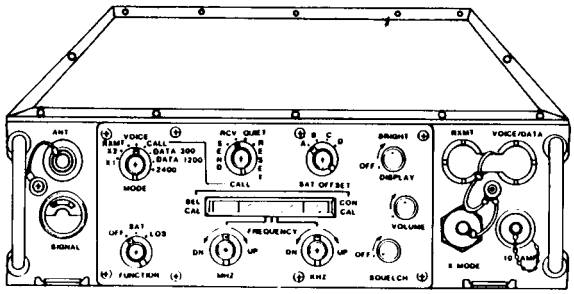
Chapter 10
TACSAT Single-Channel System

10-1. System Description

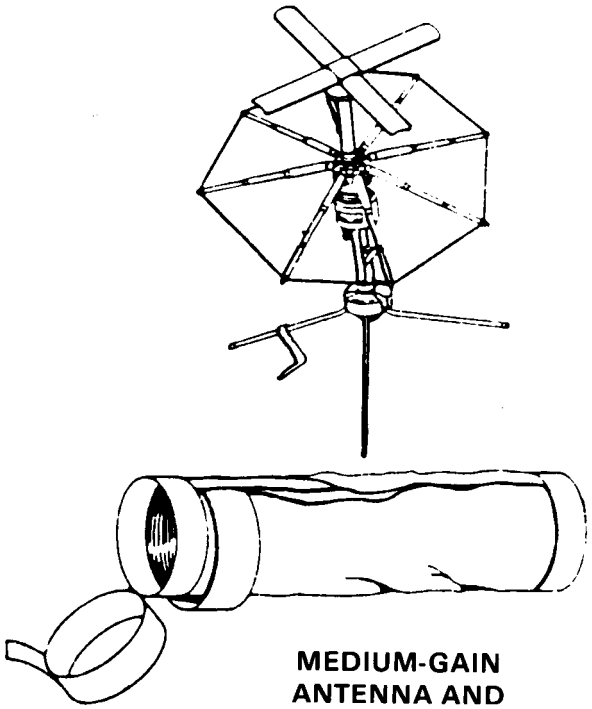
a. Single-channel TACSAT is primarily a user-owned and -operated device that does not interconnect terrestrial systems. Its general use and configuration places it within the CNR portion of the communications architecture.

b. These terminals provide reliable, highly portable communications. They have minimum setup and teardown time and satisfy the need to communicate over extended ranges without regard to terrain interference. The system operates in the UHF band between 225 MHz and 400 MHz. The terminals use a UHF satellite system (fleet satellite (FLTSAT) and Air Force satellite (AFSAT) space segments).

c. The Army terminals using Navy and Air Force space segments are the AN/MSC-64, AN/PSC-3, AN/VSC-7, AN/URC-101, and AN/URC-110. The AN/PSC-3 (Figure 10-1) is a manpack terminal carried by one operator. The AN/VSC-7 (Figure 10-2) is a vehicle-mounted terminal which normally acts as an NCS and can control up to 15 subscribers. The AN/PSC-3 and AN/VSC-7 are the most common and will be used until new and lighter equipment is fielded. The AN/URC-101 and AN/URC-110 are manpack terminal transceivers that operate in the same band range (UHF), have the same characteristics for planning, and have similar technical specifications as the AN/PSC-3. Due to the unique similarities and limited quantities of systems, any reference to the AN/PSC-3 in this chapter will also include the AN/URC-101 and AN/URC-110.

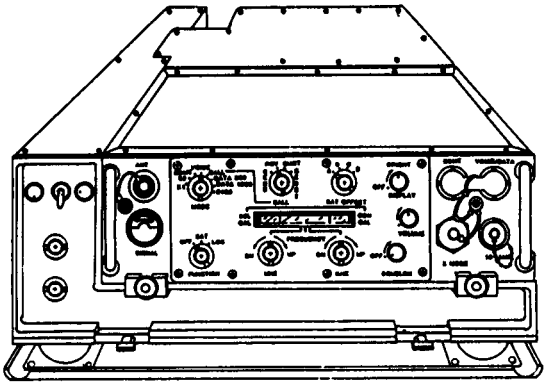


RT UNIT

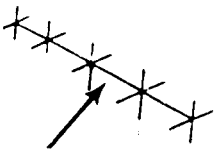


MEDIUM-GAIN
ANTENNA AND
CARRYING CASE

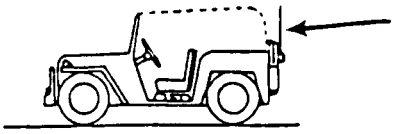
Figure 10-1. AN/PSC-3 TACSAT radio set.



