Chapter 3

Enhanced Position Location Reporting System in the TI

This chapter discusses the functional description, deployment, operational procedures, and tactics and techniques for the EPLRS. It also provides guidance for users in the TI.

FUNCTIONAL DESCRIPTION

3-1. The EPLRS is a state-of-the-art, LOS, data-only digital radio system. It operates in the 420-450 megahertz (MHz) ultra high frequency (UHF) band. It serves as a position location, navigation, identification, and communications system. Its primary components are the NCS-E and RSs.

NCS-E

3-2. The NCS-E is the control element used for system initialization and monitoring and control of EPLRS network. It provides centralized network management including assigning time slots to RSs, establishing and maintaining time synchronization for the network, assigning control circuits, and controlling cryptographic key transfers.

3-3. Although the NCS-E operates primarily with RSs in its community, it can also exchange data with other NCS-Es. RSs may communicate with other RSs or with the NCS-E within the same division since all units in a division have the same traffic key.

RS

3-4. The FBCB2 architecture uses EPLRS to provide WAN connectivity from platoon to brigade level. Operational units are equipped with RSs to provide a tactical WAN backbone for the TI. RSs are provided to EPLRS' users. These radios are the radio receiver transmitter (RT), and they provide secure, jam-resistant digital communications and accurate position location capabilities for the user. Secure communications with low probability of intercept and detection are provided by–

- Frequency hopping (512 times per second).
- Spread spectrum technology (eight frequencies between 420 MHz and 450 MHz) embedded COMSEC module (KGV-13).
- Adjustable power output.

3-5. RSs have built-in-test (BIT) functions that are activated when power is turned on.

3-6. The RS antenna is an omnidirectional dipole. The planning range is 3 to 10 kilometers between radios, depending on power output settings and terrain. The RS provides transmission relay functions that are transparent to

the user. This relay function is dependent upon the maximum distance the RS can cover (10 kilometers), assuming radio LOS between each radio and the number of radios in the needline link.

3-7. Duplex and group-addressed needlines automatically use up to four (group-addressed) or five (duplex) RS relays (hops) to establish a needline link from endpoint to endpoint. Local area coverage for these needline types is limited to two hops (one relay) and typically covers a battalion-sized area. Extended area coverage uses either four (carrier sense multiple access [CSMA]) or six (multisource group [MSG] and point-to-point [P-P]) hops to cover up to a division-sized area. Each RS has variable power output from .4 watts to 100 watts.

3-8. EPLRS RSs are divided into–

- Ground-based RSs:
  - Manpack RS (MP-RS).
  - Surface vehicle RS (SV-RS).
  - Grid reference RS (GR-RS).
- Air-based RSs: Airborne vehicle RSs (AV-RS).

3-9. RSs provide time-of-arrival (TOA) information about each other to the NCS-E and transmit and receive messages. They can communicate with each other, through the NCS-E, directly by way of needlines authorized at the NCS-E or by using a local subnet. The MP-RS, SV-RS, GR-RS, and AV-RS have a user readout (URO) device for entering and displaying messages. The AV-RS also has a pilot control display panel (PCDP) for entering and displaying messages.

3-10. RSs provide the TOA and message links for stable communications and accurate tracking. They transmit and receive messages to and from the NCS-E and between other RSs. If one RS moves into an adjacent community, the control of it is automatically transferred between NCS-Es.

3-11. The RS uses a controlled cryptographic item (CCI) for controlled access and physical security. The CCI is unclassified but controlled. However, two different conditions apply: keyed and unkeyed. It is only in the unkeyed condition that the equipment is unclassified. Important security aspects include–

- **Access**. A security clearance is not required for access to unkeyed equipment. However, users require a security clearance equal to the highest level of keyed equipment. Access shall be restricted to those who require such access.
- **Physical control**. Keyed equipment must be protected to the level of the classification of the key being used. Unkeyed equipment is unclassified, but physical security and accounting controls are required to guard against preventable losses to an actual or potential enemy.

MAJOR FUNCTIONS

3-12. The paragraphs below discuss EPLRS's major functions.

