

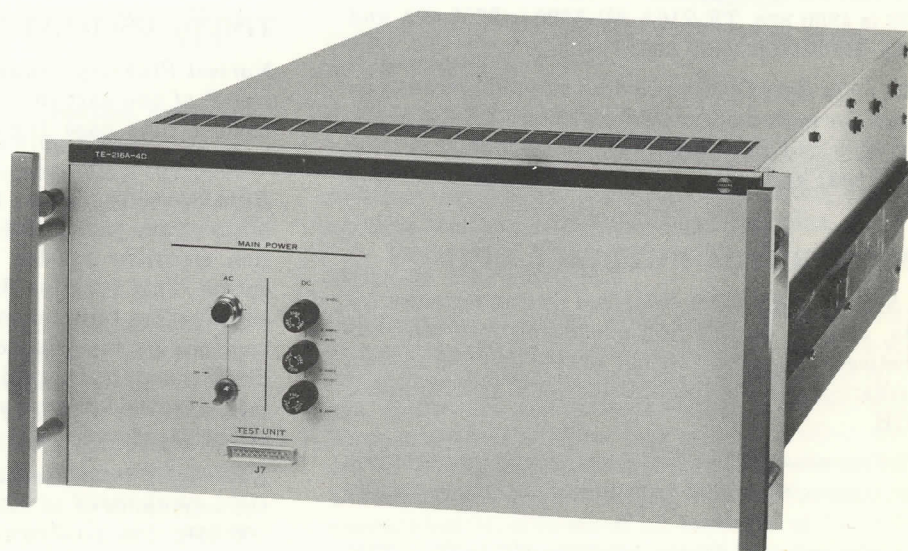
Collins Radio Company | Newport Beach, California

technical data sheet

TE-216 4800/3600/2400 bps Wireline Data Modems

Collins TE-216 Data Modems transmit and receive digital data at rates up to 4800 BPS over voice frequency bandwidth telephone circuits (wireline, carrier, cable or microwave). Design flexibility of the modems provides for increased data rates and customer-selected equipment options to fulfill a wide range of data communication system operational requirements.

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.



The modems are available in three basic configurations: The TE-216A-4D-4800, TE-216A-3D-3600 and TE-216A-2D-2400 (See table for data rates, tones, frequencies, and telephone circuit specifications). All modem chassis are wired identically. The data rate of the TE-216A-3D-3600 can be increased to 4800 BPS and the TE-216A-2D-2400 to 3600 or 4800 BPS by addition of plug-in circuit card modules. The customer-selected equipment options of DC input/output interface, data rate (fixed or variable), data rate timing, timing oscillator, and synchronization time are also accomplished by addition of the card modules. Besides the equipment feature flexibility, 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. A special external test unit is available as an accessory.

The modem is designed for continuous, unattended operation. Transmission is full duplex (synchronous transmit and receive operation) over a four-wire telephone circuit. The transmit function of the modem accepts serial digital data from an external source (computers, business machines, voice digitizers, telemetry equipment), phase-amplitude modulates the data on the data tones, and applies the data tones to the telephone circuit. The receive function establishes synchronism with the pulse repetition rate of the signal received from the transmitting modem, demodulates and regenerates the data and provides the data in serial form to the associated input/output equipment. The modems employ synchronous Kineplex[®] signal detection techniques which provide optimum signal-to-noise performance.†

The following customer-optional features and capabilities are available with all TE-216 modems:

DATA RATE OPTIONS

Fixed Data Rate Option provides a single, fixed transmission rate for each modem configuration: TE-216A-4D-4800 is 4800 BPS, TE-216A-3D-3600 is 3600 BPS, and TE-216A-2D-2400 is 2400 BPS.

Variable Data Rate Option provides selectable transmission rates for each modem configuration: TE-216A-4D-4800 is 4800 and 2400 BPS; TE-216A-3D-3600 is 3600 and 2400 BPS; and TE-216A-2D-2400 is 2400 and 1200 BPS.

DC INPUT/OUTPUT INTERFACE OPTIONS

E.I.A. Standard RS-232B Interface Option provides for all data, timing, control and grounding interface circuits between the input/output device and the modem in accordance with the specifications of E.I.A. Standard RS-232B.

CCITT Recommendation V.24 Interface Option provides all data, timing, control and grounding interface circuits

between the input/output device and the modem in accordance with CCITT Recommendation V.24.

MIL-Standard-188B Interface Option provides data and timing interface circuits between the input/output device and the modem in accordance with MIL-STD-188B specification.

