Noise squelch in FM, carrier squelch in AM  |
| TONE SQUELCH  | Tone squelch (150Hz) in FM, carrier squelch in AM                                   |
| REXMT         | Retransmit operations   |
| RMT           | (not used)  |
| SCAN          | Scan preset channels  |
| PRGRM         | Program frequencies, ECCM codes, bands, and variables for the seven preset channels |

Instructor Theory

Instructor Activity

- A. TEST/LOAD  
Used in self-identity testing, self-test, programming, radio zeroize operations, and channel-ized menu parameters
- B. CHANNEL Control  
Selects channel for programming frequency/bandwidth/COMSEC information
- C. VOLUME  
Volume control for handset
- D. FILL Connector  
Connection for standard COMSEC fill devices

Instructor Theory	Instructor Activity
-------------------	---------------------

**II. Start-up**

Refer to Section 3.5 of the AN/PRC-117D(C) Instruction Manual  
Display Overhead 2-3  
**Have students perform**

A. When power is first applied to the AN/PRC-117D(C) it is essential to check the display to ensure the radio powers up correctly, and is ready for operation.

B. Attach handset to AUDIO/DATA connector.

C. Connect antenna to ANT connector.

1. Upper connector: VHF-LO whip only

2. Lower connector: 50 ohm (VHF-LO, VHF-HI or UHF)

3. Both antennas must be used for VHF-LO/VHF-HI, VHF-LO/UHF or VHF-LO/VHF-HI/UHF multiband scan.

D. Turn XMT POWER from OFF to LOW or HIGH.

E. Display:

1. Error messages

2. Battery voltage

F. Start-up Error Messages

1. "HUB Low" Hold-up battery voltage is weak.

2. "No HUB" Hold-up battery is inoperative.

3. "COMSEC 0" COMSEC mode control is in Z ALL or Z 1-5 position.

4. "INVALID" Indicates that the band width is set to narrowband or that the modem is on when the COMSEC mode control is in any mode except P

Display  
Overhead 2-4

Instructor Theory	Instructor Activity
-------------------	---------------------

**III. Radio Zeroize**

Refer to Section 3.8.1.3 of the AN/PRC-117D(C) Instruction Manual

**Have students perform**

Display  
Overhead 2-5

- A. Set RADIO mode control to PRGRM.
- B. Set COMSEC mode control to any mode *except* LD or RV.
- C. Push and hold TEST/LOAD (approx. 3s), until display reads "RADIO OP" or "CH SETUP".
- D. Push DISPLAY until display reads "RADIO OP".
- E. Toggle MHZ switch UP or DOWN until display reads "ZERO> No".
- F. Toggle KHZ switch UP or DOWN until display reads "ZERO> Yes".
- G. Push TEST/LOAD.

- Display: ●"00000000"

Display  
Overhead 2-6

**IV. Radio Defaults**

Channel	RX Frequency (MHz)	TX Frequency (MHz)	Bandwidth (kHz)	Modem Type	Mode	Channel Type	Low Power Setting (W)
M	244.000	244.000	5	Dif	FM	Single	1
1,2,3	60.000	60.000	25	Off	FM	Single	1
4	300.000	300.000	25	Off	AM	Single	1
5,6,7	60.000	60.000	25	Off	FM	Single	1

Instructor Theory	Instructor Activity
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**I. COMSEC Initialization**

- A. Prepares the AN/PRC-117D(C) for secure mode operations
- B. Turn the COMSEC Mode control to TD. There will be a constant tone in the handset.
- C. Key the handset twice. A continuous tone will be heard This indicates that there are no Crypto variables loaded. If there are crypto variables loaded, no tone will be heard.

Refer to Section 3.4.2 of the AN/PRC-117D(C) Instruction Manual

**Have students perform**  
Display  
Overhead 2-7

Instructor Theory	Instructor Activity
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**II. Self-Identity Test**

- A. The R/T Assembly has a number of configuration options. A radio operator can determine the options available on an individual radio by performing the self-identity test.
- B. During a self-identity test, the LED display first shows the radio model number. An **M** is displayed after the model number (117D) to indicate if the internal modem is present, an **F** is displayed if the ECCM module is present, and a **C** is displayed if the COMSEC module is present. Next the software version is displayed, followed by the radio option number, and the hold-up-battery (HUB) status. Finally, the status of the radio battery pack is displayed as a battery voltage. Compatibility between two or more radios is assured if self-identity numbers are alike.

Refer to Section 3.4.2 of the AN/PRC-117D(C) Instruction Manual

Display  
Overhead 2-7

**Have students perform**

- C. Push and hold **TEST/LOAD** until after the radio model is displayed.

- D. Turn **XMT POWER** from **OFF** to **LOW** or **HIGH**.

**E. Display:**

- Radio Model                      example: "117D MFC"
- Software Version                example: "Vers 10A"
- Frequency/Band Exclusions (not used)    example: "Opt 000"
- HUB Status                        example: "HUB Good"
- Battery Status                    example: "12.6 V"



Instructor Theory	Instructor Activity
-------------------	---------------------

**III. Self-Test**

- A. Self test is a troubleshooting aid which allows operators or maintenance personnel to check the radio's performance to the module level.
- B. The display is first tested with all the display elements lit at 50% brightness. The radio then displays the hold-up-battery status followed by the battery pack status. If a fault is detected, the LED display shows a fault code. If all the tests are passed, **PASSED** is displayed.
- C. Set RADIO mode control to any position *except* PRGRM or RMT.
- D. When display blanks, push TEST/LOAD.
- E. Display:
  - Battery voltage
  - Fault code or "PASSED"
- F. Handset:
  - Beeps for one second if an error occurs

Refer to Section 3.5.1 of the AN/PRC-117D(C) Instruction Manual

Display  
Overhead 2-8

**Have students perform**

	Instructor Theory	Instructor Activity
--	-------------------	---------------------

