CHAPTER 4

Communications

CONTENTS

PRINCIPLES AND DEVELOPMENTS IN COMMUNICATIONS SYSTEMS

Communications are essential for gathering data, planning operations, performing C2 functions, and supervising performance. Effective management of FSB functions depends on adequate communications to keep abreast of changing situations and requirements.

The FSB relies on both its organic communication assets and the support of the division signal battalion. Due to the length of CSS transmissions and the high density of elements in the BSA, use of couriers and wire communications should be maximized to lessen the security risk of substantial radio use.

Communications equipment and systems in the corps and division are changing. The current area communications system described below will be replaced by the MSE system. Current FM (AN/VRC-12 series) radios and AM (AN/GRC-106) radios will be replaced by the single-channel ground and airborne radio subsystem and the improved high frequency radios.

These changes will affect the FSB in the area of connectivity to the area system. Under the current system, the forward support platoon of the signal battalion runs wire to the FSB switchboard. When MSE is deployed, the FSB will run wire from unit locations to the MSE interface point. The amount of wire the FSB headquarters and companies will need will be based on the dispersion requirements of the particular

situation. With the deployment of MSE, the wire-laying for all units will have to be covered by the unit SOP. It must cover who does it and in what priority. The actual communications means will remain essentially the same. The FSB will depend on couriers, combat net radios, and wire access to the signal-corps-provided area communications system. Automated hardware systerns will be subscribers to the area via wire access.

CURRENT AREA SYSTEM

The current area communications system is shown in Figure 4-1. The FSB headquarters and companies use their organic switchboards and telephones for internal wire communications. Wire nets are depicted in Figures 4-2 through 4-5. The FSB will normally tie into the area communications system (signal battalion multichannel system) at the signal battalion forward support platoon switchboard, The companies will tie into the FSB switchboard or directly into the signal battalion switchboard to gain access into the area system.

When the mobile subscriber equipment area system replaces the current area system, the current organic 2-wire switchboards and telephones will not be capable of entering the 4-wire digital system. The FSB and its companies will retain the two organic switchboards for BSA security and internal operations.

MOBILE SUBSCRIBER EQUIPMENT AREA COMMUNICATIONS SYSTEM

MSE is the area common user voice communications system within the corps. It is the backbone of the corps system and will be deployed from the corps rear boundary forward to the maneuver battalion main CP. The MSE system is comprised of five functional areas:

- Area coverage.
- Wire subscriber access.
- Subscriber terminals.
- Mobile subscriber access.
- System control.

The FBS will participate in the first four of above functional areas.

AREA COVERAGE

Area coverage means that MSE provides common user support to a geographic area, as opposed to dedicated support to a specific unit or customer. Figure 4-6 shows the deployment of area nodes across a corps area. These nodes are called node centers. They are depicted in Figure 4-7. They are under the control of the corps signal officer.

At division level, the signal battalion operates four of these nodes. Connected to these nodes, via line-of-sight radios, are small extension node switchboards and large extension node switchboards. The following switchboards are organic to the division signal battalion:

- 12 SEN (VI) switchboards capable of supporting 26 customers each.
- 4 SEN (V2) switchboards capable of supporting 41 customers each.
- LEN switchboard capable of supporting 176 customers.

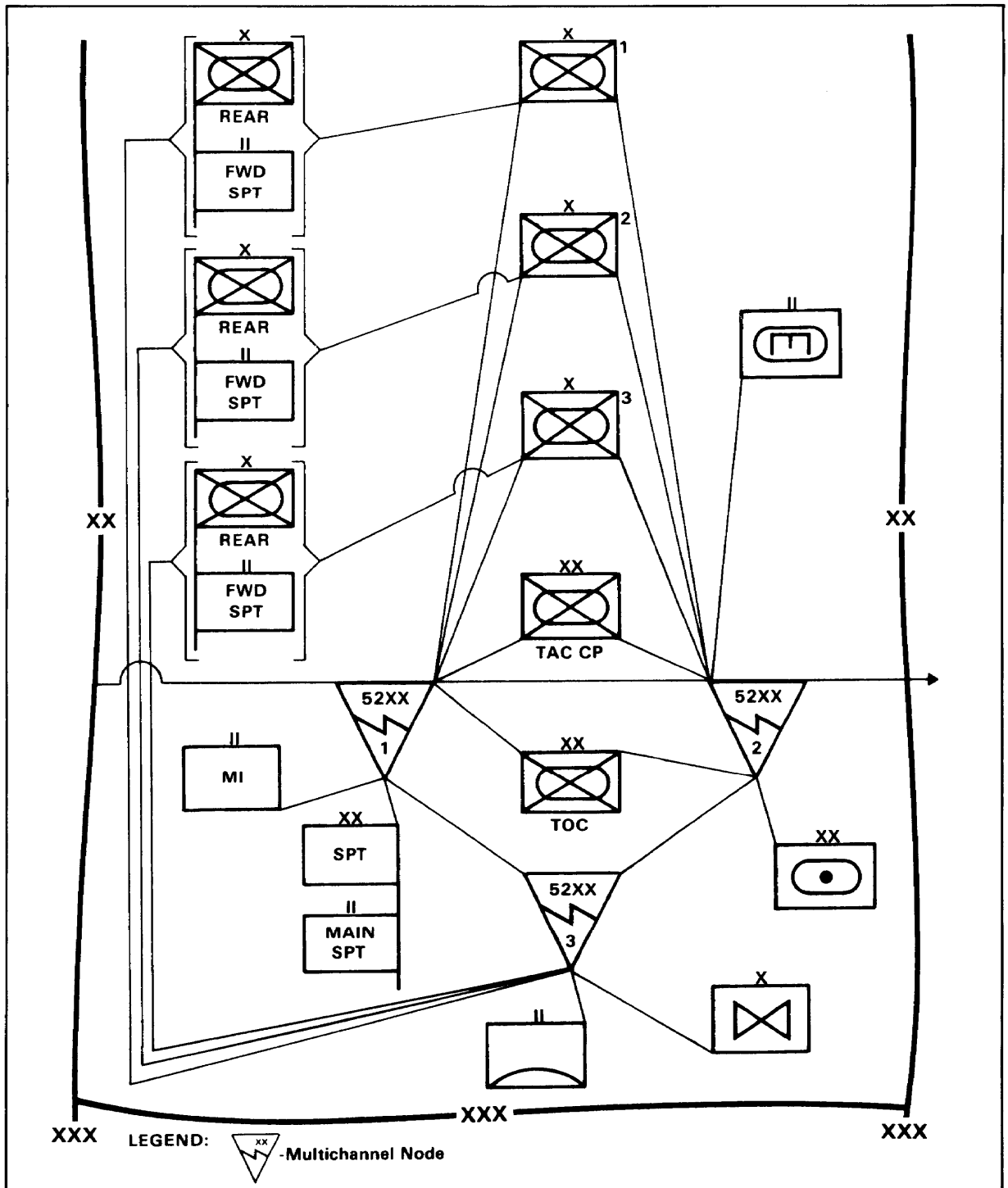


Figure 4-1. Sample Armored/Mechanized Infantry Division Multichannel Diagram (Current Area System)

