HF TRANSCEIVER
ENVOY

CODAN COMMUNICATIONS

Codan's Envoy HF Radio delivers dependable, clear, trouble-free voice, messaging and data communications, without dependence on existing infrastructure. Now with Codan's second generation Digital Voice technology, Envoy provides outstanding voice clarity in conditions where competing HF radios fail.

KEY FEATURES

- Software Defined Radio
- 125 W RF power output
- Industry leading reliability
- Handset and Console control points
- Intuitive icon based large colour display
- Multi-language user interface
- IP/Ethernet/Wi-Fi/USB connectivity
- Exceptional RF performance
- 2nd generation digital voice (TWELP)
- Standards-based
  - CCIR 493-4 based Selcall (Codan and open standard)
  - MIL-STD-188-110A/B (STANAG 4539) Data (up to 19k2 bps)
  - FED-STD-1045
  - MIL-STD-188-141B ALE (JITC Certified)
  - 3G ALE (STANAG 4538)
- AES-256/CES-128 Encryption
  - Secure Interlop feature
- MIL-STD-810G compliant
- Multiple point control capable
- Virtual Control Point (VCP) compatible
- XTEND smartphone app compatible
- Wide range of support peripherals
- Worldwide Codan service and support

EXCEPTIONAL DIGITAL AND ANALOG VOICE CLARITY

Codan's second generation Digital Voice (DV) technology provides a quantum leap in voice communications. It significantly reduces the hiss, crackle, pops, and multipath effects typical of HF. The vocoders used provide voice quality experience that is similar to cellular phones, and the modem technology ensures continued operation in degraded and fading channels.

When analog SSB mode is needed, Envoy's patented Easitalk™ DSP algorithm works to actively remove background noise and interfering tones. During transmission, Codan's TalkPower feature dynamically compresses and shapes the frequency response of the voice signal to maximise transmit power and intelligibility. A syllabic squelch only opens the speaker mute when speech signals are present to eliminate background noise.

SOFTWARE-DEFINED ARCHITECTURE

Envoy uses latest-generation high-performance Digital Signal Processor (DSP), Field-Programmable Gate Array (FPGA) and system on chip (SoC) technology. Built upon a proven SDR platform with thousands of hours of operating in the field, Envoy delivers market-leading performance and future upgradability through software updates that support evolving standards and ensure sustainability.

IP / ETHERNET / USB CONNECTIVITY

Envoy IP / Ethernet connectivity enables centralised programming, maintenance and operation of network connected stations. Envoy handsets and consoles include USB ports for convenient programming and maintenance via conventional USB cable connection or via attached memory stick.

UNPARALLELED RF PERFORMANCE

Envoy's strong RF performance is paramount to effective long range communications. Unlike many Software-Defined Radios, Envoy provides specifications superior or equal to high-end analog products. For example, to maximise range, receiver sensitivity is a massive –125 dBm, and blocking is greater than 100 dB, minimising chances of interference from adjacent stations. Envoy's transmitter is also extremely clean, with carrier, spurious and harmonics more than 65 dB below PEP. Envoy also supports connection of dual antennas for short and long range propagation.

QUICK DEPLOYMENT AND INTUITIVE OPERATION

Codan's Windows-based TPS-3250 Radio programming software can be used to build profiles, which can be conveniently deployed via direct connection, IP or USB memory stick. Once profiled, Envoy can be easily locked down using an administrator PIN, ensuring important settings are not tampered with.

Envoy's large high-resolution, sunlight-readable colour display, and intuitive menu system makes operation similar to modern smartphones. Making calls is as simple as navigating to your contact list, locating the desired contact and pressing the "call" button. Other common actions are supported through customisable hotkeys for single or multiple step operations.

For optimal user safety, Envoy includes a dedicated Emergency key. This can be configured to automatically contact one or more stations, embedding the Envoy's GPS coordinates into the emergency signal. To minimise training burden for non-English speaking users, Envoy's user interface is also made available in a variety of other languages.

