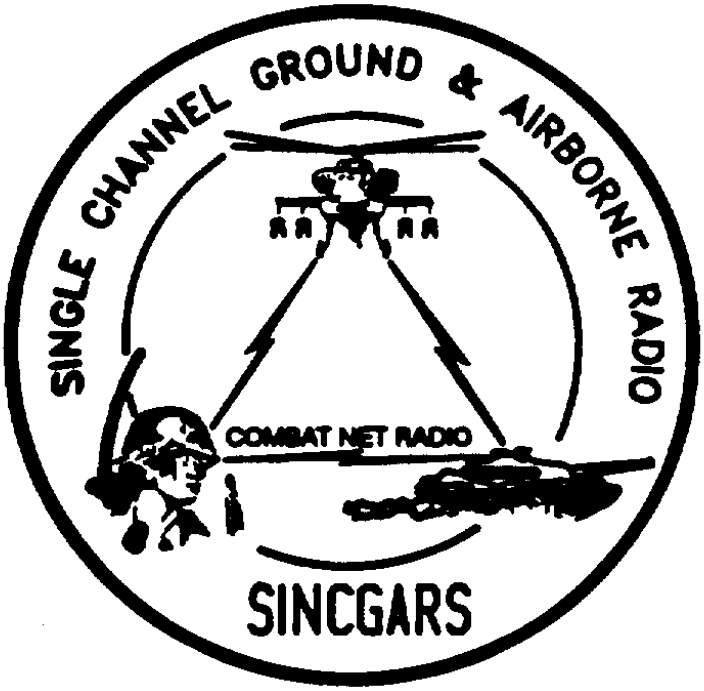
SINCGARS ICOM GROUND RADIO
OPERATOR'S POCKET GUIDE



RADIO SETS
MANPACK RADIO
(NSN: N/A) (EIC:N/A)

VEHICULAR RADIOSI
(AN/VRC-87A/C THRU AN/VRC-92A)
(NSN: N/A) (EIC: N/A)

OPERATOR ROADMAP

FLOW CHARTS

JAMMING/ANTIJAMMING

TROUBLESHOOTING CHECKLIST

Approved for public release; distribution is unlimited.

Headquarters, Department of the Army

1 SEPTEMBER 1992

SAFETY STEPS

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER. PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL.

3 SEND FOR HELP AS SOON AS POSSIBLE.

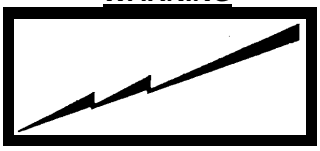
4 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK. MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION.

5 FOR ARTIFICIAL RESPIRATION. REFER TO FM 21-11.

WARNING

RF ENERGY IS PRESENT NEAR ANTENNA DURING TRANS- MISSION. MAINTAIN AT LEAST 30 INCHES BETWEEN VEH- HICULAR ANTENNA AND PERSONNEL DURING TRANSMIS- SIONS.

WARNING



HIGH VOLTAGE

EXISTS AT CONNECTOR J1 ON VEHICULAR MOUNTING ADAPTER. AVOID PERSONAL INJURY: BE SURE J1 IS COVERED OR CAPPED WHEN NOT IN USE

DEATH OR SERIOUS INJURY CAN RESULT:

- When antenna tip caps are not Installed on antennas.
- When a tied-down antenna hits a fixed object such as an overhead bridge, tree limb. Etc. Flying antenna parts might strike nearby personnel.

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SCOPE

This pocket guide is intended for use by trained SINCGARS Ground ICOM radio Operators.

