DSP 9000

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Military Radio Ciphering System

The DSP 9000 is a family of Military Ciphering Systems that provide long-term, strategic security for communications transmitted over narrowband channels. The DSP 9000 is available in base station, manpack, handset, and implant board configurations. A programmable interface and MIL-SPEC design make the DSP 9000 capable of securing virtually any HF, VHF or UHF application.

TCC's DSP 9000 base station for fixed military installations.

The DSP 9000 handset replaces the radio handset for manpack applications.

Secure Applications

- HF-SSB, VHF, and UHF radio
- Radio teletype
- Standard dial-up telephones
- Low speed data
- Facsimile (Group I and Group II)
- Tactical switchboards and field telephones

Advanced Technology

The DSP 9000 utilizes leading-edge technology throughout its design. A powerful Digital Signal Processor supplies tremendous computing power that is used to ensure exceptional recovered voice quality and cryptographic security. All audio input/output parameters are software controlled. This allows a single DSP 9000 to be quickly installed on a variety of radios without modifying the hardware.

Exclusive features such as half and full duplex versions, dual synchronization, automatic voice/data encryption selection, and storage of a large number of keys also clearly separate the DSP 9000 from its competitors. Additionally, the DSP 9000 is compatible with TCC's CSD 3324E secure telephone to enable "office-to-field" communication.

Features

- Strategic cryptographic security
- Exceptional recovered voice quality
- Half and full duplex models
- Menu driven, programmable interface and configuration
- Designed and tested to MIL-SPEC standards
- Full remote control capability for vehicles, ships and aircraft
- Select Call Mode for private conversations
- PTT and Manual synchronization
- Sync Coast feature
- Automated key management
- Fixed, mobile and manpack configurations
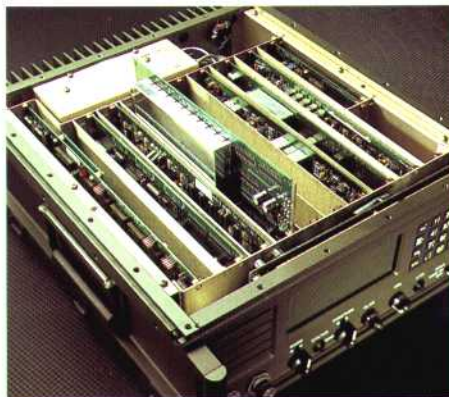
The DSP 9000 implant board is integrated in the radio system to secure radio communications.

Key Management and Cipher Technique

TCC's Enhanced Domain Transform encryption technique begins by using a "toll quality" voice digitizer operating at 64 Kbps. The digitized audio is then pseudo-randomly transformed from frequency into time and time into frequency using TCC's "Enhanced Domain Transform" technique. This transform combined with a TCC proprietary compression technique eliminates virtually any residual intelligibility.

The domain transform is controlled by a highly non-linear digital key generator. This crypto algorithm can be modified by the customer using TCC's Crypto Management System. One of the selected encryption keys stored in the DSP 9000 and a randomly generated Initialization Vector (IV) provide a new keystream for each synchronization.

TCC's completely automatic 'hands off' key management approach is ideal for military applications. All key management parameters can be selected and controlled by a COMSEC security officer, thereby eliminating potential operator errors or compromise. The transmitting

unit selects the appropriate key by means of a real time clock at a time interval set by the security officer. Automatic downline key indexing insures that the receiving unit always selects the proper key for decryption.

Handset and Implant Models

Advanced DSP technology and the latest miniaturization techniques have allowed the high-level security and voice processing of the DSP 9000 base station to be reduced in size to fit in a handset configuration, and as a board integrated into a radio.

It is no longer necessary for field soldiers to carry a separate crypto unit. The DSP 9000 HS replaces the existing radio handset, thereby adding less than one pound to the weight of the manpack radio. Prior to a mission, a security officer loads the DSP 9000 HS with 200 keys and radio interface settings using TCC's SmartModule™. Once loaded, the radio operator need

Fixed DSP 9000 base station installation in a communications shelter.

only select cipher or plain mode. With the addition of the HS model, the DSP 9000 family now provides a complete, integrated security solution for air, ground and sea operations.

The DSP 9000 Implant Board is an embedded, modular encryption option board designed for easy integration into HF, VHF and UHF radios. Radios using the DSP 9000 Implant Board will interoperate with radios secured with a full-size DSP 9000 unit or a DSP 9000

The crypto management system facilitates key generation, loading, and distribution.

HS handset unit. New radios can be phased in, and radios from different manufacturers can communicate securely.

Quality

TCC is dedicated to quality products and services. TCC is ISO 9001 certified. ISO 9001, granted to TCC by TUV, is the most stringent standard available for total quality systems in design/development, production, installation and servicing.