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ALE AND SELCALL CALLING CAPABILITY

The Envoy includes the latest generation 3G Automatic Link Establishment (ALE) technology providing the user with fast linking and data capabilities. Messages are transferred securely by employing link protection and data encryption. Envoy supports current calling standards including CCIR compliant Selcall, FED-STD-1045 ALE and JITC Certified MIL-STD-188-141B ALE. Envoy enables concurrent operation of different calling systems, and automatically optimises channel scan times. This ensures full interoperability with earlier generation Codan, competitor and legacy radios.

Selcall provides the capability to voice or message call an individual radio, group of radios, or broadcast to all radios. ALE also provides these capabilities, plus built-in intelligence to automatically select the optimum channel (frequency) to ensure the best chance of linking and the clearest signal. The MIL-STD ALE option adds NET calling (similar to Talkgroups), on-air Link Quality Assessment (LQA) exchange, and advanced addressing types.

Envoy's ALE also includes Codan Automated Link Management (CALM™). This technology is fully compatible with conventional standards-based ALE, but includes significant proprietary enhancements to improve performance. As an example, ALE LQA is internally recorded in a three-dimensional matrix against time. This results in far reduced on-air soundings and improved probability of linking. CALM™ also includes special call types including "first-in-list" for fastest possible link, and "best-in-list" for optimised data.

INTEGRAL DATA CAPABILITY

Envoy supports MIL-STD-188-110A/B high-speed data operation up to 9600 bit/s and up to 19k2 bps with the Independent Sideband (ISB) option.

The modem uses interleavers, tone-excision and turbo-decoding for optimum performance in difficult channels. When combined with Codan's STANAG 5066 compliant RC50-C Email software, email over HF can be achieved from standard SMTP/POP email clients such as Microsoft® Outlook. Emails are automatically compressed and the data rate is optimised to channel conditions.

Envoy also supports Codan's robust low-rate data modem waveform, which is compatible with our 3012 / 3212 external modems. This modem supports data operation to 2400 bit/s (typically 6000 bit/s including compression). It's available with Windows based Email / Chat software, or can be used for custom data / telemetry applications via its standards-based AT command interface.

When combined with SprintChat/SprintNet application, the optional STANAG 3G ALE provides fast linking and data capability that is capable of exceeding the performance experienced with traditional MIL-STD-110B 2G data. Codan 3G ALE supports all radio call types, including SMS text (via SprintNet stations).

ENCRYPTION

Envoy has a choice of encryption options to suit the required level of communications security. For communications up to "top secret" classification, AES 256-bit security is available for both Digital Voice and data encryption, supported with up to 256 internally pre-programmed encryption keys.

For voice only applications, Codan's CES-128 DSP-based encryption option is available, with up to 97 16-digit user programmable keys. An additional layer of security is provided by assigning a PIN number during a secure communications session.

Both of these options are supported by Codan's Key Management Software (KMS) application suite, which enables generation, management and deployment of keys. For convenience, keys can also be filled using a conventional USB memory stick. For basic voice security, the CIVS option provides a 32 code DSP-based scrambler.

All voice encryption options for Envoy can be activated by a single hotkey, and are fully integrated with core Radio functions like Selcall and ALE scanning to ensure simplicity of operation. Envoy can be configured to automatically set the encryptor type and key index per channel or network. This enables interoperability between Codan HF networks operating with disparate encryption types.

GPS SUPPORT

Envoy supports connection of GPS via NMEA0183 compatible GPS receivers. This enables polling and sending of GPS positions over air. Position data display format is user selectable and includes UTM, UPS and MGRS formats. Distance and bearing to other users or programmable waypoints can be displayed on an intuitive graphical display. When used with mapping software deployed mobiles vehicles can be graphically tracked.

VERSATILE DESIGN FOR MOBILE, BASE AND COMPLEX SYSTEMS

Envoy is designed using a modular approach, with a handset for mobile applications and a desk console for bases. The use of IP over Ethernet enables geographical separation of radio and console, without the need for expensive adaptor devices. Envoy can also be supplied in rapidly deployable cases.