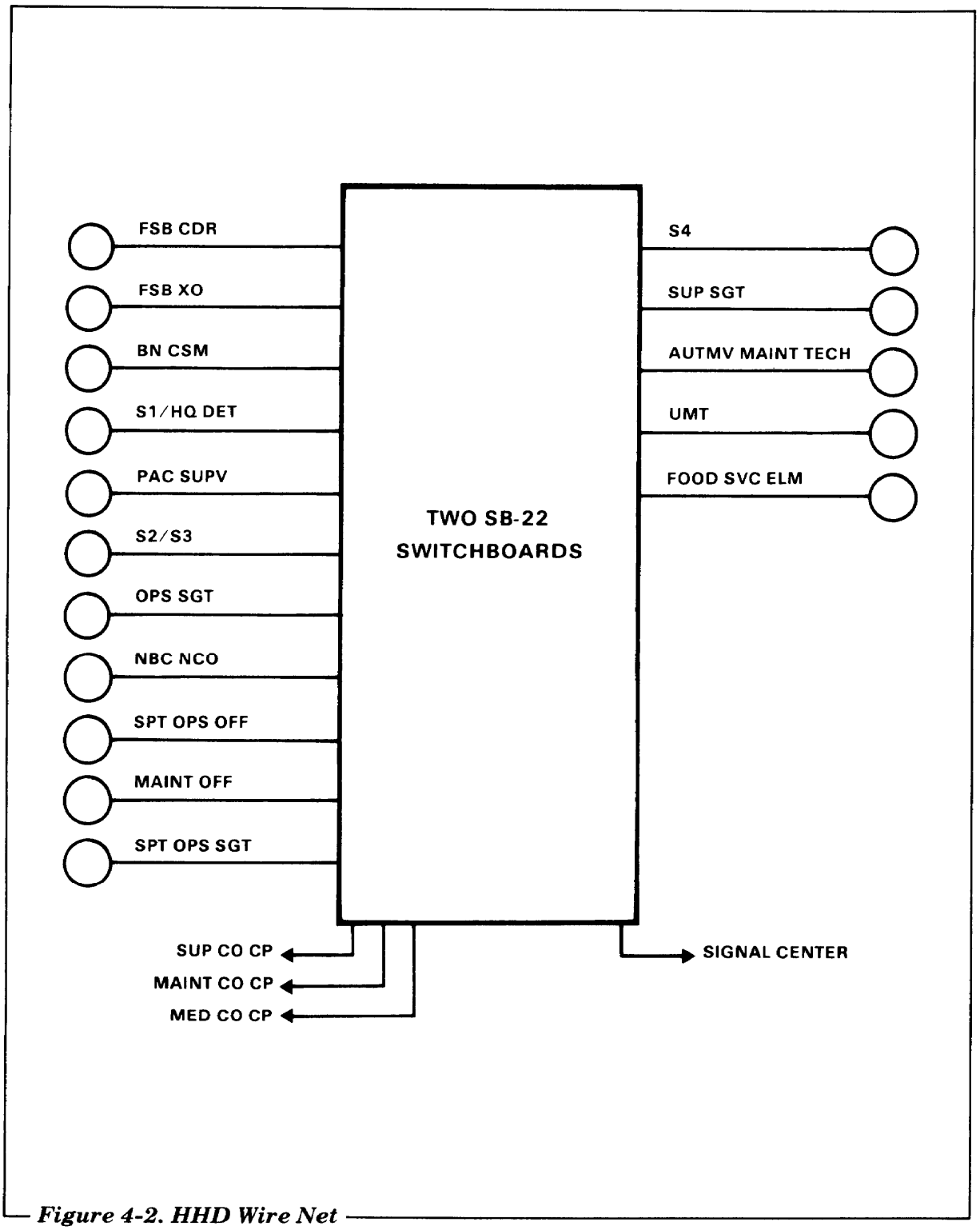


Figure 4-2. HHD Wire Net

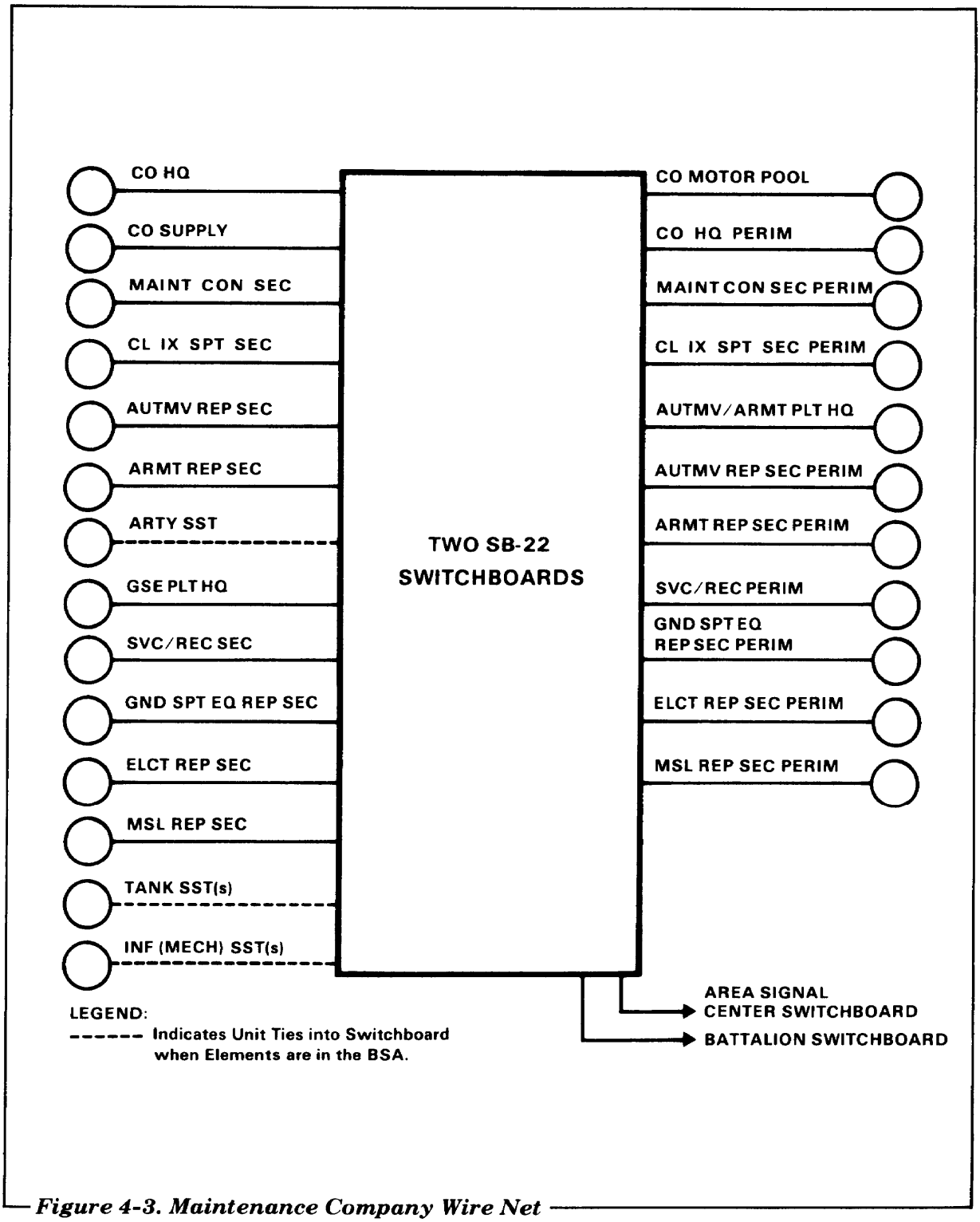


Figure 4-3. Maintenance Company Wire Net

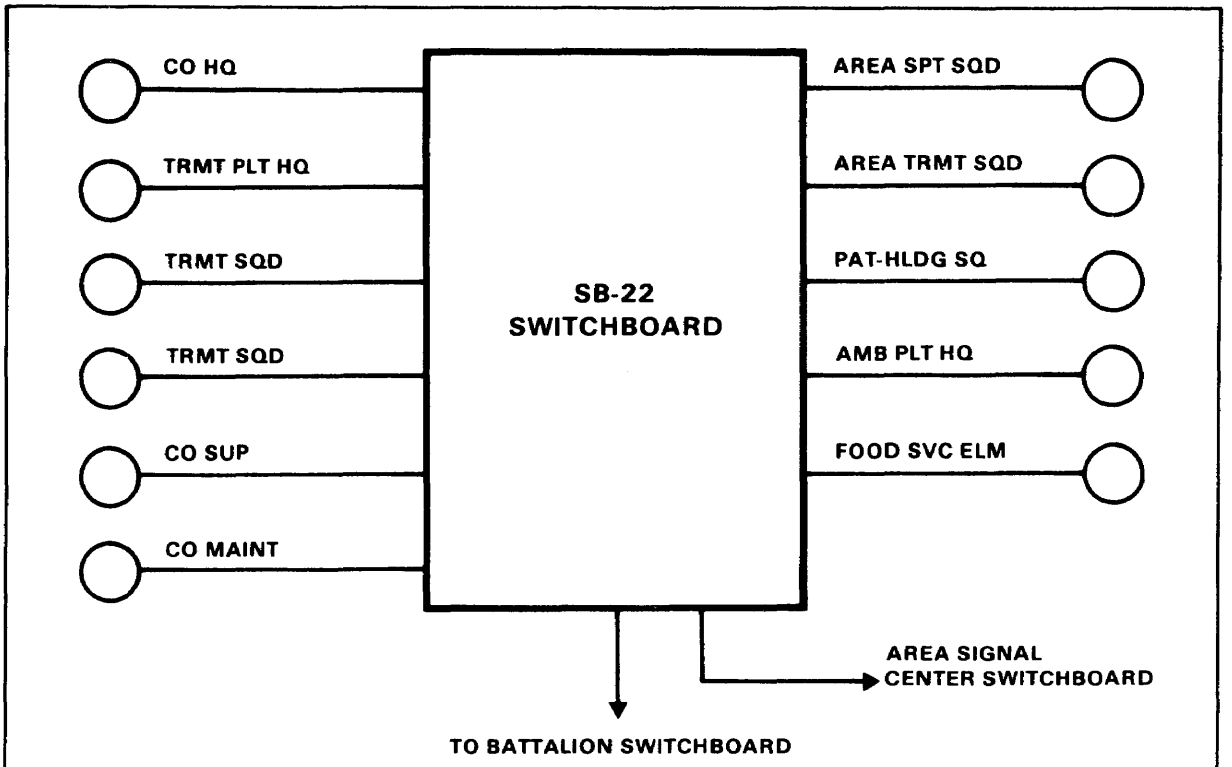


Figure 4-4. Medical Company Wire Net

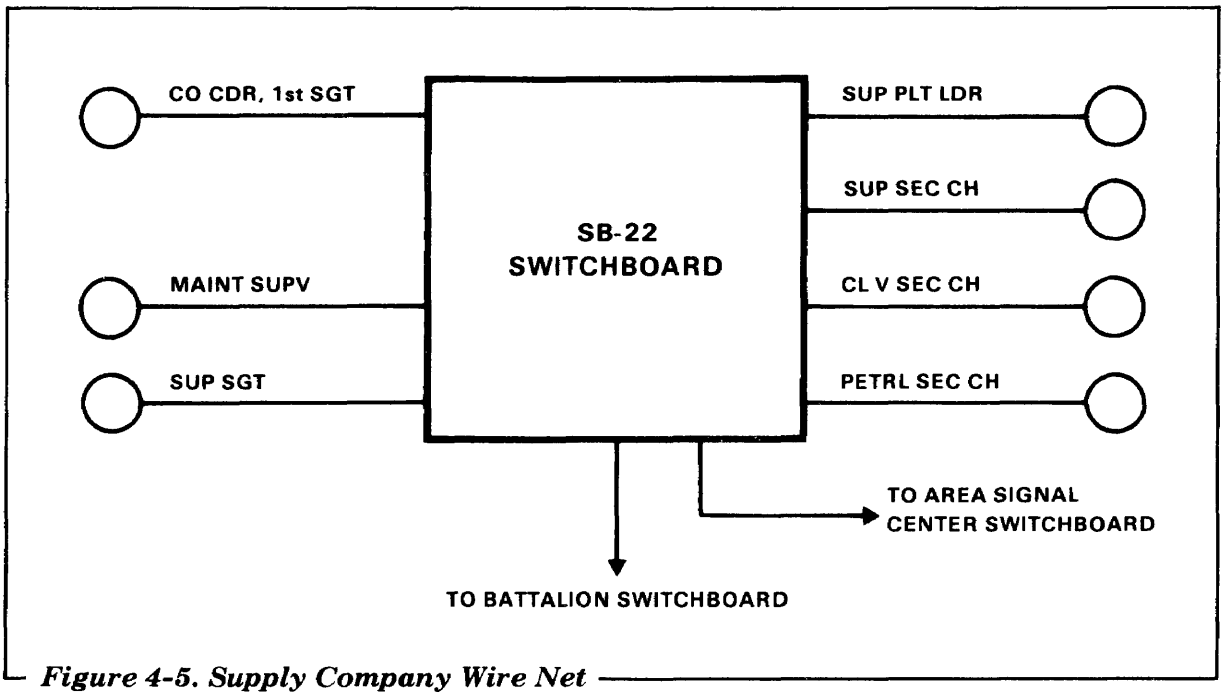


Figure 4-5. Supply Company Wire Net

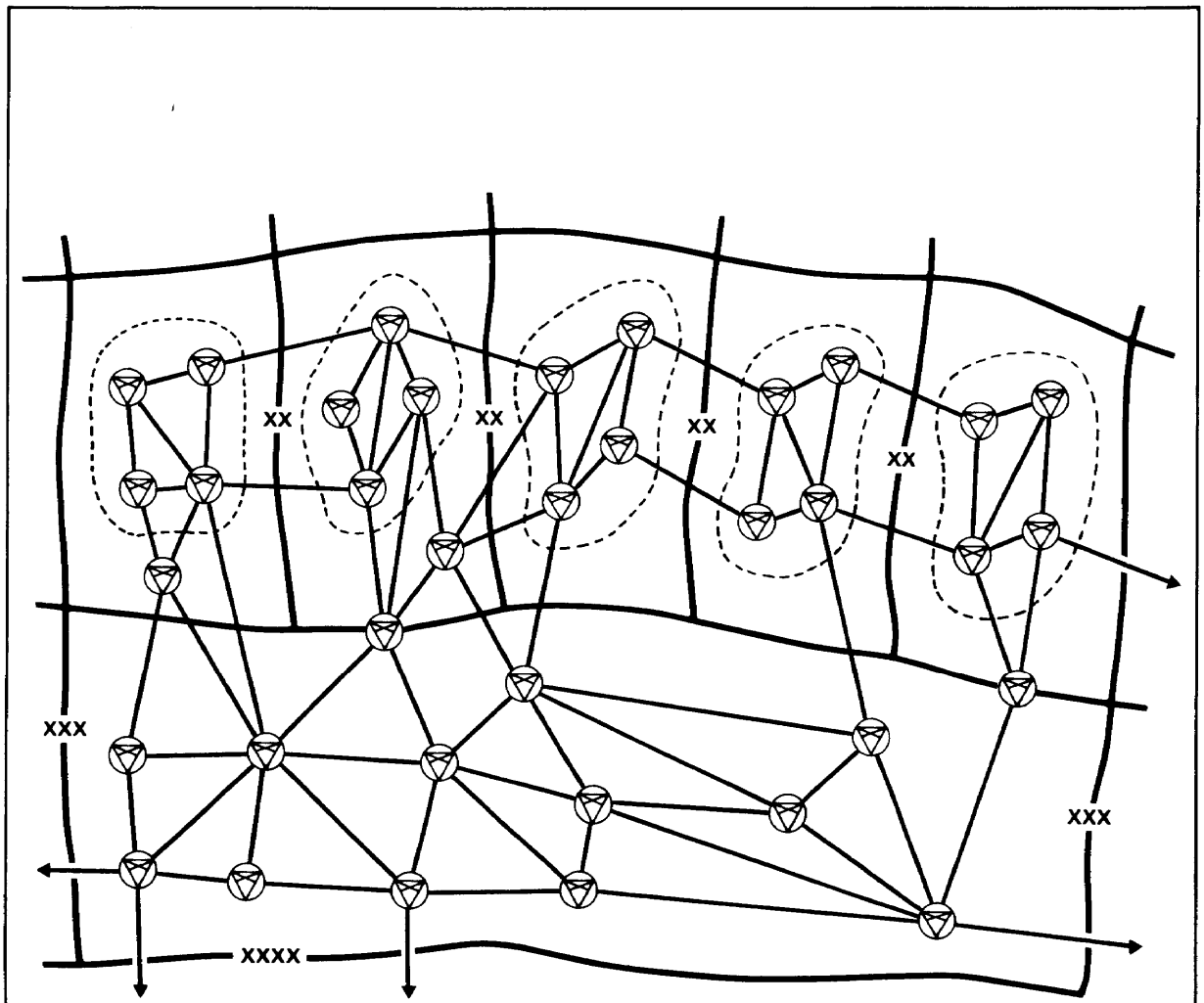


Figure 4-6. Representative Deployment of Area Nodes (MSE)