Technical Specifications   DSP 9000 Family

CIPHERING TECHNIQUE	TCC proprietary Enhanced Domain Transform (EDT), controlled by a non-linear Key Generator	AUDIO BANDWIDTH	Voice Mode: 200 Hz to 2800 Hz Data Mode: 200 Hz to 3000 Hz
CRYPTO KEY VARIABLES	System key: 8.39×10^{79} Network key: 6.55×10^{4} Local key: 7.2×10^{16} Total keys: 4.0×10^{101}	REQUIRED CHANNEL BANDWIDTH	500 Hz to 2400 Hz Minimum
		DIAGNOSTICS	BITE run at power on and on demand from keypad
SYNCHRONIZATION	Inband digitally controlled FSK sync burst (74 bits)	ENVIRONMENTAL	Humidity: 120 hours, 95% non-condensing MIL-STD-810C, Method 507
FREQUENCY CONTROL	High-stability crystal oscillator	EMI	MIL-STD-461B, Class A3
FREQUENCY OFFSET	±120 Hz maximum for HF-SSB	MTBF	Exceeds 10,000 hours per MIL-HDBK-217F & MIL-STD-756
AUDIO INTERFACE	'Soft' Selectable Interface Characteristics		

Technical Specifications continued on the next page.

DSP 9000

Technical Specifications *continued*

DSP 9000 Base Station

KEY MANAGEMENT	Key Storage: 800 Local Keys stored in two key-banks containing 400 keys Key Loading: SmartModule™ or KFD-800 keyfill devices, or keypad entry
OPERATION	Half duplex and full duplex models
SIZE AND WEIGHT	Height: 2.25" (5.7 cm) Width: 8.25" (21 cm) Depth: 11.0" (28 cm) Weight: 5.7 lbs (2.6kg) half duplex 6.8 lbs (3.1kg) full duplex
POWER	DC Voltage: +9 to +32 VDC AC Voltage: 115/230 VAC, 50/60 Hz Current: 1 watt (90mA@12VDC)
AUDIO INTERFACE	H-189/HC-250 handset 4 wire/600 ohm MIC/Speaker Telephone direct wired
PUSH TO TALK SIGNAL	Contact closure to ground or to positive supply (+32 V max.)
DIAGNOSTICS	Full range of BITE including: CPU, RAM, ROM, DSP, analog test, audio loop, keypad, keyfail, key storage and display.
ENVIRONMENTAL	Temperature: Operating: -20° C to +70° C Storage: -40° C to +85° C Vibration: 1.5G peak, 55-220 Hz MIL-STD-810C, Method 514 Shock: 40G's @ 11ms MIL-STD-810C, Method 516
OPTIONS AND ACCESSORIES	■ TCC secure phone ■ KFD-800 keyfill device ■ SmartModule keyfill device ■ Remote control head ■ 19 inch rack mount ■ Shock mount assembly ■ Automatic Test Equipment ■ Crypto Management System

DSP 9000 Handset

KEY MANAGEMENT	Key Storage: 200 Local Keys stored in two keybanks containing 100 keys Key Loading: SmartModule™ keyfill device, or keypad entry
OPERATION	Half duplex
SIZE AND WEIGHT	Height: 9" (23 cm) Width: 2" (5.1 cm) Depth: 4" (10.2 cm) Weight: 2.0 lbs (.9kg)
POWER REQUIREMENTS	Externally supplied, 9 - 18 VDC 1 watt (90 mA @ 12 VDC)
AUDIO INTERFACE	6-pin MIL-C-55116 connector Aux connectors with DC power Others available on request
PUSH TO TALK SIGNAL	Contact closure to ground
ENVIRONMENTAL Temperature:	Operating: -20° C to +60° C Storage: - 40° C to +85° C
Waterproof:	Submersible to 1 meter
Vibration:	1 Grms, 5-200 Hz random curve, MIL-STD-810D, Method 514.3
Shock:	100 G's at 11 ms MIL-STD-810D, Method 516.3

DSP 9000 Implant Board

KEY MANAGEMENT	Key Storage: 200 Local Keys stored in two key-banks of 100 keys Key Loading: SmartModule™ or keypad entry
SYNCHRONIZATION	Inband digitally controlled FSK sync burst (74 bits)
OPERATION	Half-duplex (Push-to-Talk)
POWER	DC Voltage: 5V DC Input Current: 220mA (typical)
SIZE AND WEIGHT	Length: 9.75" (248 mm) Width: 3.78" (96 mm) Height: 0.7" (18 mm) component side 0.15" (4 mm) solder side Weight: 6 oz.
ENVIRONMENTAL Temperature:	Operating: -20° C to +70° C Storage: -40 ° C to + 70 ° C
EMI	4-layer board with separate ground and power planes RFI filtering on I/O signals Metal EMI shield over components