

LXE INC.

INSTRUCTOR'S GUIDE FOR ACCELERATED INSTALL TRAINING

Course Objective

This course is designed to accelerate the students ability to install the LXE's, Mercury Generation of wireless terminals. This will be accomplished through hands on experience in: Installation and testing of three types of Local Area Networks. The installation of radio to antenna cables (Heliac). Determine and program equipment parameters as per the customers requirements to interface with various host computers. Establish communications between an LXE terminal and the customers application, utilizing an LDS, 3270, 5250 or TCP/IP protocol. Troubleshoot installed equipment down to the faulty module and return the system to a normal operating condition.

Course Overview

Module I	Introduction to Cable Building
Module II	Installation Prerequistets
Module III	Installation of Mercury Generation Equipment and Host to End User Communications
Module IV	Trouble Analysis and Repair

Intermediate Objectives

Termination of 10Base5 Local Area Networks (1.5 hr)

Given an LXE Field service Tool Kit, students will be able to successfully install and test a 10BASE5 (Thicknet) network, including AUI attachments and transceivers.

Termination of 10Base2 Local Area Networks (1.5 hr)

Given an Lxe Field service Tool Kit, students will be able to successfully install and test a 10BASE2 (Thinnet) network.

Termination of 10BaseT Local Area Networks (2.0 hr)

Given an Lxe Field service Tool Kit, students will be able to successfully install and test a 10BASE T (Unshielded Twisted Pair) network.

Termination of Radio to Antenna Cable (Heliac) (1.0 hr)

Given an Lxe Field service Tool Kit, students will be able to successfully install and test Radio to Antenna cables (Heliac).

Inventory Equipment, Verification of Mounting Locations and Customer Supplied Information (2.0 hr)

Given an LXE Installation folder and a Shipping Invoice, students will be able to inventory all necessary equipment required to perform an installation and verify designated mounting locations.

Given a list of application requirements, the students will be able to obtain all information essential for the installation from the customer.

Installation of Local Area Network and Antenna Cables (1.5 hr)

Given an LXE Field Service Tool Kit and an Installation folder, students will be able to install Antenna Cables and Local Area Networks as per the Facility Analysis Report.

Loading Software (10 hr)

Given an LXE Field Service Tool Kit and the appropriate Flash Code, students will be able to properly load and configure LXE's Mercury Generation of equipment to communicate with the following host emulations: LDS, 3270, 5250 and TCP/IP.

Trouble Analysis

(8 hr)

Given an LXE Field Service Tool Kit and an IFR, students will be able to diagnose failures in the Network Controller, RFU, Terminals and Local Area Networks. Once failures are diagnosed, students will be able to make the necessary repairs and bring the equipment to a normal operating condition.

Class Materials

Class materials listed below were calculated for a student roster of four. It is also required that the Course be instructed in Class Room A or B because of accessible host connections. All students are required to have an LXE Issued Tool Kit and Laptop Computer.

Parts Required

Thicknet/AUI

50 ft	6200L331	Thicknet PVC Cable
12	6200L306	Connector N Type M PVC Screw
5	6200L308	Connector N Type F Term
1	6200L350	Boot, N Type Term
1	6200L313	N Type Grounding Kit
20 ft	6200L335	Standard AUI Cable
8	6200L300	Connector AUI F
8	6200L301	Connector AUI M
5	6200L360	E'net Transceiver(Vamp Clamp)

Thinnet

55 ft	6200L329	Thinnet, PVC Cable
19	6200L303	Connector, BNC M PVC Crimp
2	6200L340	Terminator, BNC M
2	6200L302	Connector, BNC T

Heliac

5 ft	9887L04	Cable, RFU/ANT, 1/2" Heliac
5	9887L03	Connectors, RFU/ANT 1/2" Heliac

Twisted Pair

40 ft	6200L32	Twisted Pair Cable
17	6200L312	Connector RJ45 Plug
3	6200L325	Twisted Pair Transceiver

Equipment

4	6220 series	6220 Net. Cont. or Equivalent
4	6280RFU	6280 RFUs or Equivalent

6	HD Diskettes	Flash/Cons
4		DB25 to DB9 Null Modem Cable

Module I

Introduction

Welcome Class
 Introduce your self
 Course Title
 Building Layout (exit doors, bathrooms, break areas and telephones)
 Class Introduction (If four or less students)
 Questions
 Handouts

Termination of 10base5/AUI Local Area Network (1.5 hr)

Instructional Lab

AUI cable and Vamp Clamp/Transceiver	(Handout)
1) Handout Materials- One ft. Cable, Two Connectors and One Vamp Clamp/x'ceiver per Stu.	Max length. Pinout Cut Inst
2) Max cable lengths	
3) Attachment points/Max attachments	
4) Construct cable using cutting and crimping tool. (Inst. then Stu.)	