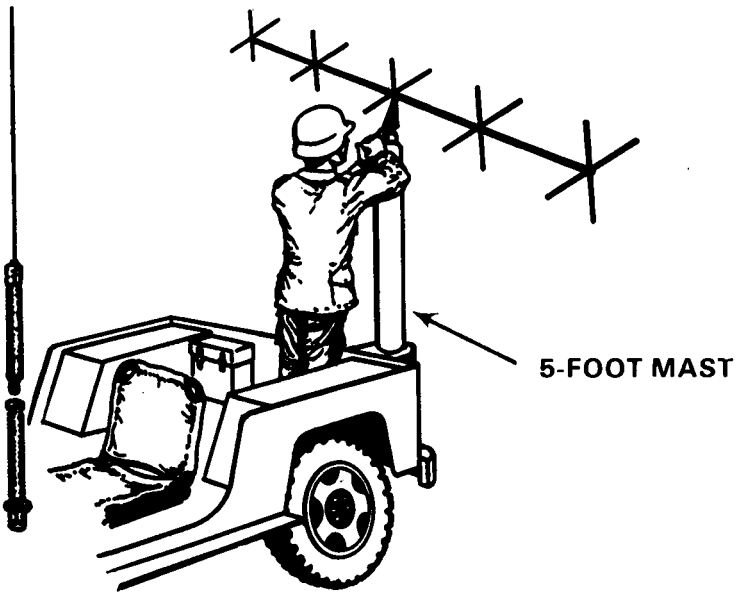
AN/VSC-7
(AN/PSC-3( ) WITH CONTROL CONVERTER)



HIGH-
GAIN
ANTENNA



LOW-GAIN
ANTENNA



5-FOOT MAST

Figure 10-2. AN/VSC-7 TACSAT radio set.

10-2. Architecture

a. The single-channel TACSAT architecture incorporates different users with different missions. Throughout" all levels of war, TACSAT provides the range extension required to conduct effective operations. Single-channel TACSAT is specifically suited for the conduct of critical contingency operations. In contingency operations, the Army Force (ARFOR) commander defines the deployment of his task force by executing a forced entry operation in five phases (Figure 10-3). They are--

- Phase l--Predeployment/crisis action.
- Phase 2--Deployment/initial combat.
- Phase 3--Force buildup/combat operations.
- Phase 4--Decisive operation.
- Phaes 5--Redeployment.

(1) Phase I: The ARFOR establishes predeployment communications when the JCS warning order is received. Liaison officers are exchanged between the ARFOR, the other service components, the designated Commander in Chief (CINC), and possibly certain national agencies. Single-channel TACSAT, HF radio, and COMSEC equipment accompany these liaison officers.

(2) Phase II: ARFORs conduct the initial assault into the operational area. This assault is planned as a forced entry. However, the situation may allow uncontested air landing of forces. During phase II, communications consist of single-channel manportable radios. Joint radio nets are installed depending on the situation and the CINC's requirement. The baseline of joint radio nets the ARFOR headquarters may enter is listed below. In most cases, single-channel TACSAT terminals (Figure 10-4) are used.