Position Location

3-13. The RS operator enters requests and receives position location updates in the form of a 10-character alphanumeric code related to the military grid reference system (MGRS). Such data is constantly updated and stored at the NCS-E and is provided to each RS upon request. In addition, the RS operator may request the position of, or bearing/range to, another RS in the net. The degree of positional information accuracy is dependent upon reference unit emplacement in the network and the density of RSs that comprise the network. Other factors that may affect position accuracy are terrain, signal reflections, multipath signal diffraction, and radio signal scatter. Due to these real-world concerns, at least five percent of RSs deployed should be reference RSs.

Navigation

3-14. Corridors, lanes, predesignated items (PDIs), or battlefield zones (such as minefields or contaminated areas) may be specified at the NCS-E. The NCS-E transmits automatic alerts to any RS crossing into these areas. Upon request, the NCS-E provides bearing and range data to assist RS operators in navigating through corridors or lanes and to PDIs (such as checkpoints, landmarks, or other units).

Identification

3-15. The military identification of all RSs in the net is stored at the NCS-E. An RS operator may request the identification of an unknown RS by providing the MGRS coordinates of that unknown RS or the bearing/range to that RS or the NCS-E. At the NCS-E, positive identification of all RSs in the net assists the NCS-E operator in coordinating the operation of all RSs.

Free Text

3-16. Free text messages are short messages sent over the control network. They communicate by–

- User-to-user indirect communications routed through the NCS-E using the URO device.
- User-to-user direct communications over an established local subnet using the URO device.

3-17. The following constraints apply to a free text message:

- Maximum 10-characters in length.
- Any RS may send free text messages to any other RS within the same single or multiple NCS-E community.
- Cannot cross boundaries between divisions.
- The RS can send only to one recipient at a time.

DEPLOYMENT

3-18. The SYSCON develops the EPLRS signal support plan through coordination with the users and signal community. The signal support plan is derived from the operation plan (OPLAN) and operation order (OPORD) of the division or corps.

3-19. EPLRS supports the transmission of C2 and SA data throughout the battlespace. The EPLRS deployment concept is based on a multiple NCS-E community of up to four single NCS-E communities to support a division area of operation. Each community would consist of up to 470 RSs.

3-20. Signal corps personnel install, operate, and maintain NCS-Es. Four NCS-Es and four gateways are assigned to the EPLRS platoon within the signal support company of the division signal battalion. The communications element of the separate brigade/armored cavalry regiment is assigned one NCS-E.

3-21. Signal units are assigned RSs to perform specific functions to enhance or supplement network operations under varying tactical situations. The GR-RS's primary function is to provide the network with good reference unit geometry for highly accurate position location recording. Dedicated relays, whose placement and movement are controlled by the signal organization, are employed in areas where pockets of RS users may be separated by terrain to enhance network connectivity and allow for a more efficient relay assignment for data communications.

3-22. Twelve GR-RSs are assigned in a division signal battalion. They are employed under the direction of the signal battalion S3 operations SYSCON element,. The GR-RS resources are not sufficient to provide all of the needed grid reference coverage, so the EPLRS must rely on other military units as grid reference points. Units that make good references are those that use surveyed points as the locations for their systems, such as field artillery and engineer units.

3-23. Gateways allow for a communications link between multiple NCS-E communities. Several gateways may be required due to the amount of traffic, security classification, or employment of a planned alternate. Several multiple NCS-E communities support a deployed Army corps with several Army divisions. Each multiple community has its own time synchronization and cryptographic keys, which does not allow for continuity of operations with other multiple communities. Gateways allow data communications between these communities. The EPLRS also provides users with the ability to move between multiple NCS-E communities and retain system services via the transient rekey process. This process delivers the traffic key for another Army division to an RS so that the RS can receive services in an NCS-E community of that division.

3-24. The NCS-E maintains the health of the EPLRS community automatically and continuously, keeping track of the RS units in the community. The NCS-E monitors the activity of all relay and reference RS units and maintains status of their barometric, TOA, oscillator, and false alarm settings. The track quality and data throughput rates are also

monitored to provide alerts that can indicate if a relay or reference RS has gone down or if jamming is occurring.

NEEDLINES

3-25. The EPLRS supports user data communications in two ways. First, host-to-host communications support BOS requirements with established needlines over the communications network. Second, a limited free-text communications capability allows quick, concise contact between users without dependence on automated host systems. Host-to-host data communications require establishing specific needlines and needline parameters, whereas free text data communications over the control network do not require any precise planning. For host-to-host communications, the user must identify his specific requirements for input into the system in the proper needline format.

