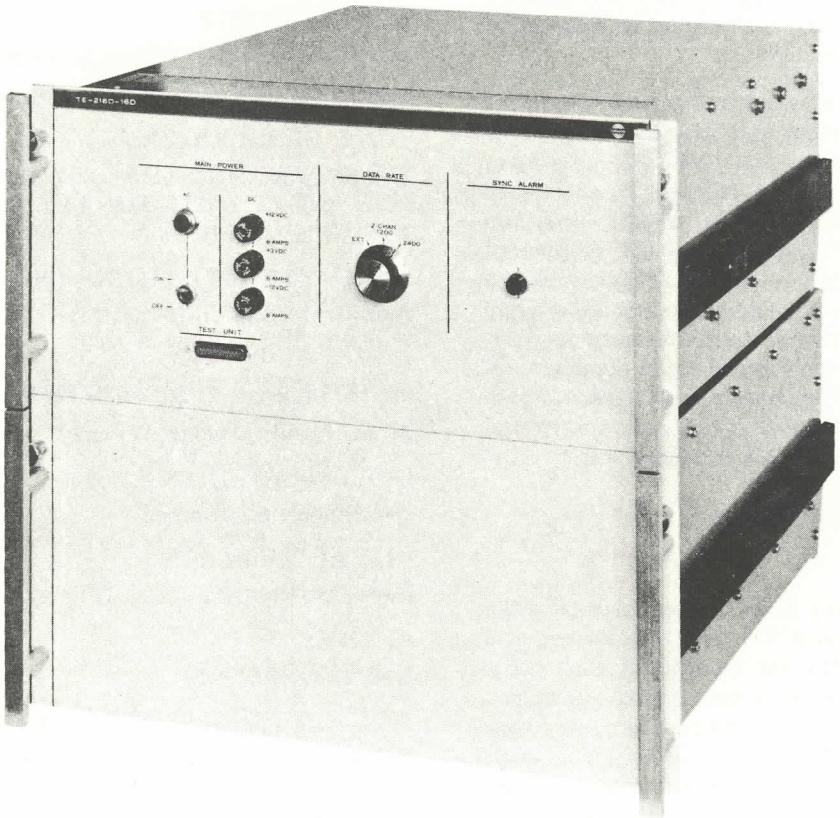
COLLINS

Collins Radio Company | Dallas, Texas

technical data sheet

TE-216D-16D 2400 bps HF Data Modem

The Collins TE-216D-16D is a 2400 BPS, full-duplex, diversity, 16-tone data modem, designed for high frequency radio data transmission applications where severe HF disturbances are expected.



The TE216D-16D accepts serial binary digital data from computers, business machines, voice digitizers, telemetry equipment, and other peripheral devices and is compatible with various error protection coding devices. Within the data modem, the binary data is converted to a composite signal consisting of 16 phase-modulated tones which are applied to a 3-KHz bandwidth transmission facility and relayed to a remote data modem. The remote data modem demodulates the individual phase-modulated tones from the receive composite signal and converts these back to binary data. The binary data is then supplied as an output of the receive modem in the order and at the rate that it was given to the transmitting modem. The operation of the data modem is automatic after initial start-up.

The TE-216D-16D Data Modem operates at the following data channel input/output combinations: One channel 2400 bps serial input/output, or Two channel 1200 bps serial input/output.

The TE-216D-16D accepts timing information from an integral frequency standard which has a stability of 1 part in 10^8 per day. Other equipment in the same installation may be provided with 100 KHz from the modem integral frequency standard.

Synchronous operation between transmitting and receiving data modems is maintained by a self-correcting time base in the receiving modem that automatically synchronizes with the timing of the transmitting modem. The TE-216D-16D contains a Sync Squelch to disable the sync correction circuitry in the event of tone interruption to the receiving modem.

Solid state design with integrated circuits employed in all digital circuits contributes to the high degree of reliability. Thorough production and test procedures assure this inherent reliability is an integral part of each element. The modem circuitry is on circuit cards and in modules, each easily plugged into the equipment chassis. This design approach also makes possible an efficient failure diagnosis and a quick system restoration by simple, card module replacement. The card modules are packaged in a drawer designed to fit standard 19-inch racks or cabinets. The drawer is on slides to provide easy access for tests and maintenance purposes. An external test unit is available as an accessory.

ACCESSORY EQUIPMENT

TE-890 Test Unit

The portable TE-890 Test Unit is used to verify the operational status of a local TE-216 Data Modem and also a data link (including the modems at each end). The TE-890 also tests each data tone channel as an aid in isolating a malfunction. This compact accessory contains a test pattern signal generator, a test signal comparator, error indicator, and an error count output. When tests are performed, the TE-890 cable is plugged into a connector (J7 on the front panel or J5 on the rear panel).

