

LONG-RANGE

TACTICAL

LINE-OF-SIGHT

SYSTEMS

COMPUTERS

combat
PROVEN



CNR-9000

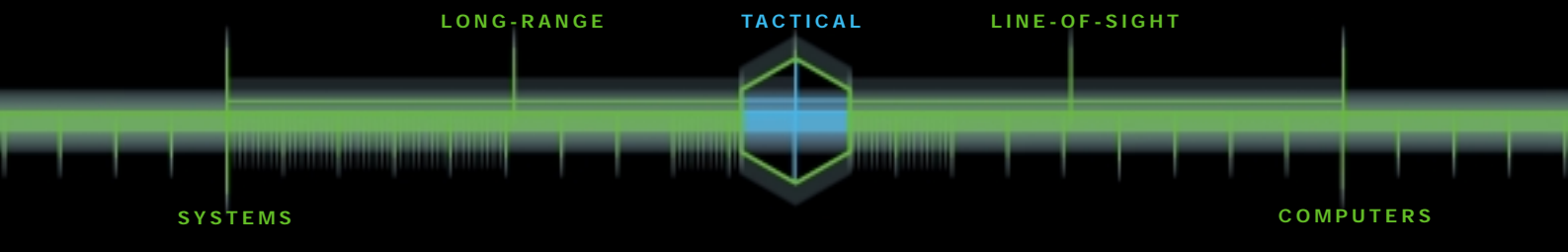
Advanced Multi Mode VHF/FM
COMSEC/ECCM Radio System for
Superior Voice and Data Communications

CNR-9000

The CNR-9000 radio is Tadiran Communications' response to present and emerging combat requirements for VHF/FM tactical networks.

The latest and most modern tactical system on the market, the CNR-9000 is a miniature version of the CNR-900 radio system. Small and compact, it contains additional features and capabilities driven by real world combat experience:

- Extended VHF/FM band 30-108 MHz (optional)
- Powerful Encryption & ECCM (Frequency Hopping)
- Synchronous orthogonal frequency hopping mode
- Powerful, high speed data transmission (up to 32Kbps)
- Powerful error detection/correction codes; automatic data rate and type adaptation
- Powerful Flash and Burst data transmission
- Selective calling/Selective barring
- Lightweight radio system
- State-of-the-art, innovative menu-driven MMI
- Built-in-mini terminal
- 100 pre-set channels
- Programmable hardware and updated software loading capability for additional features
- Variety of manpack and vehicular/fixed station configurations
- Advanced Built-In-Test (BIT)
- Built-in Vocoder (optional)
- Built-in GPS receiver (optional)
- Communication Controller utilizing MIL-STD-188-220 protocol (optional)
- Fully compatible with CNR-900 radio system



OPERATIONAL NEEDS

The diverse conditions of the modern battlefield pose a new challenge for tactical communications. When faced with potential threats, military planners must optimize their resources in terms of availability and effectiveness. Military scenarios indicate that single channel voice and data communications will play a vital role in the fast changing situations of the battlefield.

As tactical communications becomes a more integrated part of C³I systems, emphasis on data communications has grown. Synchronous and asynchronous data communications combined with error correction, is the key for successful data transfer under adverse communications conditions.

A very high level of voice and data security is required to overcome the effective electronic intelligence and tactical DF systems available today. Enemy counter-measures dictate the use of effective anti-jamming, ECCM solutions. These solutions must ensure that friendly interference is minimized while encountering jamming problems.

CNR-9000, A RADIO BORN OF OPERATIONAL NEEDS

The CNR-9000 is a mature, third generation frequency-hopping radio, developed and produced by Tadiran Communications. It possesses a comprehensive set of features rarely found in similar radios. The design of the CNR-9000 evolved from a previous frequency-hopping radio - the CNR-900 - that was developed by Tadiran in the 90's. Consequently, the CNR 9000 incorporates all the improvements that real combat experience has proven to be essential.