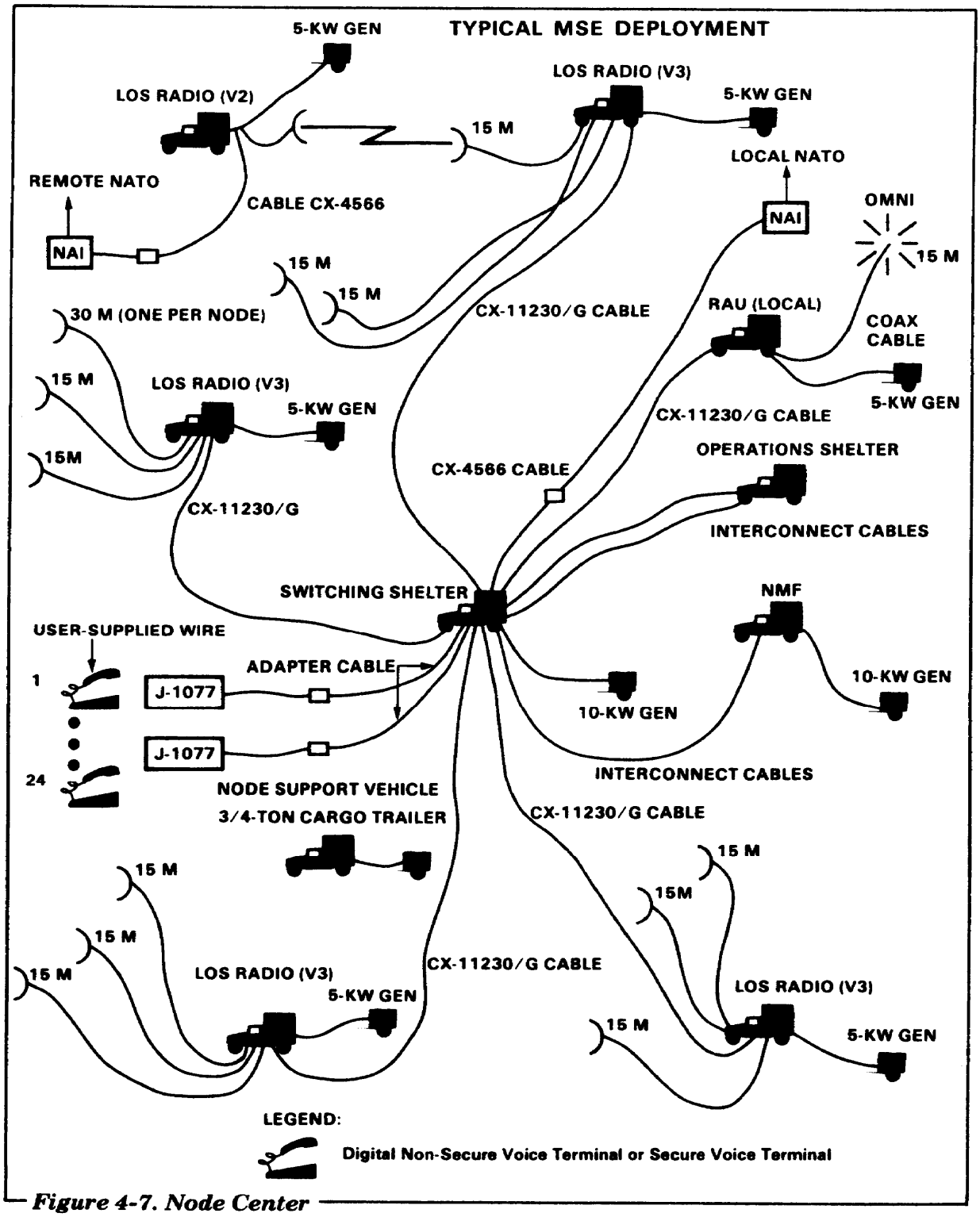


Figure 4-7. Node Center

A typical deployment of switchboards within the division is shown in Figure 4-8, (Tactical dispersion requirements require the FSB to tie into a SEN.) Figure 4-8 is only one approach. The location of switchboards will be determined by the G3 based on the recommendation of the division C-E officer. The C-E officer considers the commander's intent, customer requirements, and other factors of METT-T. Switchboard location cannot be consistently related to specific units.

WIRE SUBSCRIBER ACCESS

Wire subscriber access points will provide the entry points (interface) between fixed subscriber terminal equipment owned and operated by users and the MSE area system operated by signal units.

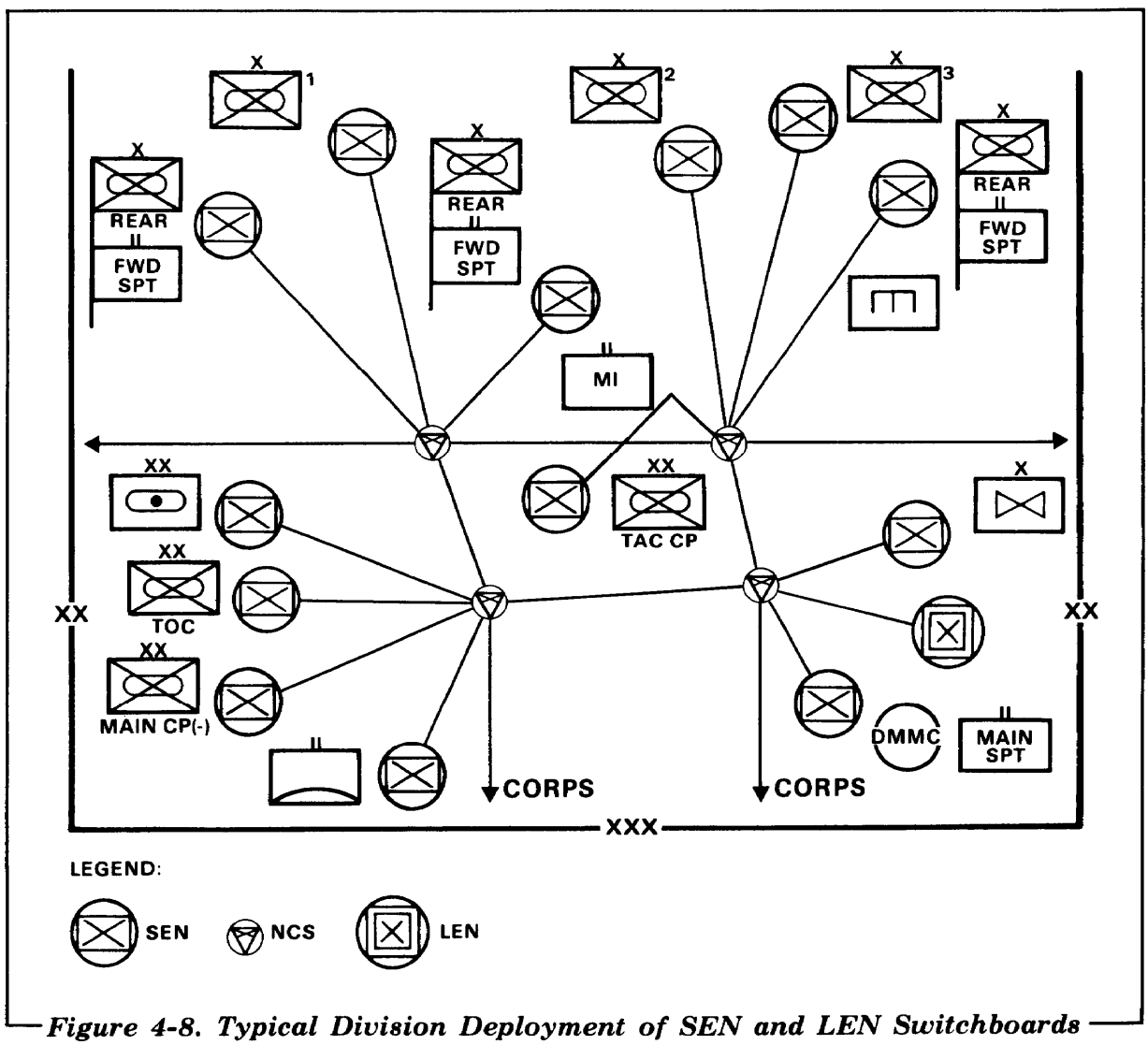


Figure 4-8. Typical Division Deployment of SEN and LEN Switchboards

Figures 4-9 through 4-11 show the MSE switchboard configurations through which the FSB may tie into the area system. The two types of interface equipment are—

- The signal distribution panel (junction box) J-1077. Each panel provides up to 13 subscriber access points.
- Remote multiplexer combiners which provide access for eight subscriber access points.

Normally the FSB will interface through the panel. In either case, the FSB is responsible for installing and operating fixed subscriber terminal instruments. It must also install and maintain the WF 16 field wire from the instruments to the interface points. WF 16 wire consists of two pairs of wire. One is olive drab and the other brown. The olive drab pair has a ridge along the side for night identification.

SUBSCRIBER TERMINALS (FIXED)

Subscriber terminals used by the FSB are digital nonsecure voice telephones. These provide full duplex digital, 4-wire voice as well as a data port for interfacing the AN\UXC-7 facsimile, the TACCS computer, and the unit-level computer, as depicted in Figure 4-12. They also provide the interface for the FSB to enter the ATCCS. Figure 4-13 portrays the assignment of DNVT, facsimile, ATCCS, and ULCs for the FSB. The DNVT ties into the area system through a panel or RMC.

MOBILE SUBSCRIBER TERMINAL

The MSE mobile subscriber terminal is the AN/VRC-97 mobile subscriber radiotelephone terminal. This MSRT, which consists of a very high frequency radio and a digital secure voice terminal, is a vehicle-mounted assembly. It interfaces with the MSE system through a radio access unit. The primary use of the MSRT is to provide mobile subscribers access to the MSE area network. Figure 4-14 is a typical MSRT interface into the area system. RAUs are deployed to maximize area coverage and MSRT concentrations. MSRTs can also operate in CPs to allow access to staff and functional personnel. Figure 4-14 represents assignment of MSRTs in the FSB, The MSRT in the supply company is located at the ATP. It is used by the DAO representative to coordinate class V requirements. The MSRT user will have a KY 68 telephone connected to the radio mounted on his vehicle. As long as the radio unit has line-of-sight contact with the RAU, it has connection into the area system. The operational planning range is 15 kilometers from any RAU.

