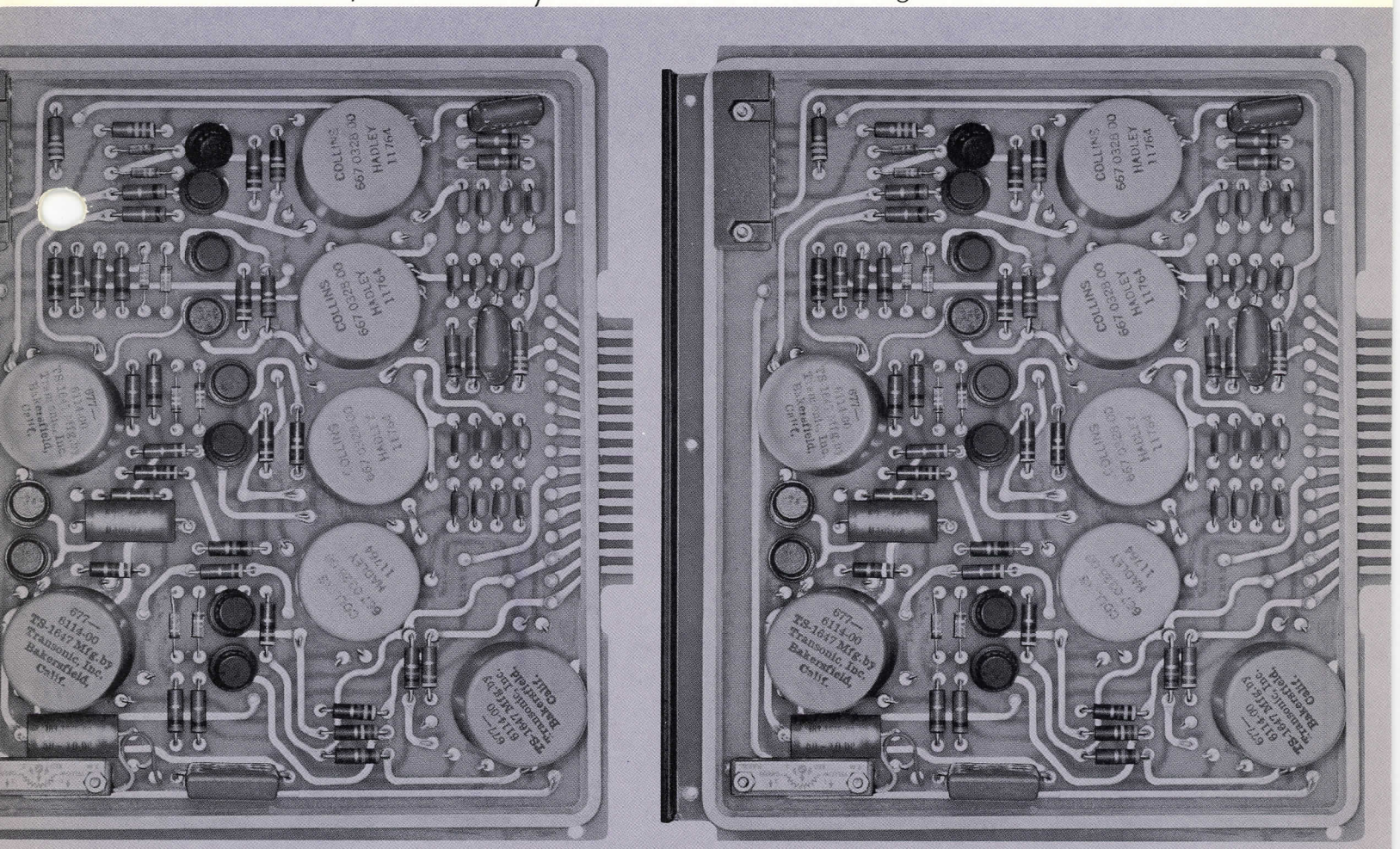
TE-210D-2

TECHNICAL DESCRIPTION

COLLINS Kineplex® Serial / Parallel 2400 BPS Digital Data Modem



COMMUNICATION AND DATA SYSTEMS DIVISION

COLLINS

GENERAL INFORMATION

Collins TE-210D-2 Digital Data Communication Modem is a solid-state, full-duplex transmitter and receiver capable of a 2400 bits-per-second data rate over a voice bandwidth channel — such as wire line, cable, carrier or microwave.