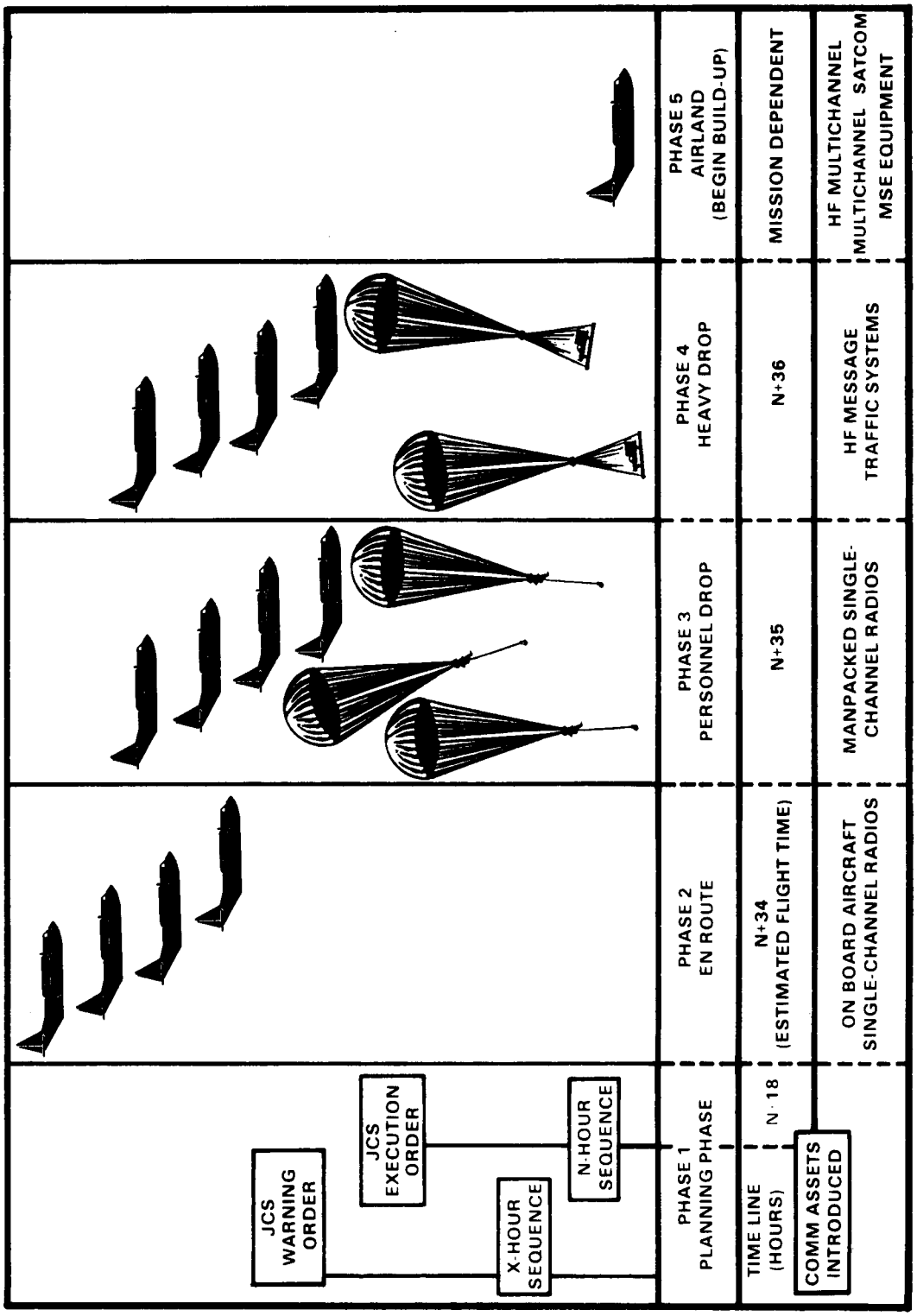


Figure 10-3. Forced entry mission in a joint service operation.