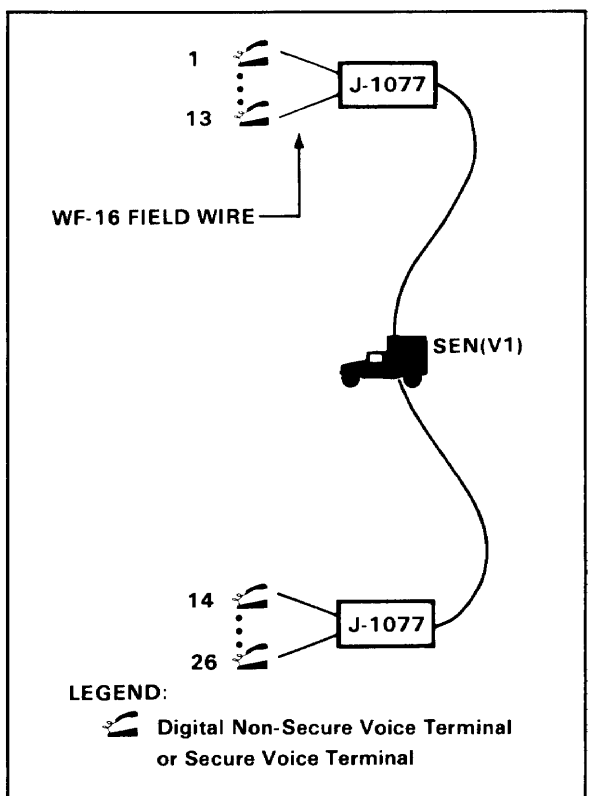


Figure 4-9. SEN Switchboard Interface (V1)

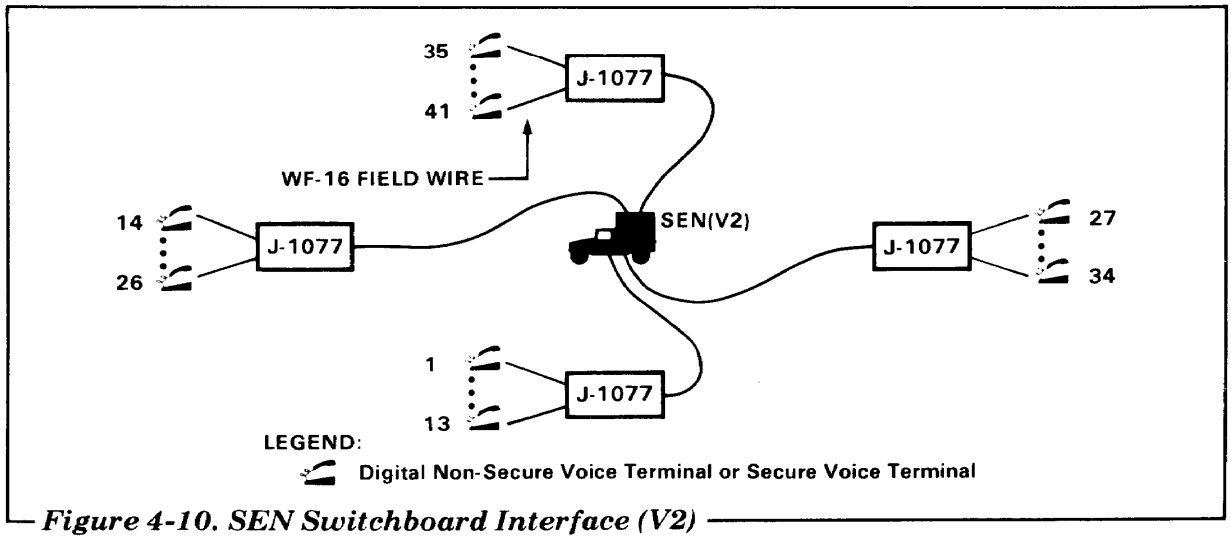


Figure 4-10. SEN Switchboard Interface (V2)

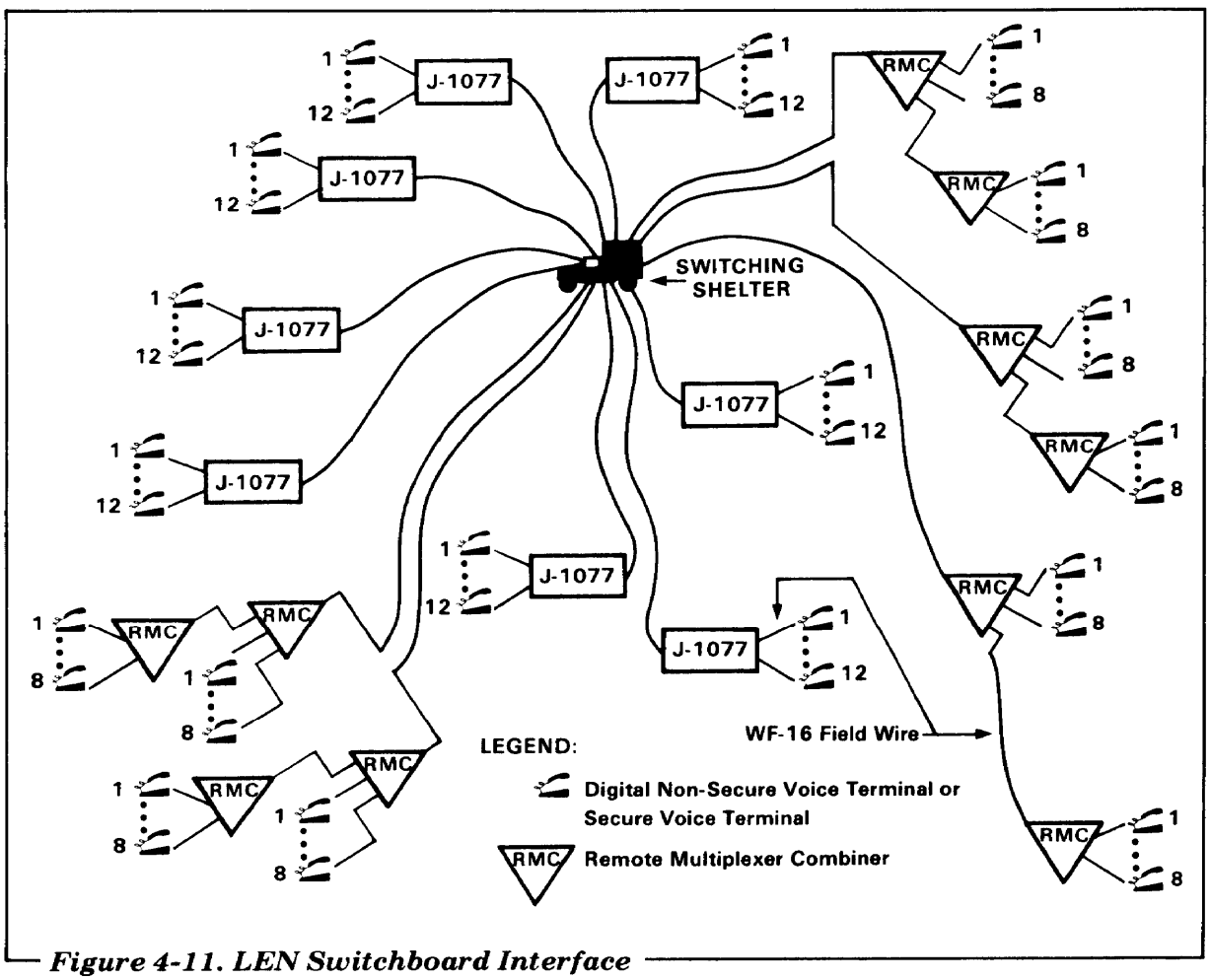
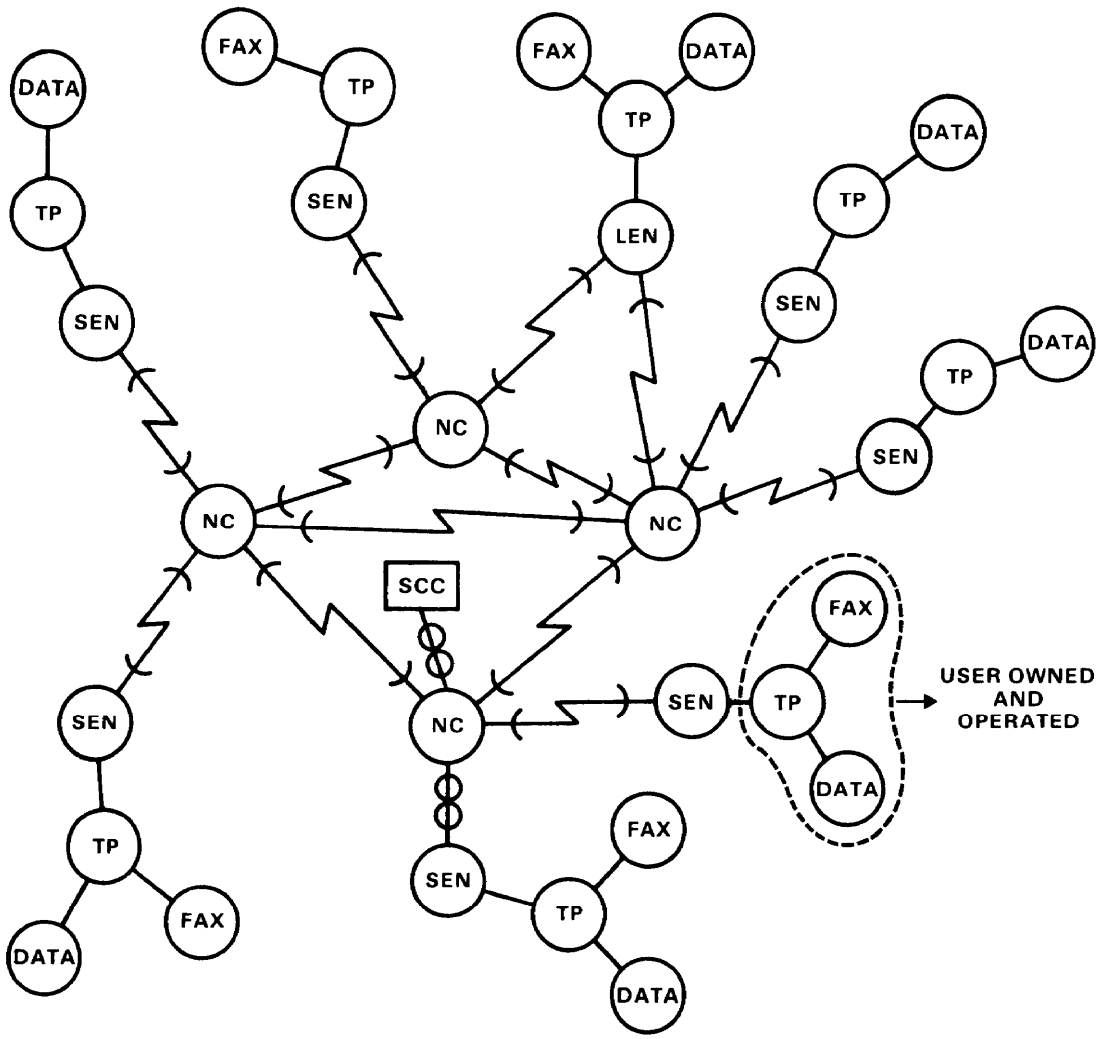


Figure 4-11. LEN Switchboard Interface



LEGEND:

SCC - System Control Center
NC - Node Center
LEN - Large Extension Node (Switchboard)
SEN - Small Extension Node (Switchboard)
TP - Digital Non-Secure Voice Telephone (DNVT-TA1035/U)
FAX - AN/UXC-7 Facsimile
DATA - Tactical Army CSS Computer System/Army Tactical C2 System/Unit Level Computer