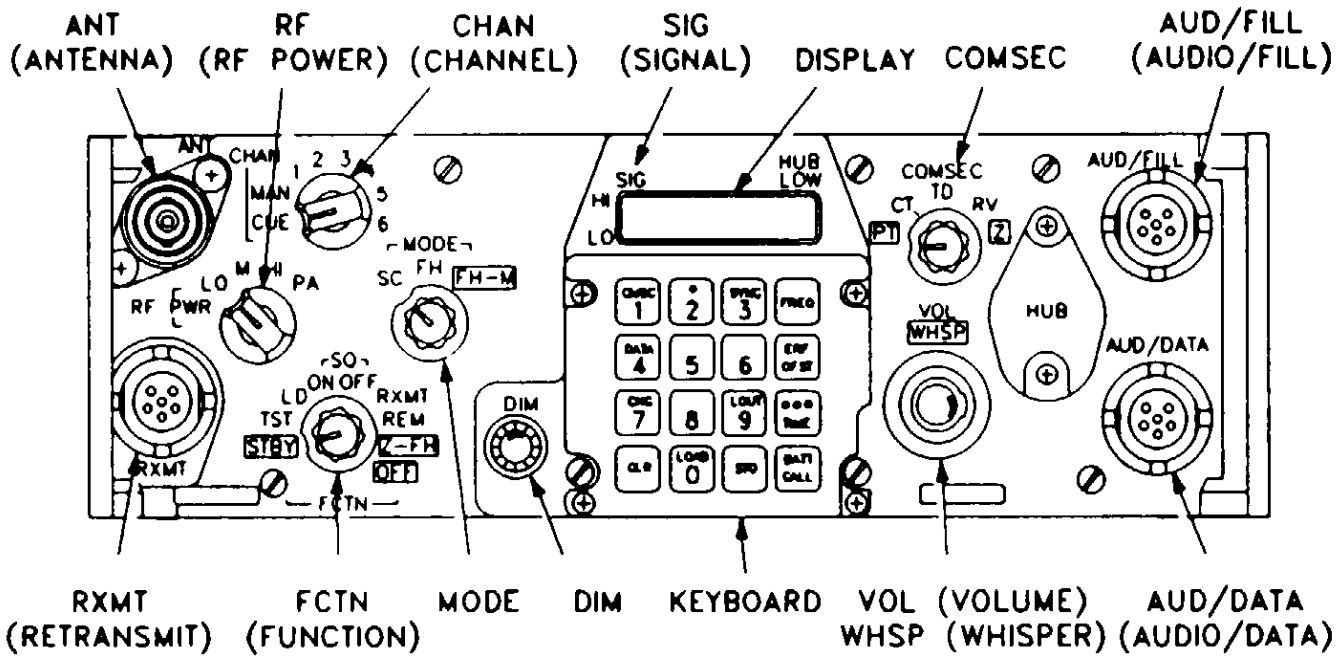
It covers Operator tasks and provides flow charts showing steps required to perform Operator functions. It serves as a handy memory Jogger to help trained Operators follow required procedures.

It also provides guidance on how to respond to Jamming and an Operator Troubleshooting Checklist.

Whenever more information Is needed, or when performing Pre-Mission Checks, refer to the Operator's Manual (TM 11-5820-890-10-1).

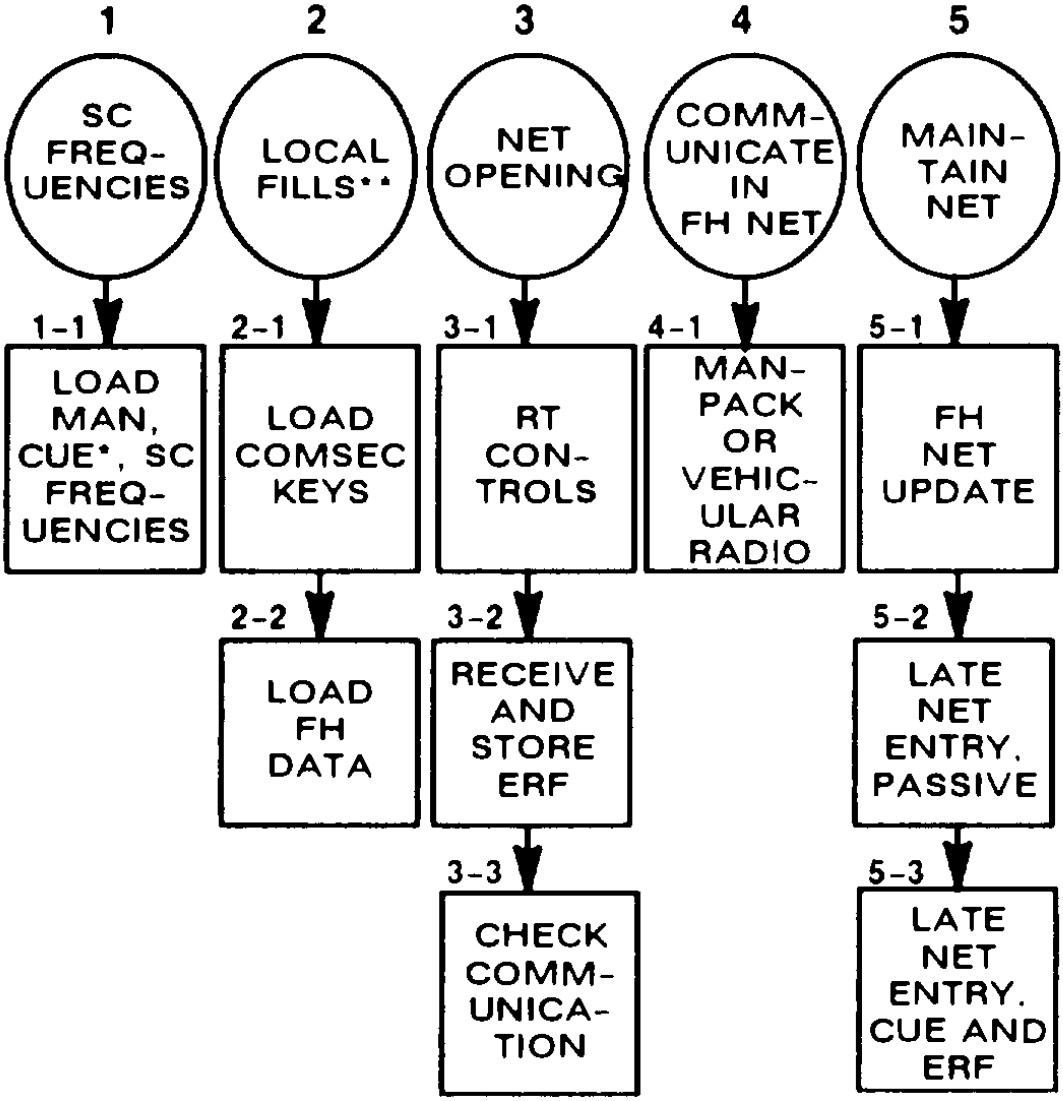
This manual supersedes TM 11-5820-890-10-2, dated 1 March 1988