Termination of 10base2 Local Area Network (1.5 hr)

Instructional Lab

"T" adapters, Terminators, Transceiver	(Handout)
1) Handout Materials-Six ft. Cable and Two connectors per Stu.	Max length. Cut Inst.
2) Max cable lengths/Hubs & Concentrator	
3) Construct cable using cutting and	

crimping tool. (Inst. then Stu.)

Termination of 10base T Local Area Network (2.0 hr)

Instructional Lab

- | | |
|---|------------|
| Types of cables, Connectors/Transceiver | (Handout) |
| 1) Handout Materials-Three ft. cable and Two Connectors per Stu. | Max length |
| 1) Max Cable lengths/Hubs & Concentrator | Pinout |
| 2) Construct cable using cutting and crimping tool. (Inst. then Stu.) | |
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Termination of Radio to Antenna Cable (Heliac) (1.0 hr)

Instructional Lab

- | | |
|---|-------------|
| Types of LXE External RF Cables | (Handout) |
| 1) Handout Materials-One ft. Cable and One Connector per Stu. | Connector |
| 2) Heliac (Installation Caution) | Instruction |
| 3) Construct cable using cutting tools. (Inst. then Stu.) | |
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Module II

Inventory of Equipment/Setup Information and Verification of Mounting Locations

(2.0 hr)

Instructional Lecture

(Handout)

Inventory

- 1) Required RFUs, Network Controllers
- 2) Heliac, Host/Modem (DB 25)
- 3) AUI connectors/RJ45/BNC connectors
- 4) Terminals
- 5) Scanners/Holsters (If ordered)

Verification of Mounting

- 1) Network Controllers/AC Power
- 2) RFU Platform/AC Power
- 3) Ethernet Wiring/Heliac
- 4) Antennas

Equipment Setup Information

- 1) Host Information
 - A. TCP/IP (IP Address, Autologin, Gateway/Router, Host Name, Subnetmask Term. Type)
 - B. LDS Anyh (Line Speed, Xon/Xoff, Retry DTE/DCE, IP Address/Gateway)
 - C. IBM 3270 (Line type, Sta. Add., XID, NRZ, LU Term, IP Address/Gateway)
 - D. IBM 5250 (Line Type, NRZ, Cnt. Type, Sta. Add., DTE/DCE, IP Address/Gateway)

- 2) Terminal Parameters
 - A. Barcode Types/RS232
 - B. All Terminal Emulations
-
-
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Module III

<u>Installation of Local Area Network</u>	(1.0 hr)	<u>None Instructional Lab</u>
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- 1) Handout Materials
 - Stu #1 12 ft. of RG-58 cable, 2 BNC connectors, 2 "T" adapters and 2 terminators
 - Stu #2 12 ft. of RG-58 cable, 2 BNC connectors, 2 "T" adapters and 2 terminators
 - Stu #3 32 ft. of Type CL2 cable, 2 N Type connectors, 1 Vamp Clamp/X'ceiver, 1 terminator, one Ground Terminator and one boot(Isolator)
 - Stu #4 12 ft. of UTP cable, 2 RJ45 connectors, 2 UTP transceivers
 - 2) Stu. #1 At Station #1 Build Thinnet Network
 - 3) Stu. #2 At Station #2 Build Thinnet Network
 - 4) Stu. #3 At Station #3 Build Thicknet Network
 - 5) Stu. #4 At Station #4 Build UTP Network
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<u>Installation of Antenna Cable</u>	(.5 hr)
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Instructional Lecture

- 1) Mounting Antennas
- 2) Mounting Pigtail
- 3) Grooming Cables

Note: No Cables
Will be built.
Stu. will use
Local Antennas

Load NMWS Software/Connect Equip.

(2.0 hr)

None Instructional Lab

- 1) Each Student at Work Stations
- 2) Attach All Cables to Equip.

Note: Each Stu.
should be given
NMWS/Flash disks.