3-26. Different EPLRS needlines support different types of message traffic. The following paragraphs discuss these needlines.

Full Duplex Needline

3-27. This needline is a point-to-point bidirectional communications path between RSs. It is also called a permanent virtual circuit (PVC). This needline supports AMDPCS hierarchical transfer of battle management messages, dynamically allocated PVCs (DAPs) implemented on demand for FBCB2 unicast C2 messages, and distribution of EPLRS-derived data from the NCS-E to the NCS-E MSG position server.

3-28. A DAP is a duplex needline established in real-time based on router commands. When a host must transmit a unicast message to another host, a DAP is set up between the router associated with the two hosts. The host transmitting the message sends the message to its attached router. The router sends an address resolution protocol (ARP) request to the network to find the RS identification (RSID)/hardware address of the EPLRS radio at the gateway servicing the receiving host. Then the destination router servicing the receiving host sends an ARP response back to the source router with its RSID/hardware address. The RSs then negotiate a path for the circuit, which results in the establishment of a DAP between the two routers.

3-29. Once established, packets associated with the host message are sent across the circuit. The DAP remains in place as long as data packets are required to be transmitted. After the circuit has been inactive for a preset period, the circuit is deactivated.

Simplex Needline

3-30. This needline is a unidirectional communications path from one RS to many RSs. It is generally used for community-wide distribution of EPLRS position data, such as the Situation Awareness Data Link (SADL) between the Forward Air Controller (FAC) and the aircraft.

CSMA Needline

3-31. This needline is a multisource, multidestination communications path among RSs where all members use a CSMA protocol to gain authority to

transmit and where all members are able to receive. This needline type is used to broadcast SA and C2 JVMF messages within organizational boundaries such as battalions. Up to two CSMA needlines per radio transmit and receive data. One needline is for the battalion area SA and the other is for the battalion area C2.

MSG Needline

3-32. This needline is a multisource, multidestination communications path among RSs. Up to sixteen active RSs are assigned shares of the MSG transmit resource, and all MSG participants are able to receive resources.

3-33. This wide-area MSG needline allows contention-free access. It broadcasts SA JVMF position reports from SA position servers located in each battalion and brigade-area CSMA communities to all EPLRS-equipped platforms. An interbrigade server transmits, onto the wide-area MSG needline, position data received from the division area and other brigades. Also, NCS-E-derived SA position data is transmitted over the wide-area MSG needline via an application layer gateway. A separate brigade-wide MSG needline enables transmission of multicast C2 messages across the brigade. A gateway router is selected from each battalion and brigade area for the MSG needline by means of Request for Comment 1256+ gateway selection. All RSs in the brigade receive messages transmitted onto the brigade-wide MSG.

3-34. The AMDPCS is separate from the wide-area MSG SA needline. It distributes air tracks from the sensor C2 to the fire units on a MSG sensor broadcast needline.

OPERATIONAL PROCEDURES

3-35. The distributed nature of EPLRS and other components of the TI make information synchronization difficult. Planning the division and brigade SYSCON elements creates initialization data.

3-36. EPLRS RS initialization is accomplished using the RT and URO device components shown in Figure 3-1. Table 3-1 lists the RT controls or indicators and their functions. Table 3-2 lists the URO device controls or indicators and their functions.

CAUTION

Before initializing any FBCB2 device attached to the TI, ensure that all radios are turned on. This includes the SINCGARS, EPLRS, and NTDR. Rationale: When an FBCB2 device is turned on, it immediately begins sending SA data. Consequently, if the radio is not turned on first (ready to pass FBCB2 data), the buffered SA data will then congest the communications link (possibly to the point of communications failure).

