

1.0 SCOPE

This specification describes the requirements for a cassette magnetic tape recorder. The device shall be a proven reliable design utilizing packaging techniques that will minimize maintainability problems in the field. The electronic assembly shall be packaged on functional plug-in assemblies. The recorder does not contain its own power.

2.0 APPLICABLE DOCUMENTS

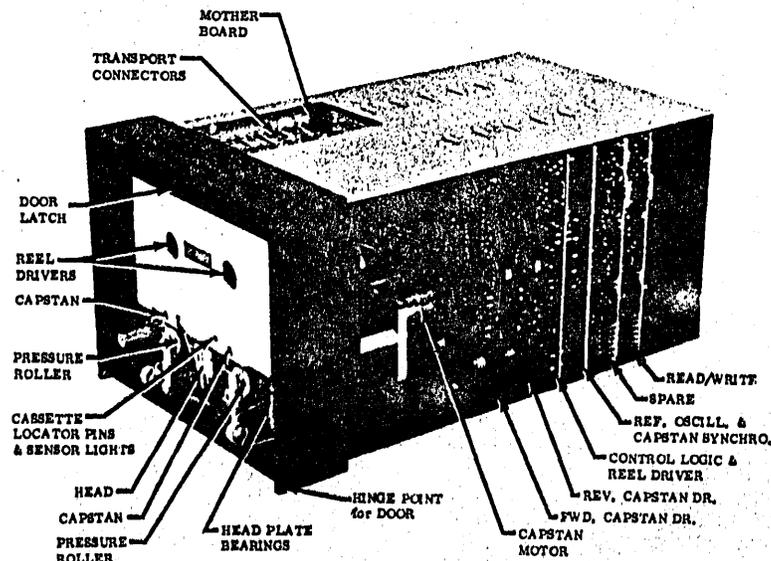
COMTEN's G10,002 Component Design Derating, General Specification for
COMTEN's G10,007 Manufacturing Engineering Change Order Procedure (ECO)
Requirements for
COMTEN's 1,000,589 Tape, Cassette
GENERAL

3.1 Description

The cassette magnetic tape recorder combines the high reliability of computer-grade digital transports with the simplicity and low cost of cassette recorders. The recorder consists of two major parts, the tape transport (driving mechanism) and the electronics package (control unit). The front loaded recorder uses a standard or improved Norelco-type cassette with pressure pad removed. The transport is designed for serial recording on a single track and operates bi-directionally in the read or write mode. The recorder weighs approximately 5 pounds and is approximately 5 x 6 x 9.

4.0 PHYSICAL DESCRIPTION

4.1 Configuration - See Figure.



4.3 Color

See paragraph 4.2. The entire front surface shall be anodized black and shall not contain manufacturer's name or part number.

4.4 Identification Tag

See paragraph 4.2. The identification tag shall contain as a minimum, Model No., Part No., Serial No., and Manufacturer's Identification.

4.5 Label - Cassette Rewind

A label shall be placed on the inside of the front door of the recorder.

The label shall read:

To Prevent Possible Tape Damage Rewind Cassette Before Removing.

4.6 Tape Cassette

The recorder shall accept and function with the standard or improved Norelco-type cassette with/without pressure pad. The Cipher Model C2 cassette or equivalent is recommended which is loaded with certified computer tape and has been tested for error-free performance. See COMTEN's 1,000,589 for tape specification.

5.0 MECHANICAL DESCRIPTION

5.1 Tape Transport

A cast transport with 4 mounted motors, 2 capstan drive motors and 2 reel drive motors. Dual ball bearing capstans are made of tungsten carbide. Linear guides are utilized to assure alignment of the retractable head and pinch roller assembly. Pressure rollers are designed to prevent compression set. Each cassette is positively located and held in position by guides and spring loaded clamps. All controls are through logic levels. Clear leader is sensed photo-electrically before and after the head and a file protect switch is included. The assembly is placed in operation by snapping in a cassette and closing the dust door.

5.2 Lamps

Tape sensing and tachometer lamps are to be L.I. #17AS15 or equivalent. Lamp voltage will be reduced to approx. 3.2 volts DC by the placement of a 5 Ω , 3.75w, 5% resistor in series with the lamps and the 5 VDC source. Units will carry the letter G adjacent to the serial number to identify this lamp modification.

5.3 Electronics Package

The package is a card cage with five removable printed circuit boards. The dual capstans are driven within phase-locked servo loops. Optical encoders feed back position information. Digital techniques maintain constant tape tension during start, stop and run mode thereby eliminating the need for a pressure pad.

6.0 TECHNICAL DESCRIPTION

6.1 General Specifications

Cassette Capacity: 300 feet, 0.5 mil, .150 inch magnetic tape.

Type of Loading: Front.

Operating Modes: Read-after Write Forward; Read Forward, Read Reverse at 6 ips or 24 ips; and Rewind.

Tape Head Type: Read-after Write.

Number of Tracks: One.

Gap-to-Gap Spacing: 0.15 inch.

