THOR III System
AN/PLQ-9(V)1

New Systems Training & Integration Division
United States Army Intelligence Center
Fort Huachuca, Arizona

THOR III

Objective

ACTION: Describe THOR III system concept, components and capabilities

CONDITIONS: Given classroom instruction and a THOR III Countermeasure Set

STANDARDS: Correctly describe all mission essential equipment, mission support equipment and their purpose

Administrative Data

- Safety Considerations:
  - No beverages near equipment
  - No handling of antenna components when systems are active
- Risk Assessment: Low
- Environmental Considerations: None
- Student Evaluation: Student Checks, Check on Learning and Hands on training/evaluation

Safety Considerations

WARNING

New BB-2590/U sometimes exhibit low voltage indications. At a minimum, allow at least ten minutes of operation. The batteries should indicate a normal voltage condition. If the batteries fail to come up to rated voltage, notify the Electronic Warfare Officer (EWO) for replacement batteries. **DO NOT** deploy on a mission with defective batteries. Failure to heed this warning may result in grievous injury or death.

WARNING

Do not touch the antenna nor allow the antenna to contact metallic materials while the THOR III Dismounted Jamming System is radiating. Failure to heed this warning may result in equipment damage, personal injury or death.

WARNING

Do not radiate the THOR III Dismounted Jamming System within 15.25 meters (50 feet) of any fueling/defueling operations. Failure to heed this warning may result in equipment damage, personal injury or death.

Agenda

- System Overview
- Capabilities and Limitations
- System Components
- Controls and Indicators
- PMCS
- Built In Test
- Faults
- Troubleshooting
- Hands On Training
- Hands On Evaluation

System Overview

- Man-pack Dismounted Electronic Countermeasures (ECM) System
- Designed to jam both High Power and Low Power RCIEDs
- Active and Reactive Jammer
  - Reactive - detects and records threat signal into memory
- Utilizes a common timing protocol via the GPS to make it compatible with other CREW systems
- Stores up to 5 mission loads
- Can incorporate a Remote Control Unit (RCU)

System Overview

- Utilizes Three separate Subsystems
  - Low, Mid, and High Band Units
- Operates on 2 BB-2590/U Lithium Ion Rechargeable Batteries
  - Batteries operate normally at 28.8 Volts
  - Capable of 3 hours continuous operation
- Operating temperature
  - -20º C to 60º C (-4º F to 140º F)

Capabilities and Limitations

Low Band subsystem

- 2 ultra-low **active** only channels
- 6 low **active/reactive** channels
- 8 high **reactive** channels

Mid Band subsystem

- 8 **active** sources within one output channel bandwidth
  - 2 **active** entries per active source
- 4 **reactive** channels
  - 16 threat frequencies per reactive channel

