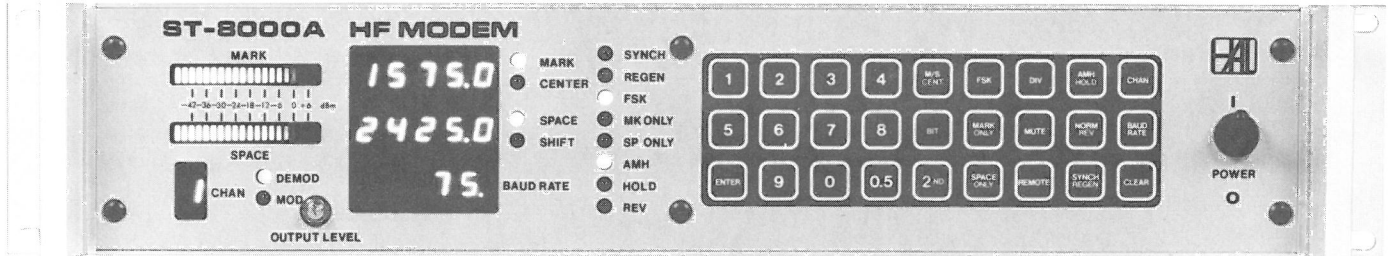




**HAL COMMUNICATIONS CORP.**  
Government & Commercial Products Division  
1201 W. Kenyon Road  
P.O. Box 365  
Urbana, Illinois 61801-0365  
Phone: (217) 367-7373 FAX (217) 367-1701

# MD-1296/G



## ST-8000A HF MODEM

The ST-8000A is a high performance modulator-demodulator (MODEM) that is an interface between digital data signals and radio or wireline transmission systems. The modulator section of the ST-8000A converts digital data pulses into audio tones. The frequency of the output tone is shifted according to the MARK or SPACE state of the data pulses. This frequency-shift-keyed (FSK) output signal is used to drive data transmission lines or as an audio input to a radio transmitter. The ST-8000A demodulator section converts FSK audio tone data from a radio receiver or wireline into digital pulses that are then used to drive a data terminal device. The National Stock Number of the ST-8000A is 5895-01-331-6220ZS.

Modulator and demodulator parameters of the ST-8000A are set by front panel keypad entry or by using remote control commands issued by a computer or controlling data terminal. Microprocessor control circuitry within the ST-8000A interprets these user inputs and generates the required control signals to the modulator and demodulator sections of the modem. The modem may be operated in either "full-duplex" (FDX) or "half-duplex" (HDX) modes.

The ST-8000A front panel includes a 27-key keypad for parameter entry, numerical digital displays, and LED mode indicators. The MARK, SPACE, and CENTER frequencies are displayed to 0.5 Hz resolution and may be set in 0.5 Hz increments from 300 to 3000 Hz. Baud rate is displayed to 1.0 baud resolution and may be set in 1.0 baud increments over the range of 30 to 1200 baud. LED indicators show currently selected operating modes. Two 20-segment Bar Graph displays show the amplitude of the MARK and SPACE signals of both the modulator output and demodulator input audio signals.

The ST-8000A remote control input port may be used with either an RS-232 or MIL-188 compatible terminal or computer at data rates from 110 to 38,400 baud. Remote control commands include HELP messages and summary output features.

The ST-8000A is housed in a rack-mountable aluminum cabinet. The cabinet is 3.5 inches high by 19 inches wide by 18 inches deep. The modem may be operated from power line sources of 115 VAC  $\pm 10\%$  or 230 VAC  $\pm 10\%$  at frequencies from 47 to 440 Hz. The modem requires a total of 30 Watts of AC power.

The ST-8000A meets U.S.A. (UL-1950) and European (EN 60 950) safety testing requirements and FCC (U.S.), VDE (Germany), and BSI (United Kingdom) requirements for RFI suppression. The design Mean-Time-Between-Failure (MTBF) of the ST-8000A is greater than 30,000 hours. The ST-8000A may be operated over the temperature range of 0 to 50 degrees C, up to 95% humidity (non-condensing), and up to 10,000 ft. elevation.