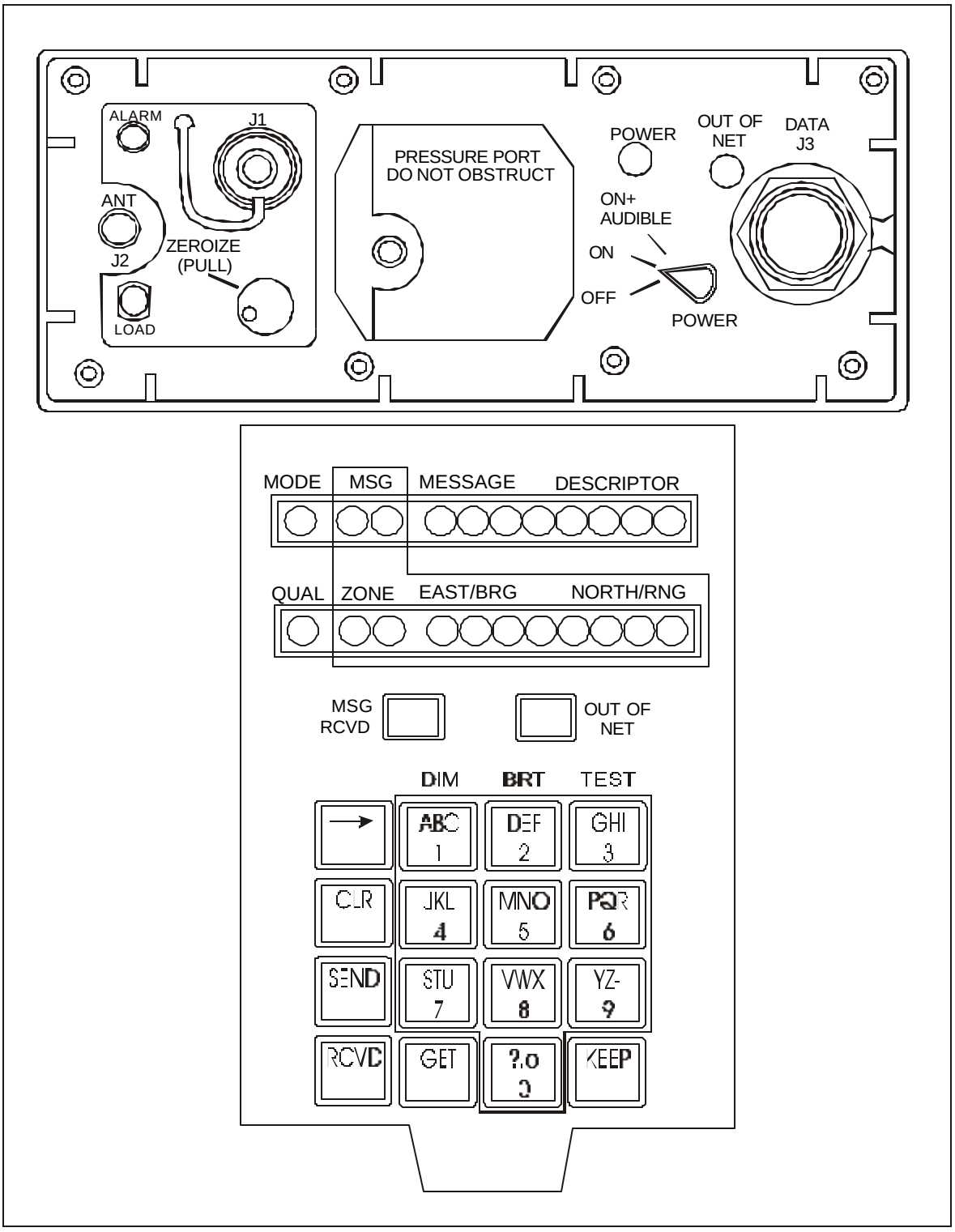

Figure 3-1. EPLRS RT and URO Device Components

Table 3-1. RT Controls and Indicators

Control or Indicator	Function
ALARM indicator (red)	If constantly lit, indicates a fault exists or no traffic keys are present.
J1 load connector	Is a connector for a key-loading device.
PRESSURE PORT	Provides atmospheric pressure-to-pressure transducer. The NCS-E uses pressure measurements to compute RS altitude.
POWER indicator (green)	Indicates power is applied to RS.
OUT OF NET indicator (red)	Indicates different operational status of the RS: • Off when RS is in an NCS-E-controlled net (ACTIVE), RS is RF SILNT, or when load device is connected. • During power-up (POWER UP), indicator stays lit until RS attempts to enter net. • Flashing once per second, RS is attempting to enter net (NET SYNC). • Flashing every four seconds, RS has joined a network of other RSs (TRACK), or RS has entered net but cannot support NCS-E-related messages. NCS-E-related services resume, when available.
DATA J3 connector	Is a connector for URO or PCDP cable. Data input to this port will be sent over the control net.
POWER switch (3-position)	Indicates power of RS: • OFF removes power from the RS except keep-alive power for key. • ON applies power to RS; audible alert is not enabled. • ON + AUDIBLE applies power to RS and enables audible alert (buzzer) function (part of RS).
ZEROIZE (PULL) switch[1]	Causes all keys to zeroize. Switch must be pulled out and then turned clockwise to zeroize RT. Unit is not functional until keys are reloaded.
LOAD switch (push-button)	Is used during key load procedure to load keys into RS. Otherwise, pressing this switch has no effect on RS.
ANT (Antenna) J2 connector	Is a connector for antenna or antenna cable.
J2 Host interface connector	Is a connector for cable from host.

[1]Zeroize RS prior to storage or if in danger of enemy capture.

Table 3-2. URO Device Controls and Indicators

Control or Indicator	Function
MODE field	Displays one character describing displayed mode: • E—Edit. • K—Keep in memory. • L—Last known own position. • R—Receive. • S—Send. • 0 through 9—Memory location for storage or retrieval.
MSG field	Displays a two-character message label describing type of message displayed. During self-test, displays cryptographic key status. When in edit mode, operator can edit field.
MESSAGE DESCRIPTOR field	Displays an eight-character descriptor of displayed messages. Not all messages have a descriptor.
QUAL field	For certain messages, displays one character (0-9) representing quality of position data being displayed: • A (Another) — RS is tracked by another NCS-E. • H (Horizontal) — RS is used by NCS-E as a horizontal reference. • L (Last) — NCS-E is not tracking RS—information is last known position. • M (Manual) — RS's position, which has been manually entered. • R (Reference) — RS is used by NCS-E as full reference unit. • U (Unconfirmed) — RS's unconfirmed position–NCS-E is in process of determining RS's confirmed position and velocity. • 0 through 9 — 0–no position information at NCS-E; 1–very poor information at NCS-E; 9–excellent information at NCS-E.