RT FRONT PANEL



TASKS

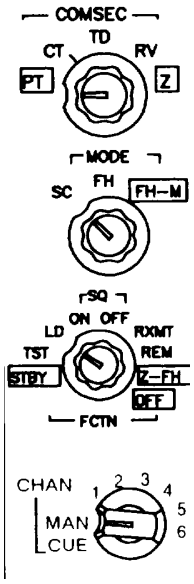
OPERATOR ROADMAP

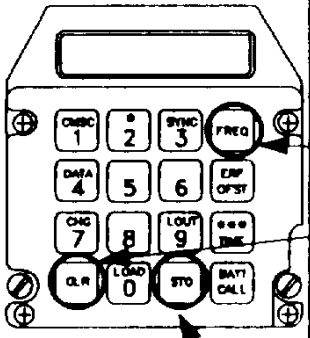
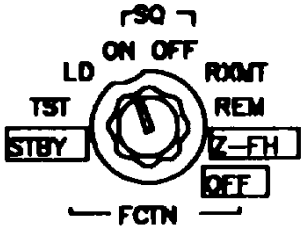


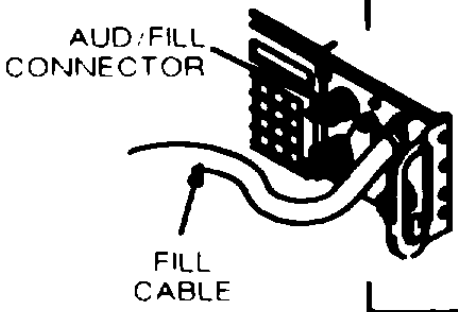
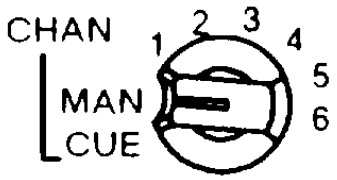
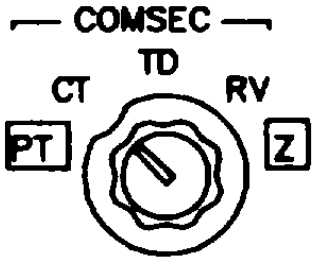
* (WHEN DESIGNATED BY COMMANDER)

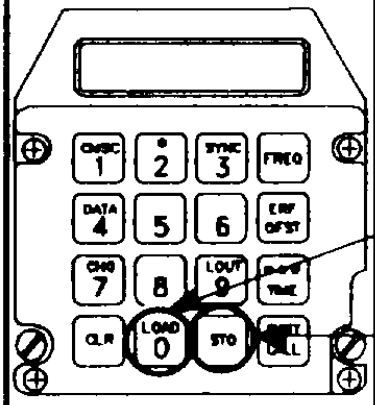
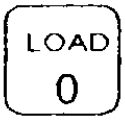
** (UNIT SOP MAY CALL FOR LOCAL FILL TASKS TO BE PERFORMED BY COMMUNICATIONS SPECIALISTS OR KEY NCO'S)

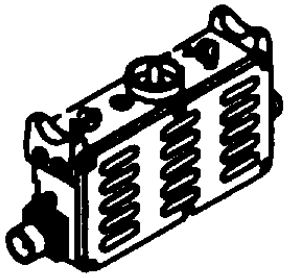
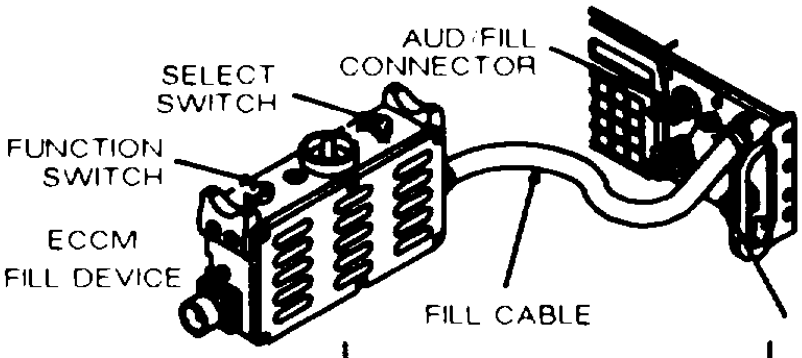
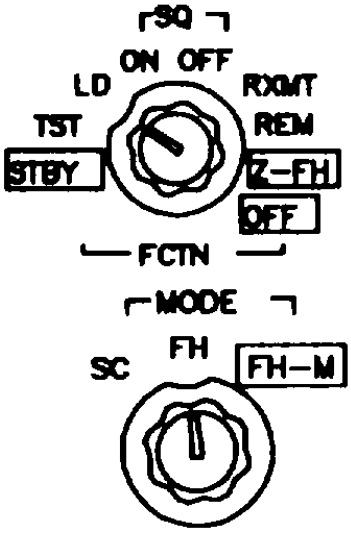
FLOW CHART