**IV. Self-Test Fault Codes**

- A. A01 Antenna Tuner/Filter Module
- B. A03 Microprocessor Module
- C. A04 Power Supply Module
- D. A05 Audio Module
- E. A06 Modem Module
- F. A07 Frequency Synthesizer Module
- G. A08 Receiver Module
- H. A09 Transmitter Module
- I. A10 Front Panel Assembly

Display  
Overhead 2-9

Instructor Theory

Instructor Activity

V. Common Self-Test Observations

A. Flashing battery voltage (below 11.0V):

- Replace battery.
- B. A05 fault:
  - Possible interference on channel frequency; disconnect antenna and re-initiate self-test.
- C. A08 fault:
  - Possible interference hindering squelch test; disconnect antenna and re-initiate self-test.
- D. A09 fault:
  - Radio may be configured for data operations without supporting device.
- E. A10 fault:
  - Radio may be attempting output power test with no load attached. Connect antenna and re-initiate self-test.
  - External audio/data device may be attached to front panel. Disconnect device and re-initiate self-test.

Display  
Overhead 2-10

Instructor Theory	Instructor Activity
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### Review Questions

1. MHz, KHz
2. TEST LOAD
3. DISPLAY DIM/WSPR
4. Z ALL, Z 1-5
5. Refer to page 2-7, table 2-2 of student guide.
6. COMSEC initialization
7. TEST LOAD
8. Self Test
9. Turn the R/T in for maintenance.

Instructor Theory	Instructor Activity
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### Lab Assignment

1. Discuss the procedures that will be performed in the Lab:
  - Power Up
  - Zeroize the Radio
  - Comsec Initialization
  - Self Identity Test
  - Self Test
  - AM Squelch
2. Have the students perform the procedures in the LAB.

Refer to page 2-15 of the Student Guide.

## Unit #3

### Plain-text Operation

**Purpose:** Learn the procedures to setup and operate the AN/PRC-117D(C) in the plain text mode.

**Instructor Materials:** Overhead projector with Projection Screen  
Overhead Displays 3-1 thru 3-6  
Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:** AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna

**Method:**

Lecture, Demo, Lab

**Task:**

Learn the procedures to setup and operate the AN/PRC-117D(C) for plain-text operations.

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 6 of 8 summary questions on the Plain Text Operation of the AN/PRC 117D(C).
2. Setup and operate the AN/PRC-117D(C) in the plain text mode.

Instructor Theory	Instructor Activity
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**I. Programming Overview**

**A. Channel use:**

1. Manual channel ("M") – Parameters may be changed without leaving operational mode as set on RADIO mode control or pushing TEST/LOAD after changes.
2. Programmable channels ("1-7") – Channels must be programmed in PRGRM mode. TEST/LOAD must be pushed to enter each parameter.

**B. Channel parameters:**

1. Frequency
  - VHF-LO: 30.000MHz – 89.975MHz
  - VHF-HI: 116.000MHz – 173.995MHz
  - UHF: 225.000MHz – 419.995MHz
2. The channel bandwidth can be selected for UHF frequencies only. Selecting BW> Wide allows 25 kHz SATCOM or UHF LOS. Selecting BW>Nar allows 5 kHz SATCOM.
3. Mode
  - VHF-LO: FM only
  - VHF-HI: FM, AM
  - UHF: FM, AM
4. When the XMT POWER control is set to LO, power output is user programmable. The power level is adjusted for 1, 2, 4, 6, 8, and 10 Watts (4 – 20 Watts in SATCOM 292 – 317.995 MHz). The transmit power level is reset to 1 W (4W in SATCOM) when the frequency or mode is changed or the radio is powered off.

Refer to Section 3.9 of the AN/PRC-117D(C) Instruction Manual  
Display  
Overhead 3-1

Display  
Overhead 3-2



Instructor Theory	Instructor Activity
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**II. Squelch**

Refer to Section 3.5.2 of the AN/PRC-117D(C) Instruction Manual

**A. Plain-Text FM squelch operation:**

- OFF – No squelch.
- NOISE – The receiver unsquelches when the received signal level is approximately 10dB SINAD.
- TONE – The received signal must be modulated by a 150-Hz subcarrier tone.

**NOTE**

Regardless of squelch setting, noise squelch mode is utilized in VHF-Hi and UHF bands.

**B. Plain-Text AM squelch operation:**

- OFF – No squelch is applied. In the absence of a signal, a rushing sound comes from the handset.
- NOISE (AM SQL HI – Set by menu) – The receiver is squelched in the absence of a signal. The radio unsquelches when the received signal power level is equal to or greater than sensitivity.
- NOISE (AM SQL LO – Set by menu) – The receiver is squelched in the absence of a signal. The radio unsquelches when the received signal power level is less than the above setting.

Instructor Theory	Instructor Activity
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**III. Manual Channel Setup**

- A. Set CHANNEL selector to M.
- B. Set RADIO mode control to OFF, NOISE or TONE.
- C. Set COMSEC mode control to P.
- D. Push DISPLAY to display frequency. (Display must be lit to change any parameter.)
- E. Toggle MHZ and KHZ switches to select frequency.
- F. If a transmit frequency other than the default is desired (half-duplex);
  - 1. Key the handset while RX frequency is displayed to display TX frequency.
  - 2. Repeat step 5 while keeping the handset keyed to select TX frequency.
  - 3. Unkey handset.
- G. 7. UHF only:
  - 1. Push DISPLAY to display "BW> Wide" or "BW> Nar".
  - 2. Toggle KHZ to select wide or narrow bandwidth.
- H. 8. VHF-HI and WB UHF only:
  - 1. Push DISPLAY to display "MODE> AM" or "MODE> FM".
  - 2. Toggle KHZ to select AM or FM.
- I. 9. Push DISPLAY.
- J. 10. Toggle KHZ switch to select TX power (LOW power only).