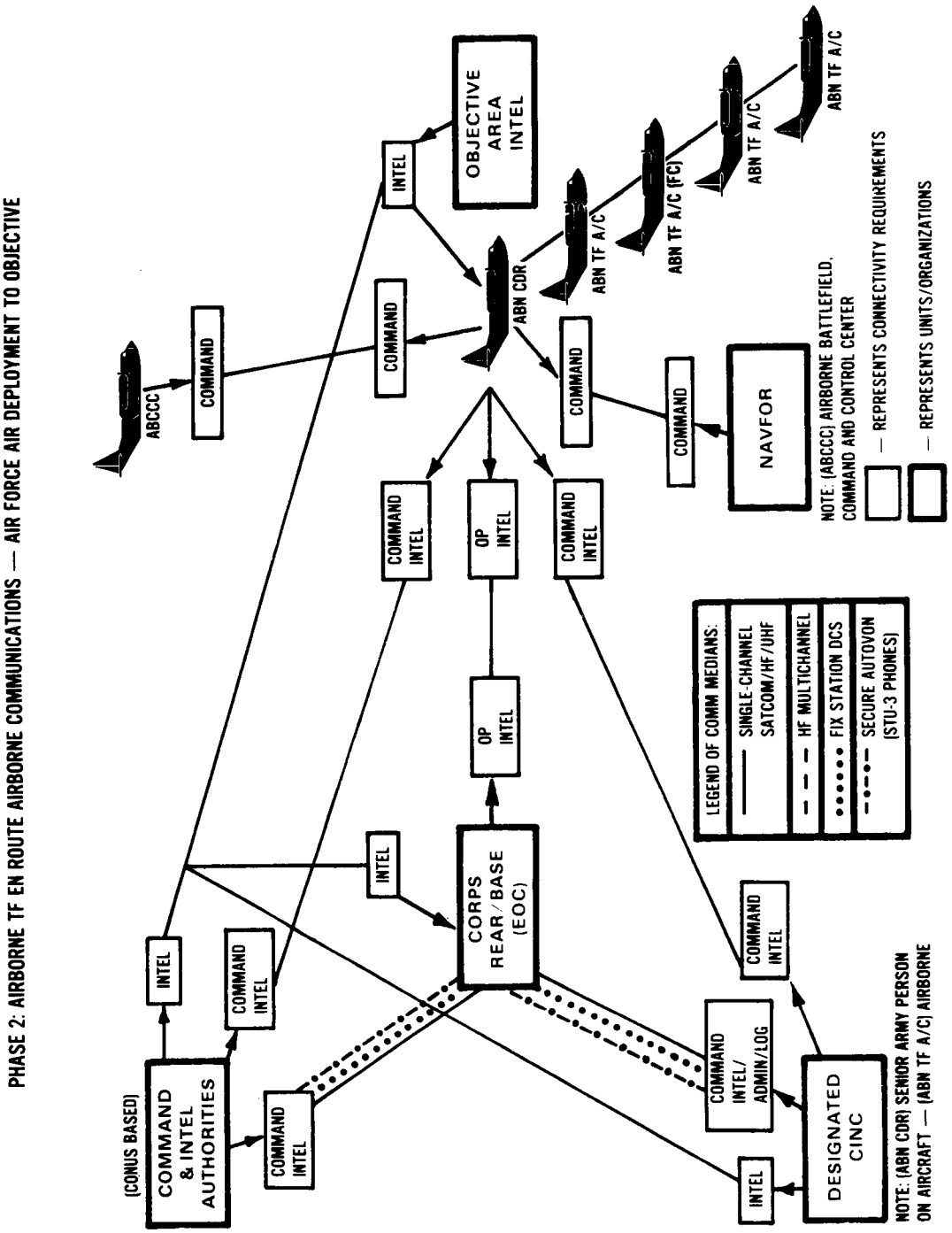


Figure 10-4. Tactical architecture connectivity requirements for a forced entry mission in a joint operation.

- JTF Command/Transition (TACSAT voice) (HF voice) (FM).
- JTF Operations/Intelligence (TACSAT data) (RATT).
- Joint Air Coordination (TACSAT voice).
- Joint Supporting Arms Coordination (FM) (HF).
- Linkup (FM).
- Embassy/DOD Interface (I-IF).
- Search and Rescue (HF or FM).
- Emergency NEO (HF or FM).

(3) Phase III: Force buildup involves moving combat, CS, and CSS elements into the area of operations. Constraints require that radios are light, reliable, and useable over extended distances. Units such as Special Forces groups and Ranger battalions deploy manpack TACSAT terminals. The physical environment does not restrict these deployments. The terminals are lightweight and compact, and they can be moved easily by one person. The NCSs are normally vehicle mounted. They are usually operated from a forward operating base by Special Forces groups or from a battalion headquarters by Ranger battalions.

(4) Phase IV and V: operations involve sustaining, exploiting, and redeploying actions. Although multichannel TACSAT and MSE are deployed, single-channel assets are retained.

b. In all phases of forced entry, single-channel TACSAT use cannot be over emphasized. Manpack terminals can be easily deployed worldwide. A network can be a small deployment of three or four terminals with one NCS or a larger deployment with numerous NCSs. The AN/VSC-7 (NCS) and AN/PSC-3 (backpack terminal) satisfy the real-time mission requirements of the following organizations.

- Special Forces.
- Ranger battalions.
- LRSUs.
- Atomic demolition team.
- Airborne/air assault divisions.
- Infantry division (light and heavy).

- Corps support command (COSCOM).
- Light infantry brigade (LIB).

10-3. Employment

a. Special Forces units use the AN/PSC-3s for group/detachment headquarters, forward operating bases, and operational teams spread over extended distances. Command and control between major headquarters is primarily secure voice (Figure 10-5). All users at the Special Forces team level operate in a data burst mode using the OA-8990 data-burst device. The special operations signal battalion can provide the following CNR capabilities :

(1) Provide two small signal extension nodes of which one service will be UHF satellite, HE', and VHF single-channel radio for voice, data, and facsimile communications.