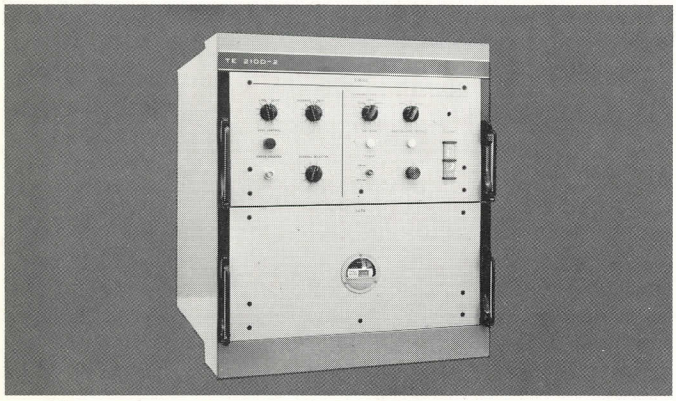
The TE-210D-2 communicates digital data between computers, business machines, telemetry equipment, teletype and other digital data sources. The modem accepts synchronous serial or parallel digital data from external sources, separates the accepted data into two, four or eight channels and superimposes this data on four audio tones, which are separated by 440 cycles in a frequency range of 935 to 2255 cps.

At the receive terminal the digital data is extracted from the audio tones, using KINEPLEX® techniques, regenerated and delivered to external equipment in both serial and parallel form.

Phase shift modulation and Collins patented predicted wave detection techniques yield a signal-to-noise ratio four times (6 db) better than frequency modulated systems and make optimum use of narrow bandwidths. Reliability and ease of maintenance are assured by solid-state components and drawer-mounted, plug-in, modular circuit card construction. This packaging technique permits custom, rack or cabinet, arrangement.

Diversity operation is available for additional communication reliability over radio circuits that are subject to selective fading. An optional diversity adapter provides frequency or space diversity. In diversity operation, the diversity unit regenerates the data through continuous, linear combination of the received signals.

The Collins TE-210D-2 is designed for continuous, unattended, automatic, full-duplex operation in any of three, dial selected, data rate modes ... 600, 1200 or 2400 bits-per-second. These high speed, flexible data rates plus designed-in reliability make the Collins TE-210D-2 Data Communication Modem the solution to rigorous data transmission applications wherever sustained, accurate performance is required.



Collins TE-210D-2 Digital Data Communication Modem

FEATURES

Fully Transistorized — Low power consumption and maximum reliability.

Efficient Bandwidth Utilization — Provides high speed data communication over common carrier, 3 kc voice channel facilities.

Versatile — Accepts serial or parallel digital data; delivers serial and parallel digital data.

Phase Shift Keying — Maximum performance in the prescence of delay distortion and transmission facility noise.

Compact Construction — Complete unit rack or cabinet mounted in two easy-access drawers using plug-in etched wire circuit cards.

Simplified Maintenance — Integral test facility permits go/no-go, back-to-back or systems test. Test, measuring and connecting jacks are conveniently mounted on plug-in circuit cards.

Diversity Operation (Optional) — Additional communication reliability over radio circuits that are subject to selective fading.

Automatic Level Control — Maintains relative input line level value by automatically correcting for long term line variations.

Phase Delay Compensator — Compensates for the differential delay inherent in transmission lines.

Self Contained Timing Source: A 100 kc crystal oscillator, with a frequency stability of 1 part in 10^7 per day, is provided and may be used to synchronize external equipment.

OPERATING PRINCIPLE

The Collins TE-210D-2 Data Communication Modem operates automatically, after initial start-up, in any one of three, dial selected, data rate modes... 600, 1200 or 2400 bits-per-second with data in either serial or parallel form.

TRANSMIT FUNCTION

The Transmit Function generates the required number of tones, phase shift modulates them according to the digital data, periodically amplitude modulates the composite signal for synchronization and heterodynes the signal to audio frequencies for transmission.

In the transmit mode, two, four or eight parallel, 300 bits-per-second channels are phase shift modulated onto audio tones (two channels per tone). Data rate timing (serial operation) and 600 cps timing (parallel operation) is supplied to external equipment and accepted from external equipment in synchronization with the incoming serial or parallel data.

RECEIVE FUNCTION

The Receive Function accepts the four composite audio tones, heterodynes them with an oscillator and passes the signal through a bandpass filter and amplifier. The composite signal is then applied to the input of keyed filters. Two keyed filters are used for each tone. While one is being driven by the signal, the other stores the previously received phase. At the end of the drive period, the phase difference between the signals is converted into binary data in the detector circuitry.

In the receive mode, the received, phase shifted, audio tones are demodulated; the digital data detected and reassembled for delivery in serial and parallel form. The receiver supplies data rate timing (serial operation), 300 and 600 cps timing (parallel operation) to external equipment in synchronization with the output data.

INTEGRAL TEST FACILITY

The Integral Test Facility compares received data pattern with transmitted test pattern and provides visual error indication. Regenerated in the receiver in synchronism with receive timing, the test pattern permits back-to-back testing or systems testing over a voice facility. In the test mode, received serial data or any one of the eight parallel data channels can be monitored; error indicating pulses are available for an external counter.

ALARMS

Transition alarms provide relay contact closure for loss of input serial data rate timing, loss of serial input data, loss of serial output data, improper transmit and receive levels.

CONTROLS AND INDICATORS (Front Panel Mounted)

Operation: Transmit Data Rate Switch, Receive Data Rate Switch, Power On-Off, Receive Level Adjust, Receive Level Indicator, D C Voltage Indicator, Oscillator Oven Indicator.