ZONE field	Displays– • Two-character grid zone designator of an MGR position. • Knots, kilofeet, nautical miles or kilometers for navigational aids (NAVAIDS) messages. • First two characters of a free-text message and other assorted messages. When in edit mode, operator can edit field.
EAST/BRG NORTH/RNG field	Displays eight numbers of an MGR position. Displays bearing and range. Displays last eight characters of free-text message. When in edit mode, operator can edit field.
OUT OF NET indicator (red)	Indicates different operational states of the RS. (See Table 3-1.)

Table 3-2. URO Device Controls and Indicators (Continued)

Control or Indicator	Function
MSG RCVD (red)	When lit, indicates a message is available for review.
→ (Cursor) key	Advances cursor one space to right each time it is pressed and puts URO in edit (E) mode.
CLR key	Clears displayed data, places cursor in first space of MSG display field, and puts URO in edit (E) mode.
BRT key	When URO is not in edit mode, pressing this key brightens display one step each time it is pressed.
TEST key	When URO is not in edit mode, pressing this key initiates URO self-test and displays current status of RS, enabling the RS operator to verify that the URO and RS are functioning.
Alphanumeric keys	Used to enter numbers or letters in edit mode: • Press once to display number. • Press twice to display first letter. • Press three times to display second letter. • Press four times to display third letter.
KEEP key	Stores displayed data in one of ten memory locations. The RS operator must enter memory location (press 0 through 9) within three seconds. Stored memory is deleted upon power off.
GET key	Displays previously stored data when URO is in SEND mode: • Press once to recall last sent message. • Press twice to recall last known own position. • Press once immediately followed by a numbered key (0 through 9) to display corresponding (KEEP) message.
RCVD key	Deletes displayed message (if any) and displays first received message found in memory. If a displayed URO message times out, pressing RCVD key once restores timed-out message; pressing the RCVD key twice displays the next received message.
SEND key	Transmits displayed message: • Press once for one-time response. • Press twice in rapid succession for automatic updating of requested data (about 10 responses). Operator should wait for responses to ensure message was sent.
DIM key	When URO is not in edit mode, pressing the DIM key dims the URO display one step each time the key is pressed.