(2) Provide a total of 14 quick reaction single-channel radio systems for C^2/liaison support that are deployable by ground, air, or amphibious assault.

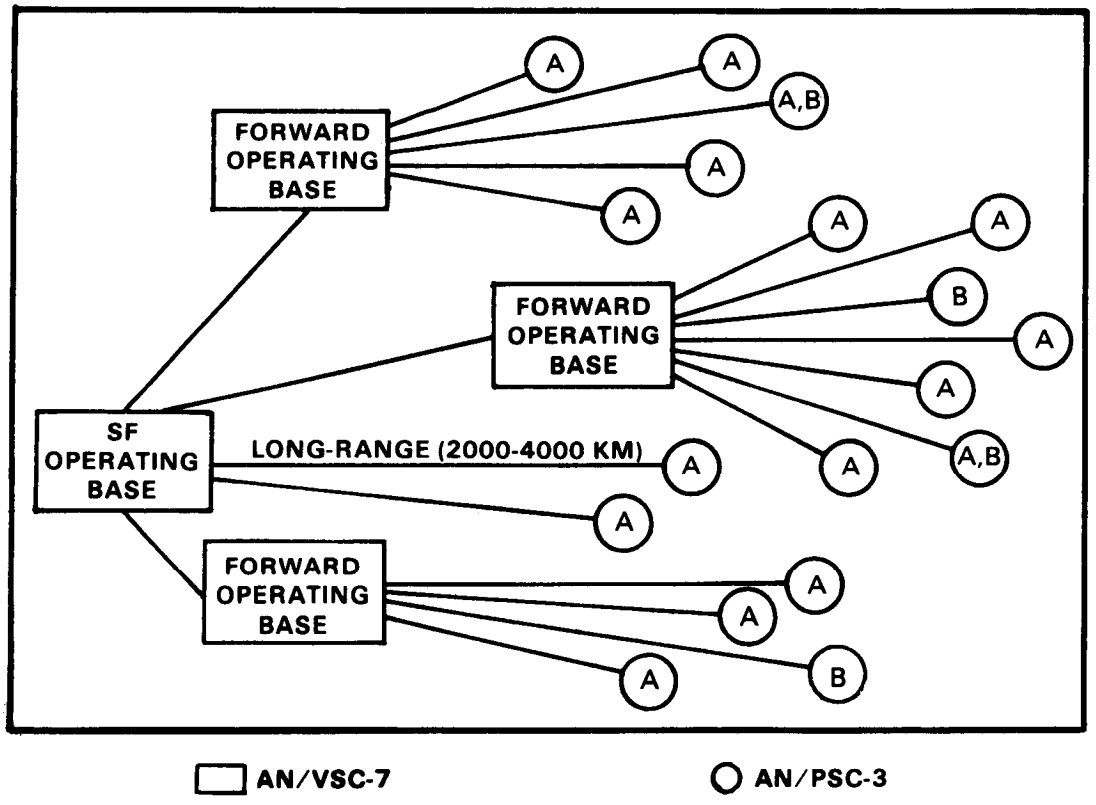


Figure 10-5. Special forces employment.

b. The Ranger regiment/battalion command nets provide C^2 from regimental headquarters through company headquarters. They use secure voice and data burst in their operations (Figure 10-6).