Figure 4-12. Division Fixed Subscriber Terminals

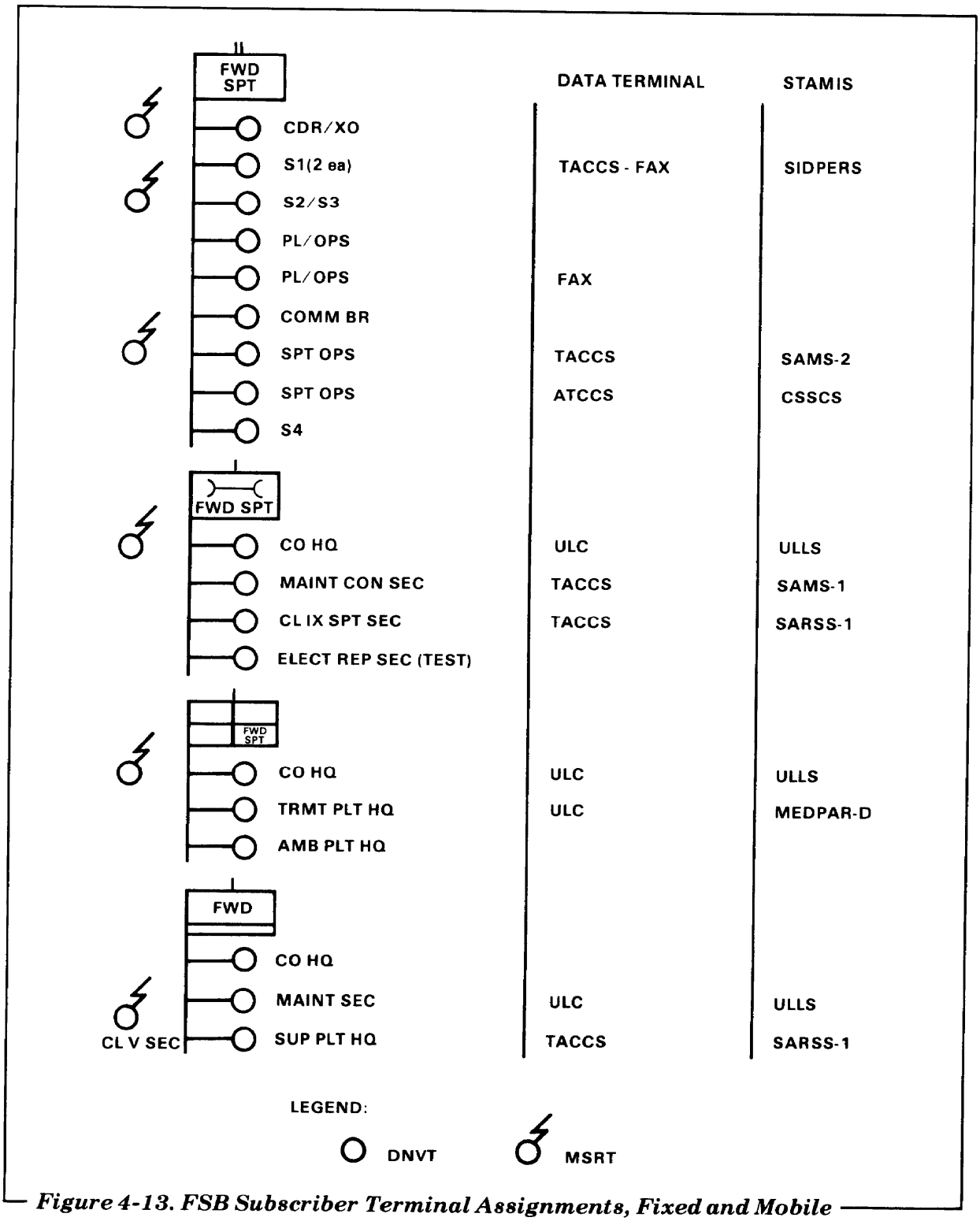


Figure 4-13. FSB Subscriber Terminal Assignments, Fixed and Mobile

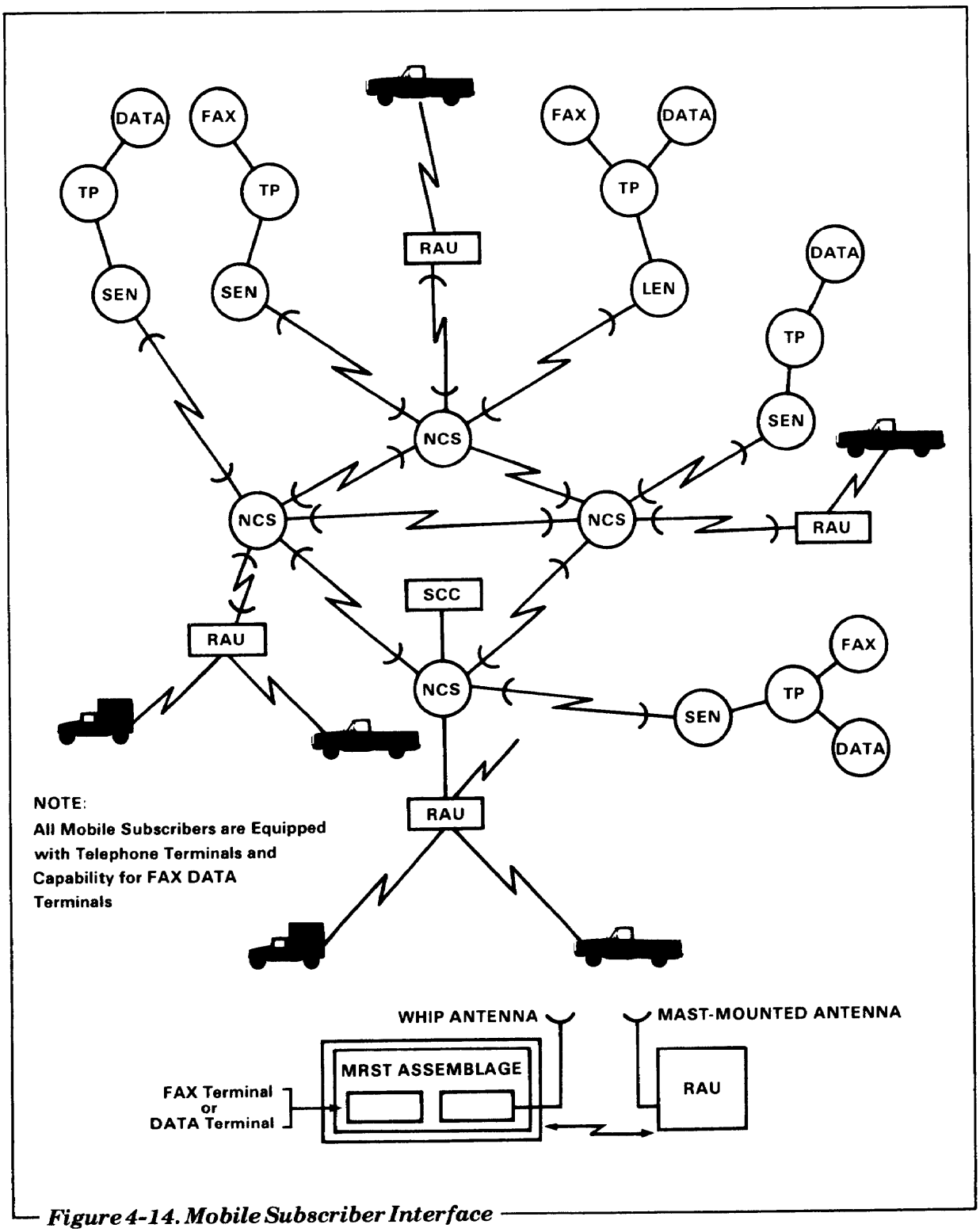


Figure 4-14. Mobile Subscriber Interface

COMBAT NET RADIO SYSTEM

The combat net radio structure is designed around three separate radio systems; each has different capabilities and transmission characteristics. The three systems are—

- Single-channel objective tactical terminal.
- Improved high frequency radio.
- Single-channel ground and airborne radio.

SCOTT is a stand-alone transportable tactical satellite communications terminal which will be transparent to the FSB. The other two systems, IHFR and SINCGARS, will provide a means of voice transmission of C2 information and a means for data transmission, which will be required if data transfer requirements cannot be met by the MSE system.

Current CNR equipment in the FSB consists of the AN/GRC-106 and the AN/VRC-12 series radios. These will be replaced by the AN/GRC-213 (IHFR) and SINCGARS series respectively. The AN/GRC-231 is a low-power manpack/vehicular radio. It interfaces with the other configurations of the IHFR system. SINCGARS is a new family of VHF-FM radios. These radios are designed for simple, quick operation using a 16-element keypad for push-button tuning. They are capable of short-range or long-range operation for voice or digital data communications. The planning range is 8 to 35 kilometers. They are capable of a single-channel operation for interface with the AN/VRC-12 series or other FM radios operating in a single-channel mode. They also operate in a jam-resistent, frequency-hopping mode which can be changed as needed.

FSB RADIO NETS

Diagrams for each net in the FSB are presented in this section. Each is presented first with the current equipment (AN/VRC-12 and GRC-106 radios) and then with the SINCGARS and IHFR radios. The second diagram for each net does not represent a simple, one-for-one replacement, old for new. Rather the diagram reflects the application of incremental change packages for SINCGARS and IHFR over a period of time. (The assignment of radio equipment to specific sections was influenced by a requirements validation review.)

FSB COMMAND/OPERATIONS NET

The principal radio net operated by the FSB headquarters is the FSB command/operations net (Figures 4-15 and 4-16). This is the net used to command and control the elements of the FSB, both from a command standpoint and from a CSS mission perspective. The net control station of this net is the S2/S3 site in the CP. In addition, headquarters personnel/sections monitor the following nets:

- FSB commander—DISCOM command/operations net.
- Support operations section—brigade admin/log net.
  (remote to FSB command net radio in S2/S3 tent with AN-GRA 39).
- S2/S3—DISCOM command/operations net.
  —brigade command net.
  —FSB command net.
  —DISCOM log ops net (AM-HF).

Collocation of the FSB CP and the brigade rear CP may help to overcome perpetual shortfalls in radios. This collocation may allow the support operations section access to

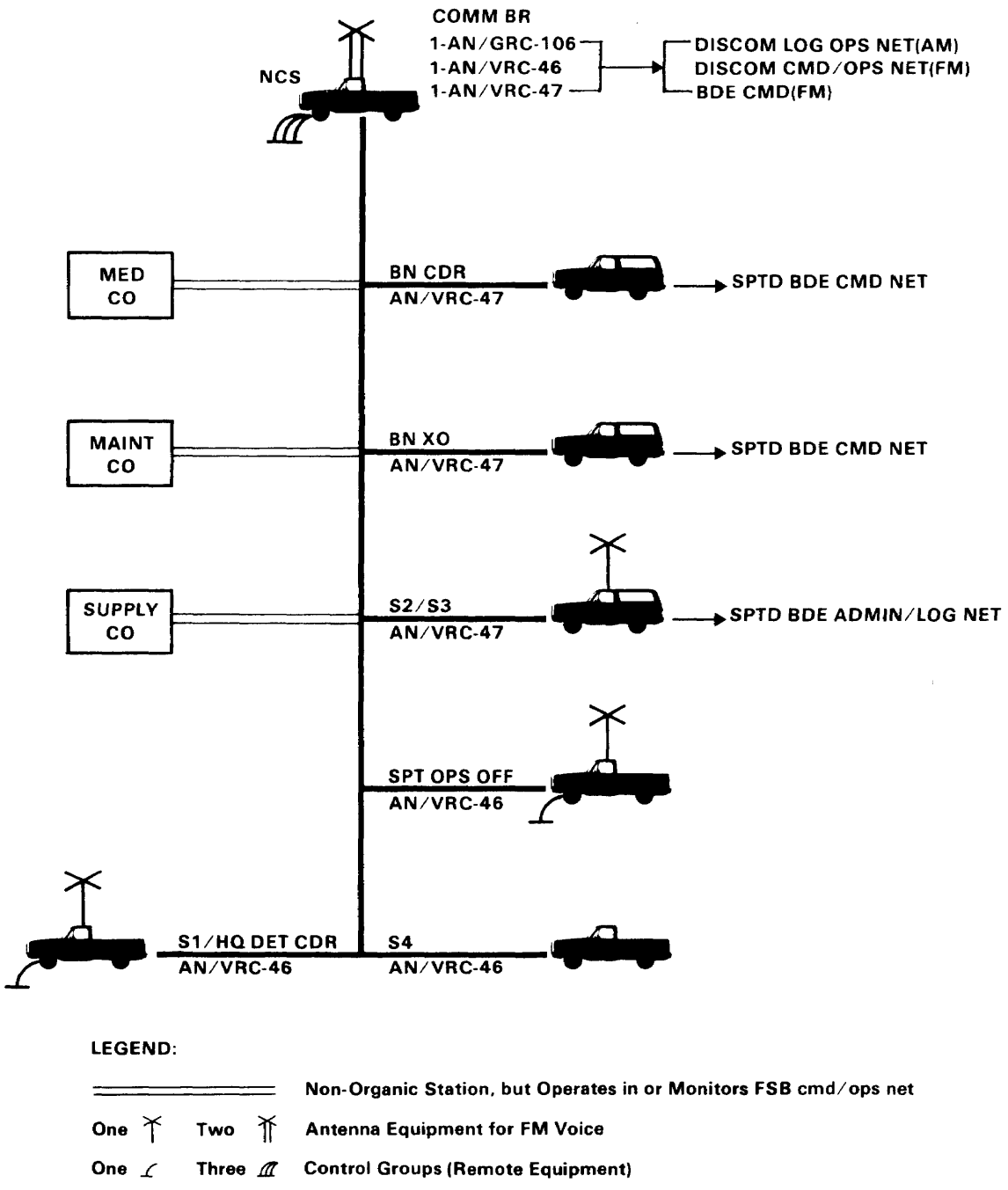


Figure 4-15. FSB Command/Operations Net, FM (AN/VRC-12 Series)