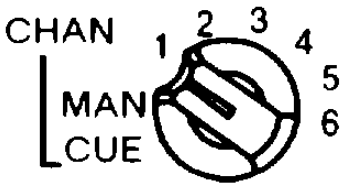
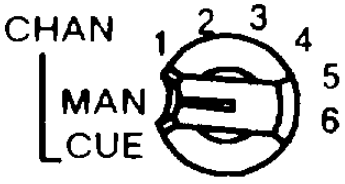
TASK 1: SC FREQUENCIES		
TASK 1-1	**ACTIONS**	**RESULTS**
LOAD: MAN CUE* or SC frequencies  	(1) Get; Frequencies from SOI or NCS Set: COMSEC to PT MODE to SC FCTN to Z-FH CHAN to MAN. CUE or 1 thru 6	(When designated by commander) Note' ('STO X and "XXXXX Indicate numbers obtained from NCS or SOI) Display shows "GOOD (or contact unit maintenance) FCTN to LD

TASK 1: SC FREQUENCIES		
TASK 1-1	**ACTIONS**	**RESULTS**
	(2) Press: FREQ [FREQ] CLR [CLR] XXXXX (Frequency from NCS or SOI)	Display shows "00000". or "30000" Display shows "- - - - -" Display shows "XXXXX"
	(3) Press: STO [STO]	Display blinks* once
	(4) Set: FCTN to SQ ON	SC loading is complete * Indicates data is stored

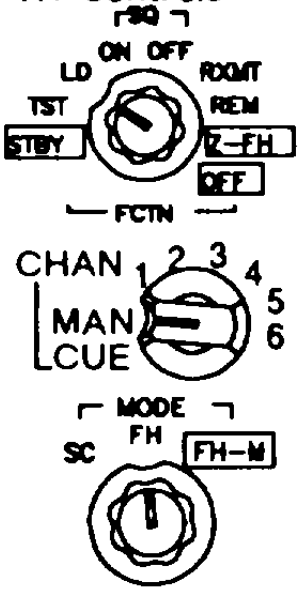
TASK 2: LOCAL FILLS		
TASK 2-1	**ACTIONS**	**RESULTS**
LOAD: COMSEC keys  	(1) Turn: COMSEC fill device to OFF Connect: COMSEC fill device to RT AUD/FILL connector using fill cable	
 	(2) Set: RT FCTN to LD RT MODE to SC RT CHAN to MAN RT COMSEC TO CT	COMSEC alarm is heard (beeping tone)
 	(3) Press: RT handset push-to-talk 2 times	COMSEC alarm changes to steady tone
	(4) Get: COMSEC key from SOI or NCS	
	(5) Turn: COMSEC fill device to the directed position	

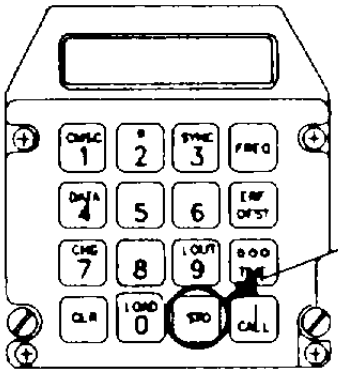
TASK 2: LOCAL FILLS		
TASK 2-1	**ACTIONS**	**RESULTS**
	(6) Turn: COMSEC MODE switch to ON	
	(7) Press: RT LOAD 	Display shows "LOAD" Display shows "H TEK" or "H KEK"
	RT STO 	Display shows "STO_"
	RT number for channel X	Display shows "STO X" and blinks once COMSEC alarm goes away
	Note: Always load channels 1 thru 6. Repeat steps 6 thru 7 for each channel to be loaded	
	(8) Turn: COMSEC fill device to OFF	
	(9) Disconnect: COMSEC fill device and fill cable	Fill loading is complete

TASK 2: LOCAL FILLS		
TASK 2-2	**ACTIONS**	**RESULTS**
LOAD: FH data 	(1) Turn: ECCM fill device to OFF Connect: ECCM fill device to RT AUD/FILL connector using fill cable	
		
	(2) Set: RT FCTN to LD RT MODE to FH RT CHAN to MAN ECCM fill device to ON ECCM fill device select switch to directed position	Display shows "FILL 0"