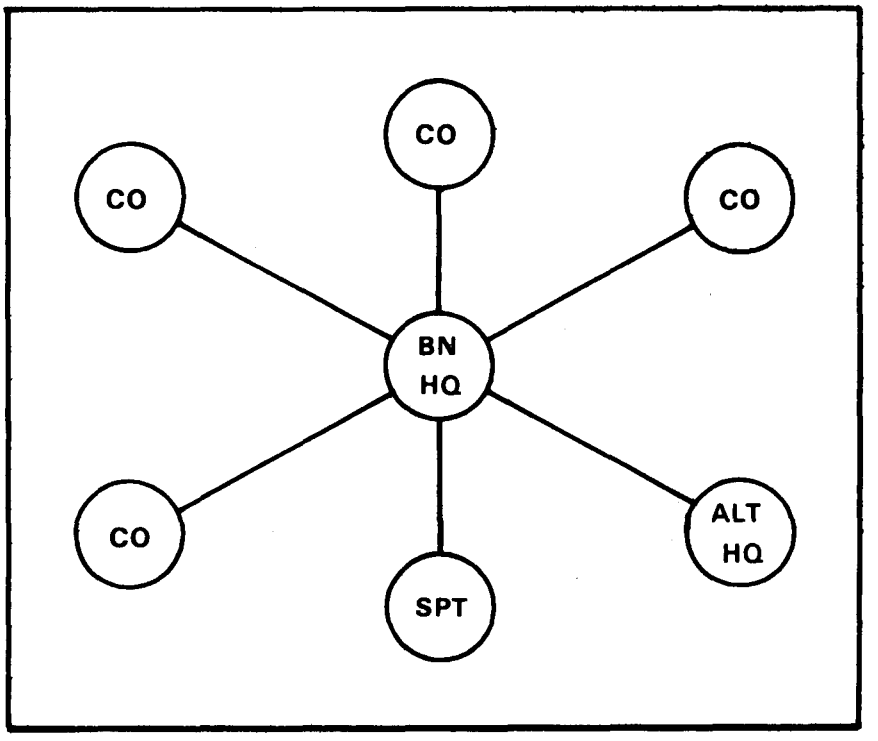


Figure 10-6. Ranger battalion employment.

c. The LRSU net provides C^2 of long-range patrols deployed at extended distances. The sensitivity of the special surveillance missions performed by these patrols is satisfied by using manpack communication terminals with data burst transmissions.

d. The engineer atomic demolition net can coordinate and control releasing atomic demolition munitions (ADMs). The ADM nets operate secure voice and burst communications to pass release orders.

e. The airborne/air assault divisions use the AN/PSC-3s primarily to provide a long-haul C^2 link between major headquarters during initial deployment. Once on the ground, those 'headquarters still requiring a communications link not available by LOS means or by multichannel satellite link will continue to operate by the AN/PSC-3 network. The primary mode is secure voice, though secure teletype (AN/UGC-74) is also used with appropriate interface devices.

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f. Selected infantry divisions (light and heavy) use the AN/PSC-3s to provide a long-haul C^2 link between major headquarters during initial deployment of a contingency operation. The primary mode is secure voice, though secure teletype (AN/UGC-74) is also used.

g. The contingency force CSS unit uses its AN/PSC-3s to facilitate communications for C^2, operations, and logistics traffic between the CSS unit's emergency operations center and its deployed headquarters. The AN/PSC-3S are deployed on an as required basis to units whose long-haul communications needs cannot be serviced by terrestrial or multichannel satellite links. The primary communications mode is secure voice.

h. The LIB has some unique, long-haul communications requirements which LOS means cannot satisfy. These units deploy AN/VSC-7s and AN/PSC-3s with their headquarters, when dispersed over extended distances, to provide a C^2 communications link. The primary communications mode is secure voice. (Figures 10-7 and 10-8 are typical employment schemes using single-channel UHF TACSAT terminals.

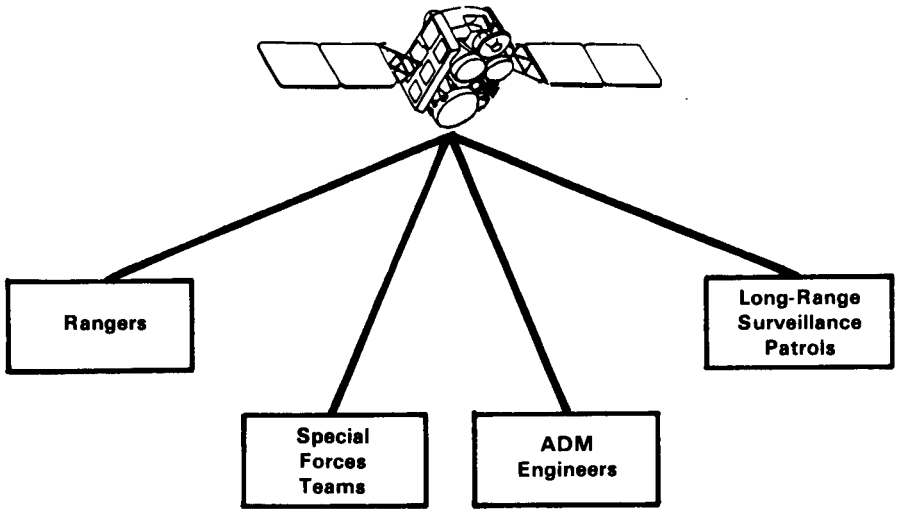

Figure 10-7. Burst communications system (BCS) users.