Advanced frequency hopping (ECCM), data communication (DATA) and message security (COMSEC) are facilitated by the CNR-9000. The Third-generation ECCM facility provides unique features, including an automatic synchronization technique eliminating the need for a master station, and orthogonal nets with Internet synchronization resulting in a superior performance that can defeat the most persistent and powerful EW systems. Adjacent radio interference is thereby reduced to a minimum even in concentrated radio environments. Error free data communications at various data rates is achieved by use of powerful error detection and correction codes and automatic data rate adaptation. The COMSEC digital encryption facility provides a high degree of voice and data message security. Other functions include "Secure Alarm" and "Clear Override", resulting in operational ease and user friendliness.

The CNR-9000 offers an optional internal integrated GPS in the receiver-transmitter, and an external GPS antenna connection. GPS information is displayed on a radio display and the operator has full knowledge of his location. As an integrated part of the radio, the operator can also automatically transmit his location to a higher level command post, or receive and display the location of other friendly forces' equipment.

Utilizing large-sized display screen, the CNR-9000 can operate as a mini terminal. The operator can transmit a chosen message and on the receiving radio's screen the message will be displayed.

The CNR-9000's built-in vocoder (optional) operates at 2400 bps and 4800 bps, and has excellent intelligibility. The low data rate enables use of a high degree of error correction, resulting in enhanced speech quality on noisy channels (relative to the current CVSD technique).

The CNR-9000 offers an optional internal integrated communications controller called the CC-9000. The CC-9000 provides data services to a single user employing a PC (through the COM serial interface), or to a group of users residing on a Local Area Network (LAN). Users are able to access combat radio networks while running any of their preferred commercial applications (encapsulated in IP packet) such as e-mail, ftp file transfers and browsers. Consequently, CC-9000 seamlessly extends the reach of LAN and WAN (Wide Area Networks) subscribers to Combat Area Networks (CAN). CC-9000s may also be connected back to back in order to provide routing functionality between different CANs. As a result, it expands contemporary voice-based-networks into an advanced tactical Internet radio environment. CC-9000 employs the well established IP as its network layer protocol, allowing message routing between networks in the combat area, as well as gateways to virtually all non-military networks. CC-9000 adopts MIL-STD-188-220 protocol stack in layers 1 through 3a (physical, data link and intra-net layers).

The CNR-9000 provides an entire system solution for tactical communications in the VHF band. Operational and logistic flexibility are achieved through the use of common building blocks. The same receiver-transmitter unit is the basis for both manpack and vehicular configurations.

The CNR-9000 also guarantees maintenance ease, thanks to its modular design and extensive BIT. In addition, its functional and operational simplicity round out its operational and logistic flexibility.



HIGHLIGHTS

Operational Flexibility of Configuration Variety to Suit Every Operational Scenario

- Manpack
- Manpack High-Power
- Vehicular, Low-Power
- Vehicular, High-Power
- Vehicular, High-Power, Dual-Radio, with an internal power amplifier automatically allocated to the first transmitting radio
- Vehicular, High-Power, Dual-Radio, with two power amplifiers

Interoperability

- Compatible with old generation radios - e.g. AN/VRC-12
- Compatible with CNR-900 and PRC-710 radio systems in all modes of operation
- Compatible with old generation and new generation vehicular intercom systems - e.g. AN/VIC-1.VIS
- Interfaces with a wide range of peripherals

Retransmit capability (with optional cable CX-5230)

- Manpack and Vehicular
- Voice and data retransmission
- High-Power, Dual-Radio configuration forms a self-contained retransmit station
- No external retransmit boxes required for manpack or vehicular retransmit stations
- Automatic communication type adaptation (voice/data, syn/async, data rate)
- Operation modes: CLEAR, COMSEC, ECCM
- Protected against security breach

Data Communication

- Powerful data rate adapter
- Error correction
- High probability of error free data transfer under severe communication conditions

Built-In Information Security And Immunity Encryption (COMSEC)

- Very high level of voice and data security (digital encryption)
- Two sets of ten cipher kits each protected against unauthorized access
- No error propagation