# MD-1296/G

## SPECIFICATIONS

### DEMODULATOR

Input Impedance:	600 ohm or 10,000 ohm, $\pm 10\%$ , Balanced; impedance set by internal jumper option.
Input Level:	-45 dBm to +6 dBm into 600 ohm.
Data Rate:	30 to 1200 baud, in 1.0 baud increments.
Frequency:	300 to 3000 Hz, in 0.5 Hz increments.
Frequencies Set:	MARK and SPACE or CENTER and SHIFT.
Shift:	30 to 2700 Hz, 30 to 600 baud, 1 Hz incr. 850 to 1200 Hz, 601 to 1200 baud, 1 Hz incr.
Filter Bandwidth:	16 MARK and 16 SPACE bandwidths automatically selected according to data rate selected.
Detection:	MARK Only, SPACE Only, or MARK/SPACE detection.
Mark Hold:	Returns output RXD to MARK state when signal is not present. Threshold = -42 to 0 dBm, 6 dB incr. Delay = 1.0 to 5.0 seconds, 0.5 sec. incr. Set via internal option switch.
Low/High Speed:	Two separate demodulators and detectors; Low-Speed = 30 to 600 baud; High-Speed = 601 to 1200 baud. Automatically selected according to data rate.
Receive Data Out:	EIA RS-232C and MIL-STD-188C (on separate pins)
Data Sense:	Selectable NORMAL or REVERSE.
Carrier Detect:	RS-232 or MIL-188 output, by internal jumper.
Receive Clock:	RS-232 Mid-Bit Regen. Clock, 30 to 1200 baud.
Synchronous Mode:	RS-232 and MIL-188, 30 to 1200 baud.
Asynchronous Mode:	RS-232 and MIL-188 for 5, 6, 7, and 8 bit data codes; set via front panel or Remote Control.
BIT Loop-back:	Internal Built-In-Test (BIT) loop-back of Modulator signal into Demodulator input; BIT levels = 0 dBm, -20 dBm, and -45 dBm.
Diversity Option:	OPTIONAL FEATURE: Connects two ST-8000A FSK Modems for two-receiver combination diversity. Requires OPTION 01.

### MODULATOR:

Output Impedance:	600 ohm $\pm 10\%$ , balanced.
Output Level:	-35 dBm to 0 dBm into 600 ohm; set via Front Panel adjustment.
Data Rate:	30 to 1200 baud in 1.0 baud increments.
Modulation:	FSK as defined in MIL-STD-188C (2.347 & 4.5.15) and MIL-188-110A (5.2.1, 5.2.2, & 5.3.1.3).
Harmonics:	All harmonics < -40 dBm, referenced to 0 dBm output signal.
Spurious Signals:	All non-harmonic spurious outputs < -60 dBm.
Frequency:	300 to 3000 Hz in 0.5 Hz increments.
Shift:	30 to 2700 Hz in 1.0 Hz increments.
Frequencies Set:	MARK and SPACE or CENTER and SHIFT.
TXD Mute:	Turns Modulator output tones OFF. MUTE may be selected by internal option jumper to turn output tones OFF from 0.000 to 9.999 seconds after input TXD has ceased.
Transmit Data In:	30 to 1200 baud; RS-232 or MIL-188; selected via internal option jumper.
Transmit Clock:	Provides synchronous transmit clock for data terminal devices. RS-232, 30 to 1200 baud; clock frequency = selected data rate.
Data Sense:	NORMAL or REVERSE.
Keyline Output:	Isolated relay contact output for control of transmit/receive function (PTT).