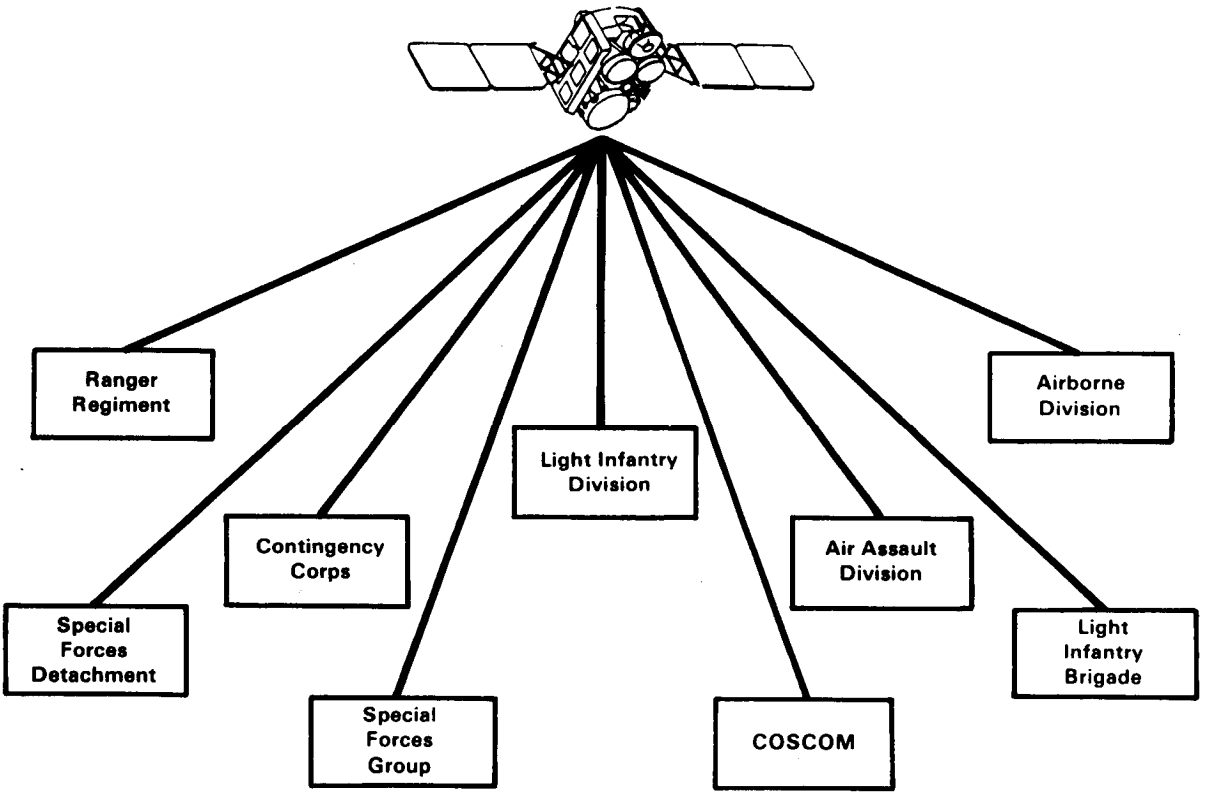

Figure 10-8. Command and control secure voice users.

10-4. System Configuration

a. The AN/PSC-3 is a battery operated, highly portable, manpack TACSAT terminal. Additional power sources include the PP-6148( )/U power supply or the G-76(V)l/G DC generator. It uses an RT-1402 unit that provides two-way communications in the frequency range of 225 MHz to 400 MHz. The RT functions in the satellite and LOS mode of operation. It can provide data or secure voice. The terminal uses a low-gain omnidirectional whip antenna for LOS operation while on the move. This antenna also enables reception of a satellite alert ringing signal while in LOS mode. The set uses an AS-3567( )/PSC-3 medium-gain antenna for at-halt satellite communications. The terminal provides half-duplex communications at 300 and 1200 bps biphase shift keying (BPSK), 2400 bps synchronous BPSK, and 16 kbps frequency shift keying (FSK).

(1) In the data mode, it uses the digital message device group (DMOG) OA-8990 as the input/output (1/0) device. It provides data rates of 300 bps or 1,200 bps.

(2) In the secure voice mode, the AN/PSC-3 uses the ANDVT or a COMSEC interface device such as the VINSON KY-57.