Modem	Data Rate BPS	No. of Data Tones	Normal Data Tone Frequencies Hz	Telephone Circuit Specification**
TE-216A-4D-4800	4800	4	1000 1500 2000 2500	Type 3005 (Schedule 4, Type C4)
	2400*	2	1500 2000	Type 3003 (Schedule 4, Type C1) or CCITT M89 (GPO Tariff S)
TE-216A-3D-3600	3600	3	1250 1750 2250	Type 3004 (Schedule 4, Type C2) or CCITT M89 (GPO Tariff S)
	2400*	2	1500 2000	Type 3003 (Schedule 4, Type C1) or CCITT M89 (GPO Tariff S)
TE-216A-2D-2400	2400	2	1500 2000	Type 3003 (Schedule 4, Type C1) or CCITT M89 (GPO Tariff S)
	1200*	1	1750	Type 3003 (Schedule 4, Type C1) or CCITT M89 (GPO Tariff S)

*When equipped with the variable data rate option.

**As defined in Tariff F.C.C. No. 260 or CCITT Recommendation M89.

DATA RATE TIMING OPTIONS

Internal Data Rate Timing Option provides a square wave timing signal to the associated input/output device for timing the input data to the modem. (Modem operation is synchronous. This requires the input data rate be synchronous with the modem timing rate.)

External Data Rate Timing Option provides acceptance of a timing signal at the input data rate from the associated input/output device by means of internal strapping.

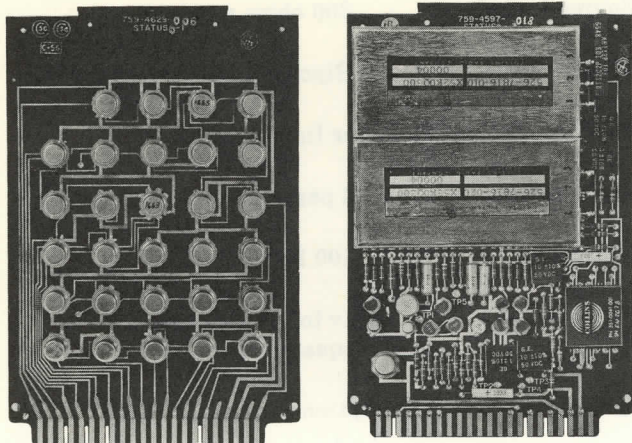
TIMING OSCILLATOR OPTIONS

Normal Stability Timing Oscillator Option provides a signal of one part in 10^4 per day for application to the modem time base from which all timing signals are derived.

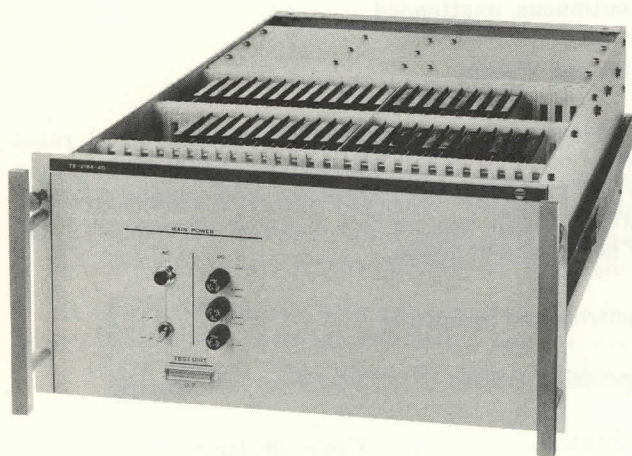
High Stability Timing Oscillator Option provides stability of one part in 10^8 per day. A receive synchronization circuitry squelch function is included with this option. This function disables the receiver timing synchronization function in the event of high noise or interruptions on the telephone circuit. During the time of disablement, synchronization of the modem is maintained by the inherent stability of the timing oscillators at both send and receive locations.

External Timing Oscillator Input Option provides for the acceptance of an external timing oscillator signal of 100 kHz. The receive synchronization squelch function is also included with this option.

†For a detailed analysis of Kineplex techniques, refer to the brochure, "Collins High Speed Data Transmission System, Kineplex."



The modem circuitry is on cards and in modules, each easily plugged into the equipment frame. Shown are a timing card (with integrated circuits) and the sync squelch card (with Collins wideband crystal filters and a Collins thin film flat pack).



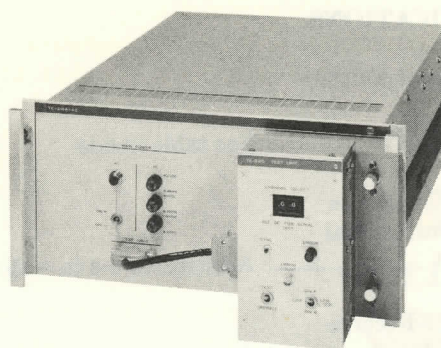
SYNCHRONIZATION TIME OPTIONS

Normal Synchronization Time Option provides synchronism within ten seconds following the presence of received carrier at the input to the modem.

Fast Synchronization Time Option provides synchronism within 32.5 milliseconds following presence of received carrier at the input to the modem. When equipped with this option, the modem also requires the control functions of the RS-232B Interface.