TASK 2: LOCAL FILLS		
TASK 2-2	**ACTIONS**	**RESULTS**
	(3) Press: RT LOAD	Display shows "LOAD" then "HF XXX"
	RT STO	Display shows "STO_"
	RT number for channel in which FH data is to be stored	Display shows "STO X" and blinks once
	(4) Turn: ECCM fill device to OFF	
	(5) Disconnect: ECCM fill device and fill cable	
	(6) Turn: RT CHAN switch to channel X to verify data is stored	Display shows "F XXX"
	RT CHAN switch to MAN	Display shows "COLD"
	(7) Stand by: To receive instructions from NCS	FH data loading is complete

TASK 3: NET OPENING

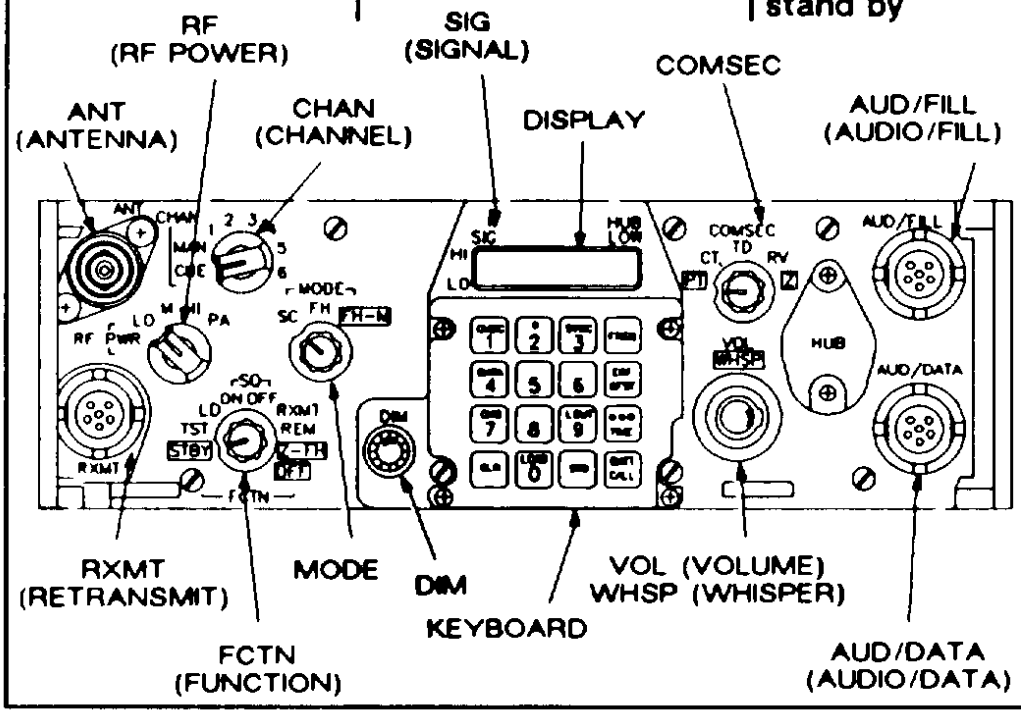
TASK 3-1	ACTIONS	RESULTS
SET: RT controls 	(1) Follow: NCS directions	
	(2) Set: FCTN to LD CHAN to MAN MODE to FH	Display shows "COLD" * * When display shows "COLD" RT is ready to receive ERF

TASK 3-2	ACTIONS	RESULTS
RECEIVE: ERF STORE: ERF where directed/desired 	(1) Wait: For NCS to send ERF When ERF is received	 Display shows "HF XXX" or "HL XXX"
	(2) Press: STO Number 1 **	Display shows "STO_" Display shows "STO 1" and blinks

** Your own primary net Is normally stored In CHAN 1.
When entering other nets, use CHAN 2 - 6 as desired.

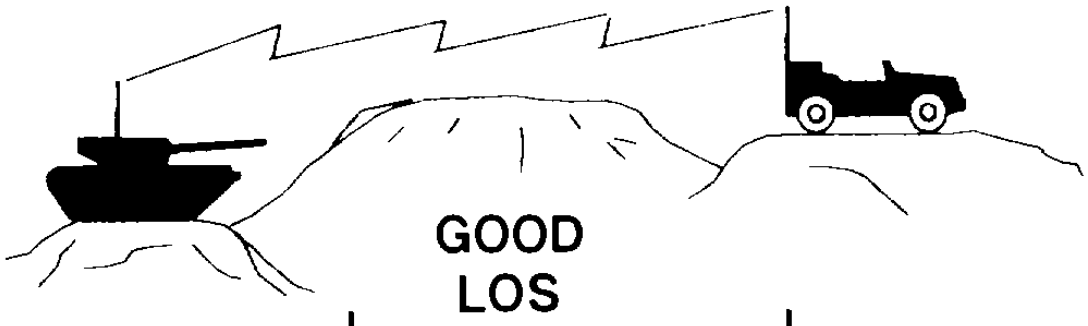
TASK 3: NET OPENING

TASK 3-3	ACTIONS	RESULTS
CHECK: Communications CHAN 1 2 3 4 5 6 MAN CUE	(1) Set: FCTN to SQ ON	
	(2) Change: CHAN switch to channel 1.	Display shows "F XXX"
	(3) Check: Communication when NCS calls net	Reception of ERF complete Note: If NCS fails to contact you, set CHAN to MAN and stand by