Anti-Jamming (ECCM)

- Medium hopping rate
- Wideband (or narrowband) frequency hopping over the entire frequency band
- Synchronous, orthogonal frequency hopping minimizes friendly collocation interference
- PTT oriented, self-distributed synchronization eliminates need for master stations (vulnerable) and provides immediate readiness for operation
- Very high probability of synchronization and resynchronization under severe jamming conditions
- Spoofing resistant
- Hailing from fixed frequency to frequency hopping and vice versa

Special Features

- Use of radio system as mini terminal for message transmissions
- Built-in GPS for system's location and for location report to higher level (optional)
- Built-in Vocoder for high voice quality reception even under poor level channels (optional)
- Communication Controller for vehicular configurations of tactical data transmission with Local Area Network (LAN) using MIL-STD-188-220 (Optional)



PRC-930



PRC-930 HP



VRC-906



VRC-920

Logistic Flexibility

- Operational configurations easily configured from basic blocks around common receiver-transmitter
- Variety of ancillaries, compatible with CNR-900, PRC-710, AN/VRC-12 and AN/VIC-1 accessories
- Reduced equipment down-time and logistical costs
- High MTBF including DATA/COMSEC/ECCM module
- Low MTTR; Plug-in modular design at LRU and SRU levels
- Extensive and efficient built-in-test (BIT)

Human Engineering

- Functional simplicity, skilled operators not required. All functions unambiguously identified.
- Innovative, menu-driven MMI, using large interactive display guided operation for higher level functions and data loading.
- Preset, DATA, COMSEC and ECCM parameters loaded via keyboard, keygun loader or another CNR-9000.
- Visual and audible alerts; security breach, frequency hopping reception in fixed frequency mode; COMSEC reception in CLEAR mode, data communication.
- Minimum operator workload under battlefield conditions; auto data rate adaptation, auto synchronization, auto protection against security breach, clear override.
- Quick emergency erasure of radio secure parameters; protected against unintentional erasure.

CONFIGURATIONS

The modular design of the CNR-9000 provides a variety of configurations geared to match any specific operational requirement. Manpack, Vehicular and Airborne radio sets are easily configured around the common Receiver-Transmitter unit, the RT-9001 and various portable & vehicular accessories.

RT-9001, Receiver-Transmitter Unit

- Common to all CNR-9000 configurations
- 30-88 MHz coverage (30-108 optional)
- Operational ease and friendliness
- Innovative, menu-driven MMI
- Built-in powerful COMSEC/ECCM facility
- Powerful error detection/correction data transmissions
- Unique functions: SCAN, HAIL, Relay, mini terminal, GPS (optional), Vocoder (optional) and more.

PRC-930, Manpack Radio Set

- 0.25, 5 W power output
- Battery Operated: Lithium, Alkaline, NiMH rechargeable, NiCad rechargeable, and Lilon rechargeable
- Long and short whip antenna

PRC-930HP, High Power Manpack Radio Set

- 0.25, 5, 20 W power output
- AM-7320B amplifier connected to the receiver-transmitter, using a single coaxial cable

VRC-906, Low Power Vehicular Radio Set

- 0.25, 5 W power output
- Ability to connect to vehicle intercommunication (VIC-1) system
- 24 Vdc power supply
- Communication Controller, CC-9000 (optional)

VRC-920, High Power Airborne Radio Set

- 0.25, 5, 20 W power output
- Cockpit control box - the C-6200 - allows full control of radio modes and parameters along with voice transmission and reception
- Integrated power amplifier
- Ability to connect to airborne intercommunication system
- Airborne 28 Vdc power supply
- Communication Controller, CC-9000 (optional)



VRC-950



VRC-980



VRC-990

VRC-950, High Power Vehicular Radio Set

- 0.25, 5, 50 W power output
- Integrated power amplifier
- Ability to connect to vehicle intercommunication system (VIC-1)
- 24 Vdc power supply
- Communication Controller, CC-9000 (optional)