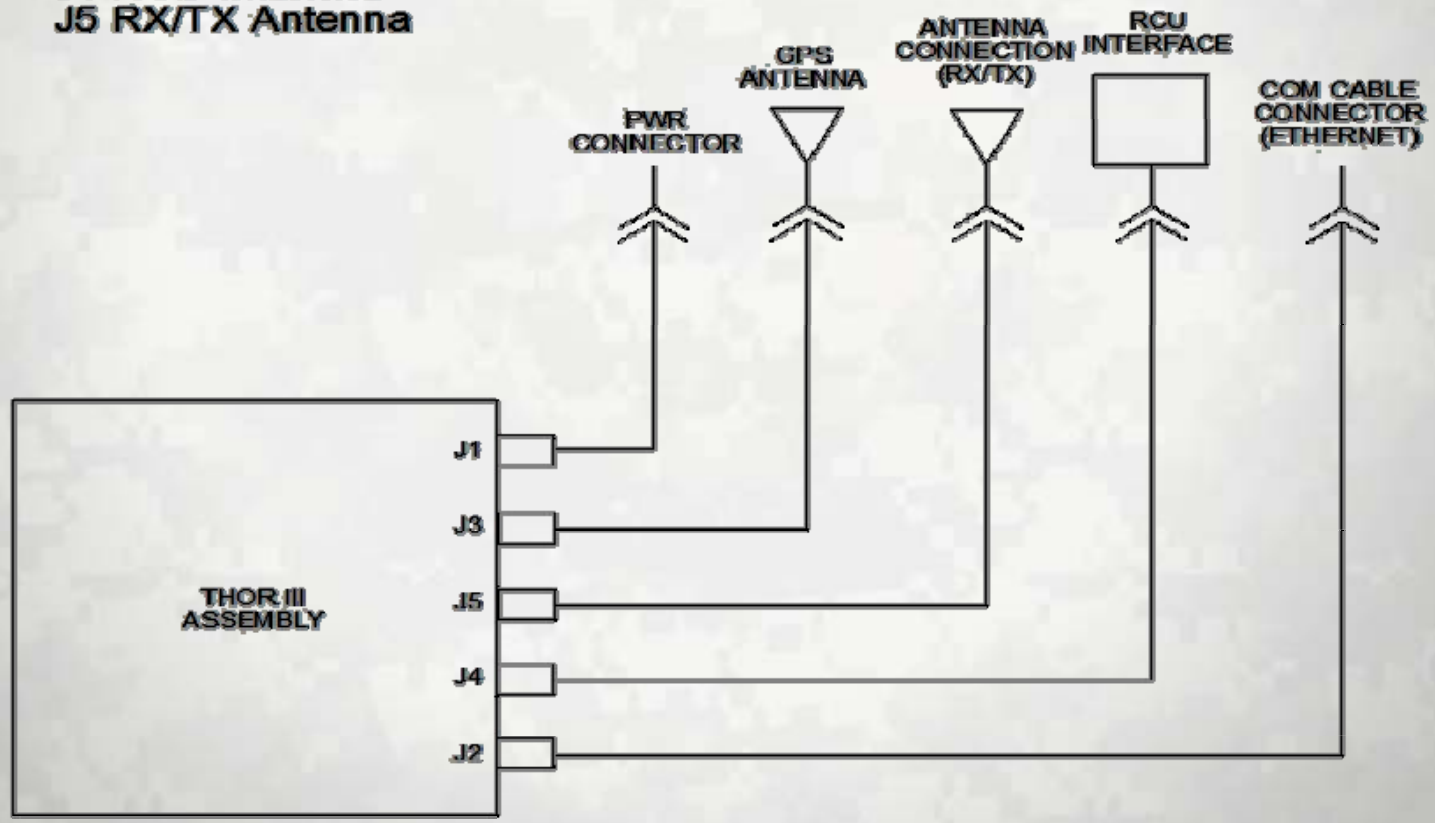
High Band Subsystem

- 8 **active** sources within one output channel bandwidth
  - 2 **active** entries per active source
- 4 **reactive** channels
  - 16 threat frequencies per reactive channel

System Cable Diagram

Antenna Cable Interconnect Diagram

J1 Power
J2 Communications Cable
J3 GPS Antenna
J4 RCU Interface
J5 RX/TX Antenna



System Components

Low Band Antenna

Mid Band Antenna

High Band Antenna

RCU

GPS

Pack Layout

Battery Module

System Components – Antennas

Low Band:

One notch

Mid Band:

Two notches

High Band:

Three notches

Mid and High Band have different sized connectors that are not interchangeable

System Components – Antennas

Pivoting antenna mount for prone position

Check on Learning

1. How many Subsystems does the THOR III consist of ?

3

2. Are the THOR III systems active or reactive?

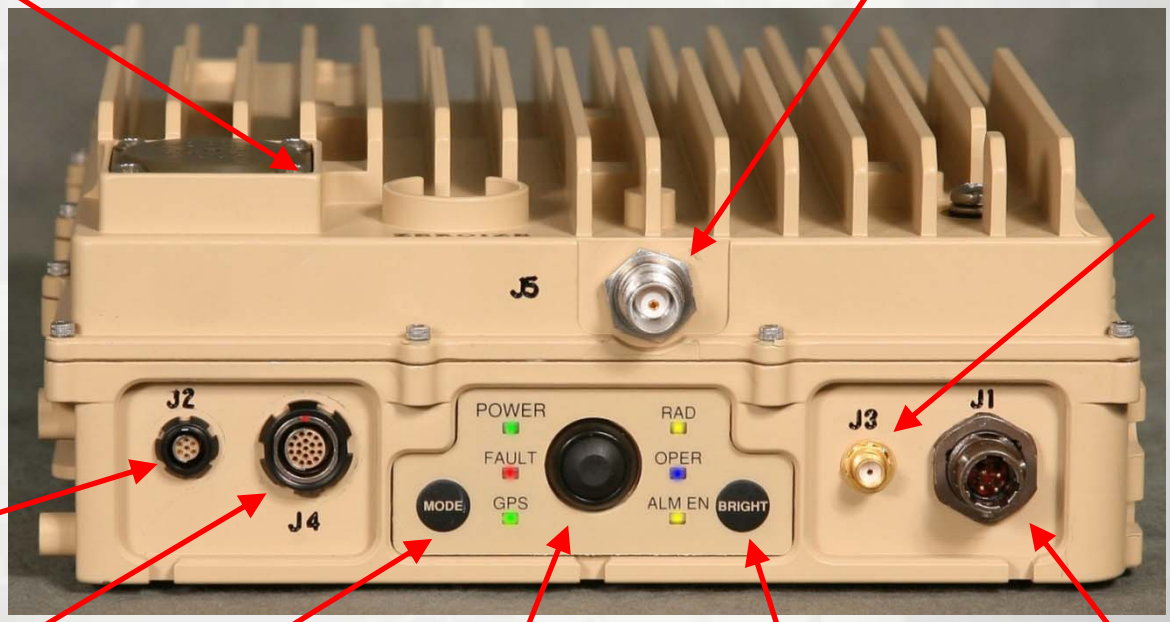
Both, Active and Reactive

3. What component is used to keep the THOR III compatible with other CREW systems?

GPS antenna

Controls and Indicators

Primary Unit



Zeroize Button

J5
Rx/Tx Antenna Connection

J3 GPS

J2
COM Cable Connection

J4
Remote Control Connection

Mode Button

Power Button

Bright Button

J1
Power Connection

Controls and Indicators

BRIGHT and MODE

BRIGHT button			
Push	LEDs	Vibrator	Alarm
1	Bright	Enabled	-
2	Dim	Enabled	-
3	Off	Enabled	-
4	Bright	Disabled	-
5	Dim	Disabled	-
6	off	Disabled	-
HOLD 2 sec.	-	-	Enabled
HOLD 2 sec.	-	-	Disabled

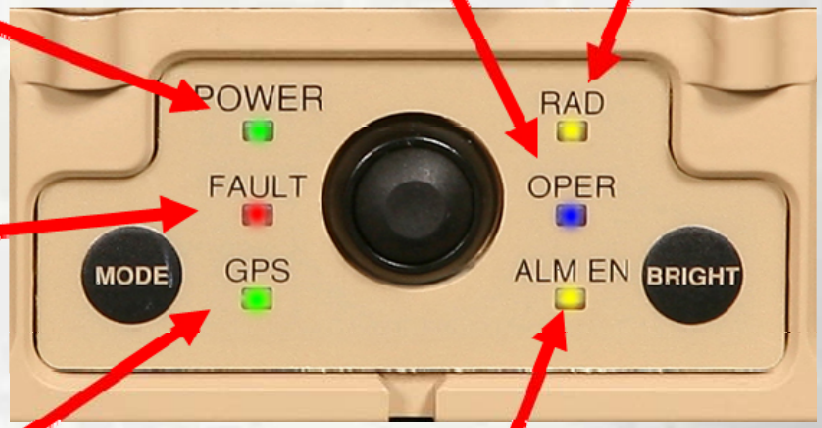
MODE button	
Push	**Operation**
1	Operate (Jamming)
2	Standby

Controls and Indicators

RAD LED	
LED	System Life
OFF	Standby – System not radiating
ON	Operating – System is radiating

POWER LED	
LED	Battery Life
ON	> 30% life
Blink 3	10% - 20% life
Blink 2	5% - 10% life
Blink 1	< 5% life
Off	Unit off or LEDs disabled

OPER LED	
LED	System State
OFF	Standby mode
ON	Operate mode – active only
Blink	Operate mode – active + reactive



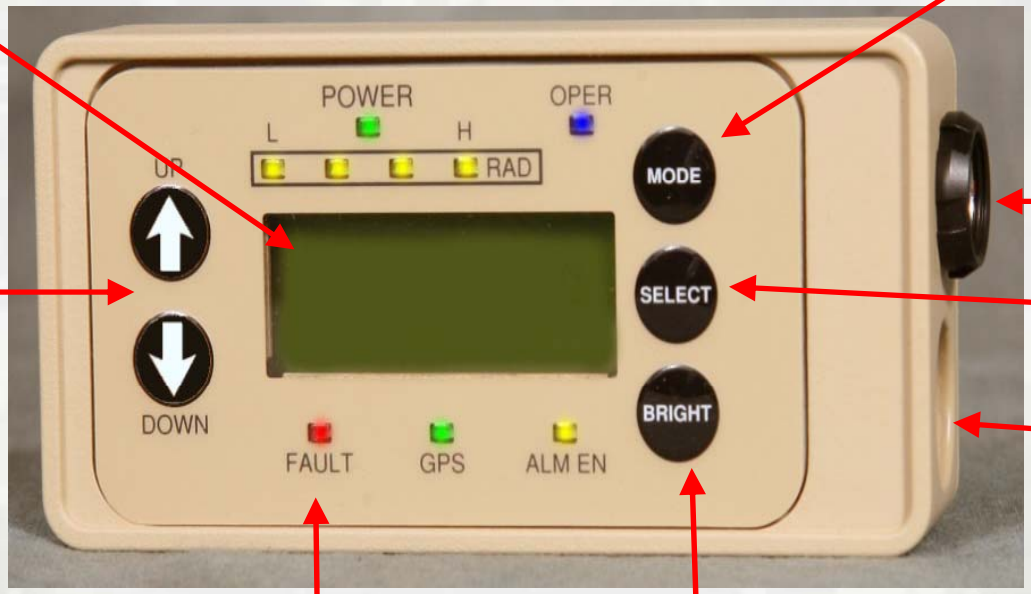
FAIL LED	
LED	System State
OFF	BIT passed, no failures
Blink	System Over Temperature
	VSWR alarm
ON	BIT Fail
	HPA Failure