EPLRS RT AND URO WARNING LIGHTS/MESSAGES

3-37. Table 3-3 lists common EPLRS RT and URO warning lights/messages and their indications.

Table 3-3. EPLRS RT and URO Warning Lights/Messages

Light/Message	Indication
RS OUT OF THE NET indicator light	Indicates status of RS: • Flashing one time each second – RS is searching for the NCS-E; RS has no communications. • Flashing one time each four seconds – RS is communicating with another RS, but not with the NCS-E. RS is unable to position itself. • Off – RS is operational.
MSG RCVD light	Lit – RS has a message. To read message, press RCVD on the URO device; message is displayed on the device screen.
RS Track Quality	The URO device QUAL field indicates how well the NCS-E is tracking the RS. The number field ranges from 1-9; 9 is best and 1 is worst. When 9 appears in QUAL field, it means the NCS-E is tracking the RS to within 15 meters. The accuracy of the position goes down as the displayed number goes down. “L” in QUAL field indicates the NCS-E is not tracking the RS and gives the last known position of the RS.
Send/Receive Reports/Messages	Position reports. To get own position: Step1 Press the CLR key on the URO device one time to get arrow under the M in the MSG field. Step 2 Press the #6 key two times to change the #6 to P. Step 3 Press SEND; wait for MSG RCVD to light. Step 4 Press the RCVD key. The unit position appears in the lower part of the screen on the URO device. The ZONE field, followed by an eight-digit grid reference, indicates the position. To get the position of another RS: Step 1 Enter P in the MSG field, as above. Step 2 Press the arrow key four times to get the arrow flashing under the E in the East/Bearing (EAST/BNG) field. Step 3 Type in all eight characters of the MILID for the unit being located. Step 4 Press Send.

Table 3-3. EPLRS RT and URO Warning Lights/Messages (Continued)

Light/Message	Indication
	Bearing and range message. Step 1 Enter B in the MSG field to get a bearing and range to a grid coordinate. Step 2 Move under the Z in ZONE using the arrow key and type the two-letter ZONE identifier then an eight-digit grid; press Send. Step 3 Press the RCVD key. First part in EAST/BNG field is degrees (magnetic azimuth); second part is distance. Time. Step 1 Enter T in the MSG field to get EPLRS network time. Step 2 Press SEND. MSG RCVD lights. Step 3 Press RCVD; time is DD/HH/MM/SS. Send message to another EPLRS RS: Step 1 Type R in MSG field; arrow down to under the E in EAST/BNG field, type in eight-character MILID. Step 2 Press SEND; MSG RCVD lights. Step 3 Press the RCVD key. Display shows WILCO (this means NCS-E found the unit). Step 4 Type Q in MSG field. Arrow down to the Z in the ZONE field. Type the 10-character message to send to the unit designated in the above step. Step 5 Press the SEND key. MSG RCVD lights. Press the RCVD key. Display shows WILCO (meaning other unit received message). Free-text message to NCS-E. If you are having problems with EPLRS operations: Step 1 Type F in the MSG field; arrow down to under ZONE field and type the 10-character message to the NCS-E; press the SEND key. MSG RCVD lights. Step 2 Press the RCVD key on the URO device. Display shows STANDBY (this means NCS-E has received the message).

Display Mode

3-38. The character in the MODE field of the URO device indicates the function currently being performed by the device. Table 3-4 lists these modes and their descriptions.

Table 3-4. URO Display Modes and Descriptions

Mode	Description
E (Edit)	Indicates URO device is in edit mode. Cursor is blinking at current position when in edit mode. New messages are entered in display fields or currently displayed messages are edited. Access this mode by pressing the CLR or cursor (→) key. When the CLR key is pressed, displayed message clears and the cursor appears in first space of MSG field. When the cursor key is pressed, the displayed message remains in display fields and is edited by moving cursor through each character position to be changed.
K (Keep)	Indicates the displayed message is to be stored in 1 of 10 memory locations. To store displayed message, press the KEEP key; then immediately press desired numeric key (0 through 9). To keep display on for another 10 seconds, press the KEEP key.
L (Last)	Indicates displayed message is last own position received from the NCS-E. To display last received position, press the GET key twice.
R (Receive)	Indicates displayed message is a received message. URO automatically stores last five received messages. When a message is received, MSG RCVD indicator lights. To view received messages, press the RCVD key.
S (Send)	Indicates displayed message has been sent. Pressing the SEND key sends message. To retrieve last message sent, press GET key once.
0 through 9	Indicates displayed message is stored in this memory location. To display stored message, press GET key, then immediately press numeric key of desired memory location.