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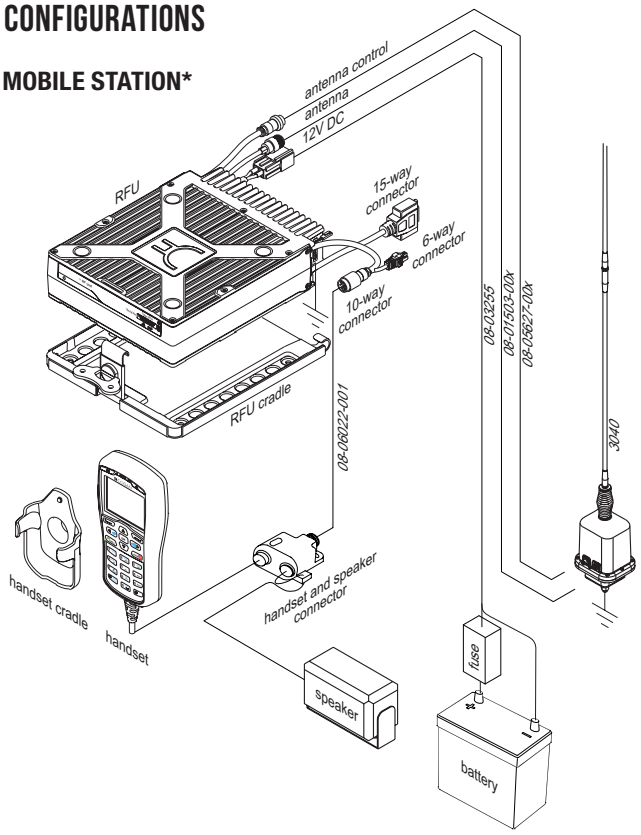
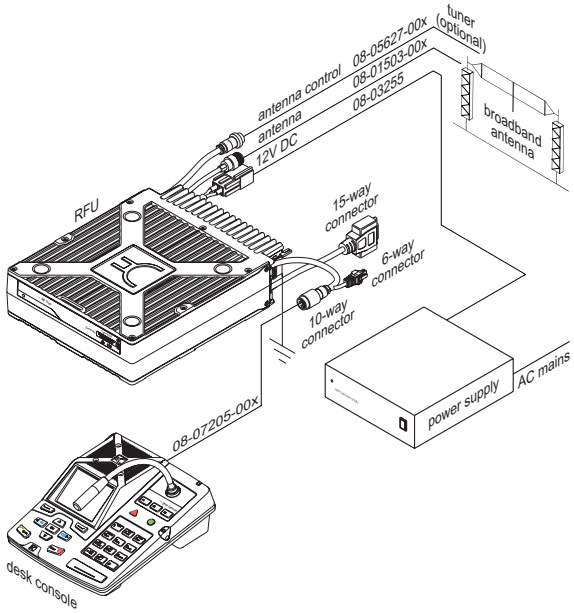
FEATURE	MODELS	
	ENVOY X1	ENVOY X2
Channels/Scan groups	100/10	1000/20
Contact list entries	250	500
GPS calling	Optional	Optional
Accessory serial port	N/A	Standard
Data modem	N/A	Optional
ALE	FED-STD (Optional)	FED/MIL-STD/3G ALE (Optional)

CONFIGURATIONS

MOBILE STATION*



BASE STATION*



*Note both diagrams represent typical configurations.

SOFTWARE APPLICATIONS

- TPS-3250 Radio Programming Software
- Radio Tracking Software (RTS)
- RC50-C Email (for high-speed modem)
- Codan Chat (for robust low rate modem)
- SprintChat and SprintNet

ANTENNAS

- 3040 Automatic Antenna Tuner
- 9300 Automatic Antenna Tuner
- 9320 Automatic Antenna Tuner
- 9390 Tuned Dipole base antenna
- 3048 Tuned Dipole base antenna
- 3240 1kW base antenna tuner
- Wide range of broadband base antenna solutions

ACCESSORIES

- 500 W/1 kW High Power Amplifiers
- 3033 Telephone Interconnect
- Dual-port Antenna Selector
- Vehicle installation kit (including dash-mount)
- Handset cradle mount
- Satellite/cellular modem for Codan Convoy
- 2240 Smartlink
- XTEND Smartphone app
- Virtual Control Point