LED	GPS State	Synchronization State
ON	Locked	GPS Synchronization
Blink	Not Locked	Flywheel Synchronization
OFF	Not Locked	Not Synchronized (stale)

ALM LED	
LED	System Life
OFF	Alarm disabled
ON	Alarm enabled
Blink	Tamper Detected

Controls and Indicators

Remote Control Unit



Display Screen

Mode Button

Main Unit Connection

Selection Arrows

Select Button

Zeroize Button

System LED's

Bright Button

Control Panel

Status Page

Load set Name

Mode

GPS Status

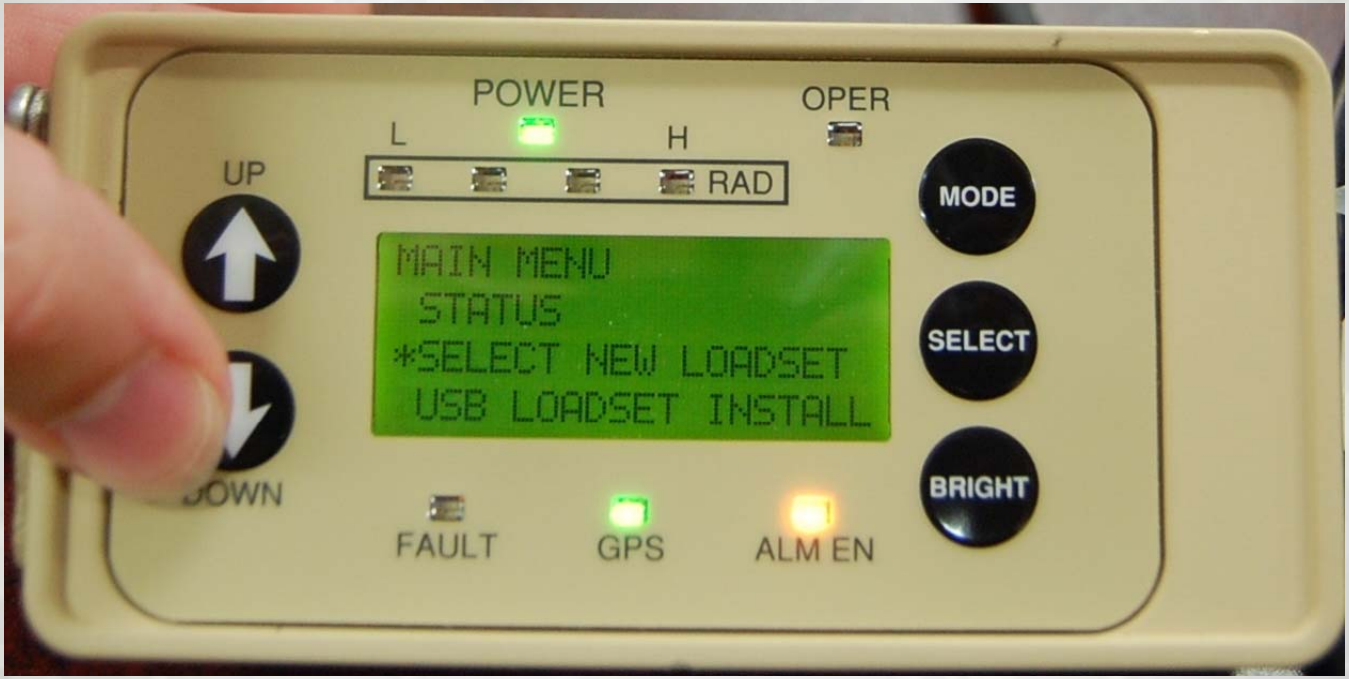
Battery Life