Track Quality

3-39. Track quality indicates the reliability of position-location information. The track quality information is displayed in the QUAL field of the URO device. Table 3-5 lists the alphanumeric characters that indicate track quality and a description of what each character represents.

Table 3-5. Track Quality and Description

Track Quality	Description
0 through 9	Numeric value of message information quality: • 0 – no position information at NCS-E. • 1 – very poor information at NCS-E. • 9 – excellent information at NCS-E.
H (Horizontal)	NCS-E is using the RS as a horizontal reference.
L (Last)	NCS-E is not tracking RS; information is last known position.
M (Manual)	NCS-E has manually entered the RS's position.
R (Reference)	NCS-E is using the RS as a full reference unit.
U (Unconfirmed)	NCS-E is in process of determining RS's confirmed position and velocity.

Message Abbreviation Glossary

3-40. Table 3-6 is the glossary of message abbreviations.

Table 3-6. Glossary of Message Abbreviations

Abbreviation	Definition
a	Any alphabetical character.
f	Any alphabetical, numerical, or special character (-, ?, ., °, or blank).
n	Any nonalphabetical character.
oa	Any odd number (1, 3, 5, 7), followed by an alphabetical character.
ea	Any even number (2, 4, 6, 8), followed by an alphabetical character.
x	Hexadecimal character.
b	Blank space.

Operator Troubleshooting

3-41. During normal operation, faults may occur in the RSs. Faults not identified or corrected require evacuation of the RS to unit maintenance.

RS Self-Test

3-42. When the POWER switch on the RS is moved from OFF to ON or ON+AUDIBLE, the RS self-test is initiated. The self-test tests the various functions of the RS and URO and displays the results. See Figure 3-2 for self-test generation methods.

3-43. Self-test generation methods the operator can initiate include–

- Using the TEST key on the URO device.
- Moving the RS power switch from OFF to ON or ON+AUDIBLE.
- Sending a -T message from the host RS equipment.
- Removing the key loading device (AN/CYZ-10).