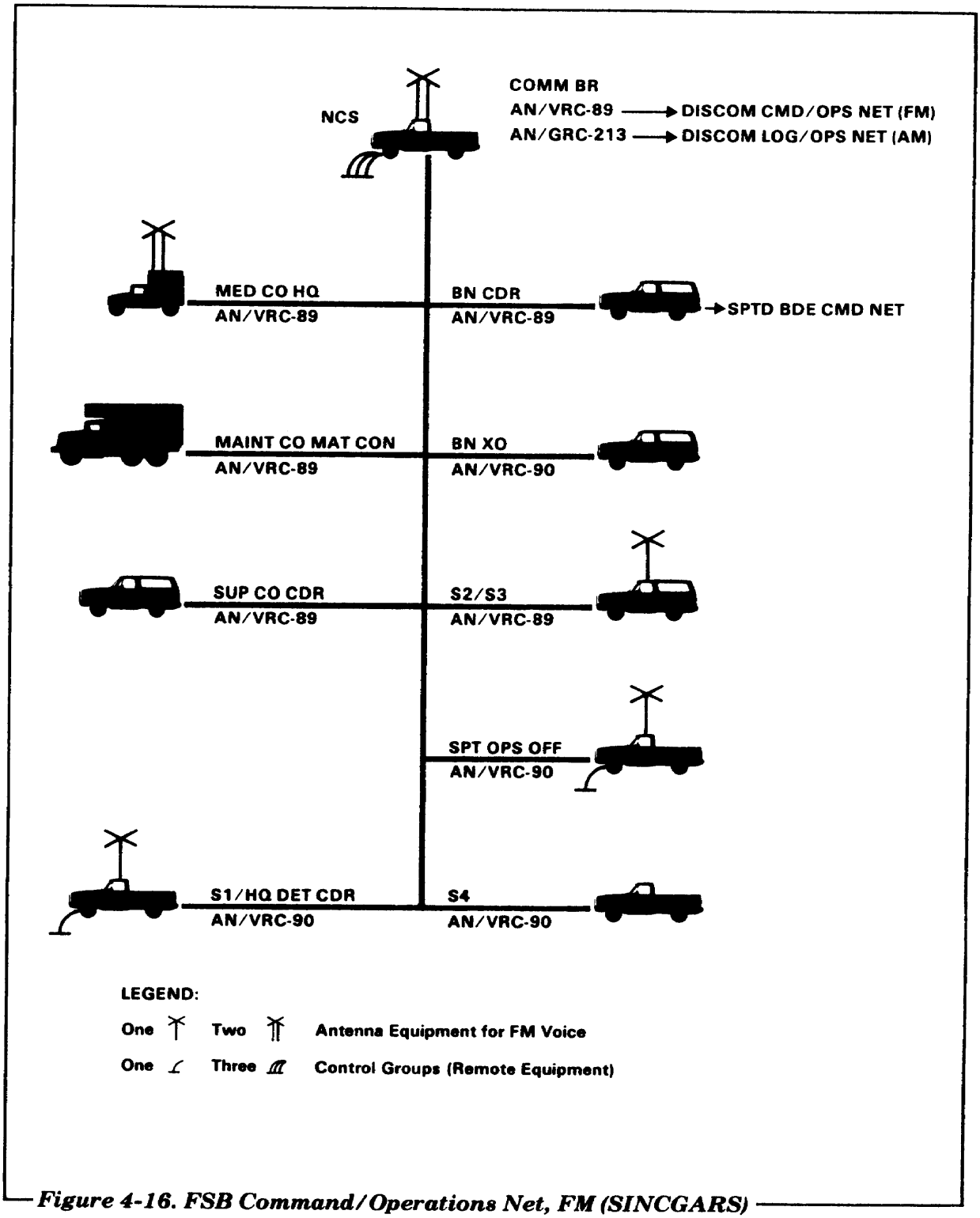


Figure 4-16. FSB Command/Operations Net, FM (SINCGARS)

the brigade administrative/logistics net and the S2/S3 section access to the brigade command net.

SUPPLY COMPANY COMMAND NET

This command net provides C2 for the supply platoon headquarters and the petroleum and ATP sections. In the petroleum section, every third tanker unit has a radio for control purposes, In the ATP, the section chief and each forklift have radios to expedite the transloading of class V to units. Due to the isolation of the ATP and the requirement for corps management of class V, additional CNR capability is located at the ATP. The DAO representative at the ATP will have an FM radio (AN/VRC-46 or AN\ VRC-90) to coordinate the flow of class V with the DAO located at the DMMC. This radio operates in the DMMC net. When MSE is deployed, an MSRT will also be located at the ATP, thus providing access to the corps class V structure. The supply company net is shown in Figures 4-17 and 4-18.

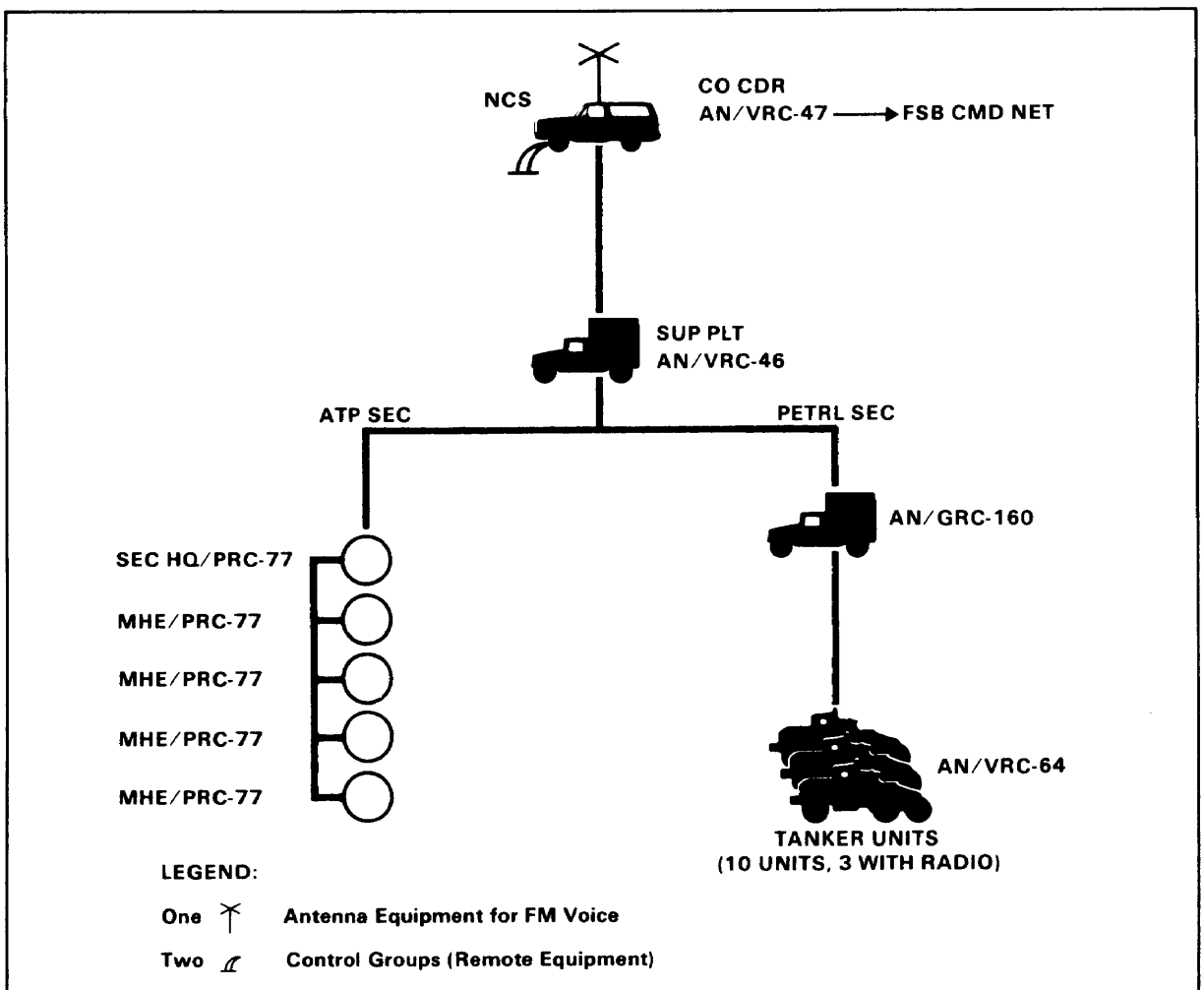


Figure 4-17. Supply Company Command Net, FM (AN/VRC-12 Series)

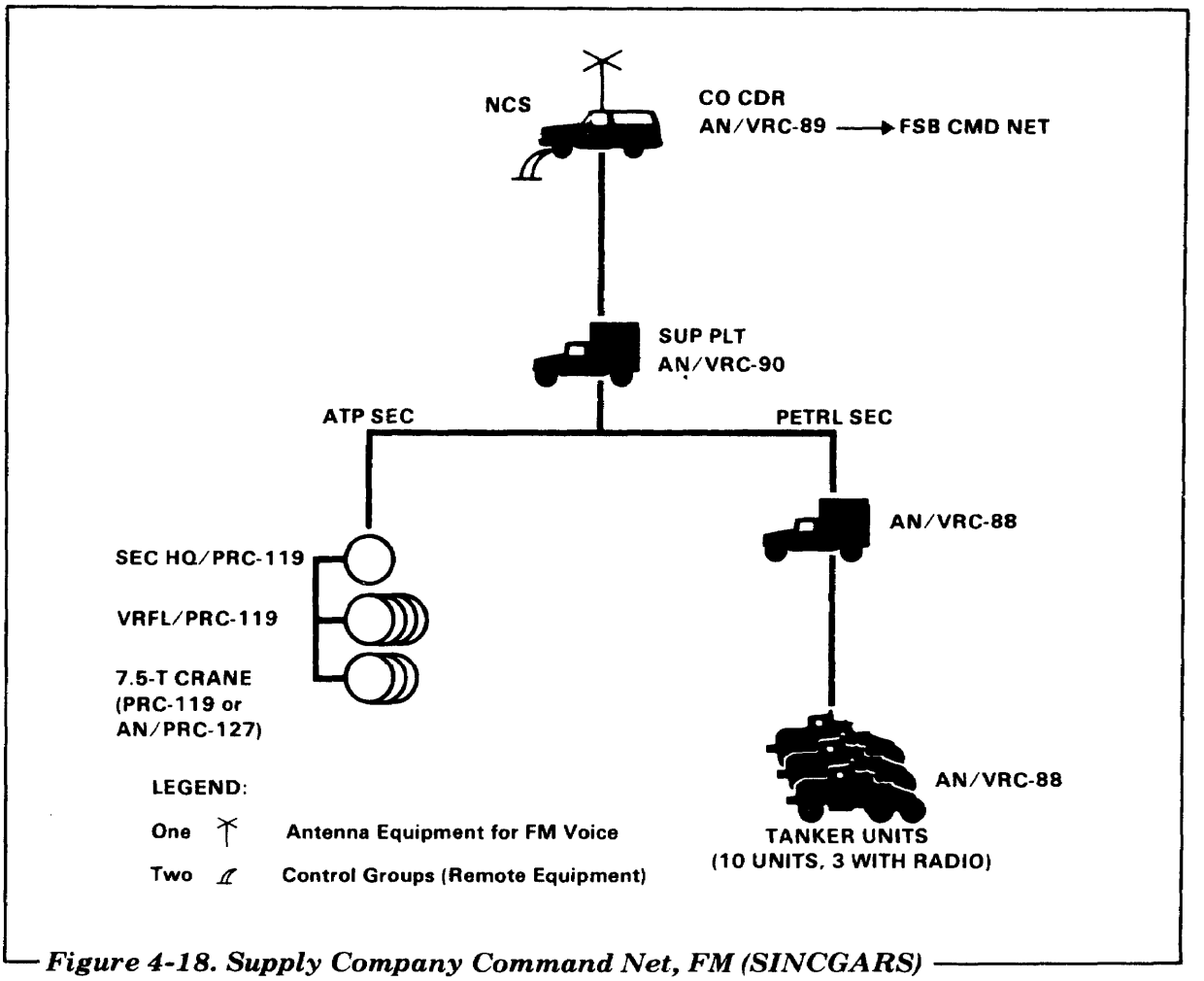


Figure 4-18. Supply Company Command Net, FM (SINCGARS)

MAINTENANCE COMPANY COMMAND NET

The maintenance company net (Figures 4-19 and 4-20) provides C2 for its maintenance elements which operate throughout the brigade area. Close coordination of customer radio frequencies is required by elements of this net to meet on customer nets for coordination purposes.