System Temperature

System Health

Control Panel

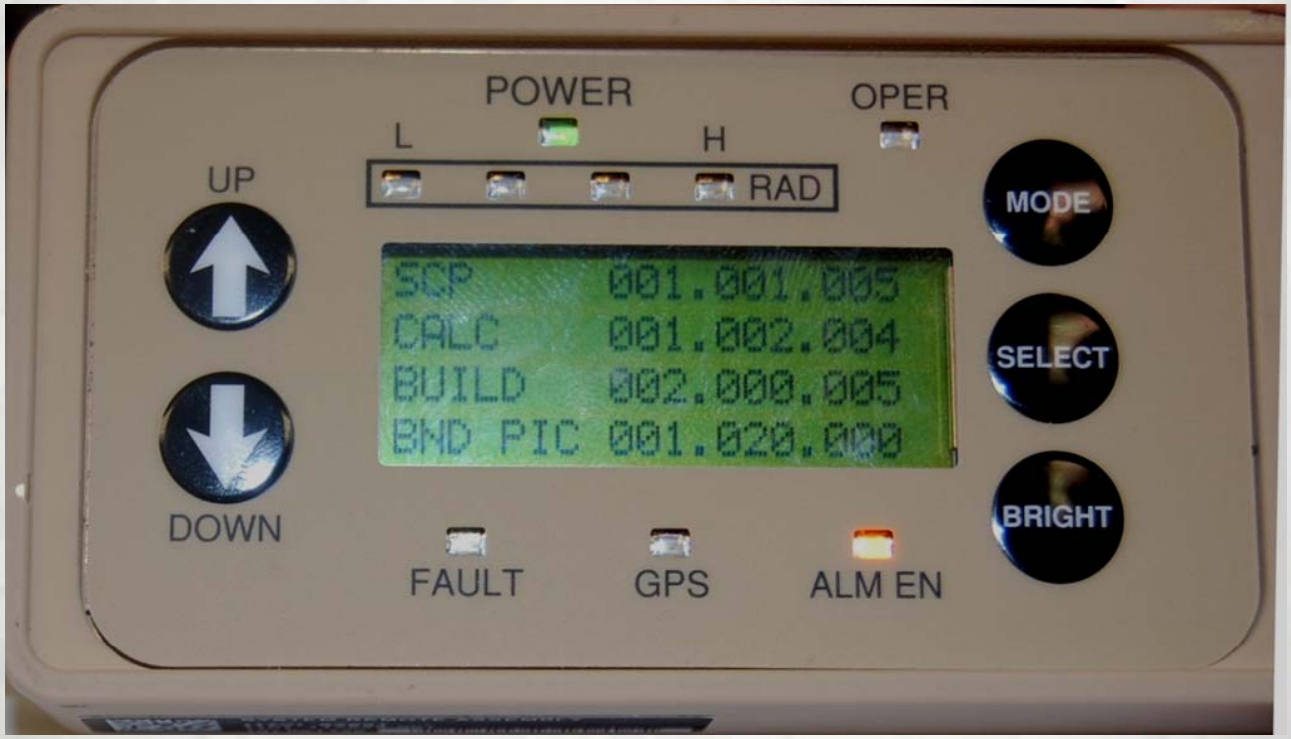
Menu Page



When in the Status Page, press SELECT to see the Menu Page

Control Panel

System Revision Page



Displays current software and firmware in the system

Check on Learning

1. On what screen do you find the battery life information?

System Status (press SELECT for the MENU and scroll to System Status)

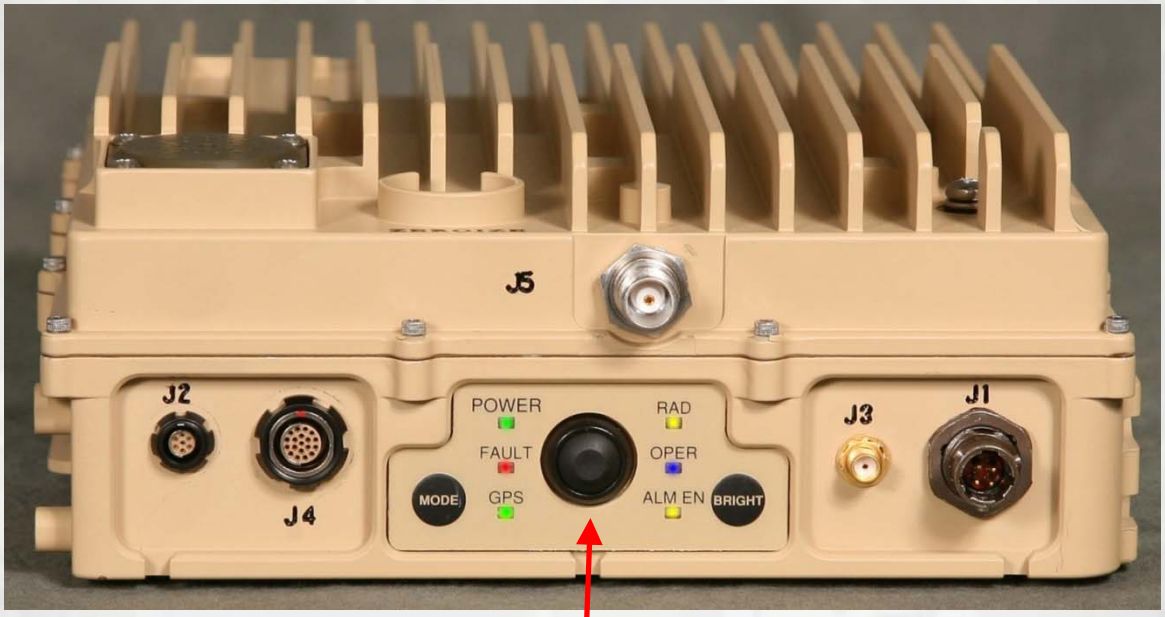
2. What button takes the THOR III system from Standby to Operate (Jamming)?

