

TE-204A-2

TECHNICAL DESCRIPTION

COLLINS Synchronous FSK Data Modem



Collins TE-204A-2 Data Modem, through in-band frequency diversity and time diversity, provides highly reliable data communication. Used primarily in air-ground-air communication networks, the modem transmits and receives synchronous, serial, binary data over a standard 3 kc voice channel derived on SSB, FM, AM or wireline.

Transmitting at 75 bits-per-second, equivalent to 100 words-per-minute, the TE-204A-2 is particularly well suited for teletypewriter, remote control, telephone signaling and many other applications.

The modem provides continuous, unattended, half-duplex service. No adjustments during operation are necessary. Any bit-synchronous coding scheme can be used, for, unlike ordinary FSK modems, the TE-204A-2 synchronizes on the transmitted signal, not on the content of the message. Either the built-in or an externally supplied clock pulse can be used for synchronization.

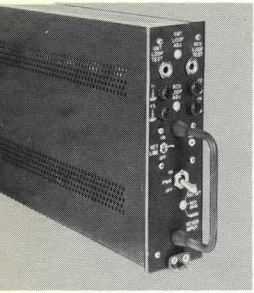
Collins patented Predicted Wave Signaling and kinematic filtering improve the signal-to-noise ratio and reliability. Solid-state micro-modules and plug-in, etched-wire circuit cards assure low power consumption, long life and simple maintenance. Test points are located on the front panel of the $\frac{1}{4}$ ATR case for easy access.

The TE-204A-2 uses frequency shift keying to convert binary data into four audio tones spaced 440 cycles apart in a frequency range of 935 to 2255 cps.

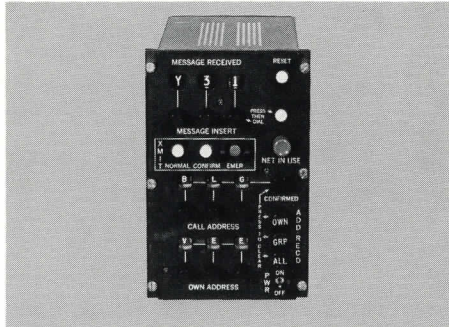
In in-band frequency diversity and time diversity operation, the modem transmits each binary bit on two tones, the first half of the bit at the low end of the band, the second half at the high end of the band. In the receiver, the diversity combiner linearly combines the two halves of each bit, either of which is sufficient to distinguish the binary information.

The synchronization detector selects one of the low frequencies and one of the high frequencies for synchronization of receiver time base to received signal. The modem provides 150 or 600 ohms outputs, enabling it to selectively operate with diverse equipment.

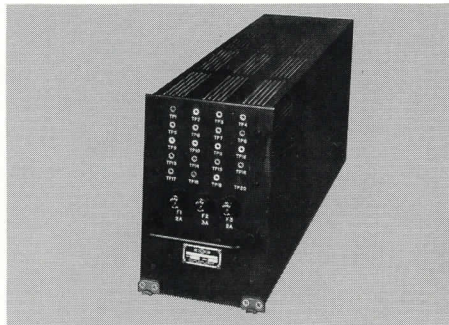
ASSOCIATED EQUIPMENT



COLLINS 399R-1 TELETYPE ADAPTER
In the transmit function, the 399R-1 accepts single channel, serial, non-synchronous, Baudot coded data from a keyboard, tape reader or storage unit. It also synchronizes accepted data for subsequent transmission.
In the receive function, received binary data from the modem is used to key a loop circuit to operate a teleprinter, tape perforator or storage unit.



387E CONTROL AND DISPLAY BOX
Handles over 400 canned messages; controls the information content and displays received and canned messages.



COLLINS 683D ENCODER/DECODER
Transmit Mode: Accepts decimal coded information from the control and display box and converts the information into proper serial message structure.
Receive Mode: Recognizes selective calls and presents the decoded message in decimal coded form to the control and display box.