Integral Test Facility: Operate Test Switch, Channel Selector Switch, Line-Loop Switch, Pattern Sync Button and Error Indicator, Error Output Connector.

ACCESSORIES

TE-210D-2 Diversity Receiver: Adapts the TE-210D-2 for diversity operation, filters and detects the diversity transmission paths, provides data for linear combination of the received signals.

TE-210D-2/206 Modification Kit: Simple field modification kit adapts TE-210D-2 for communication with a Collins TE-206 Data Modem.

ASSOCIATED EQUIPMENT

TE-210D-3 Data Transmitter is a high speed digital data transmitter capable of a 2400 bits-per-second data rate over voice bandwidth channels. Designed for simplex operation, the unit transmits serial or parallel digital data at any one of three, dial selected, data rates... 600, 1200 or 2400 bits-per-second from computers, business machines, telemetry equipment and other digital data sources to a Collins TE-210D-2 Modem or a Collins TE-210D-4 Data Receiver. The operating parameters are identical to the transmit functions of the TE-210D-2 Data Communication Modem.

TE-210D-4 Data Receiver is a high speed digital data receiver capable of detecting the signal transmitted by the Collins TE-210D-2 Data Communication Modem or the Collins TE-210D-3 Data Transmitter. Designed for simplex operation, the TE-210D-4 can receive, detect and regenerate 600, 1200 or 2400 bits-per-second data received from nominal 3 kc bandwidth channels. The TE-210D-4 delivers the data to external equipment in serial and parallel form. The operating parameters are identical to the receive functions of the Collins TE-210D-2 Data Communication Modem.

LINE FACILITY REQUIREMENTS

The TE-210D-2 performs satisfactorily over telephone facilities having the characteristics specified under FCC Tariff 237, Schedule 4A, maintained in accordance with standard telephone systems practices.

TE-210D-2 SPECIFICATIONS

Data Input (Digital)

Serial: Single channel, synchronous, binary at 600, 1200 or 2400 bits-per-second, −1 to + 0.25 volt for binary zero (0) and +3.6 to +6.0 volts for binary one (1), 5000 ohms, nominal, input impedance.

Parallel: Two, four or eight, parallel, 300 bits-per-second, synchronous binary channels, −4.0 to −6.5 volts for binary zero (0) and +1 to −1 for binary one (1), 10,000 ohms, nominal, input impedance.

Data Output (Digital)

Serial: Single channel, synchronous, serial binary at 600, 1200 or 2400 bits-per-second, −1 to +0.25 volt for binary zero (0) and +3.6 to +6.0 volts for binary one (1), 600 ohms, maximum, output impedance.

Parallel: Two, four or eight, parallel, 300 bits-per-second, synchronous, binary channels, −5.5 to −6.5 volts for binary zero (0) and +0.2 to −0.2 volt for binary one (1), 600 ohms, maximum, output impedance.

Audio Input/Output

Frequencies:

600 bits-per-second rate — 1375 cps.
1200 bits-per-second rate — 1375 and 1815 cps.
2400 bits-per-second rate — 935, 1375, 1815 and 2255 cps.

Impedance: 600 ohms ±20% from 900 to 2300 cps.

Level: Input: Variable, −35 dbm to +5 dbm.

Output: Variable, − 20 dbm to +4 dbm.

External Timing: Provided by internal 100 kc crystal oscillator. Data rate timing input: Bipolar square waves, 2.9 to 6.8 volts peak to peak at 600, 1200 or 2400 cps, 5000 ohms nominal. Data rate timing output: Bipolar square waves, 3.6 to 6.0 volts peak-to-peak at 600, 1200 or 2400 cps, 600 ohms maximum.

300 cps and 600 cps input/output: 0 to − 6 volts, 10,000 ohms input impedance; 600 ohms output impedance.

External Clock Input: (Optional) 100 kc, with frequency stability of 1×10^6 per day, or greater, 5 vrms minimum, 5000 ohms minimum.

Cooling: An internal blower and distribution — panel controlled air paths maintain suitable internal operating temperatures.

Mechanical: Two drawers, mounted in a cabinet 19″ wide, 22¾″ high, and 28¾″ deep, free standing or rack mounted (projects 7″ from front of rack).
Weight: 120 lbs.

Operating mode: Full duplex, continuous, unattended at 600, 1200 or 2400 bits-per-second rates.

Environmental: (Operating)

Temperature: 0°C to +52°C.

Humidity: 0 to 80% relative without condensation.

Altitude: 0 to 15,000 feet.

Vibration: MIL-T-4807A.

Power Requirements:

108 to 132 v ac, 47 to 450 cps, single phase, 200 watts maximum.

Reliability:

Greater than 3000 hours MTBF (Mean Time Between Failures).

Less than 15 minutes MTR (Mean Time to Repair).

Preventative maintenance less than 5 hours per month for continuous operation.

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

COLLINS

4M — CDS3 — 10-61
Printed in U.S.A.