The MODE button

3. How do you disable the audible alarm?

Press and hold the BRIGHT button for 2 seconds

Power ON / OFF



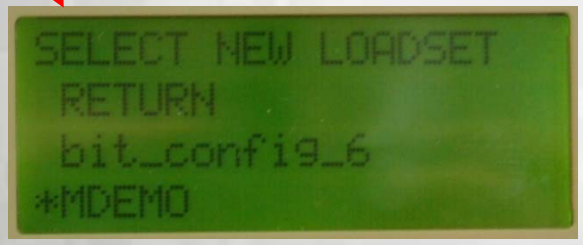
Power On/Off Button

NOTE : Ensure J1 power cable is connected and fully charged batteries are properly installed

Changing Loadsets

Loadset Page

Select Loadset



Confirm Loadset

Changing Loadsets

Loadset Active Page

- Displayed during the changing of loadsets
- Approx 10 seconds

- Displayed once the loadset is active
- Stays on display until SELECT is pressed

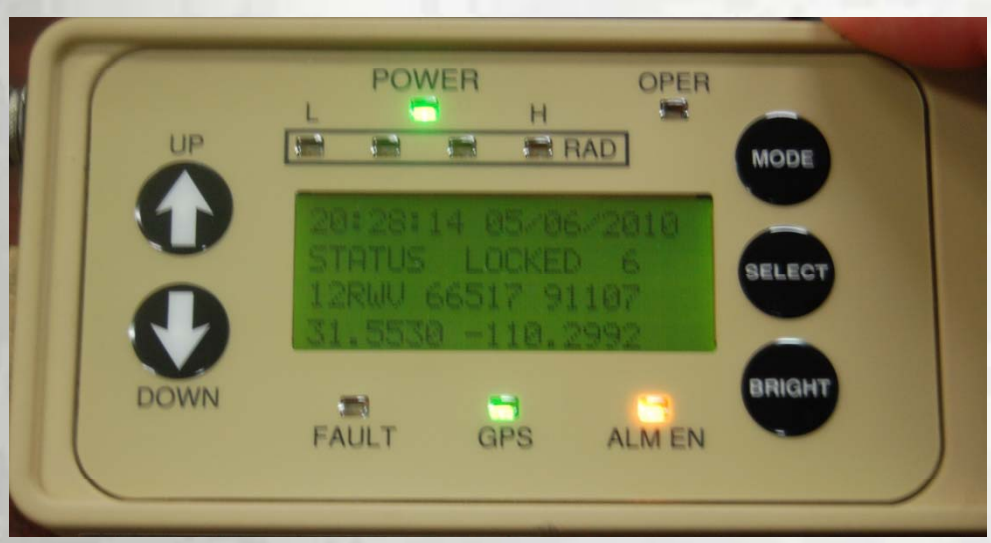
GPS STATUS

- When system starts up, GPS will go into TRAIN
  - GPS is finding satellites
  - Compatible with other CREW systems

- After 15 minutes, GPS will go into a LOCKED state
  - GPS has found 3 satellites
  - Compatible with other CREW systems
  - GPS LED will illuminate solidly

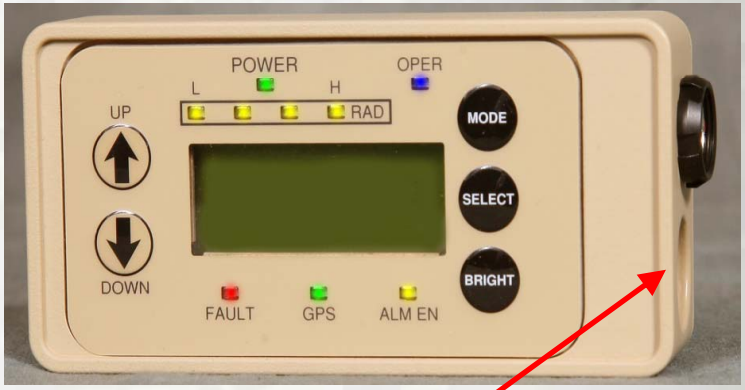
GPS STATUS

- If the system has LOCKED but loses a satellite, GPS will go into FLYWHL
  - GPS is finding satellites
  - Compatible with other CREW systems
  - Can remain in FLYWHL for 3 hours before losing GPS sync



