



Distinguishing Features

- Provides full duplex voice and data communications between a control site and a remote site using fully digital techniques
 - Provides an interface between Voice Switching system and remotely located radio transmitters and receivers
 - Provides Speech plus Data Modem for operation over unconditioned 4-wire telephone lines and satellite links
 - Provides a high speed user serial data interface @ 1200 BPS or 300 BPS for trans-receiver tuning and other controls
 - Provides status monitoring and health check of assets located at remote sites
 - Provides excellent unmatched voice quality because no part of the bandwidth is used by the digital modem (as done in older designs using FSK)
 - Provides two separate and independently operating voice channels in one RCE unit, thus
 - Provides auto-switching to backup line in case of line failures
 - Low Power requirements allow it to run with convection cooling
- Uses Texas Instruments TMS320C5410A DSP running @ 160 MIPS, executing most of the instructions in single clock cycle.
 - The DSP employs a high degree of parallelism and enhanced Harvard architecture for increased performance
 - Superior all digital design approach employing speech encoding @ 8KBit/s.
 - Digitization scheme embeds control data with voice in 19.2 Kbit/s data stream, providing a high degree of data reliability
 - End-to-end voice bandwidth of 300-3300 Hz
 - All digital scheme does not need band-pass filters to isolate voice and data, as done in older analog designs using FSK modem schemes.
 - Push-to-talk throughput time (RCE-to-RCE over unconditioned telephone lines) is typically 50msec without sacrificing any audio band-width
 - Provides superior operation by eliminating PTT and transmit voice skews.
 - All Input/Output (I/O) signal connections are made through standard 25-pair telephone type connectors, which are used widely in communication systems
 - 16 BIT CRC insures data integrity.
 - Up to 6 controls (PTT M, PTT S, RX M/S, TX M/S, Rcvr Mute, Over-ride) for each radio frequency, with confirmation signals
 - Can introduce up to 500ms Tx audio delay in 1msec steps to compensate for satellite channels.

RCE 2027 Specifications

Other Features	
<ul style="list-style-type: none"> ▪ 12 Digital control inputs and 12 control outputs for radio communications and status monitoring of equipment at remote site. ▪ 1.75-inch high, 1U chassis for Single card, 19-inch rack mounting arrangement w/Power Supply. ▪ 7.00-inch high, 4U chassis for Eight cards, 19-inch rack mounting arrangement w/Power Supply. ▪ Provides data scrambler for secure and error free operation over noisy telephone lines. ▪ On-card high speed transient clamping for protection of circuitry connecting to trunk lines. ▪ Built-in 404 Hz test tone generation and Loop-back capability for fast fault isolation and recovery. ▪ Front Panel LED's for easy and quick equipment status fault isolation. ▪ Front Panel Dip-Switch settings for fast programming, line level settings, test and debugging. ▪ To prevent inter-system noise/hum all digital interfaces are implemented using opto-isolator and relay contacts. 	
Specifications	
Audio:	Voice Frequency Response (All Audio Interfaces): +/- 1.5 dB 300-3300 Hz with-respect-to 1 KHz Audio Line Levels: From -30 to +7 dBm, AGC: +/- 8 dB DSP implementation Audio Coupling: 1:1 Transformer for ground loop noise reduction, Impedance: 600 Ohms +/- 5% Signal Routing: Main or Standby Radio Transmitters or Receivers Secondary Protection: High Speed Transient Line Protection Testability: Near-end and Far-end Audio Loop-back Digitization: 16-bit Linear for 89 dB S/N Ratio and signal range
Data:	Overall Data Rate:19.2 kBits/second (16.8 and 14.4 KBits/second in backup mode) User Data Rate:1200 Bits Per Second (w/single voice channel), 300 BPS (w/2-voice channels) – Continuous (without effecting radio communications) Voice-to-Data Isolation: 65 dB minimum Data Integrity: Parity Check, Checksum Validation, Positive Data Acknowledge, and 16 bit CRC
Radio Controls: (12 Outputs)	PTT, Tx Main/Standby, Rx Main/Standby PTT Confirm, TX Main Confirm, Rx Main/Standby Confirm, Rx Mute, Squelch Break, Lockout Confirm Contact Closure, 500ma maximum current @ 48 VDC, or Ground when Active, 500ma maximum current @ 48 VDC, or 12/24 VDC when Active, 500ma maximum current @ 48 VDC contact protection RC network for spark suppression and contact protection MOV transient suppressor for enhanced contact life
Confirm Signals: (12 Inputs)	Contact Closure, 5ma maximum current @ 12 VDC, Ground when Active, 5ma maximum current @ 12 VDC Series current limiting for enhancing contact life RC network for contact de-bounce and noise filter Diode limiting for input transient protection
Installation	
Opt. 1: 1.75 inch high (1Unit) rack space or Opt. 2: Up to 8 cards in a 10.5 inch high (6 Unit) space in a 19 or 23 inch wide racks. The I/O design uses standard telephone type Amp-Champ connectors for I/Os No daughter or mezzanine boards are required, so there are no add on hidden costs.	
Other DSP Products	
Digital Voice & Data Recorder – DSP, Inc.'s Voice/Data Recorder Model 2025 is specially designed for demanding applications. It uses state of the art carrier grade server with 16-channel Line Interface cards to provide the necessary functionality. Up to six such Line Interface cards can be directly plugged into the server providing 96-channel recorder system. For larger systems (up to 1200 channels) the Line Interface cards can be plugged into a separate chassis. DSP, Inc. has received a 5-year contract for supplying these recorder for all US Navy ships and Coast Guard cutters.	
Tone Notching and Automatic Gain Control (AGC) – Air Traffic Controllers have identified two significant problems in many current voice switches: high frequency tones accidentally induced into their headsets, and improper balancing of volume of incoming calls. DSP has developed an Audio Signal Processor (ASP) that can remove two extraneous tones simultaneously in less than 70 msec without degrading the quality of the incoming signal. The same ASP also adjusts all incoming calls to a volume that is selected by the air traffic controller.	
Best Signal Selection (BSS) – In some radio communication systems, there are more than one receiver for a given frequency. This occurs for reasons such as too great a distance or terrain interference with only one receiver. Under some circumstances, multiple receivers will have a signal that exceeds an audible threshold, but the strength and quality may be significantly different. The Best Signal Selection ASP monitors all receivers and within 70 msec routes the call using the highest quality signal.	
Digital Signal Products, Inc.	
Digital Signal Products, Inc. provides both high quality products for communication systems as well as services for developing solutions for specific customer problems. DSP Inc. can help establish requirements, provide both a high level design and a detailed design that satisfy a set of requirements and, if desired, actually build and test products that conform to the design.	