VRC-980, Dual Fit High Power Vehicular Radio Set

- 0.25, 5, 50 W power output
- Integrated power amplifier
- Two receiver-transmitter units sharing a single power amplifier
- Self-contained retransmit (relay) station (with optional CX-5230 cable)
- Ability to connect to vehicle intercommunication system (VIC-1)
- 24 Vdc power supply
- Communication Controller (for two radios), CC-9000 (optional)

VRC-990, Dual Fit High Power Vehicular Radio Set with Additional External Amplifier

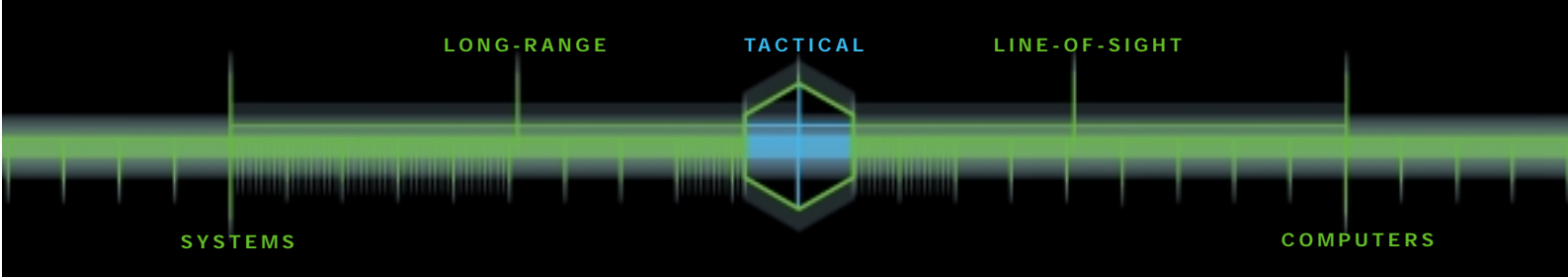
- 0.25, 5, 50 W power output
- A combination of VRC-980 and AM-9050 external amplifier
- Integrated power amplifier and additional external amplifier
- Simultaneous Dual 50 W transmissions
- Ability to connect to vehicle intercommunication system (VIC-1)
- 24 Vdc power supply
- Communication Controller (for two radios), CC-9000 (optional)

SYSTEM COMPLEMENTS

Description

Configurations

	Manpack (5W) PRC-930	Manpack H.P. (20W) PRC-930HP	L.P. Vehicular (5W) VRC-906	Single H.P. Airborne (20W) VRC-920	Single H.P. Vehicular (50W) VRC-950	Dual H.P. Vehicular (50W) VRC-980	Dual H.P. Vehicular with External Amplifier (2X50W) VRC-990
Receiver/Transmitter, RT-9001	1	1	1	1	1	2	2
Vehicular Adapter, VA-9002/1 For Single Radio w/o 50W Amplifier			1				
Vehicular Adapter, VA-9002/2 For Single Radio					1		
Airborne Adapter, VA-9002/3 For Single Radio				1			
Vehicular Adapter, VA-9004 for Dual Radio						1	1
Mounting Base, MT-9002			1	1	1		
Mounting Base, MT-9004						1	1
Mounting Base, MT-9050 for external amplifier							1
External Amplifier, AM-9050							1
Portable Amplifier, AM-7320B		1					
Control Box, C-6200				1			
Vehicular Antenna, AS-1288B			1		1	2	2
Antenna Matching Unit, AB-288	1	1					
Long Whip Antenna, AT-290	1	1					
Short Whip Antenna, AT-980	1	1					
Handset, H-250U	1	1	1		1	2	2
Cover Battery, CY-6001	1	1					
Vehicular Loudspeaker, LS-454U			1		1	2	2
Harness, Carrying, ST-9010	1	1					
Harness, Carrying, ST-9020		1					
Accessories Bag, CW-503M	1	1					
RF Cable (VA-RT), CG-1127				1	1	2	2
RF Cable (RT-AM), CG-1127		1					1
ANT RF Cable, CG-1773			1		1	2	2
Control Cable, CX-9050							1
Power Cable, CX-8120			1		1	1	1



OPTIONAL ANCILLARIES

AS-1188 Low Profile, Wide-band Whip Vehicular Antenna

- Extremely thin silhouettes, 2.5 mm diameter at the top; practically undetectable under battlefield conditions.
- Rugged, blast proof.
- Monopole, Omnidirectional, Wide-band 30-88 MHz; no antenna control.
- Directly replaces AS-1729/VRC and AS-1288B antennas.