ACCESSORY EQUIPMENT

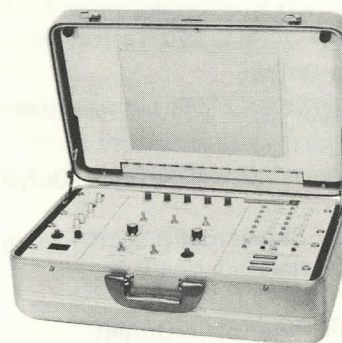
The *TE-890 Test Unit* is used to verify the operational status of a local TE-216 Data Modem and also a data link (including the modems at each end). The TE-890 also tests each data tone channel as an aid in isolating a malfunction. This compact accessory contains a test pattern signal generator, a test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



Collins portable TE-890 Test Unit attaches to modem handle.

The *TE-897 Test Unit* is used to check TE-216 Data Modems, including all options, either on-line (including data link and the modems at each end) or off-line. The interface circuit cards of the Test Unit meet the voltage and impedance requirements of E.I.A. Standard RS-232B and CCITT Recommendation V.24 specifications or MIL-STD-188B specification. The unit is packaged in an aluminum transportable suitcase-type container. Interconnection cables are stored in the lid. Power for the unit is provided by the modem under test. The unit may be mounted in a standard 19" rack.

The *TE-216 Mounting Bracket 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.



Collins portable TE-897 Test Unit weighs approximately 30 pounds.

SUPPORT

Collins Radio Company offers full support capability for customer convenience including installation, field engineering, training, and repair depot facilities.

MODEM EXPERIENCE

Collins Radio Company is the world's most experienced data communicator. Since the Company's research efforts in the field of synchronous radio teletype nearly 20 years ago, Collins has sold modems for use in surface and airborne radio and wireline data systems. Collins modems are in service in many industrial systems, at all the United States missile ranges, and in the major data communication systems of all branches of the military services at installations throughout the world.

SPECIFICATIONS**Audio Input/Output**

FrequenciesSee table inside

Levels: Composite**Transmit Signal**

OutputAdjustable +4 to -15 DBM

Composite Receive

Signal InputAccepts +5 to -30 DBM

Impedance600 ohms \pm 10 per cent, 300
to 3200 Hz**E.I.A. Standard RS-232B Data Input/Output**Send Data LevelsMARK (1) -3v to -20v;
SPACE (0) +3v to +20vReceived Data LevelsMARK (1) -6v \pm 1v;
SPACE (0) +6v \pm 1v**Send Data Input**ImpedanceGreater than 3000 ohms. Shunt
capacity to signal ground
measured at the interface and
including up to 50 feet of cable
shall not exceed 2500
picofarads**Received Data Output**

Load Impedance3000 ohms or greater

CCITT Recommendation V.24 Input/OutputSame as E.I.A. Standard RS-232B and in accordance
with CCITT Recommendation V.24.**MIL-STD-188B Data Input/Output**Send Data LevelsMARK (1) +0.5v to +20v;
SPACE (0) -0.5v to -20vReceived Data LevelsMARK (1) +6v \pm 1v;
SPACE (0) -6v \pm 1v**Send Data Input**

Impedance5000 ohms minimum

Received Data Output

Load Impedance5000 ohms minimum

High Stability Timing Oscillator OptionStability1 part in 10^8 per day**External Frequency**

Output.....100 kHz

Source Impedance200 ohms nominal

Signal LevelBipolar \pm 6v \pm 1v**External Timing Oscillator Input Option**Recommended Stability.. 1 part in 10^8 per day or better

Frequency100 kHz

Signal Level1v to 10v RMS sine wave or
square wave**Synchronization Time Options****Normal**

SynchronizationWithin 10 seconds

Fast Synchronization Within 32.5 ms.

Operating Duty Cycle

Continuous, unattended.

Size and WeightDesigned as drawer mount to fit standard 19-inch racks
or cabinets. Height: 8 $\frac{3}{4}$ inches, Depth 22 $\frac{1}{2}$ inches,
Width 17 $\frac{1}{2}$ inches. Total weight is 72 pounds. The TE-
897 Test Unit may be rack mounted; it occupies 12 $\frac{1}{4}$ "
of height and 6" depth.**Controls and Indicators**

Operating ControlPower ON/OFF Switch

IndicatorPower ON lamp

Power Requirements

105-125 VAC, 210-250 VAC, 47-63 Hz, 200 watts maximum.

Environmental ConditionsTemperatureOperating 0°C to +50°C;
non-operating -55°C to +75°CAltitudeOperating, sea level to 10,000
feet;
non-operating, sea level to
50,000 feetHumidityOperating, 0 to 95 per cent
relative without condensation;
non-operating, 0 to 100 per cent**Line Facility Requirement**

See table inside.