To view GPS location, select GPS STATUS from Menu Page

Zeroize System



- System can be Zeroized by the RCU and the Primary Unit
- System can be Zeroized when power is off but does NOT give indication until power is applied
- System indicates Zeroized state by flashing Power, Fault, GPS, and ALM EN LED's

Check on Learning

1. How many ways can the THOR III be powered on?

One, through the primary unit

2. As an Operator, how many ways can you Zeroize the THOR III system?

Two, through the Primary Unit and RCU

3. How does the THOR III display a Zeroized state?

All LEDs except OPER and RAD blink on and off

PMCS

- Inspect antennas, chassis, battery module and external cables for damage and deterioration
- Ensure mounting bolts on the antennas and battery module, and mounting straps on the backpack harness are secure
- Inspect antennas for cracks or holes
- Inspect cables for damage, deterioration, bends, and kinks

Built in Test (BIT)

- The THOR III system runs an initial BIT (1 min)
  - While running BIT, the LEDs (POWER, FAULT, GPS, ALM EN) will light up **clockwise** and then **counter-clockwise**
  - During the **counter-clockwise** rotation, the OPER LED will illuminate solidly

- The BIT Tests
  - High Power Amplifier
  - Temperature
  - Volts
  - Voltage Standing Wave Ratio

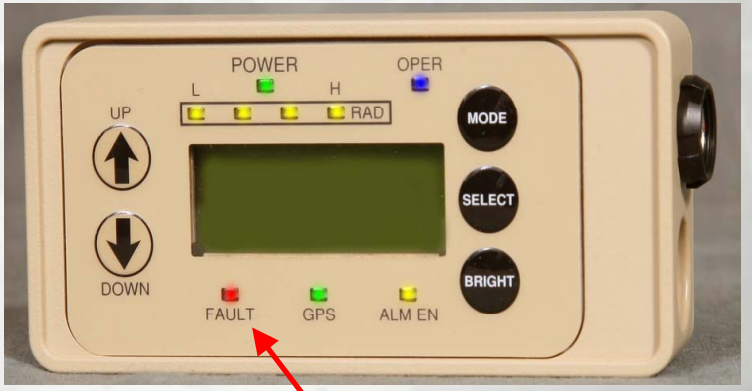
Faults

- There are two types of faults in the THOR III System
  - Critical faults
    - VSWR (Voltage Standing Wave Ratio) – **FAULT** LED will be blinking
    - HPA (High Power Amplifier) - **FAULT** LED will be solid
  - Non-critical faults
    - TMP (Over-temperature) – **FAULT** LED will be blinking
    - BAT (Battery) – **POWER** LED will blink in pattern according to how much battery life is left

Faults

- Faults are shown on both the RCU and the front panel of the THOR III as a blinking or solid FAULT LED