LANGUAGE SUPPORT

- English
- Spanish
- Russian
- Chinese
- French
- Arabic
- Dari
- Pashto
- Portugese

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SPECIFICATIONS

GENERAL

Channels and Scanning	Up to 1000 simplex or semi-duplex. Up to 20 scan groups. Simultaneous scanning for Selcall (ALE/CCIR) and voice. Dwell time 125 ms to 9.9 s, adjustable
Contacts List	Up to 500 entries
SDR processing architecture	DSP: 456 MHz, 32-bit. FPGA: 500,000 gate. MCU: ARM9, 300 MHz, 32-bit
Interfaces	USB (via Handset or Console). Serial RS232 (supports NMEA-0183 GPS). Ethernet (TCP/IP, supports remote control). Auxiliary GPIO (audio in/out, PTT, RS232) on Envoy X2 model
Audio response	Less than 3 dB variation from 300 Hz to 3 kHz (with optional 2.7 kHz filter)
Compliance	CE, FCC, IC, AS/NZS 4770:2000, AS/NZS4355:2006
Temperature range and Humidity	–30 to +60°C; 95% RH maximum, non-condensing

RF

Frequency range	**Tx:** 1.6 to 30 MHz; Rx: 250 kHz to 30 MHz **Frequency stability:** ±0.3 ppm from –30°C to +60°C
Modes	Single sideband (J3E), USB/LSB, ISB (B7D or B2B) AM (H3E), CW (J2A, J2E), AFSK (J2B), FSK (J2D, F1B), Digital Voice and Data (G1D) (software defined)
Output power	125 W PEP ±1 dB (two-tone or voice), user-programmable in 1 W steps (low/medium/high)
Duty cycle	100% Voice/Data with optional Fan
RF output impedance	50 Ω
Filter bandwidths	2.4 kHz standard (500 Hz, 2.7 kHz, and 3 kHz optional)
Transmitter specifications	**Spurious and harmonic emissions:** Better than <69 dB below PEP **Intermodulation products:** 40 dB below PEP **Carrier suppression:** Better than 65 dB below PEP **Sideband suppression**: 70 dB below PEP
Receiver specifications	**Sensitivity:** 0.12 µV, –125 dBm for 10 dB SINAD **Selectivity:** >70 dB at –1 kHz and +4 kHz ref SCF USB **Blocking:** >100 dB at ±50 kHz I**mage rejection:** >95 dB **Spurious response:** >85 dB **Intermodulation:** Unwanted signal >92 dB below desired signal **Intercept point:** +38 dBm
Switching speed	<25 ms (Tx:Rx or Rx:Tx)

Values noted are typical. Equipment descriptions and specifications subject to change without notice or obligation.

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ELECTRICAL AND MECHANICAL

Operating range	10.8 to 15 V DC (12 V Nominal)
Supply current	**Rx:** 500 mA (backlight min, audio muted) **Tx:** Two-tone 12.5 A typical, average speech 8 A
Protection	Over-voltage/under-voltage/over-temperature/reverse polarity
Size and weight	**2210 RF Unit:** 210 x 270 x 65 mm (8.3 x 10.6 x 2.6 in) 2.8 kg (6.2 lb) **2220/1 Handset:** 75 x 32 x 151 mm (3.0 x 1.3 x 5.9 in) 0.3 kg (0.7 lb) **2230 Console:** 190 x 228 x 79 mm (7.5 x 9.0 x 3.1 in) 1.1 kg (2.4 lb)
Ingress protection	IP43, MIL-STD-810G method 510.5
Environmental standards	MIL-STD-810G (Dust, Shock, Vibration, Humidity, Fungus, Altitude)

OTHER

Data modem (robust low rate)	CHIRP/QPSK, 2400 bit/s (up to 6000 bit/s using in-built compression)
Data modem (high speed)	MIL-STD-188-110A/B, STANAG 4539, 75 to 19200 bit/s
Encryption	CES-128, 97 x programmable 16-digit keys, 4-digit PIN (Voice only) AES-256, 256 x programmable 256-bit keys (Voice/Data)
Vocoder	MELPe (1200/2400 bit/s); TWELP (600/1200/2400 bit/s)

Values noted are typical. Equipment descriptions and specifications subject to change without notice or obligation.