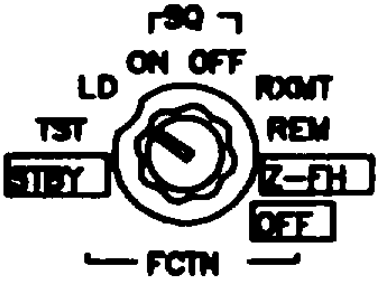
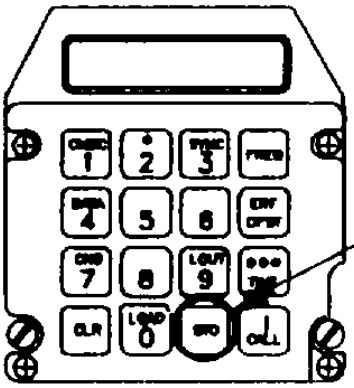


TASK 4: COMMUNICATE IN FH NET		
TASK 4-1	**ACTIONS**	**RESULTS**
Manpack or vehicular radio	(1) Push-to-talk	Message sent
	(2) Adjust volume to hear	Message received
	(3) <u>Seek:</u> Line-of-sight	Avoid loss of communication

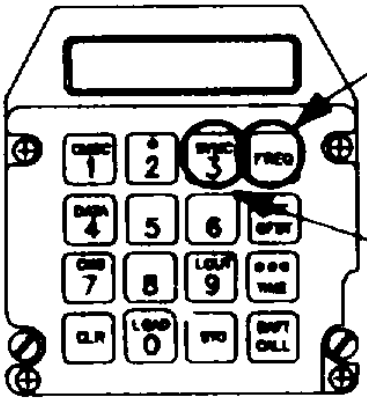


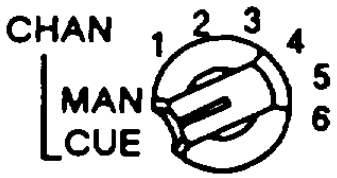
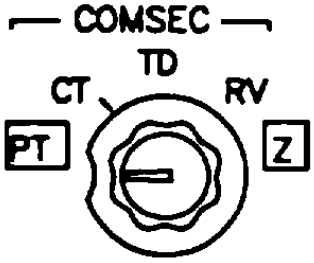
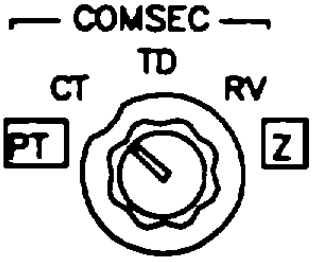


	(4) React if jammed (see pages 16 thru 21)	Avoid loss of communication

TASK 5: MAINTAIN NET		
TASK 5-1	**ACTIONS**	**RESULTS**
RECEIVE: FH net update  	(1) Follow: NCS directions	
	(2) Set: RT FCTN to LD	
	(3) Wait: For NCS to send ERF	Display shows "HF XXX" or "HL XXX"
 	(4) Press: STO Number as directed	Display shows "STO_" Display shows "STO X" and blinks
	(5) Stand by: For NCS instructions	

TASK 5: MAINTAIN NET

TASK 5-2	ACTIONS	RESULTS
LATE NET ENTRY: Passive method 	(1) Press: FREQ  SYNC  Note: Press SYNC again to cancel late net entry mode	Display shows "F XXX" Display shows "LF XXX"
	(2) Wait: For radio traffic (DO NOT PRESS PTT SWITCH)	Communication is heard Display shows "F XXX". "L" is dropped
	(3) Contact: NCS for communications check	Passive late net entry is complete Note: If traffic is not heard after 3 minutes, proceed to CUE and ERF method

TASK 5: MAINTAIN NET		
TASK 5-3	**ACTIONS**	**RESULTS**
LATE NET ENTRY: CUE and ERF method   	(1) Set: CHAN to CUE* RT COMSEC to PT	* Note: Load proper CUE and MAN frequencies for net to be contacted.
	(2) Press: Handset push-to-talk for 4 seconds THEN, AT ONCE	
	(3) Set: RT COMSEC to CT	
	(4) Wait: For answer	NCS/alternate NCS will respond on CUE frequency
	(5) Repeat: After 15 seconds until CUE call is answered	Note: (Go to PT for CUE, then to CT for response)
	(6) Follow: Procedures as directed for receiving ERF	CUE and ERF late net entry is complete Note: Reload own unit MAN frequency upon leaving net entered by CUE and ERF.
Note: Even if you have a COMSEC key loaded, when your radio has been set to STBY and is switched to SQ ON, you will hear a COMSEC alarm. Pressing PTT twice will clear this alarm.		