Loading Flash Software for various Emulations and RF Protocols

(4.0 hr)

None Instructional Lab

- 1) Stu. #1 Station #1 (LDS/NB)
Stu. #2 Station #2 (3270/NB)
Stu. #3 Station #3 (5250/SS)
Stu. #4 Station #4 (TCP/IP/SS)
 - 2) Stu. #1 Station #2 (3270/NB)
Stu. #2 Station #3 (5250/SS)
Stu. #3 Station #4 (TCP/IP)
Stu. #4 Station #1 (LDS/NB)
 - 3) Stu. #1 Station #3 (5250/SS)
Stu. #2 Station #4 (TCP/IP/SS)
Stu. #3 Station #1 (LDS/NB)
Stu. #4 Station #2 (3270/NB)
 - 4) Stu. #1 Station #4 (TCP/IP/SS)
Stu. #2 Station #1 (LDS/NB)
Stu. #3 Station #2 (3270/NB)
Stu. #4 Station #3 (5250/SS)
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(Handout)

Eng. Notice
#249

Note: Stu. uti-
lizing Eng.
Note. Install
Flash code.
After each
Step- Stu.
must proceed
thru Ini. Equi

Configuration Files**(2.0 hr)**None Instructional Lab

- 1) Network
- 2) Host

(Handout)

Eng. Notice

249. Setup

instruction should
be at station

Setup terminals to operate with Configured System (2.0 hr)None Instructional Lab

- 1) Download Emulation to Terminals
- 2) Configure Various Scanners

(Handout)

Eng. Notice

249

Scanner Handout

Setup handout

should be at station

Obtain Host Communications**(1.0 hr)**Instructional Lab

- 1) Check Systems for operation
- 2) Initialize Equipment-Instructor
- 3) Start Next session at Loading Flash

Initialize equipment- Instructor

All students change stations

Start instructions at LOADING FLASH

AFTER THIRD CHANGE DO NOT INITIALIZE EQUIPMENT

Module IV

Trouble Analysis

(8.0 hr)

None Instructional Lab

- 1) Stu. #1 station #1
A. Network bug in LAN
- 2) Stu. #2 Station #2
A. RF bug in RFU (disconnect cable from radio)
- 3) Stu. #3 Station #1
- 4) Stu. #4 Station #2
- 5) Stu. #1 Station #2
- 6) Stu. #2 Station #1
- 7) Stu. #3 Station #2
- 8) Stu. #4 Station #1
- 9) Stu. #1 Station #1
A. Software bug in Controller (Incorrect Cons)

Note: Only two
Stu. in Lab
while T'Shoot

10)Stu. #2 Station #2
A.RF bug in Terminal

Quiz

(.5 hr)

Review Quiz and answer sheets before Quiz
Show Answers on transparency after test

(Handout)

Class Critique

(.5 hr)

(Handout)

CLASS QUIZ

What is the maximum length on one segment of ethernet 10base5 cable?

- A. 100 ft.
- B. 1600 ft.
- C. 1000 ft.
- D. 8200 ft.

What is the maximum length of AUI cable that can be used and still meet IEEE 802.3 standards?

- A. 100 ft.
- B. 64 ft.

- C. 1000 ft.
- D. 164 ft.

What is the approximately distance between termination points along a 10base5 network cable?

- A. 8 ft.
- B. 4 ft.
- C. 2 ft.
- D. None of the above

The hole that is drilled into the thicknet ethernet to attach the transceiver should be made before applying the vamp clamp.

- A. T
- B. F

The maximum length of 10base2 cable that can be used in one segment and still meet IEEE 802.3 standards is 324 ft.

- A. T
- B. F

When terminating a thinnet cable the first cut should be aligned using point "A" on the stripping tool.

- A. T
- B. F

After terminating a thinnet cable with a 50 ohm load and placing a test meter at the opposite end, you should read approximately

- A. 100 ohms
- B. 50 ohms
- C. 40 ohms
- D. 25 ohms

After terminating both ends of a thicknet cable and applying a vamp clamp, a test meter would read _____ ohms from the ground pin to the center pin.

- A. 10 ohms
- B. 100 ohms
- C. 50 ohms
- D. 25 ohms

What is the maximum length of UTP cable that can be used on one segment and still meet IEEE 802.3 standards?

- A. 100 ft.
- B. 300 ft.
- C. 400 ft.
- D. 500 ft.

When terminating a UTP cable a DB 15 connector should be attached to one end of the cable and a RJ45 connector should be attached to the other end.

- A. T
- B. F

Heliac cable is connected between which to devices

- A. Network Controller and RFU
- B. Host computer and the RFU
- C. Host computer and the antenna
- D. None of the above

Heliac cable is terminated with a TNC crimp on connector.

- A. T
- B. F

When should the inventory of the equipment to be installed be completed?

- A. After verifying mounting locations
- B. First arrival on site
- C. When a Connector or cable is found to be missing
- D. None of the above

Where should you be able to obtain the IP Addresses to be loaded into the system be found.