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HF TRANSCEIVER
SENTRY-H 6120-BM

CODAN COMMUNICATIONS

Codan's Sentry-H 6120-BM delivers a rugged Software Defined Radio (SDR) solution for military organisations that demand uncompromised, secure long range voice and data communications. With 150W RF power, it has been specifically designed to deliver the smallest and lightest form factor for no-fuss integration into base and mobile platforms.

In close consultation with military customers, the 6120-BM has been optimised for ease-of-use and features an ergonomic smart handset with a colour, high-resolution multi-language interface and a variety of other capabilities.

KEY FEATURES

- Software Defined Radio
- 150 W power output
- Wide range 10 V to 36 V DC input
- Rugged and waterproof MIL-STD-810G design
- Rugged smart handset with colour display and integrated GPS
- Intuitive icon based colour display
- Multi-language user interface
- Embedded GPS
- IP/Ethernet/Wi-Fi/USB connectivity
- Exceptional RF performance
- 2nd generation digital voice (TWELP)
- Digital voice message call
- Standards based:
  - MIL-STD-188-110A/B (STANAG 4539) Data (up to 19k2 bps)
  - FED-STD-1045
  - MIL-STD-188-141B ALE (JITC certified)
  - 3G ALE (STANAG 4538)
- AES-256/CES-128 COMSEC
- ECCM
- H-250 Accessories support
- Virtual Control Point (VCP) compatible
- Wide range of supported peripherals
- Worldwide Codan service and support

PROVEN SOFTWARE DEFINED ARCHITECTURE

Codan's 6120-BM uses the latest-generation high-performance Digital Signal Processor (DSP), Field-Programmable Gate Array (FPGA) and system on chip (SoC) technology.

Built upon a proven SDR platform with thousands of hours of operation in the field, the 6120-BM delivers market-leading performance and future upgradability through software updates that support evolving standards and ensure sustainability.

IP/ETHERNET/USB CONNECTIVITY

The 6120-BM's IP based design facilitates remote access and the 2320 Handset USB port provides a convenient point for connecting the Codan TPS-M transceiver programming application. Alternatively, a conventional USB memory stick can be connected for radio profiling, COMSEC key fill and firmware upgrades in the field.

INTUITIVE INTERFACE AND LOCALISED LANGUAGES

The Sentry 2320 Handset user interface has been designed with ruggedness, and ease of configuration and operation as primary objectives. The intuitive icon-based menu system and easy to read colour screen layout, coupled with an ability to switch between multiple native languages (including data entry modes) ensures that you can focus more on your mission and less on complex radio operations and training.

Operator access to radio configuration parameters can be easily locked down or made available, depending on your unique circumstances.

DUAL HANDSET CONTROL

The 6120-BM features the 2320 Smart Handset as the primary user interface. However, support for H-250 audio accessories is also provided via a dedicated interface. This presents the advantage of being able to conveniently locate the 2320 Handset for radio monitor and control while using a dedicated headset/handset or intercom system for voice communications.

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ADVANCED ALE
The 6120-BM includes the latest generation STANAG 4538 3G ALE technology providing the tactical user with fast linking and data capabilities. Mission critical messages are transferred securely by employing link protection and data encryption. Synchronised scanning provides more efficient use of existing bandwidth.

The 6120-BM is fully interoperable with military transceivers using JITC certified MIL-STD-188-141B ALE. You can initiate NET, GROUP, and WILDCARD selective calls, along with a number of advanced calls including, digital voice message, phone, text message, GPS and status calls. Calls can be made ad-hoc or via fully pre-programmed entries in the contacts list.

The 6120-BM certified waveforms allow for integration and interoperability with agencies using disparate radio networks and systems.