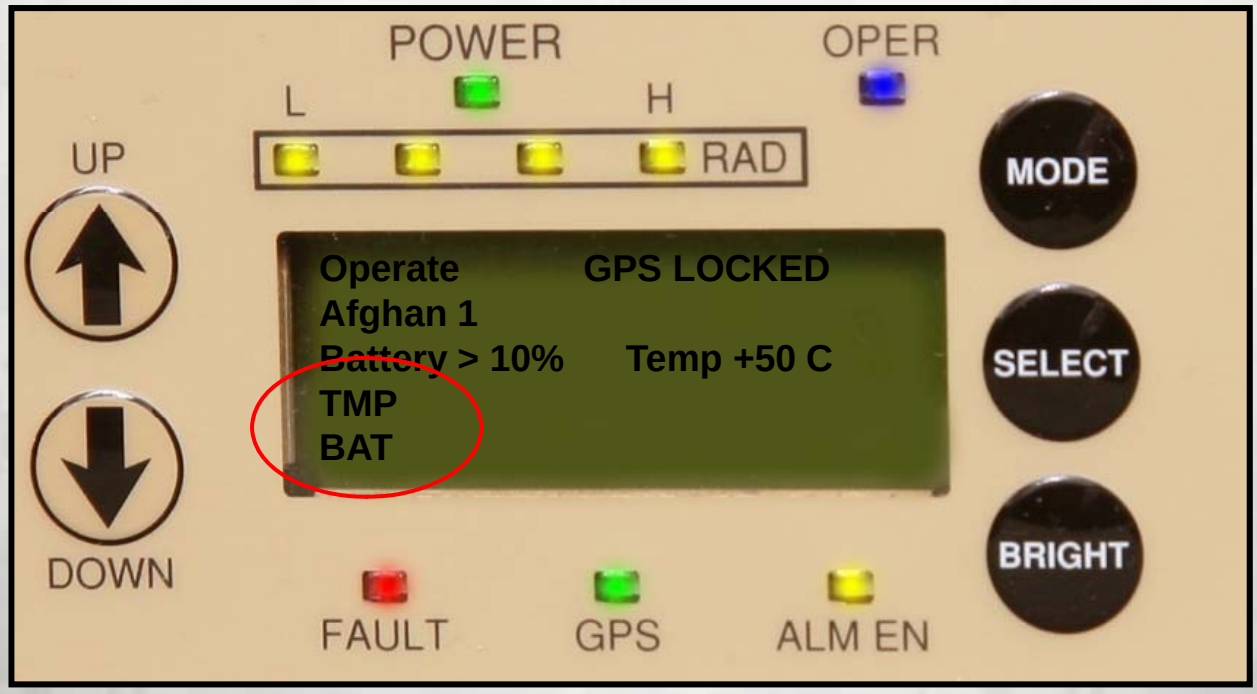
FAULT LED



FAULT LED

Faults

- Faults are also shown on the enunciator of the RCU. Multiple faults can be displayed at the same time



Troubleshooting

- If THOR III system does have a fault
  - Power down system
  - Ensure J1 Power cable is connected properly to Primary Unit and battery module
  - Check batteries for power level and proper installation
  - Check Antennas and cables for damage
  - Check all connections
  - Replace damaged components if available
  - Power up system to see if fault clears

If a fault cannot be cleared, return the system to your EWO/FSR for repair/replacement

Troubleshooting

Battery Replacement

It is unnecessary to power down the system when changing batteries

Simply remove and replace one battery at a time, being careful not to remove both batteries simultaneously

Troubleshooting

Non-operational RCU

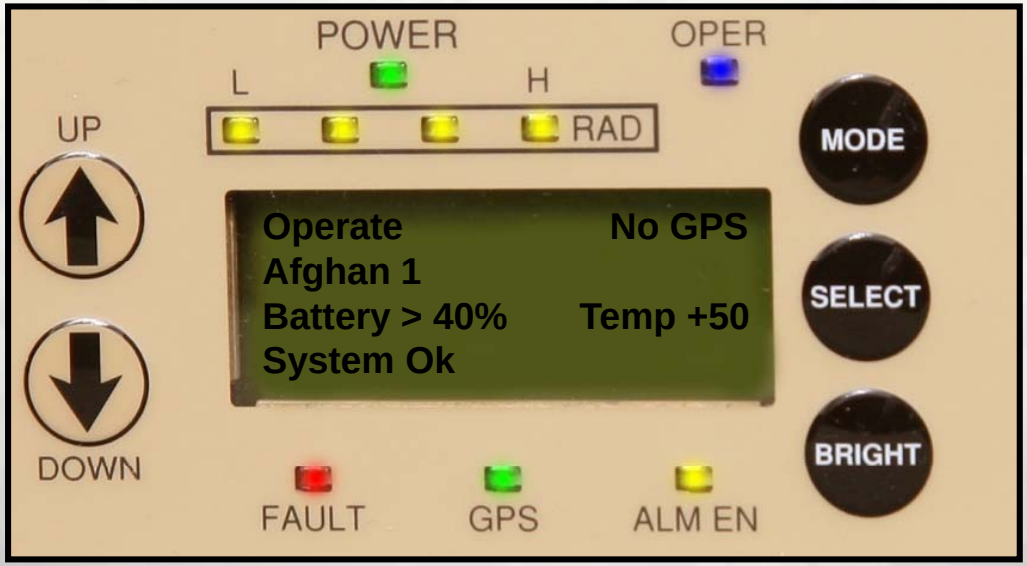
- If RCU becomes non-operational, the system continues processing under its current mode (i.e., Operate or Standby)
  - Ensure RCU cable is attached securely to both the Primary Unit and the RCU
  - Check RCU cable for damage
- Forward system to EWO to clear non-operational RCU

NOTE: If system does not display LED's upon start-up, check the BRIGHT button

Troubleshooting

GPS Failure

- GPS Synchronization takes ~ 15 minutes
  - While synchronizing the Thor operates normally
  - Will indicate GPS TRAIN during synchronization
- System will display NO GPS if there is no access to satellites or GPS antenna or cable is damaged or disconnected



Check on Learning

1. What does a blinking FAULT LED indicate?

VSWR (Voltage Standing Wave Ratio) or Over Temp

2. What does a solid FAULT LED indicate?

High Power Amplifier Fault (critical)

3. What should your first check be if, when you power on the system, the LED's on the primary unit do not light up?

Press the BRIGHT button

Summary

- System Overview
- Capabilities and Limitations
- System Components
- Controls and Indicators
- PMCS
- Built In Test
- Faults
- Troubleshooting
- Hands On Training
- Hands On Evaluation

QUESTIONS?

Hands on Training