AT-1000 GPS Antenna

- Useful for potable and vehicular configurations
- Installed on manpack harness or vehicular antenna by special adapter

CC-9000 Communication Controller for Vehicular Configurations

- CC-9000 provides data services to a single user employing a PC, or to a group of users residing on a Local Area Network (LAN).
- CC-9000 employs the well established IP as its network layer protocol, allowing message routing between networks in the combat area as well as gateways to virtually all non-military networks.
- CC-9000 adopts MIL-STD-188-220 protocol stack in layers 1 through 3a (physical, data link and intra-net layers).

C-7300 Extended Control Unit (ECU)

- Controls radio functions from short distances: Power Level, Preset Channel and Operating Mode.
- Take-control override enables tandem connection of up to four units, providing changeover control of the radio from one site to another.

GRA-7400 Remote Control System

- Comprises GRA-7410 Far Unit and GRA-7420 Local Unit, interconnected via field telephone wire.
- Provides voice, data and control functions: Operating Modes, Squelch, Preset Channel, Power Level and BIT over distances of up to 4 km.
- Asynchronous data transmission.
- TEL service channel between Far Unit and Local Unit operators.

AM-7320B Portable, Low Weight, 20 W Power Amplifier

- Extends communication range of PRC-930 manpack configuration.
- Simple interconnection between power amplifier and radio; only one coaxial cable.
- 12 V dc battery operated; the same batteries as used for the manpack radio.
- Built-in-test (BIT) incorporated.

C-739 Control Unit

- Control radio functions: Volume Control, Preset Channel and Operating Mode.
- Take-control function enable transfer of radio control functions to radio panel.

G-10N Keygun Loader

- Automatically loads CNR-9000 DATA, CLEAR, COMSEC and ECCM parameters
- Accepts external computer data or another G-10N
- Built-in-test (BIT) incorporated
- Battery operated

LS-108M Loudspeaker

- Portable, Light weight
- Ruggedized Construction

Manpack Power Sources

- TNH-2012 NiMH rechargeable Battery
- TNC-2188 NiCd rechargeable Battery
- TLS-020 Lithium Battery
- TLS-015/A Half Size Lithium Battery
- BA-3791 Alkaline Battery
- TLI-9380 Lilon rechargeable Battery

Battery Charges

- BC-2188 Simultaneously charges 4 TNC-2188
- BC-2012 Simultaneously charges 4 TNH-2012
- BC-9300 Simultaneously charges 4 TLI-9380