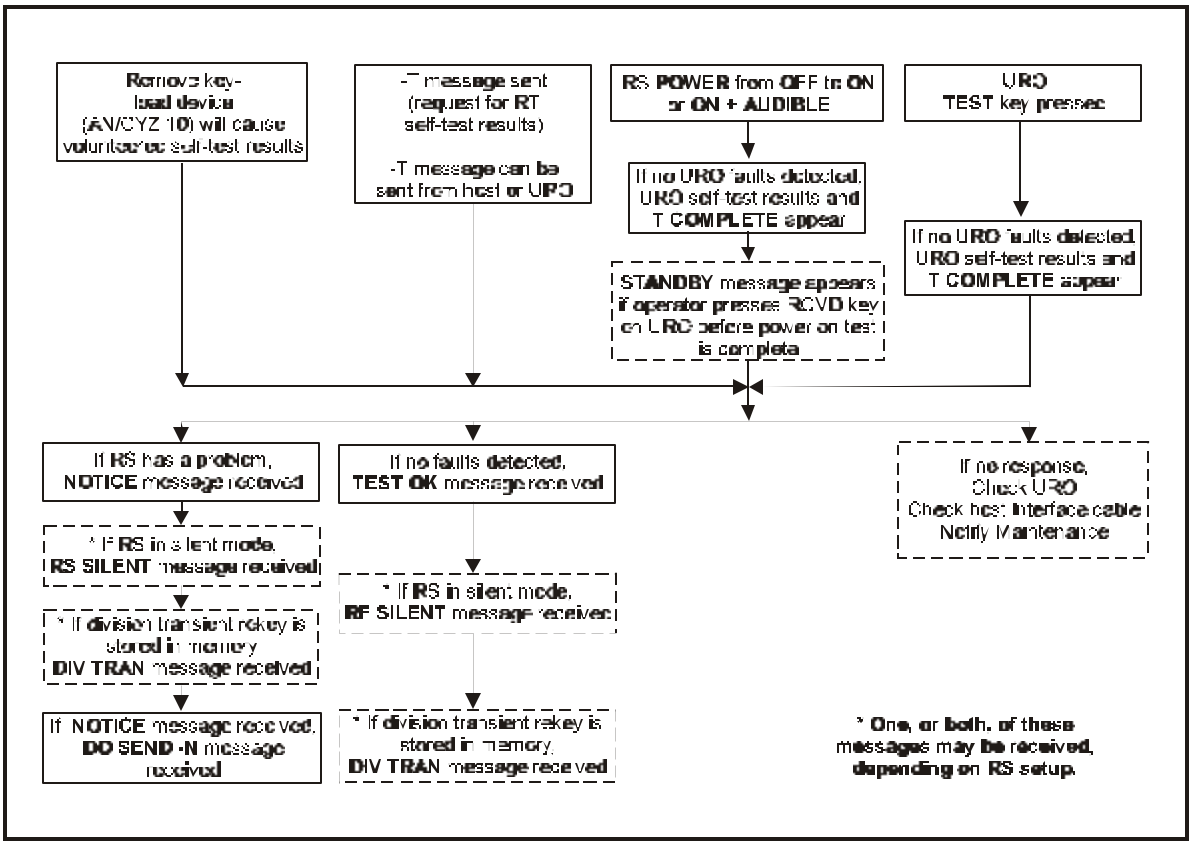

Figure 3-2. Self-test Generation Methods

USERS

3-44. Typical EPLRS's users consist of commanders, staff, soldiers, signal and warrant officers, and NCS-E operators and maintainers. All users must be knowledgeable about the EPLRS characteristics and the role they play in the TI. The system transmits and receives typical battlefield C2 information, and SA data is transmitted, received, and passed through the radio network. Because EPLRS has a INC capability, automatic routing of C2 and SA information is transparent to the operator. Modern digital battlefield procedures dictate that SINCGARS SIP/ASIP and EPLRS radios mutually support data flow throughout the battlespace.

TACTICS AND TECHNIQUES

3-45. EPLRS employment in the TI provides optimal support to the commander. Using EPLRS as a key component, the TI leverages technology and achieves cross-battlefield operating functional integration. This improves the commander's ability to manage time and control tempo, reduce staff layering, and enhance information exchange, analysis, and processing.

3-46. Network management supports the following critical functions of EPLRS:

- Automatic establishment and maintenance of the control network.
- Automatic establishment and maintenance of the communications network:
  - Adaptation to limited connectivity due to ground terrain masking.
  - Adaptation to connectivity changes due to user motion and jammers.
  - Establishment of needline paths using relays as necessary.
  - Management of network security.
- Position location determination and reporting.
- Friendly unit identification distribution.
- Support of C2 functions.
- Corridor guidance.
- Boundary penetration.
- System performance monitoring.

3-47. In the battlefield environment, the operating radio links (connectivity) available in the network can be limited and rapidly changing. The high antijam capability of the spread spectrum RSs allows continuous service in such an environment. In addition, the network management function automatically controls all network operations in real-time, including the ability to effectively use the limited battlefield connectivity to satisfactorily route messages.

3-48. EPLRS has a broad range of message types available to the user equipped with a URO device. Table 3-7 lists the EPLRS NCS-E services.

3-49. EPLRS provides a controlled process that allows an RS to quickly attain full operational status within the network. Normal operations accommodate RS network entry that is not in cryptographic or time synchronization with the network. Network entry is supported by all active network RSs and the enhanced command response unit (ECRU), which is the network interface for the NCS-E. This systems function is vital during tactical usage where a number of RSs are just entering the area. These lost RSs will become members of the network so that the system can provide current data on the tactical situation.

Table 3-7. EPLRS NCS-E Services

Service	Definition
Position data	Where am I? Where is he?
Guidance	Air corridors, ground lanes.
Zone warnings	Penetration alerts. Where is Zone X?
Identification	Who is there?
Free-text	To NCS-E operator; to other RS operators, to C2.
Needline request	Authorized communications circuit from X to Y.
Key requests	Allow transition to new division.