TE-216 Mounting Bracket Kit

This kit contains all parts required for mounting a TE-216 Data Modem in a standard 19-inch rack that does not otherwise provide rear support.

SPECIFICATIONS

DATA INPUT PER MIL-STD-188B

Serial, synchronous, single channel binary @ 2400 BPS, or two channel binary @ 1200 BPS. Binary 0 (space) −0.5 VDC or greater; Binary 1 (mark) +0.5 VDC or greater. Data rise and fall times: 40 microseconds.

DATA OUTPUT PER MIL-STD-188B

Serial, synchronous, single channel binary @ 2400 BPS, or two channel binary @ 1200 BPS. Binary 0 (space) −6 (±.6) VDC, Binary 1 (mark) +6 (±.6) VDC.

TIMING INPUT/OUTPUT

Per MIL-STD-188B

AUDIO INPUT

Level: −35 DBM to +5 DBM.

Impedance: 600 ohms in frequency range 300 to 3400 Hz.

AUDIO OUTPUT

Level: Adjustable −20 DBM to +4 DBM.

Impedance: 600 ohms in frequency range 300 to 3400 Hz.

TONE FREQUENCIES

715, 825, 935, 1045, 1155, 1265, 1375, 1485, 1705, 1815, 1925, 2035, 2145, 2255, 2365, 2475 Hz.
AFC Tone: 495 Hz.

HIGH STABILITY TIMING OSCILLATOR OUTPUT

Stability: 1 part in 10^8 per day

Frequency: 100 KHz

Source Impedance: 200 ohms nominal.

Signal Level: Bipolar ±6v ±1v.

OPERATING DUTY CYCLE

Continuous, unattended.

VISUAL DISPLAYS

Power on Indicator, Loss of Sync Alarm Indicator.

ALARMS

Loss of Sync Alarm.

AFC FREQUENCY TRANSLATION

Fixed +50 Hz AFC Shift; Fixed −50 Hz AFC Shift. Shift cycle is linear from −50 Hz to +50 Hz to −50 Hz at a 2.0 Hz/second rate.

POWER REQUIREMENTS

105-125 VAC or 210-250 VAC, 47-63 CPS, single phase, 250 watts.

LINE FACILITY REQUIREMENT

Telephone facilities having the characteristics specified by FCC Tariff 260, Type 3005 (Schedule 4, Type C1).

SIZE AND WEIGHT

Designed as two-drawer mount to fit standard 19-inch racks or cabinets, providing rear support. Each drawer Height: 8¾", Depth 22½", Width 17½". Weight is 126 pounds.

ENVIRONMENTAL CONDITIONS

Temperature: Operating +0°C to +50°C; non-operating −55°C to 75°C.

Altitude: Operating, sea level to 10,000 feet; non-operating, sea level to 50,000 feet.

Humidity: Operating, 0 to 80 per cent relative without condensation; non-operating, 0 to 100 per cent.

HF RADIO TRANSMITTER REQUIREMENT

Audio Response: 2.5 DB 450 to 3050 Hz; 30 DB 4000 Hz above carrier; 40 DB 400 Hz below carrier.

Differential Delay: 0.5 msec, 800 to 3050 Hz; 0.9 msec 500 to 800 Hz.

Frequency Stability: 1 part in 10^8 per day.

Frequency Deviation: Not more than 0.5 Hz, audio output.

Phase Stability: Not more than 4° per bit period.

SSB Distortion: At full PEP, all distortion products 35 DB below tone of a two-tone test signal.

Spurious Signals: At least 50 DB below rated PEP.

Noise: 40 DB below either tone of a tone-tone test signal.

Audio Input Impedance: 600 ohms.

ACC: Adjustable to more than 90% of PEP.

HF RADIO RECEIVER REQUIREMENT

Audio Response: 2.5 DB 450 to 3050 Hz; 30 DB 4000 Hz above carrier; 40 DB 400 Hz below carrier.

Differential Delay: 0.5 msec 800 to 3050 Hz; 0.9 msec 500 to 800 Hz.

Frequency Stability: 1 part in 10^8 per day.

Frequency Deviation: Not more than 0.5 Hz, audio output.

Phase Stability: Not more than 4° per bit period.

IM Distortion: 3rd order distortion products are 40 DB below either tone of a two-tone test signal.

Audio Distortion: Not more than 1% total.

Spurious Signals: More than 80 DB down inclusive images.

Audio Output: 600 ohms, 8 DB maximum variation due to AGC Control.

AGC: Attack and release time constant of 200 msec.

Gain Stability: Not more than 2 DB difference between the audio output levels of the dual diversity receiver.