Refer to Section 3.9.1 of the AN/PRC-117D(C) Instruction Manual

**Have students perform**

- Display  
Overhead 3-3
- Display  
Overhead 3-4

Instructor Theory	Instructor Activity
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- K. If a transmit frequency other than the default is desired (half-duplex);
1. Key the handset while RX frequency is displayed to display TX frequency.
  2. Repeat step 5 while keeping the handset keyed to select TX frequency.
  3. Push TEST/LOAD.
  4. Unkey handset.
- L. UHF only:
1. Push DISPLAY to display "BW> Wide" or "BW> Nar".
  2. Toggle KHZ to select wide or narrow bandwidth.
  3. Push TEST/LOAD.
- M. VHF-HI and WB UHF only:
1. Push DISPLAY to display "Mode> AM" or "Mode> FM".
  2. Toggle KHZ to select AM or FM.
  3. Push TEST/LOAD.
- N. Push DISPLAY.
- O. Toggle KHZ switch to select TX power (LOW power only).
- P. Push TEST/LOAD.
- Q. Set RADIO mode control to OFF, NOISE or TONE.
- Display  
Overhead 3-7

Instructor Theory	Instructor Activity
-------------------	---------------------

#### IV. Plain Text Voice Operation

Refer to Section 3.5.2 of the AN/PRC-117D(C) Instruction Manual

- A. Set CHANNEL selector to desired channel.
- B. Set RADIO mode control to OFF, NOISE or TONE.
  1. For plain-text FM operation the squelch positions operate as described below.
    - OFF – No squelch is applied.
    - NOISE – The receiver is squelched in the absence of a signal. Unsquelches at the 10 dB SINAD level.
    - TONE – The receiver is squelched unless the received signal has the proper characteristics. The received signal must be modulated by a 150-Hz subcarrier tone. Signal power must be equal to that for NOISE SQUELCH.
    - In VHF-Hi and UHF only NOISE SQUELCH is used.
  2. For plain-text AM operation the squelch positions operate as described below.
    - OFF – No squelch is applied.
    - NOISE (AM SQL HI – Set by menu) – The receiver is squelched in the absence of a signal. Unsquelches at approximately the 15 dB SINAD level.
    - NOISE (AM SQL LO – Set by menu) – The receiver is squelched in the absence of a signal. The radio unsquelches when the received signal power level is at approximately the 4 dB SINAD level.
    - TONE SQUELCH is not used in AM.
- C. Set COMSEC mode control to P.
- D. Key the handset.

Instructor Theory	Instructor Activity
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**V. Plain Text Data Operation**

Refer to Section 3.12.1 of  
the AN/PRC-117D(C)  
Instruction Manual

- A. The manpack transceiver can be used with data devices the meet MIL-STD-188-114A specifications.
- B. When performing plain-text data operations the data is asynchronous so no transmit or receive clock is needed.
- C. When a data device with a data rate of other than 16 kbps is used during ECCM or REXMT operations, an external squelch signal (ground applied) must be applied to the DATA IN/ANALOG DATA MODE/EXTERNAL SQUELCH pin F of the AUDIO/DATA connector.
- D. Attach the data device to the front panel AUDIO/DATA connector:
  - 1. The digital data mode control pin E must be grounded.
- E. Set CHANNEL selector to desired channel.
- F. Set RADIO mode control to OFF, NOISE or TONE.
- G. Set COMSEC mode control to P.
- H. Key the handset.

Instructor Theory	Instructor Activity
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### Review Questions

1. PROGRAM
2. UHF
3. AM, COMSEC
4. P
5. TRANSMIT
6. DISPLAY
7. DATA DEVICES
8. ASYNCHRONOUS

Instructor Theory	Instructor Activity
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### Lab Assignment

1. Discuss the procedures that will be performed in the Lab:
  - Programming simplex channels
  - Programming half duplex channels
  - Programming VHF-Hi frequencies
  - Programming UHF frequencies
  - Programming all channels
2. Have the students perform the procedures in the LAB.

Refer to page 3-11 of the Student Guide.

## Unit #4

# COMSEC Operation

**Purpose:** Learn the procedures to setup and operate the AN/PRC-117D(C) in the COMSEC mode.

**Instructor Materials:** Overhead projector with Projection Screen  
Overhead Displays 5-1 thru 5-13  
Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:** AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna  
Fill Device



**Method:**

Lecture, Demo, Lab

**Task:**

Learn the procedures to set up and operate the AN/PRC-117D(C) COMSEC operations, COMSEC SARK operations, and COMSEC SAC operations.

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 7 of 10 summary questions on the COMSEC Operation of the AN/PRC 117D(C).
2. Setup and operate the AN/PRC-117D(C) in the COMSEC mode.

Instructor Theory	Instructor Activity
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**I. COMSEC Overview**

- A. Allows the transceiver to process signals so that their information content can be extracted only by those authorized and equipped to do so.
- B. TSEC/KY-57 (VINSON) compatibility in voice and data modes
- C. 5 traffic variables – any of which can be linked to any channel or group or channels.
- D. 1 rekey variable – can be preserved during zeroization of traffic variables.
- E. # scratchpad variable – used during rekey operations instead of variable 5.
- F. Variable locations can be filled, linked and zeroized without affecting channel parameters.
- G. For cipher-text, single frequency operation, the radio is squelched automatically so the squelch position of the RADIO mode control is ignored.
- H. For cipher-text, ECCM operation, the radio operates exactly as it does for plain-text ECCM operation
- I. A plain-text signal may be received in single frequency cipher-text operation, if the radio transmitting in plain text is on the same frequency and is transmitting a 150-Hz tone.
- J. For ECCM cipher-text operation, a plain-text signal may be received if the receiving and transmitting radios have the same code and bandwidth.
- K. Plain text received in cipher-text operation only needs the 150-Hz tone in the 30 – 89.975 MHz band. For the 116 – 173.995 MHz band, NOISE squelch is used exclusively.
- L. When a plain-text signal is received in cipher-text operation, a double beep is heard at the beginning of the signal and repeated every ten seconds.