JAMMING AND ANTIJAMMING

JAMMING. Jamming is the intentional transmission of signals that interrupt your ability to receive needed signals. Interference is the accidental transmission of signals that also interrupt your ability to receive needed signals If you are being jammed. it might sound like strong static, misleading signals, or random noise: or the net may be quiet with no signals heard. These signals depend upon the type of jamming signals and whether your net is operating in single channel (SC) or frequency hopping (FH) mode The source of jamming could be power generators, radar sets, high power RF radio sets, or intentional enemy jammers.

SINGLE CHANNEL OPERATION.

SYMPTOM	POSSIBILITIES	ACTION
SIG marker is lit and showing a signal higher than LO. You hear no traffic or noise and you are not transmitting.	(1) You have a bad handset if you disconnect the handset and the lighted signal goes away (stuck or "hot" mike)	(1) Try to free-up the stuck mike by pressing push-to-talk 2 or 3 times Remove faulty handset and replace with one that is good
	(2) You are being jammed If you set RT FCTN switch to SQ OFF and hear strong static or random noise You can confirm this by disconnecting the antenna (MP) or antenna cable (vehicular) The SIG marker will drop and the noise will go away or be reduced.	(2) Change your tactical location. Try to mask your RT/antenna by placing hills rocks buildings, etc, between you and the enemy. Notify your supervisor and prepare a MIJI feeder report.

SINGLE CHANNEL OPERATION. Continued

SYMPTOM	POSSIBILITIES	ACTION
	(3) You may have faulty or "locked-up- RT If you try removing the antenna (MP) or antenna cable (vehicular) and the SIG marker remains higher than LO.	(3) Set RT FCTN switch to STBY: then to SQ ON. If the problem still exists. contact unit maintenance.
SIG marker Is lit and showing a signal higher than LO You hear random radio traffic or radio signals	You have enemy or friendly radio Interference.	Set RT FCTN to SQ OFF and listen for radio traffic. Try to identify a friendly call sign If you can determine friendly signals. If you determine that Jamming Is from an enemy source. Change location and use terrain to mask your RT from enemy jamming source. Switch to a better antenna (if using a manpack. switch to a vehicular or OE-254). Contact NCS and your supervisor

SINGLE CHANNEL OPERATION. Continued

SYMPTOM	POSSIBILITIES	ACTION
SIG marker Is lit and showing a signal higher than LO The SIG marker may light on and off at regular Intervals (pulsing) or In a random cycle. You may or may not hear any noise. Contact NCS and your supervisor.	(1) You may have enemy sweep jamming.	(1) Set RT FCTN to SQ OFF. You may hear a very high-pitched noise or static each time the marker lights. Use terrain to mask your RT from the enemy's suspected location
	(2) You may have radio or radar Interference.	(2) Symptoms or actions are similar to sweep jamming (above) except that signals will be coming from a friendly source (maybe). Use terrain to mask your RT from suspected source location Contact NCS and your supervisor

FREQUENCY HOPPING OPERATION.

SYMPTOM	POSSIBILITIES	ACTION
SIG marker is lit and showing a signal higher than LO The signal marker may light on and off at regular intervals (pulsing) or light steady. There is strong static when you attempt to hear net traffic.	(1) You are being jammed if you disconnect the antenna (MP) or antenna cable (vehicular) and the SIG marker Is reduced or drops to LO and the noise Is reduced.	(1) Reconnect the antenna. Use terrain to mask your RT from the suspected enemy location. Contact NCS and your supervisor.
	(2) You may be - receiving interference from a nearby high-power communication system (this Is a co-site problem).	(2) If possible, obtain authorization to have the interfering equipment turned off (this determines If you are receiving Interference or If you are being jammed by the enemy). Move away from the source of Interference by using terrain to mask your RT from the source. Attempt to remotely locate your antenna(s) or RTs, separating antennas by at least 50 meters Use one RT at a time.

FREQUENCY HOPPING OPERATION. Continued

SYMPTOM	POSSIBILITIES	ACTION
SIG marker is lit and showing a signal higher than LO You hear a constart hiss or background noise In the handset, but no real noise or radio traffic.	(1) There is a compromised or captured RT In your net. The compromised RT is constantly transmitting to act as a Jammer. (2) There is a stuck mike or bad handset in your net that Is locked. In the transmit (push-to-talk) position (3) Your RT has a stuck handset if you blow or speak into the mike and you hear sidetone	(1) Press handset push-to-talk 2 times. If voice or data transmissions return, continue to operate. Contact NCS or refer to SOI. Use authentication procedures (2) Push handset push-to-talk 2 times. Contact NCS Use authentication procedures. (3) Disconnect handset from RT and the SIG marker drops to LO or below. Press handset push-to-talk several times to free the switch If you reconnect the handset and the SIG marker lights. Replace the bad handset with one that is good.