MEDICAL COMPANY COMMAND NET–FM

The medical company net (Figures 4-21 and 4-22) provides C2 for medical treatment and evacuation throughout the brigade sector. Dual net capability is provided at platoon and squad level for coordination with supported units and medical air evacuation.

MEDICAL COMPANY OPERATIONS NET–AM VOICE

The medical operations net (Figures 4-23 and 4-24) provides long-range voice capability to tie division medical elements into the overall corps medical treatment and evacuation system.

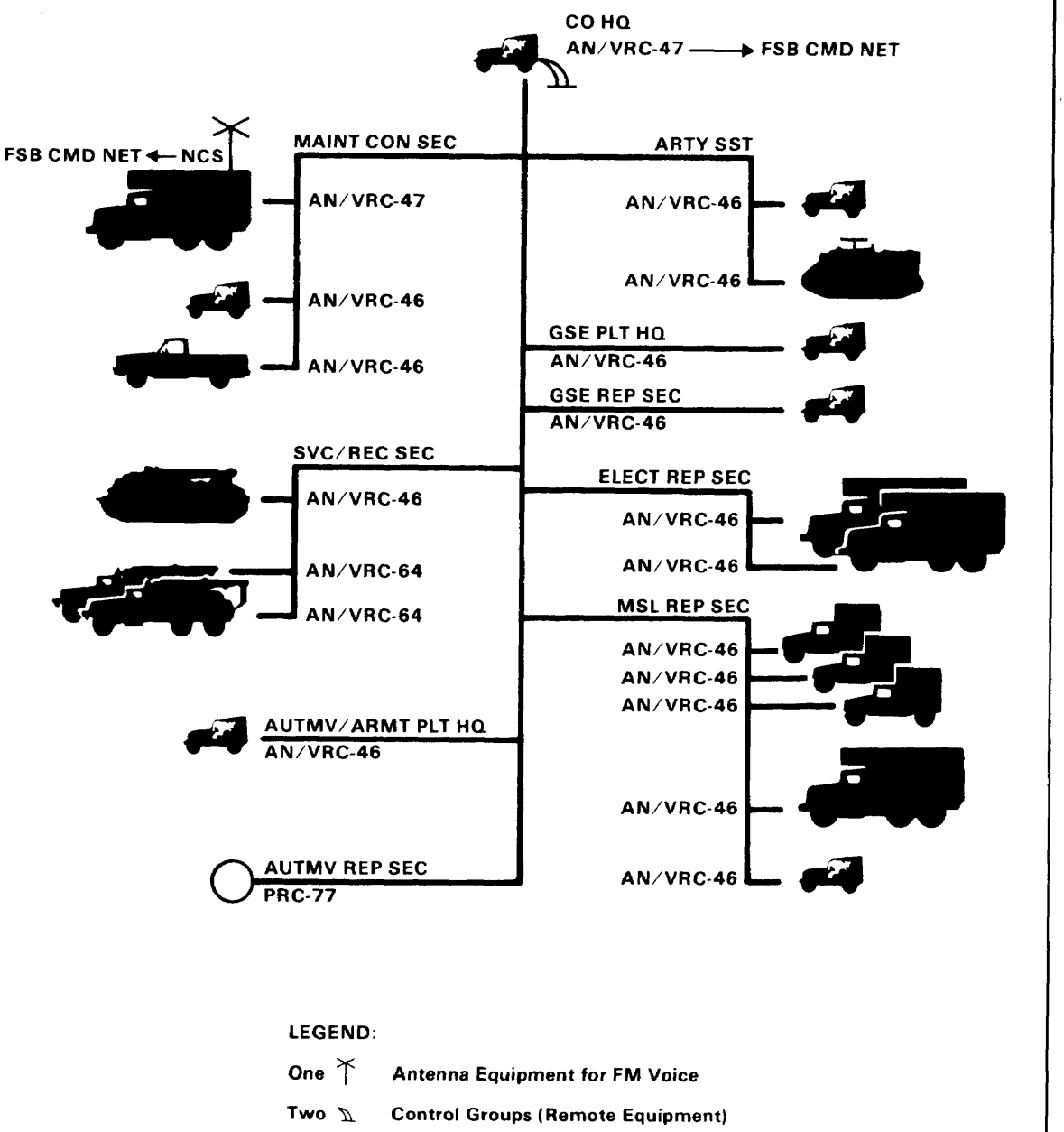


Figure 4-19. Maintenance Company Command Net, FM (AN/VRC-12 Series)

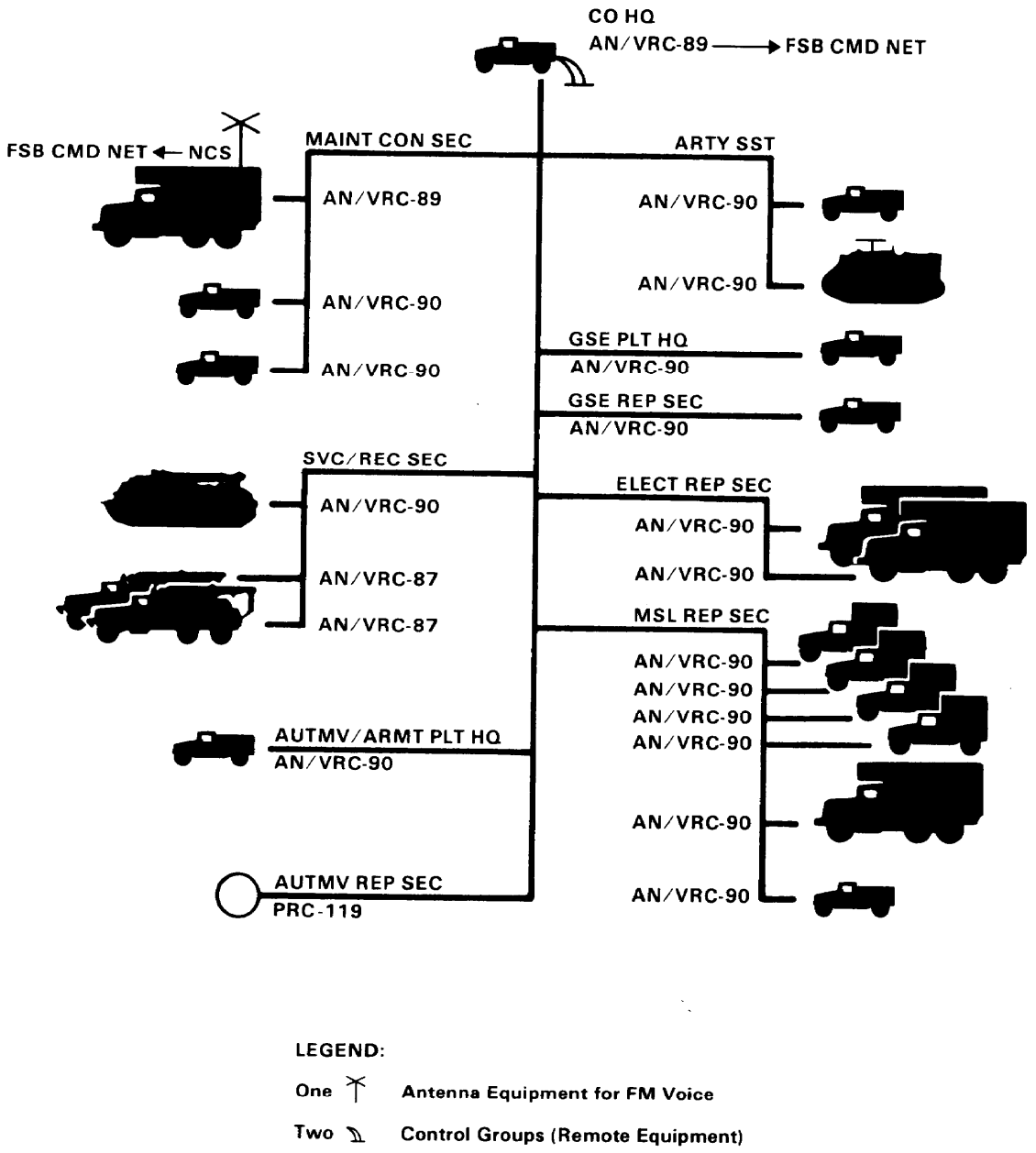


Figure 4-20. Maintenance Company Command Net, FM (SINCGARS)

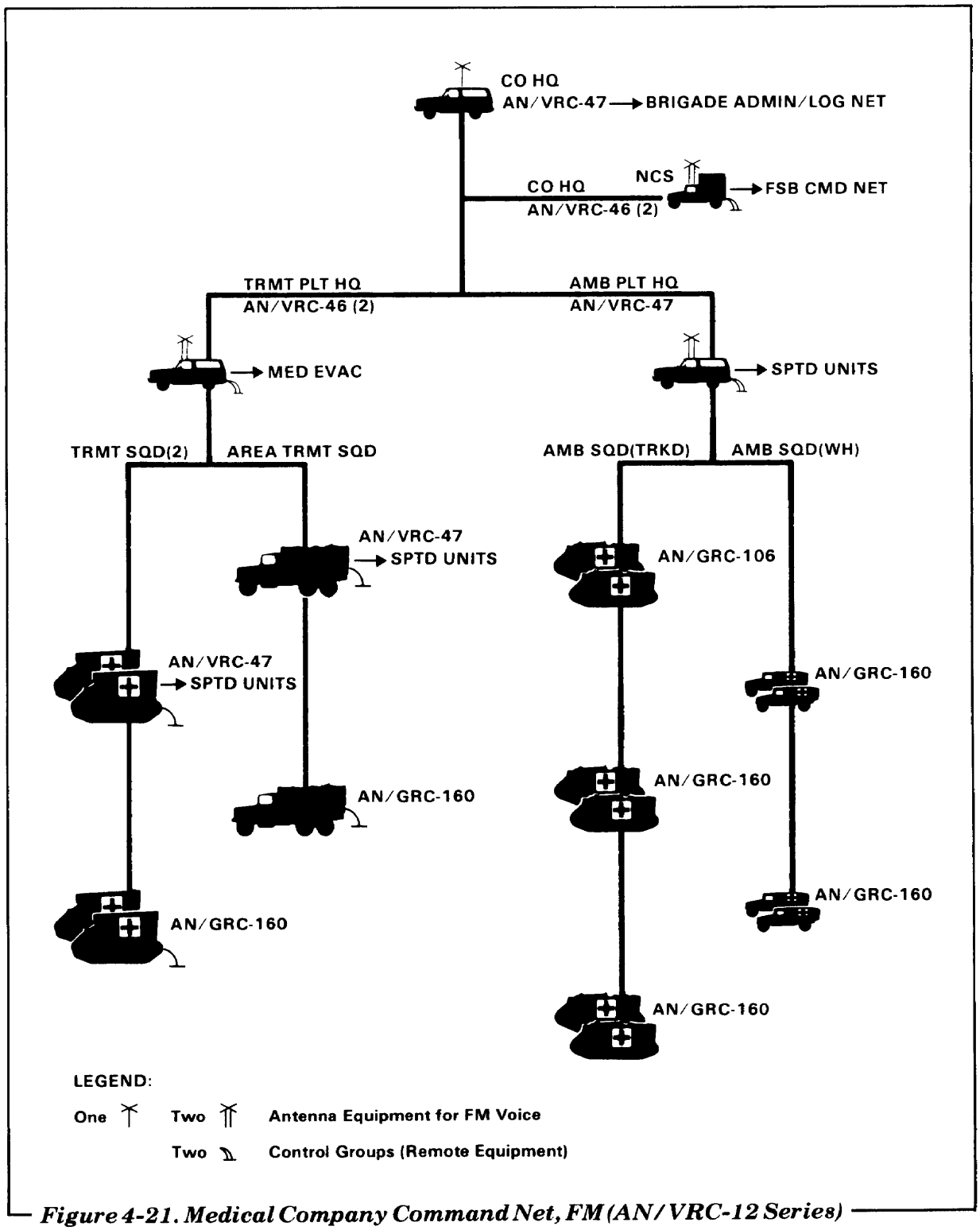


Figure 4-21. Medical Company Command Net, FM (AN/VRC-12 Series)