Refer to Section 3.11 of the AN/PRC-117D(C) Instruction Manual Display Overhead 5-1

Instructor Theory	Instructor Activity
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**II. COMSEC Zeroize**

- A. To zeroize only crypto variables 1 through 5, pull out and turn the COMSEC mode control to the Z 1-5 position. (Variables in registers number 6 and # will be preserved).
- B. Display:
  - "COMSEC 0"
- C. To zeroize all crypto-variables (including 6 and #), pull out and turn the COMSEC mode control to the Z ALL position. It also erases all programmable values if the XMT POWER switch is turned on.
- D. Display:
  - "COMSEC 0"
- E. COMSEC zeroization erases only the specified crypto variables.

Refer to Section 3.11.4 of the AN/PRC-117D(C) Instruction Manual

Display  
Overhead 5-2

Display  
Overhead 5-3

Instructor Theory

Instructor Activity

**III. Loading COMSEC Variables**

- A. Crypto variables are loaded into the crypto variable storage locations by attaching a fill device i.e., KOI-18, KYK-13, or KYX-15 to the FILL connector on the front panel.
- B. Connect fill device to FILL connector. Turn fill device on and select desired variable.
- C. Set RADIO mode control to OFF, NOISE or TONE.
- D. Set COMSEC mode control to LD.
- E. Push DISPLAY.
- F. Display:
  - "1< Ready"
- G. Toggle MHZ switch to select desired variable storage location.
- H. Push TEST/LOAD.
- I. If rapid beeps are heard in handset, key handset twice to initialize COMSEC.
- J. Key handset.
- K. Display:
  - "Wait", then "LD OK", "No LD" or "Bad LD".
- L. If display does not read "LD OK", key handset again.
- M. If display still does not read "LD OK", confirm fill device is turned on and programmed.
- N. Repeat steps 5,6,7, and 9 as necessary.
- O. Return COMSEC mode control to desired position.

Refer to Section 3.11.2 of the AN/PRC-117D(C) Instruction Manual  
Display  
Overhead 5-4

Display  
Overhead 5-5

Instructor Theory

Instructor Activity

**IV. Linking COMSEC Variables**

- A. There are six crypto variable storage locations that can be associated with each channel on the manpack transceiver. Five of these locations (1-5) are used for storing cryptonet variables (CNV) and the sixth is used for the rekey variable (RKV).
- B. Set CHANNEL control to desired channel.
- C. Set COMSEC mode control to LD.
- D. Set RADIO mode control to PRGRM.
- E. Push DISPLAY.
  - 1. Display:
    - "(Variable number)>(Channel frequency)"
- F. Toggle MHZ to select desired variable.
- G. Push TEST/LOAD.
- H. Repeat steps 1, 4, 5, and 6 as necessary.
- I. Return RADIO mode control to OFF, NOISE or TONE.
- J. Return COMSEC mode control to TD OR C.

Refer to Section 3.11.1 of the AN/PRC-117D(C) Instruction Manual Display Overhead 5-6

Instructor Theory	Instructor Activity
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**V. COMSEC Voice Operation**

- A. Turn CHANNEL selector to desired channel.
- B. Turn RADIO mode control to desired operational mode.
  - 1. For cipher-text, single channel operation, the radio is squelched automatically so the squelch position of the RADIO mode control is ignored.
  - 2. For cipher-text, ECCM operation, the radio operates exactly as it does for plain-text ECCM operation so that both TONE squelch and NOISE squelch ECCM transmission are possible.
- C. Turn COMSEC mode control to TD (time delay) or C (COMSEC).
- D. If rapid beeping is heard in handset, key handset twice, slowly and firmly.
- E. If continuous tone is heard in handset, crypto-variables may be missing or corrupted. Initiate fill procedure.
- F. The continuous tone will not sound if there is at least one variable position filled. To assure successful communication, the same crypto-variable must be loaded and linked to each channel on which concurrent traffic is expected.
- G. Key the handset.

Refer to Section 3.5.2.4  
of the AN/PRC-117D(C)  
Instruction Manual  
Display  
Overhead 5-7

Instructor Theory	Instructor Activity
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**VI. COMSEC Data Operation**

Refer to Section 3.12.2 of the AN/PRC-117D(C) Instruction Manual

- A. The manpack transceiver can be used with data devices that meet MIL-STD-188-114A specifications, such as the RF-3490 Digital Data Buffer/Processor.
- B. For cipher-text data operation, attach the data device to the front panel AUDIO/DATA connector. Data must be 16 kbps for proper operation. The digital data mode control pin E must be grounded.
- C. Analog data can be used by attaching the appropriate device and grounding the analog data mode control pin. Analog data mode is asynchronous and does not require a clock.
- D. Turn CHANNEL selector to desired channel.
- E. Turn RADIO mode control to desired operational mode.
  1. For cipher-text, non-ECCM operation, the radio is squelched automatically so the squelch position of the RADIO mode control is ignored.
  2. For cipher-text, ECCM operation, the radio operates exactly as it does for plain-text ECCM operation so that both TONE squelch and NOISE squelch ECCM transmission are possible.
- F. Turn COMSEC mode control to TD (time delay) or C (COMSEC).
- G. If rapid beeping is heard in handset, key handset twice, slowly and firmly.
- H. If continuous tone is heard in handset, crypto-variables may be missing or corrupted. Initiate fill procedure.
- I. The continuous tone will not sound if there is at least one variable position filled. To assure successful communication, the same crypto-variable must be loaded and linked to each channel on which concurrent traffic is expected.
- J. Key the handset.