(3) In addition to voice and data, the AN/PSC-3 interfaces with facsimile, teletype, NRI, and FM retransmission media.

b. The NCS uses the same basic AN/PSC-3 unit with the C-1119 control converter to form the vehicle-mounted AN/VSC-7. The vehicles electrical system provides power for operation; however, 110/220 V AC 50 to 400 Hz generators can be used. The control converter functions as the vehicle mount and an NCS applique. The NCS applique allows the NCS to control as many as 15 terminals in a network providing individual and conference call capabilities. Because it is a single-channel system, it is configured with data needs being satisfied by some terminals and secure voice needs being satisfied by other terminals. The call mode operation is a unique calling function. It allows the sending station to alert a distant unit with a visual indication. It also allows an optional 5-second audible alarm. The NCS can transmit or receive any one of 15 selective calls. It can also receive all conference calls regardless of the selective control setting on the NCS applique front panel. The NCS selects any 1 of the 15 units operating in its net for selective call transmissions. Conference calls will be received by all units operating in the net with their controls set to receive selective call messages.

10-5. Planning Considerations

a. Unlike most communications systems single-channel TACSAT has no planning range. The capability to communicate depends on the location of the satellite for LOS. The channelization of each satellite is standardized providing flexibility and interoperability in normal operations. Given a contingency mission, the controlling authority can change the geosynchronous position of the satellite and improve the footprint as required.

b. The UHF single-channel TACSAT has the following characteristics:

- Lightweight.
- Ruggedized.
- Greater security.
- Easily installed.
- Operates over extended distances.
- Requires minimum training.

c. Single-channel TACSAT is used primarily to initiate early communications during forced entry and provide redundancy during sustainment. TACSAT will not directly interfere with other combat net communications systems due to the frequency bands in which it operates. Using a GSA-7 or C-6709 interface device for radio wire integration and a multichannel means allows TACSAT to interface with the ACUS network.

10-6. Anti jamming and ECCM Techniques

Physical damage and hostile electromagnetic jamming threaten all communications including satellite. This system presently does not offer any antijamming protection to the TACSAT terminal. Mobile TACSAT terminals offset the need for providing protected multiple ground relay sites. In addition, it reduces exposure time to hostile actions. The protection of these terminals by terrain, such as valleys, further reduces the possibility of detection. Where ordinary means of communications are subject to varying degrees of radio direction finding (RDF), the satellite system can be used to deter enemy RDF success. The short transmission times of burst mode present less attractive jamming targets than the longer continuous communications of regular nets. The only options available to tactical UHF satellite terminals are data burst, alternate frequency selection, mobility, and reducing the on-air time of each transmission.

10-7. Future TACSAT Single-Channel Systems

a. Future single-channel TACSAT terminals are being designed to overcome the limitations of today's terminals. Two forms of small radios have been proposed to be phased in over the next ten years: one manpackable, the other manportable.

(1) The manpackable builds on existing UHF technology to provide a smaller, lighter manpack radio. It features demand assigned multiple access (DAMA). A developmental version, the advanced manpack UHF terminal (AMUT), also features built-in COMSEC.

(2) The manportable radio is the manportable milstar terminal (MMT). The MMT will use technology currently under development. It is lightweight (less than 30 pounds), robust, and survivable. It will provide a low probability of detection capability for joint and worldwide communications. Setup time will be less than five minutes. The single channel objective tactical terminal (SCOTT) AN/TSC-124 terminal is also part of the Milstar system and is approaching initial operational test and evaluation (IOT&E). It will replace the AN/MSC-64 and will provide long-range, robust, and survivable communications.

b. Future users of single-channel TACSAT include four current user groups and four new user groups: LRSUs, echelons above corps (EAC), corps, and divisions. The LRSUs will use TACSAT like the special operations forces (SOF). Adding EAC, corps, and division as users ensures a common C^2 network across all battlefields and interoperability with all services.

c. The SOF and LRSU will use the LST-5 (a downsized PSC-3) until the AMUT becomes available. Because of weight and size restrictions, they will remain in the UHF arena. Contingency units will use the AN/PSC-3 with DAMA and the MMT depending on the mission requirements (particularly satellite availability in the area of operations). All remaining divisions and corps

will use the MMT because they require robust communications and a radio that is lighter and smaller than the AN/PSC-3. EAC will use the AN/TSC-124 available in the theater TACSAT companies. The Flaming Arrow Net will use the AN/TSC-124 which replaces the AN/MSC-64.

d. Because there are many UHF users and satellite resources are limited, JCS have mandated efficiency measures for operating UHF. The first concerns the use of ANDVT. The second concerns the use of DAMA for 5 kHz and 25 kHz communications. DAMA should alleviate the satellite resource problem for most users.