LQA RAPID
Codan's proprietary enhancement to ALE waveforms provides improved performance through monitoring channel conditions over a 24 hour period. This ensures that users can rapidly establish communications on the best channel for the time of day, without the need to initiate updates to the LQA information prior to calling, thus increasing network availability and performance.

GPS SUPPORT
The 6120-BM has embedded GPS receivers in the RF Unit and 2320 Handset with GPS, GLONASS and BEIDOU navigation systems supported. The RF Unit has a connection point for an external remote GPS antenna if needed.

Position data display format is user selectable and includes UTM, UPS and MGRS formats. Your distance and bearing from a remote HF station or waypoint can be displayed graphically via the handset user interface.

HIGH POWER FOR BASE AND MOBILE CONFIGURATIONS
The 6120-BM is the military industry's first base and mobile radio system that delivers 150 W of RF power without the added cost, weight and complexity of an external amplifier. It has an in-built power amplifier that provides full-duty cycle performance across the complete HF band for all supported modes. Designed for maximum efficiency and a wide range of DC input voltages, the 6120-BM is the HF radio of choice for vehicle and other battery based systems.

The rugged RF unit is made out of a high-grade metal cast chassis and meets or exceeds MIL-STD-810G so you can be confident it will get the job done no matter where you operate.

DIGITAL VOICE
Codan's second generation digital voice technology utilises TWELP (Tri-Wave Excited Linear Prediction) to provide a major improvement in High Frequency (HF) voice communications. A fully digital mode, coupled with highly optimised vocoder technology, provides clarity and connectivity when traditional methods fail. Optional AES-256 encryption can be added to deliver a fully secure, high quality voice capability.

DATA WAVEFORMS
The 6120-BM is hardware ready for data mode and is delivered with the Codan 2400 bit/s robust data modem as standard. This data waveform is supported with the Codan Chat application providing peer-to-peer text chat, email, and file transfer with a simple GUI that supports multiple languages.

The optional STANAG 3G ALE provides fast linking and data capability, when combined with Sprint Chat/Net application, that is capable of exceeding the performance experienced with traditional MIL-STD-188-110B 2G data. Codan 3G ALE supports all call types including digital voice message calls and SMS text (via Sprint Net stations).

The 6120-BM may be software upgraded to full MIL-STD/STANAG data capability with data rates up to 19k2 bps (with ISB) using the Codan RC50-C HF email application.

COMSEC
A range of COMSEC options are available with the 6120-BM, from CES-128 grade voice encryption through to full AES-256 encryption of digital voice, STANAG/MIL-STD data and STANAG 4538/3G ALE. The AES-256 encryption supports 256 by 256 bit keys with additional layers of protection possible by incorporating unique radio identifiers.

All voice encryption options can be activated by a single hotkey, and are fully integrated with core radio functions like Selcall and ALE calling to ensure simplicity of operation. The Secure Interop feature enables configuration of the 6120-BM to automatically enable encryption on specified networks /channels

Codan Key Management is used to generate the key files, and Codan Key Fill software or a USB memory stick may be used to load the radio.

FREQUENCY HOPPING
The 6120-BM can be enabled with frequency hopping capability providing tactical networks with additional capability to prevent malicious jamming and signal interception. The user can select between up to 31 user programmable hop plans, each comprising a hop name, rate, bandwidth and encryption key.

Additional information security can be achieved with the use of one time session PIN's, and also combining frequency hopping with CES-128 voice encryption.

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CODAN COMMUNICATIONS

WARRANTY, SERVICE, AND SUPPORT

Reliability and performance, backed up by our standard three year warranty, with the ability to independently sustain your communications, complimented by field upgradable unique option codes to truly utilise SDR technology should your mission change features can easily be enabled.