Instructor Theory	Instructor Activity
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**VII.SARK Overview**

- A. Transmit crypto-variables in encrypted format to one or a group of radios in a net. Variables are then linked to radio channels as required by the receiving unit operator.
- B. KY-57 VINSON compatible
- C. Transmitting radio keyed by net control device (such as KYX-15).

Refer to Section 3.11.3 of the AN/PRC-117D(C) Instruction Manual  
Display  
Overhead 5-8



Instructor Theory

Instructor Activity

**VIII. SARK Operation**

**A. Transmitting Radio:**

1. Set CHANNEL selector to desired channel.
2. **NOTE:** Transmitting and receiving radios must have common crypto variable linked to operating channel, and same rekey variable (variable #6).
3. Set RADIO mode control to OFF, NOISE or TONE.
4. Set COMSEC mode control to C or TD.
5. Attach net control device to FILL connector. Device will key radio to transmit keys.

**B. Receiving Radio:**

1. Set CHANNEL selector to desired channel.
2. **NOTE:** Operating channel must be configured identically to that of transmitting radio.
3. Set RADIO mode control to OFF, NOISE or TONE.
4. Set COMSEC mode control to RV.
5. Press DISPLAY.
6. Display:
  - Variable storage location and channel frequency.
7. To change variable location for received variable, toggle MHZ switch to select variable, and press TEST/LOAD.

Refer to Section 3.11.3.1  
of the AN/PRC-117D(C)  
Instruction Manual  
Display  
Overhead 5-9

Refer to Section 3.11.3.2  
of the AN/PRC-117D(C)  
Instruction Manual  
Display  
Overhead 5-10

Instructor Theory	Instructor Activity
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**IX. Stand-Alone COMSEC (SAC) Overview**

Refer to Section 3.11.5 of the AN/PRC-117D(C) Instruction Manual

- A. Allows operator to use radio as a COMSEC device for another radio which does not feature COMSEC.
- B. Receiver and transmitter are disabled during SAC operation.
- C. SAC cable required for operation; design depends on radios used.

Display  
Overhead 5-11

**X. Stand-Alone COMSEC (SAC) Operation**

Display  
Overhead 5-12

- A. Set CHANNEL selector to desired channel.
- B. Set RADIO mode control to OFF, NOISE, TONE or REXMT.
- C. Set COMSEC mode control to TD, C or RV.

Display  
Overhead 5-13

- D. Attach SAC cable to REXMT connector.

- E. Push DISPLAY.

- F. Display:

- G. Set CHANNEL selector to number of desired crypto-variable.

- H. Ch. M and 7 default to crypto-variable #1.

- I. Key handset.

- 1. Display:

- SAC TX indicator "T".

Instructor Theory	Instructor Activity
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### Review Questions

1. PRGRM, LD
2. Z ALL or Z 1-5
3. plain - text signal
4. 16 KBPS synchronous
5. Rekey the radio
6. TD, C
7. SAC
8. TEST/LOAD
9. DISABLED
10. REXMIT connector

Instructor Theory	Instructor Activity
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### Lab Assignment

1. Discuss the procedures that will be performed in the Lab:
  - Loading COMSEC variables
  - Linking COMSEC variables
  - COMSEC voice operations (Non- ECCM)
  - COMSEC voice operations (ECCM)
  - Saville advanced rekey (SARK) operation
  - COMSEC Zeroize
2. Have the students perform the procedures in the LAB.

Refer to page 5-12 of the Student Guide.

## Unit #5

# Scan Operation

**Purpose:** Learn the procedures to setup and operate the AN/PRC-117D(C) in the scan mode.

**Instructor Materials:** Overhead projector with Projection Screen  
Overhead Displays 6-1 and 6-2  
Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:** AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna

**Method:**

Lecture, Demo, Lab

**Task:**

Learn the procedures to setup and operate the AN/PRC-117D(C) to scan.

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 4 of 5 summary questions on Scan Operation of the AN/PRC 117D(C).
2. Setup and operate the AN/PRC-117D(C) in the Scan mode.

Instructor Theory	Instructor Activity
<p><b>I. SCAN Mode Overview</b></p> <p>A. The AN/PRC-117D(C) is capable of scanning all available bands (VHF-Lo, VHF-Hi, and UHF) either individually or simultaneously. This requires that an antenna configuration consists of the following:</p> <ol style="list-style-type: none"><li>1. Either the VHF-Lo blade or whip antenna must be installed in the ANT connector;</li><li>2. and</li><li>3. The VHF-Hi/UHF antenna must be installed in the 50 ohm antenna connector.</li></ol> <p>B. If a plain-text signal is received when the COMSEC mode control is set for P, TD, or C; a P and the channel number will be displayed.</p> <p>C. A cipher signal cannot be received if the COMSEC mode control is set for P</p> <p>D. For best performance in SCAN mode, the transmitting radio should be in TD during cipher operation.</p> <p>E. The radio scans at a rate of approximately ten channels per second. When scanning fewer than eight channels, it may be advantageous to load the same frequencies more than once, using otherwise unused channels to shorten scan response time.</p> <p>F. The radio normally transmits on the channel selected on the front panel.</p>	<p>Refer to Section 3.13 of the AN/PRC-117D(C) Instruction Manual</p>

Instructor Theory	Instructor Activity
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- G. Keying up within three seconds after receiving a scan call initiates the Answer-Back scan feature. This allows transmission in the SCAN mode on the channel that just received the scan call, regardless of where the CHANNEL control is set.
- H. The radio cannot detect ECCM transmission while in SCAN mode, and the radio does not transmit with a frequency-hopping signal when keyed in SCAN mode.
- I. In SCAN mode, the radio treats ECCM channels the same as other radio channels; it scans for a signal at the frequency entered in any of these channels. It transmits when keyed, but this transmission is standard single channel transmission, not ECCM frequency-hopping transmission.