Specifications subject to change without notice.  
CAGE CODE: 63256



**HAL COMMUNICATIONS CORP.**  
Government & Commercial Products Division  
1201 W. Kenyon Road  
P.O. Box 365  
Urbana, Illinois 61801-0365  
Phone: (217) 367-7373 FAX (217) 367-1701

### FRONT PANEL:

Data Entry Keys:	27 Key keypad, functions are: 0.5, 0 through 9, ENTER, M/S — CENT, BIT, 2nd, FSK, MARK ONLY, SPACE ONLY, DIV, MUTE, REMOTE, AMH HOLD, NORM REV, SYNCH REGEN, CHAN, BAUD RATE, CLEAR.
Indicators:	Keypad annunciators on ENTER, DIV, MUTE, and REMOTE keys. LED annunciators for DEMOD, MOD, MARK, CENTER, SPACE, SHIFT, SYNCH, FSK, REGEN, MK ONLY, SP ONLY, AMH, HOLD, and REV.
Frequencies:	RED LED displays as follows: 5-Digit for MARK/CENTER; 5-Digit for SPACE/SHIFT; 4-Digit for BAUD; 1-Digit for CHANNEL.
Signal Level:	Two 20-segment RED LED Bar Graphs, calibrated from -42 dBm to +6 dBm (600 ohm reference).
Other Controls:	POWER: AC power to ST-8000A; OUTPUT LEVEL: Continuous adjustment of Modulator output level Previous parameters are restored on power-ON.
Memory:	

### REMOTE CONTROL:

Data Format:	RS-232 or MIL-188 jumper selectable. ASCII format: 1 Start, 8 Data, 2 Stop bits.
Data Rate:	110, 300, 600, 1200, 2400, 4800, 9600, 19,200, or 38,400 baud (internal switch).
Unit Address:	Select Unit1 through Unit 9 (internal switch).
Multi-Modem:	Up to nine ST-8000A Modems may be "daisy-chained" to a single remote control terminal.
Commands:	All Front Panel features (except OUTPUT LEVEL and POWER ON) can be set by REMOTE commands.

### REAR PANEL CONNECTIONS:

DATA I/O:	MS27508E14F35SB MIL connector.
AUDIO I/O:	MS27508E14F35SA MIL connector.
REMOTE:	MS27508E10F35P MIL connector.
DIVERSITY:	Optional MS27508E10F35S MIL connector, requires Diversity Option-01.
AC POWER:	IEC 320 power connector; MS27472E12F98P MIL connector to IEC 320 adapter cable is provided.

### PHYSICAL DATA:

Cabinet Finish:	Front Panel: Light Gray. Cabinet: Natural aluminum iridite finish.
Cabinet Style:	19" rack mounting; rack handles included.
Size:	3.50" High x 18.0" Deep x 19.0" Wide (8.9 cm x 45.7 cm x 48.3 cm).
Weight:	16 lbs (7.3 kg) net, 28 lbs (12.8 kg) shipping.
AC Power:	115 VAC $\pm 10\%$ or 230 VAC $\pm 10\%$ , 47 to 440 Hz; 30 Watts. AC voltage and freq. switch selectable.
AC Protection:	Rear panel fuse, 0.5 Amps, slow-blow.

### COMPATIBILITY:

Interoperability:	Operationally and plug-compatible with 1280A/M; Communications compatible with MD-1232G (ST-8000) and other FSK Modems.
Safety:	Meets UL 1950 and EN 60 950.
RFI:	In accordance with FCC Part 15 (Class A), VDE/TUV (Germany) and BSI (United Kingdom).
Environment:	Operational: 0 to 50 degrees C, 95% Relative Humidity (non-condensing); Sea level to 10,000 ft. Non-operational: to 50,000 ft.
Reliability:	Design MTBF $\geq$ 30,000 hrs. (MIL-HDBK-217E).
Warranty:	One year from date of purchase.

### OPTIONS:

Option 01:	Diversity Option — Allows connection of two ST-8000A's in combination diversity operation.
Loop Supply:	LP-1200A (1 channel) or LP-1210 (10 channels).