- A. Job Folder
- B. Use LXE defaults
- C. Customer's MIS Department
- D. None of the above

Barcode information is obtained from which source.

- A. Job Folder
- B. Use LXE defaults
- C. Customer's MIS Department
- D. None of the above

Given two lengths of thicknet cable measuring 1000 ft. apiece and they are to be installed on the same network, what is required to make this installation meet IEEE 802.3 standards

- A. Repeater
- B. Modems
- C. Thinnet hub
- D. None of the above

What is the maximum number of devices that can be attached to one segment of thicknet cable.

- A. 50
- B. 70
- C. 75
- D. 100

All Terminal firmware contains which two emulation softwares

- A. LDS and 5250
- B. 5250 and 3270
- C. TCP/IP and LDS
- D. TCP/IP and 3270

What information is typed into the Inet on Ethernet field after booting the unit and stopping it at the first countdown

- A. Flash revision
- B. The host IP address
- C. The hardware (MAC) address
- D. The IP address of the unit to be installed

Given a host IP Address of 192.152.6.6 and a Network Controller IP Address of 141. 186.6.7, what device is required in the network to make the Network controller capable of communicating to the host

- A. Repeater
- B. Transceiver
- C. Modem
- D. Router

Flash code is loaded into a controller using a HD 3 1/2" floppy

- A. T
- B. F

Both ends of a 10base5 (thicknet) network must be grounded.

- A. T
- B. F

The transmit frequency of the RFU in a 450 Narrow Band configuration must be set to a higher of the two frequencies in the frequency pair.

- A. T
- B. F

Name _____ Date: _____

**Exhibit C: LXE Partial Price List Indicating
Non-Retail Pricing**

AP Accessories: 6430

Model	Notes	Description	List Price	LT	Category
6400A051CBL153DBEX		Opt,Cbl,N(M) to RSMA(F), 15ft	\$99	7	B
6400A276ANTREMOTE	1,2	ANT,AP,OMNI DIRECTNL,6410/11	\$250	7	B
6400A277ANTLOCAL	2,3	ANT,AP,OMNIDIRECTNL,6410/11	\$250	7	B
6400A285SPLIT		2.4GHz Splitter/Combiner	\$310	7	B
510508-2400		2.4GHz Lightning Protector	\$200	7	B
6430A001BRKT		6430 Mounting Bracket	\$65	7	B
6430A003ENCLOSURE	4,5	Ceiling Enclosure, AP2	\$330	7	B
6430A053TYPEN	6	Cbl., Ceiling Encl, RTNC to Type N	\$65	7	B
6430A052POLARTNC	7	Cbl, Ceiling Encl, RTNC to Polar TNC	\$65	7	B
6430A276ANT3LOCAL	5	3dB Omni,Ceiling Mount,6ft. Cable	\$300	7	B
6430A277ANT6LOCAL	5	6dB Patch,6ft Cable	\$450	7	B
6430A278ANT15REMOT	5	15dB YAGI, Remote	\$450	7	B
6430A279ANT3REMOTE	5	3dB Omni, Remote	\$300	7	B
6430A280ANT6REMOTE	5	6dB Patch, Remote	\$450	7	B
6430A281CBLASSY15		6430 Extension Cable 15ft.	\$99	7	B
6430A282ANT4LOCAL	5	4/6 dB Bi-Directional,Ceiling,6ft Cable	\$300	7	B
6430A283ANT4REMOTE	5	3dB Bi-Directional, Remote	\$300	7	B
6430A281ANT3FEMALE		Ant,2.4GHZ Omni 3dB,N(F),AP2	\$150	7	B
6430A284ANT3	5	3dB Omni, Ceiling Mount, No Adapter Cable	\$195	7	B
6430A285ANT4	5	4/6dB Bi-Directional, No Adapter Cable	\$195	7	B
6430A286ANT6	5	6dB Patch, No Adapter Cable	\$225	7	B
6430A287CBL38REMOT		6430 38" Remote Antenna Adapter Cable	\$99	7	B
6430A288CBL6FLOCAL		6430 72" Local Antenna Adapter Cable	\$99	7	B

Note:

1. Uses Heliac Cable.
2. Must order 154401-0001, cable assy, when this item is ordered for 6430's.
3. Uses RG142 Cable.
4. Must order one 6430A053TYPEN or 6430A052POLARTNC with each enclosure.
5. Approved for use in the United States and Canada and are not approved for use in European countries. The use of high gain antennas in other countries may be allowed. Consult your local radio approvals agency to ensure compliance with the regulations.
6. For use with 6430A290ANT4.
7. For use with standard Proxim Antenna.