Instructor Theory	Instructor Activity
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**II. SCAN Mode Operation**

Refer to Section 3.13.1 of the AN/PRC-117D(C) Instruction Manual  
Display Overhead 6-1

- A. Connect VHF-LO blade or whip antenna to ANT connector, or connect VHF-HI/UHF antenna to 50 ohm connector.
- B. If performing multi-band scan including VHF-LO band, both antennae must be installed.
- C. Program channels as desired.
- D. Set the CHANNEL selector to the desired channel. (Keying is allowed on this channel.)
- E. Set RADIO mode control to SCAN.

Display Overhead 6-2

- 1. Display:
  - Blinking "dot"
- F. If message is received:
  - 1. COMSEC type and receiving channel number appear in display.
  - 2. Transceiver locks in channel as long as message is received.
  - 3. After 5s, display blanks.
  - 4. Transceiver will not receive COMSEC transmissions if receiving channel is configured for plain-text.
  - 5. Only single-channel communications are permitted on channels configured for ECCM.

Instructor Theory	Instructor Activity
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- G. To transmit in SCAN mode:
  - 1. Key handset within three seconds of receiving a SCAN call.
  - 2. Radio will transmit on receiving channel.
- H. Radio must be in same COMSEC mode as received signal for answer-back to be functional.
- I. After contact is broken, SCAN mode resumes.

Instructor Theory	Instructor Activity
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### Review Questions

1. 10
2. ECCM
3. 3
4. P
5. VHF-LO blade or whip antenna, VHF-HI/UHF antenna

Instructor Theory	Instructor Activity
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### Lab Assignment

1. Discuss the procedures that will be performed in the Lab:  
Scan mode operation
2. Have the students perform the procedures in the LAB.

Refer to page 6-6 of the Student Guide.

## Unit #6

# Satellite Operation

**Purpose:** Learn the procedures to setup and operate the AN/PRC-117D(C) for satellite operations.

**Instructor Materials:** Overhead projector with Projection Screen  
Overhead Displays 7-1 thru 7-4  
Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:** AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna  
SUNBURST or ANDVT

**Method:**

Lecture, Demo, Lab

**Task:**

Learn the procedures to setup and operate the AN/PRC-117D(C) for satellite operations.

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 4 of 5 summary questions on Satellite Operation of the AN/PRC 117D(C).
2. Setup and operate the AN/PRC-117D(C) for satellite operation.

Instructor Theory	Instructor Activity
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**I. Satellite Overview**

Refer to Section 3.7 of the AN/PRC-117D(C) Instruction Manual

- A. The AN/PRC-117D(C) is capable of UHF TACSAT. During TACSAT operations, the AN/PRC-117D(C) should have a transmit frequency between 292 - 317.995 MHz, and a receive frequency between 240.000 - 270.000 MHz.
- B. When a transmit frequency is set between 292 - 317.995 MHz, the AN/PRC-117D(C) low power setting will default to 4 watts.
- C. Satellite operations can be performed with the bandwidth set for narrow or wide.
  - 1. If communicating with a narrowband satellite the radios SATCOM modem must be turned on. If performing cipher operations with a narrowband satellite an external COMSEC device is required.

Instructor Theory	Instructor Activity
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**II. Narrowband Satellite Operations**

- A. Set RADIO mode control to PRGRM.
- B. Set COMSEC mode control to P.
- C. Set CHANNEL selector to desired channel.
- D. Push DISPLAY until RX frequency is displayed.
- E. Toggle MHZ and KHZ switches to select desired frequency.
- F. Push TEST/LOAD.
- G. Push DISPLAY until "BW> Wide" or "BW> Nar" is displayed.
- H. Toggle KHZ switch until display reads "BW> Nar".
- I. Push TEST/LOAD.
- J. Push DISPLAY until low power level is displayed.
- K. Toggle KHZ switch to select desired LOW power level.

Display  
Overhead 7-3



Instructor Theory	Instructor Activity
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- L. Push TEST/LOAD.
- M. Push DISPLAY until RX frequency is displayed.
- N. Key handset to display TX frequency.
- O. While keying, toggle MHZ and KHZ switches to select desired TX frequency.
- P. Push TEST/LOAD.
- Q. Unkey handset.
- R. Review programming by repeatedly pushing DISPLAY. Check TX frequency by keying handset while RX frequency is displayed.
- S. After display blanks, push and hold TEST/LOAD until "RADIO OP" or "CH SETUP" is displayed.
- T. Push DISPLAY until "CH SETUP" is displayed.
- U. Toggle the MHZ switch until "MODM> Std", "MODM, Dif" or "MODM> Off" is displayed.
- V. Toggle the KHZ switch until "MODM> Dif" is displayed.
- W. Push TEST/LOAD.
- X. Attach the "Y" portion of the SUNBURST or ANDVT interface cable to the AUDIO/DATA and REXMT connectors.
- Y. If using SUNBURST, set to EXTENDED PHASING. Follow setup instructions for appropriate encryption device.