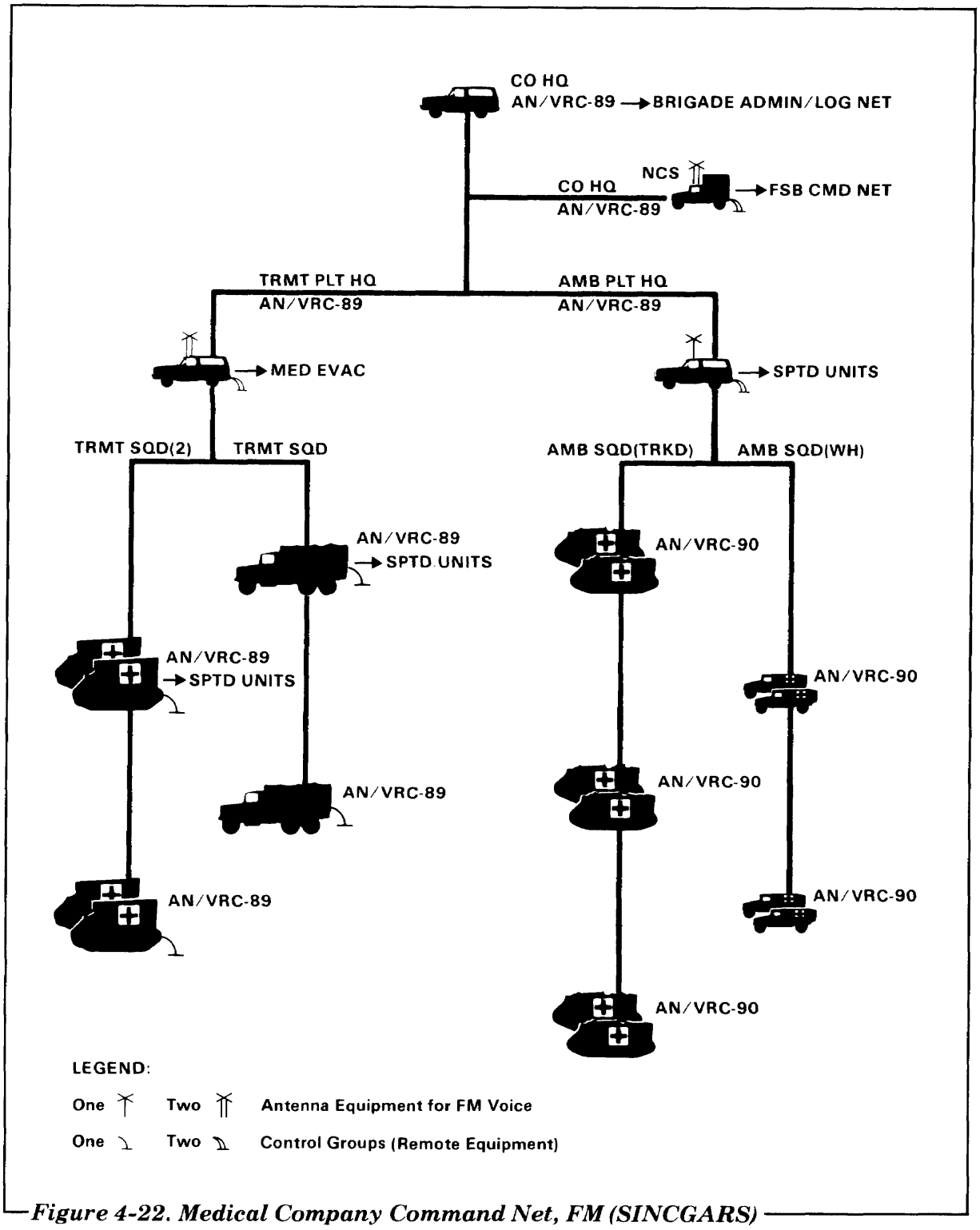


Figure 4-22. Medical Company Command Net, FM (SINCGARS)

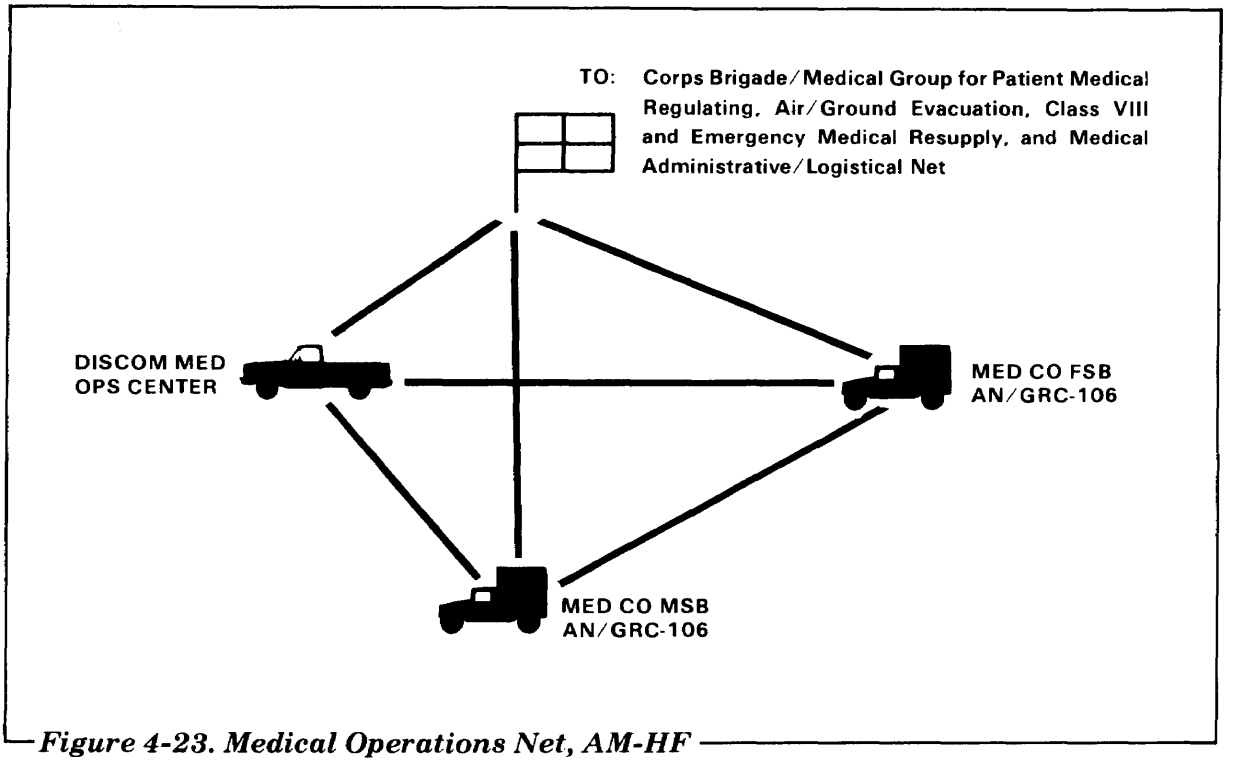


Figure 4-23. Medical Operations Net, AM-HF

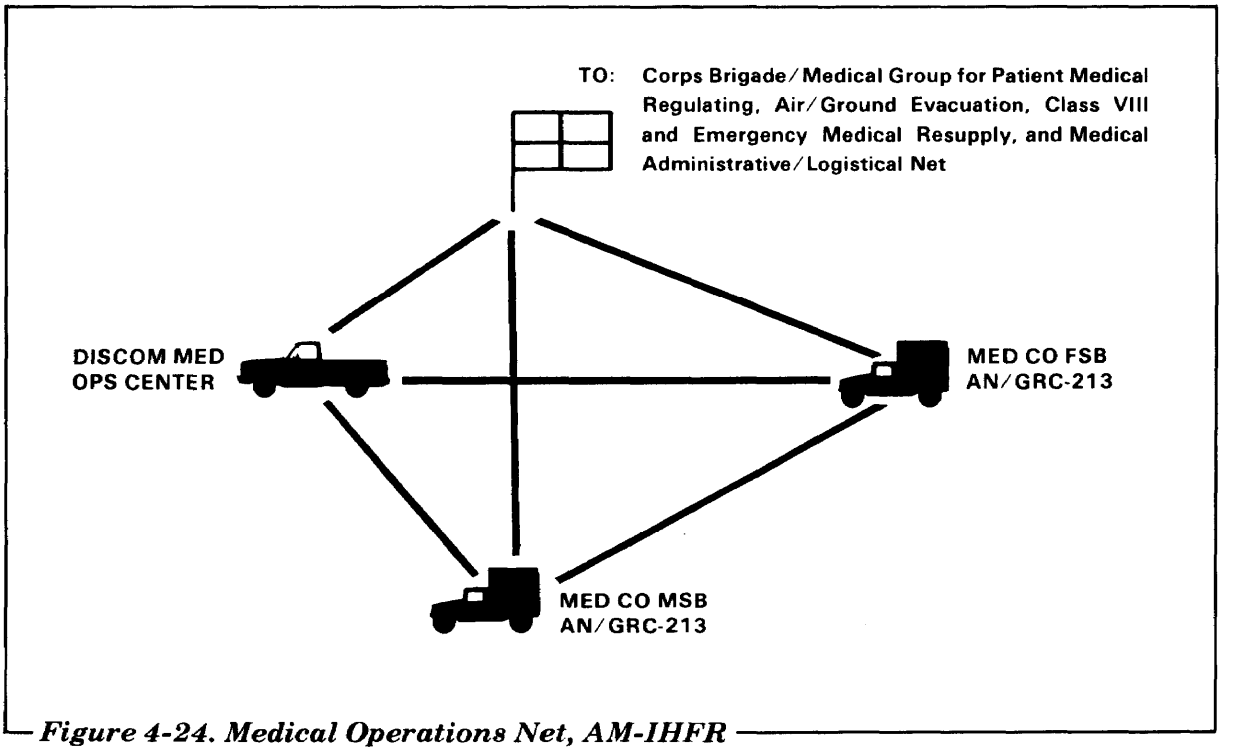


Figure 4-24. Medical Operations Net, AM-IHFR

SIGNAL SECURITY

As part of the overall operations security program, FSB elements must consistently practice signal security. A vital consideration is siting of transmitting antennas. Sites must enable communications while minimizing the enemy's ability to intercept and locate transmissions. Considerations include—

- Remote antennas away from CPs by at least 1 kilometer.
- Construct and use directional antennas.
- Use terrain features, such as hills, vegetation, and buildings, to mask transmissions.
- Disperse transmitters.

Other guidelines on signal security include the following:

- Maintain radio or radio listening silence, using radio only when absolutely necessary.
- Distribute codes on a need-to-know basis.
- Use only authorized call signs and brevity codes.
- Use wire and messengers whenever feasible.
- Use available secure voice/RATT devices.
- Maintain net discipline and control.
- Use authentication and encryption codes specified in the current SOI.
- Keep transmissions short (less than 20 seconds).
- Report all COMSEC discrepancies to the net control station.
- Use lowest transmitter power output consistent with good communications.
- Avoid significant surges in traffic on single-channel radio nets.