SPECIFICATIONS

Data Input: Single channel, 75 bps, synchronous serial binary, 0 volts for binary "1" (Mark), and -6 volts for binary "0" (Space). Input impedance is 5000 ohms.

Data Output: Single channel, 75 bps, synchronous serial binary, 0 volts for binary "1" (Mark), and -6 volts for binary "0" (Space). Output impedance is 1800 ohms.

Audio Output: Time division multiplex FSK signal variable from 0.5 vrms to 2.0 vrms at 150 ohms, balanced or 1.0 vrms to 4.0 vrms at 600 ohms, balanced.

Audio Input: Time division multiplex FSK signal variable from 0.25 vrms to 4.0 vrms at 150 ohms, balanced or 0.5 vrms to 8.0 vrms at 600 ohms, balanced.

Audio Frequencies:

Mark 1	935 cps
Space 1	1375 cps
Mark 2	1815 cps
Space 2	2255 cps

External Timing: 75 cps square wave synchronous with data transitions at 0 v dc to -6 v dc level. Input impedance is 5000 ohms, output impedance is 1800 ohms.

Control Input: Transmit/receive line, 0 v dc for receive, -6 v dc for transmit.

Frequency Tolerance: ± 60 cps.

Power Requirements: 115 v ac, single phase, 400 cps, 25 watts.

Environmental Conditions: Ambient temperature: -20° C to $+55^{\circ}$ C. Humidity: 80% relative over temperature range without condensation. Altitude: 0 to 50,000 ft., Vibration: Mil E-5400D, class 1.

Dimension: Standard $\frac{1}{4}$ ATR case, $2\frac{1}{4}$ " wide, $7\frac{7}{8}$ " high, $19\frac{9}{16}$ " deep.
Weight: 14 lbs.

COMMUNICATION FACILITY REQUIREMENTS

Frequency Response: (Referenced to 1000 cps) 600 cps to 2600 cps, ± 1.5 db; 300 cps to 2900 cps, ± 3 db; 1000 cps below carrier to 4200 cps, 60 db.

Differential Delay: 600 cps to 2600 cps, 1.5 msec; 300 cps to 2900 cps, 3.0 msec.

Audio Input: 0.5 vrms to 2.0 vrms at 150 ohms or 1.0 vrms to 4.0 vrms at 600 ohms for full rated output.

Audio Output: 0.25 vrms to 4.0 vrms at 150 ohms or 0.5 vrms to 8.0 vrms at 600 ohms.

Frequency Stability: ± 1 part per million per day; ± 30 cps audio output.

Audio Distortion: 5% maximum.

RF Distortion: All intermodulation products 35 db down from either of two equal test tones at full power output.

Noise Figure (Receiver): 10 db or better.

Noise Output (Transmitter): 40 db down or better.

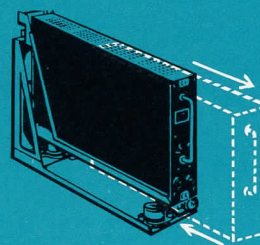
Automatic Gain Control: Medium attack and release time constants, less than 500 msec, greater than 50 msec.

Transmitter Gain Control: Manual with limit set 3 db above full rated output.

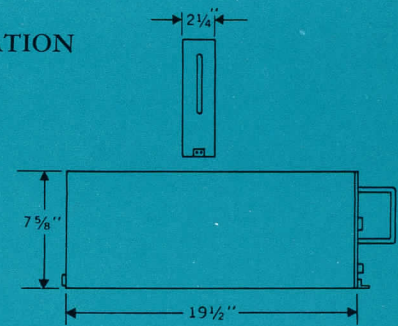
SAMPLE FUNCTIONAL DIAGRAM



TYPICAL INSTALLATION



MT-1797(XA)/U MOUNT



STANDARD MILITARY $\frac{1}{4}$ ATR CASE

For further information contact
Collins Radio Company
Communication & Data Systems Division
Dallas, Texas