Display  
Overhead 7-3

Instructor Theory	Instructor Activity
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**III. Wideband Satellite Operations**

- A. Set RADIO mode control to PRGRM.
- B. Turn CHANNEL selector to desired channel.
- C. Push DISPLAY.
  - 1. Display:
    - Channel frequency
- D. Toggle MHZ and KHZ switches to select RX frequency.
- E. Push TEST/LOAD.
- F. Push DISPLAY.
  - 1. Display:
    - "BW> Wide" or "BW> Nar"
- G. Toggle KHZ switch until display reads "BW> Wide".
- H. Push TEST/LOAD.
  - 1. Display:
    - "Mode> FM" or "Mode> AM"

Display  
Overhead 7-1

Instructor Theory	Instructor Activity
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- I. Toggle KHZ switch until display reads "Mode> FM".
- J. Push TEST/LOAD.
- K. Push DISPLAY.
  - 1. Display:
    - Power level
- L. Toggle KHZ switch to set LOW power level.
- M. Push TEST/LOAD.
- N. Push DISPLAY until RX frequency is displayed.
- O. Key and hold handset.
  - 1. Display:
    - TX frequency
- P. While handset is keyed, toggle MHZ and KHZ switches to select TX frequency.
- Q. Push TEST/LOAD.
- R. Unkey handset.
- S. Frequency offset can be checked by keying the handset while the display is lit.

Display  
Overhead 7-2

Instructor Theory

Instructor Activity

## Review Questions

1. 243-317 MHz UHF
2. SATCOM modem
3. COMSEC device
4. FM
5. 4

Instructor Theory	Instructor Activity
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### Lab Assignment

1. Discuss the procedures that will be performed in the Lab:  
Wideband satellite operations  
Narrowband satellite operations
2. Have the students perform the procedures in the LAB.

Refer to page 7-8 of the Student Guide.

## Unit #7

# Retransmit Operation

**Purpose:** Learn the procedures to setup and operate the AN/PRC-117D(C) for retransmitting.

**Instructor Materials:** Overhead projector with Projection Screen  
Overhead Displays 8-1 thru 8-3  
Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:** Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:** AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna  
Backpack Harness

**Method:**

Lecture, Demo, Lab

**Task:**

Learn the procedures to setup and operate the AN/PRC-117D(C) for retransmit operations.

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 4 of 5 summary questions on Retransmit Operation of the AN/PRC 117D(C).
2. Setup and operate the AN/PRC-117D(C) for retransmit operations.

Instructor Theory

Instructor Activity

**I. Retransmit Operation – Overview**

- A. A retransmission or repeater station receives a signal transmitted at one frequency and retransmits it at another frequency, enabling communications over a greater range than using individual radios. There are two ways the AN/PRC-117D(C) can be setup for retransmit operations:
  - 1. Simplex operation, commonly termed retransmission,, uses one frequency (F1) to communicate with one group of radios and a second frequency to communicate with a second group of radios.
  - 2. Half-duplex operations, commonly termed repeater operation, only receives on a single frequency (F1), and only transmits on a single frequency (F2). With this setup, all radios use the repeater to transmit on F1 and receive on F2.
  
- B. When performing retransmit operations it is recommended that the repeater be set to tone squelch, and it must be set to tone squelch for ECCM retransmissions.

Refer to Section 3.15 of the AN/PRC-117D(C) Instruction Manual Display Overhead 8-1



Instructor Theory	Instructor Activity
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**II. Retransmit Operation**

- A. Follow steps for both R/Ts used in retransmission/repeater station:
- B. Set CHANNEL selector to desired channel.
- C. Set RADIO mode control to REXMT.
- D. Set COMSEC mode control to P, TD or C. (In cipher operation, use TD for best results.)
- E. Attach retransmit cable to REXMT connector.
- F. A handset can be attached to the receiving radio to monitor incoming signals. If in cipher mode, correct variable must be loaded to monitor signals.

Refer to Section 3.15.3 of the AN/PRC-117D(C) Instruction Manual  
Display Overhead 8-2  
Display Overhead 8-3

Instructor Theory	Instructor Activity
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### Review Questions

1. TRANSMIT, RECEIVE
2. TONE
3. COMSEC variable
4. 10 MHz

Instructor Theory	Instructor Activity
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### Lab Assignment

1. Discuss the procedures that will be performed in the Lab:  
Simplex operation  
Half-duplex operation
2. Have the students perform the procedures in the LAB.

Refer to page 8-5 of the Student Guide.

## Unit #8

# ECCM Operation

**Purpose:**

Learn the procedures to setup and operate the AN/PRC-117D(C) in the ECCM mode.

**Instructor Materials:**

Overhead projector with Projection Screen  
Overhead Displays 4-1 thru 4-6  
Student Guide  
AN/PRC-117D(C) Instruction Manual

**Student Materials:**

Student Guide  
AN/PRC-117D(C) Instruction Manual

**Equipment:**

AN/PRC 117D(C) Manpack  
Handset  
Battery Pack  
VHF-Low Manpack Blade Antenna  
VHF-Low Manpack Antenna Kit  
VHF-Hi/UHF Manpack Antenna

**Method:**

Lecture, Demo, Lab

**Task:**

Learn the procedures to setup and operate the AN/PRC-117D(C) for ECCM operations.

**Standard:**

Using this Student Guide as reference material the student will be required to successfully complete the following to meet the minimum lesson objectives.

1. Correctly answer at least 6 of 8 summary questions on ECCM Operation of the AN/PRC 117D(C).
2. Setup and operate the AN/PRC-117D(C) for ECCM operations.

Instructor Theory	Instructor Activity
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**I. ECCM (Quick Look) Overview**

- A. Automatic frequency-hopping on programmed channels.

**NOTE**

ECCM frequency-hopping capabilities are disabled when the frequency is in the following regions 292 – 317.995 MHz, 116 – 120 MHz or 170 – 174 MHz.

- B. Programmed with 6-digit ECCM codes rather than with frequencies.
- C. The six-digit number determines part of the pseudorandom hopping pattern for ECCM transmission and reception on this channel.
- D. The ECCM bandwidth defaults to a 5-MHz (narrow) band.
- E. If bandwidth is changed from the default the radio will be operating in (wideband) hopping.
- F. This selection can be made anywhere in the range of the selected band (VHF, VHF-Hi, UHF), but the bandwidth must always remain a multiple of 5 MHz; e.g., 5, 10 ..... 60 MHz.
- G. Hopping bandwidths:
  - 1. VHF-LO: 5-60MHz
  - 2. VHF-HI: 5-50MHz
  - 3. UHF: 5-165MHz
- H. A second six-digit ECCM code can be entered by keying the handset.
- I. Synchronization controlled by the transmitting radios squelch setting.