TECHNICAL SPECIFICATIONS

General

Frequency:	30.000-87.975 MHz (optional-30.000 to 107.975 MHz)
No. of Channels:	2320 (3120 optional) at 25 kHz spacing
Modulation:	F3 simplex, voice, analog and digital data
Modes of Operation:	Fixed frequency: Clear and COMSEC Frequency hopping: ECCM/COMSEC
Preset Channels:	100
Frequency Stability:	±3 ppm
Scanning:	up to 4 pre selected channels
Selective Call/ Selective Bar:	Individual and group communication
Vocoder (optional)	2400, 4800 bps
GPS (Optional):	Including radio position transmission (Automatic / manual)
Communication Controller (Optional):	Per MIL-STD-188-220
• User-End Interfaces:	* Ethernet (IEEE802.3) 10 base2 10 Mb/s * Serial - ASY at 115Kb/s
• Radio Interface:	Synchronously up to 16Kb/s
Built-In-Test (BIT):	On-line and operator initiated, microprocessor controlled
Display:	Menu driven LCD, large graphic display, that presents a wide variety of radio status
Power Source:	12V DC nominal
• Manpack:	TLS-020 Lithium battery
• Primary battery:	TLS-015/A Lithium battery BA-3791 Alkaline battery
• Rechargeable battery:	TNH-2012 NiMH battery TNC-2188 NiCad battery TLI-9380 Lilon battery
• Vehicular:	24V dc nominal per MIL-STD-1275
• Airborne:	28V dc nominal per MIL-STD-704A
Environmental:	
• Operating Temperature:	-40°C to +65°C
• Dynamic & Mechanical:	MIL-STD-810E
• Relative Humidity:	95%
• Immersion:	up to 1 meter of water for 2 hours
• Electromagnetic Interference:	MIL-STD-461C/462
Manpack Dimensions (WxDxH) (Including battery):	226x245x86 mm
Vehicular Dimensions (WxDxH):	
• VRC-906/VRC-950:	245x300x195 mm
• VRC-920:	245x300x195 mm + 146x100x115 mm(C-6200)
• VRC-980:	345x280x245 mm
• VRC-990:	345x280x245 mm + 147x268x135 mm (AM-9050)
RT Weight:	3 kg
Ancillaries:	compatible with backward ancillaries
RT MTBF per MIL-STD-217F:	>7500 hours
Receiver	
Sensitivity:	-116 dBm for 10 dB SINAD or 10 ⁻¹ BER at 16 kbp/s
Distortion:	< 5%
IF Rejection:	100 dB
Audio Outputs:	
• Adjustable:	20mW/600Ω (earphone) 200 mW/45Ω (speaker)

• Fixed Level:	220 mV/150Ω
Squelch:	OFF, ON:150 Hz tone or noise activated
Front-end Protection:	+38 dBm

Transmitter

Power Output	
• Manpack:	0.25, 5W
• High Power Manpack with portable amplifier AM-7320B:	0.25, 5, 20W
• Airborne:	0.25,5,20W
• Vehicular:	0.25, 5, 50W
Output protection:	Open & Short circuit
Spurious Emission:	-75 dBc
Harmonics:	-47 dBc
Wideband Noise Level:	-137 dBm/Hz at 10% off carrier
Frequency Deviation:	5.6 kHz

Anti-Jamming (ECCM)

Technique:	Synchronous orthogonal frequency hopping over the entire frequency band (30-108 MHz) or partial band
Frequency hopping rate:	Medium
No. of preset Hopping Keys:	Two sets of 10 Keys each
No. of preset Frequency Tables:	10 tables
Synchronization:	Acquired at up to 4.5 minutes T.O.D. difference. Auto resynchronization capability
Maximum radio silence time:	No limited for full synchronization
Late Entry:	Fully automatic ,no special procedures required
Orthogonality:	Up to 64 orthogonal nets over any frequency table
Special Feature:	Hailing from frequency hopping to fixed frequency and vice versa
Programming & Data Loading:	Via keyboard, Keygun loader, another CNR-9000 radio or personal computer

Encryption (COMSEC)

Type:	Digital, very long non-linear "white" sequences
No. of Keys:	Two sets of 10 Keys each
Synchronization Time:	Less than 250 msec
Special Features:	CLEAR override, COMSEC alarm, Auto resynchronization capability
Programming & Data Loading:	Via keyboard, Keygun loader, another CNR-9000 radio, personal computer

Data Communication

Type :	Analog (varied standards), digital synchronous and asynchronous
Rate:	50 to 19,200 bps with error correction. 16,000 and 32,000 bps (synchronous) w/o error correction. 19,200 (asynchronous) w/o error correction.
Flash:	Very short data transmission with minimum delay
SMS (Short Messages Service):	
• Data Type:	900 codes and 200 preformatted messages
• Data Entry:	Via keyboard, data loader and personal Computer
• Features:	Storage of last 16 messages (up to 320 charac. each). Message acknowledgement. Message displayed on radio front panel
Special Features:	Automatic rate and data type adaptation