FREQUENCY HOPPING OPERATION. Continued

SYMPTOM	POSSIBILITIES	ACTION
Your net is not in a silence directive and you haven't heard traffic for a period of time.	Your RT is out of FH sync time.	Attempt to contact NCS or another member 2 or 3 times. If unsuccessful, perform passive late net entry. If late net entry Is unsuccessful, perform CUE and ERF procedure. Follow NCS direction.
SIG marker steadily flikers. You can communicate, but there is background popping or static when you are receiving. You notice your RT cornmunication range Is reduced.	Co-site interference from another radio.	If possible, ask the interfering radio operator to stand by or to reduce RF power. Attempt to move your RT or antenna 50 meters or more. Contact NCS.

Note: When a station in **PT** calls one In CT, the receiving operator can hear the message and beeping In the background. This tells the receiving operator that the sender has COMSEC set to **PT** rather than CT.

OPERATOR'S TROUBLESHOOTING CHECKLIST

If you have difficulty communicating, take the time to perform the following checks before you decide that there is something wrong with your radio.

- Make sure you have all the switches set properly.
- Check all cable connections to ensure that they are tight.
- Make sure that the antenna is properly connected and positioned.
- Try to verify that you have LOS with other stations.
- Change position to see if communications improve.
- If you have not heard net traffic in some time, perform passive late net entry.
- Make sure your radio has adequate power (especially manpack).
- Look and see if another net station is co-located in your area (called co-site interference).
- Determine if you are being jammed by the enemy. If so, take appropriate action.
- Should your radio give a strange, unexplained message that doesn't automatically clear:

(1) Set FCTN to **STBY** , then return to SQ ON. This action may clear your problem.

(2) If it does not, and the situation permits, set FCTN to **Z-FH** and wait for GOOD, then to **OFF** and wait 10 seconds, then back to **Z-FH** and again wait for GOOD. Now run self-test. If GOOD results, reload and re-enter net. If problem still exists, contact unit maintenance.

If you still cannot communicate, there may be something wrong with your radio. However, any one of the above operator troubleshooting actions may put you back into communications. They are well worth trying.

ABBREVIATIONS USED

CHAN	Channel
CLR	Clear
CM	Control Monitor
COMSEC	Communication Security
CT	Cipher Text
ECCM	Electronic Counter-Counter Measures
ERF	Electronic Remote Fill
FCTN	Function
FH	Frequency Hopping
HUB	Hold Up Battery
KEK	COMSEC Key
LD	Load
LO	Low
LOS	Line of Sight
M	Medium
NCS	Net Control Station
PA	Power Amplifier
PT	Plain Text
RCU	Remote Control Unit
REM	Remote
RF (PWR)	Radio Frequency Power
RT	Receiver-Transmitter
RV	Receive Variable
RXMT	Retransmit
SC	Single Channel
SIG	Signal
SOI	Signal Operating Instructions
SQ ON	Squelch On
STBY	Stand by
STO	Store
SYNC	Synchronization
TD	Time Delay
TEK	COMSEC Key
TST	Test
VOL	Volume
WHSP	Whisper
Z	Zero

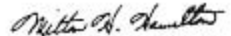
WARNING

- A lithium battery used with your manpack radio contains pressurized sulfur dioxide gas The gas is toxic, and the battery MUST NOT be abused In any way which may cause the battery to rupture.
- DO NOT heat, short circuit, crush, puncture, mutilate or disassemble batteries.
- DO NOT USE any battery which shows signs of damage such as bulging, swelling, disfigurement, a brown liquid, in the plastic wrap, a swollen wrap, etc
- DO NOT test lithium batteries for capacity.
- DO NOT recharge lithium batteries
- DO NOT dispose of lithium batteries with ordinary trash/ refuse. Turn in discharged batteries to local supply
- If the battery compartment becomes hot to the touch If you hear a hissing or burping (i.e. battery venting), or smell irritating gas (sulfur dioxide). IMMEDIATELY TURN OFF the equipment and leave the area.
  1. Allow the equipment to cool at least one hour
  2. Remove and replace the battery after the equipment has cooled to the touch.
  3. If there is a safety incident, or if you believe a safety hazard exists notify your local Safety Office/Officer. file a Product Quality Deficiency Report, SF Form 368 and notify the CECOM Safety Office, Ft Monmouth, NJ at AV 995-3112
- DO NOT use a Halon type fire extinguisher on a lithium battery fire.
- In the event of a fire near a lithium battery(les), rapid cooling of the battery(les) is important. Flood the equipment with water, or use a carbon dioxide (CO,) extinguisher Control of the equipment fire and cooling may prevent the battery from venting and potentially exposing lithium metal In the event that the lithium metal becomes involved in fire, the use of a graphite based Class D fire extinguisher is recommended.
- DO NOT store batteries in unused equipment
- DO NOT store lithium batteries with other hazardous materials. Keep them away from open flame or heat.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:



MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
01986

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