Refer to Section 3.10 of the AN/PRC-117D(C) Instruction Manual

Display  
Overhead 4-1

Instructor Theory	Instructor Activity
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- J. Two squelch settings for ECCM transmission, each compatible with the other:
1. TONE SQUELCH ECCM
    - The transmitter sends a burst of synchronizing characters each time the handset is keyed and unkeyed. The handset beeps each time the radio is keyed.
  2. NOISE SQUELCH ECCM – RADIO mode control in NOISE or OFF
    - The transmitter sends a synchronizing burst when first keyed, but only intermittently thereafter.
- K. If bandwidth is in VHF-LO band (30-90MHz), must be operated in TONE squelch.
- L. It is recommended to set all network radios to the same SQUELCH mode. Radios set for different SQUELCH ECCM modes are fully compatible within the network.
- M. Disabled when the frequency is in the SATCOM region (292-317.995 MHz).
- N. The SCAN feature of the radio does not detect ECCM frequency-hopping signals. In SCAN mode, keying does not initiate frequency-hopping transmission.

Refer to Section 3.5.2.3  
of the AN/PRC-117D(C)  
Instruction Manual

Instructor Theory	Instructor Activity
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**II. Programming ECCM Channels**

- A. Set COMSEC mode control to any position except LD.
- B. Set CHANNEL selector to desired channel.
- C. Set RADIO mode control to PRGRM.
- D. Push and hold TEST/LOAD until "RADIO OP" or "CH SETUP" is displayed.
- E. Push DISPLAY until "CH SETUP" is displayed.
- F. Toggle the MHZ switch until "TYP> Sngl" or "TYP> 117B" is displayed.
- G. Toggle the KHZ switch until "TYP> 117B" is displayed.
- H. Push TEST/LOAD.
- I. When display blanks, push DISPLAY to display 6-digit hop-code.
- J. Toggle MHZ and KHZ switches to select desired 6-digit hop code.
- K. Push TEST/LOAD.

Refer to Section 3.10.1 of the AN/PRC-117D(C) Instruction Manual  
Display Overhead 4-2  
Display Overhead 4-3



Instructor Theory	Instructor Activity
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- L. If wideband hopping is desired:
1. Press DISPLAY to display hopping bandwidth.
  2. Toggle MHZ switch to select lower band limit in megahertz.
  3. Toggle KHZ switch to select upper band limit.
  4. Press TEST/LOAD.
- M. If 12-digit hop-code is desired:
1. Key handset while 6-digit code is displayed.
  2. While holding key, toggle MHZ and KHZ switches until desired code extension is displayed. Extension code must be in same band as 6-digit code.
  3. Push TEST/LOAD.
  4. Unkey handset.
  5. Once display blanks, verify codes by pressing DISPLAY to display 6-digit code, and keying handset to display code extension for 12-digit code.
- N. Set RADIO mode control to OFF, NOISE or TONE.

Display  
Overhead 4-4

Instructor Theory	Instructor Activity
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**III. ECCM Operation**

Refer to Section 3.10.2 of the AN/PRC-117D(C) Instruction Manual

- A. ECCM communication between two or more transceivers requires identical setup conditions. The radios must have:
  - 1. Identically programmed frequency codes and bandwidths
  - 2. Identical jumper positions on the Signal Synchronizer Module A2 (Refer to the A2 Unit Instruction section.)
- B. In addition to these conditions, a compatible SQUELCH setting is recommended
- C. For ECCM cipher-text operation, a plain-text signal may be received if the receiving and transmitting radios have the same code and bandwidth.
  - 1. For VHF-LO needs 150 Hz tone.
  - 2. For VHF-HI noise squelch is used.
- D. Recommendations when using ECCM channels include the following:
  - 1. When keying the handset, wait for the beep to end before beginning to talk.
  - 2. When receiving, wait for the end-of-message beep before keying. This is especially important when using TONE SQUELCH ECCM.
- E. Set CHANNEL selector to desired ECCM channel.
- F. Set COMSEC mode control to P, TD or C.

Display  
Overhead 4-5

Instructor Theory	Instructor Activity
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- G. Set RADIO mode control to OFF, NOISE or TONE.
  - 1. OFF or NOISE: Noise Squelch ECCM
    - Synchronization burst sent at beginning of first transmission, intermittently thereafter if no more than 2-3s between transmissions.
    - Handset: Single beep at start of first transmission.
    - Advantage: Fewer sync bursts (increases difficulty of unauthorized monitoring or jamming).
  - 2. TONE: Tone Squelch ECCM
    - Synchronization burst sent with each transmission.
    - Handset: Single beep at start of each transmission.
    - Advantage: Less net dependence on single sync burst.
  - 3. Both Modes
    - Handset: Single beep at end of received message.

Instructor Theory	Instructor Activity
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### Review Questions

1. 292 – 317.995 MHz, 116 – 120 MHz or 170 – 174 MHz.
2. Scan
3. Tone squelch
4. LD
5. PRGRM
6. Clear-net channel
7. M
8. bandwidth

Instructor Theory

Instructor Activity

## Lab Assignment

1. Discuss the procedures that will be performed in the Lab:
  - Programming a narrowband 6-digit hop-code
  - Programming a narrowband 12-digit hop-code
  - Programming a wideband 6-digit hop-code
  - Programming a narrowband 12-digit hop-code
  - ECCM operation
  - ECCM clear net entry operation
2. Have the students perform the procedures in the LAB.

Refer to page 4-10 of the  
Student Guide.