SOFTWARE APPLICATIONS

- TPS-M Radio Programming Software
- RC50-C HF Email (for STANAG/MIL modem)
- Codan Chat HF (for robust ARQ modem)
- Key Management Software
- Key Fill Software
- RTS tracking software
- SprintChat and SprintNet
- Virtual Control Point (VCP)
- Software Developers Kit (SDK)

ACCESSORIES

- Tactical base antenna and mast solutions
- Mobile / base antenna tuners
- Mobile Shock Mounts
- General mounting accessories
- H-250 audio accessories, remote speaker
- 3320 AC power supply
- Morse key
- Crosspatch
- Telephone interconnect
- 500 W / 1kW high power amplifiers
- External GPS antennas

TRANSCEIVER BASED OPTIONS

- Standard digital bundle
- Advanced digital bundle
- 3G ALE (STANAG 4538)
- CES-128 voice encryption
- Frequency hopping
- Languages: (Dari, Pashto, Arabic, French, Spanish, Russian, Chinese)
- Free tune transmit
- Independent Sideband (ISB)

SPECIFICATIONS

GENERAL

Frequency range	**Transmit:** 1.6 to 30 MHz **Receive:** 250 kHz to 30 MHz
Power output	150 W RF±1 dB (two-tone or voice), user-programmable in 1 W steps (low/medium/high)
Channels	Up to 1000 entries
Contacts	Up to 500 entries
HF networks	Up to 20 networks (simultaneous scanning)
Input voltage range	13.8 V DC nominal, negative earth **Functional range:** 10.8 V to 35.2 V DC
Supply current	**Transmit:** output power 150 W, two-tone 11 A to 20 A CW or average speech 8 A for battery life calculations **Receive:** no signal < 0.6 A typical, 0.9 A maximum
Frequency stability	±0.3 ppm from – 20°C to +60°C
GPS	RFU - external antenna, 2320 Handset - embedded receiver/antenna (GPS, GLONASS and Beidou)
Programming	TPS-M- Radio Programming Software, USB memory device
Language support	Multiple language UI and documentation
Compliance	CE, FCC Part 90, AS/NZS 4770, AS/NZS 4355

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SPECIFICATIONS

RF

Modes	Single Sideband USB, LSB (J3E), AM (H3E), CW (J2A), AFSK (J2B), FSK (F1B), ISB (B7D or B2B), Software Defined
Duty cycle	100% voice and data
Receiver specifications	**Sensitivity:** SSB: -125 dBm (0.12 uV) for 10dB SINAD **Selectivity:** >65 dB at -1 kHz at -1 kHz +4 kHz SCF (USB)
Transmitter specifications	**Spurious and harmonic suppression:** >65 dB below PEP **Intermodulation products:** >31 dB below PEP

WAVEFORMS

Automatic Link Establishment (ALE)	FED-STD-1045; JITC Certified MIL-STD-188-141B; STANAG 4538 3G ALE
Data	MIL-STD-188-110A/B (STANAG 4539)data capability with data rates up to 19k2 bps
Selcall	CCIR 493-4 proprietary and open standard
Digital Voice	TWELP 2400 bit/s, 1200 bit/s, 600 bit/s, 400 bit/s, 380 bit/s MELPe (STANAG 4591) 2400 bit/s, 1200 bit/s
Encryption	AES-256 digital voice and data (256 keys, direct entry and programmable via Codan KMS/KFS & memory stick) CES-128 voice (97 x 16-digit keys, direct entry and programmable via Codan KMS/KFS & memory stick, 4-digit session PIN)
ECCM	6/12/25 hops per second

ELECTRICAL AND MECHANICAL

Size	**RFU:** 220 mm x 66.5 mm x 190 mm **Handset:** 67 mm x 210 mm x 72.5 mm
Weight	**RFU:** 2.82 kg; Handset: 280 g (no cable)
Interfaces	ATU Control, General Purpose Interface, Handset Interface, DC supply, USB (via Handset), Fan Control, H-250 Audio (powered), GPS antenna, Antenna, Ethernet via adaptor (TCP/IP, supports remote control)
Temperature range	Operational at –30 to +60°C; 95% RH maximum, non-condensing
Environmental standards	MIL-STD-810G (Immersion, Shock, Drop, Vibration, Humidity, Blowing Dust, Salt Fog, Fungus, Altitude)
MTBF	141,000 hours
MTTR	<10 minutes

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