Track Width: 0.057 inch Write; 0.036 inch Read.

Offset from Tape Center Line: 0.044 inch.

Recording Method: Saturation NRZ.

Recording Density: Up to 3200 Flux reversals per inch with external clock.

Internal Clock: 500 bpi data and gap generation (writing).

Tape Speed:	6"/sec.	24"/sec.
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Tape Speed Variation (max)		
Long Term:	+2%	+2%
Instantaneous:	+5%	+5%

Start Time:	30ms max.	100ms max.
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Stop Time:	30ms max.	100ms max.
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Start Distance:	0.128 inch <u>+0.015 in.</u>	1.55 in. <u>+0.2 in.</u>
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Stop Distance:	0.036 inch <u>+0.010 in.</u>	0.43 in. <u>+0.1 in.</u>
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Transfer Rate @ 800 BPI	4,800 Bits/sec.	19,200 Bits/sec.
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6.2 Logic Levels

Standard DTL or TTL integrated circuits shall be used for the interface.

The recorder shall operate with the following worst case input logic levels.

Lower Logical Level (Logical True): 0V to +0.8V

Upper Logical Level (Logical False): +2.2V to +5.5V

Recorder shall provide the following worst case output logic levels.

Lower Logical Level (Logical True): 0V to +0.6V

Upper Logical Level (Logical False): +2.2V to +5.2V

Recorder inputs are single DTL loads (846 type) and outputs are unloaded DTL outputs (846 type).

6.3 Control Description

6.3.1 Forward: When true, tape runs in forward direction.

6.3.2 Reverse: When true, tape runs in reverse direction.

6.3.3 Fast: Modifies Forward and Reverse for fast tape speed.

6.3.4 Write Enable: When true, write head current can flow.

6.3.5 Select: When true, inputs and outputs are enabled.

6.3.6 Rewind: Winds tape at fast speed to beginning clear leader. Once set, rewind is completed regardless of other commands.

6.4 Data Description

6.4.1 Write Data Input: When false, write head current flows in the reference direction; when true, current flows in the opposite direction.

6.4.2 Read Data Output: When a change to false occurs, with the tape running in the forward direction a transition to the reference flux condition has been read. A change to true indicates a transition to the opposite flux has been read.

6.4.3 Read Data Pulse: Pulse each time a flux reversal is read.

6.4.4 Read Data Threshold: False, 25%, true, 50%.

6.5 Status Outputs

6.5.1 Forward Leader Sensor: When true, clear leader is in the forward sensor.

6.5.2 Reverse Leader Sensor: When true, clear leader is in the reverse sensor.

6.5.3 EOT/BOT Hole Sensing: The recorder shall have EOT/BOT hole sensing capability.

- 6.5.4 Ready and Selected: When true, power is applied, cassette is installed, door closed and the drive is selected.
- 6.5.5 Tape Rewinding: True, when rewind command is given and remains true until beginning clear leader is sensed.
- 6.5.6 File Protect: True when file protect tab is removed and drive is selected and write enabled.
- 6.5.7 Clock Output: Pulses from the optical encoder may be used to write data at 500 bpi and/or generate precise gaps.

7.0 INTERFACE

7.1 Connector

Amphenol 17-20500 or equivalent. Used for power, control and data and is mounted on rear of recorder. Each unit shall have 2 sliding lock posts (Cinch D-53018 or equivalent) properly mounted with the Amphenol 17-20500 connector assembly to accommodate a sliding lock retainer on the COMTEN mating connector.

7.2 Connector Pinout - Twisted Pair.

Pin No.'s		Function
Common		
7	23	Write Enable
8	24	Write Data Input
10	26	File Protected
11	27	Encoder Clock Output
44	43	Read Data Pulse Output
50	49	Threshold
37	38	Read Data Output
12	28	Forward Input
13	29	Reverse Input
14	30	Reverse
17	33	Forward } -----Leader Sensed
15	31	Select
16	32	Fast Input
	18	+12
	19	-12
34		Return } -----Motor
35	36	Return
41		+5 -----Chassis Ground
	42	Ready-Selected
	46	Tape Rewinding
	1	Status Signal (Side A/Side B sensing)
	48	Rewind Input
20		Signal Ground

8.0 POWER REQUIREMENTS

The following DC voltage and current requirements are to be supplied to the recorder by COMTEN via the interface cable.

Voltage	Regulation	Current		
		Average	60ms duration	100µsec duration
+12VDC	+2%	0.5A	1.2A	2.4A
-12VDC	+2%	0.5A	1.2A	2.4A
+5VDC	+4%	1.2A	1.2A	1.2A

9.0 THEORY OF OPERATION

See manufacturer's technical manual for additional information on the basic concepts of digital recording, serial data coding, properties of serial phase-encoded data and phase encoding and decoding.

10.0 ERROR RATE

Based on usage with a C2 tape cassette or equivalent.

10.1 Non-Recoverable Error Rate

Less than 1 bit in 10^9 . A non-recoverable error is one which persists after 5 tries at reading a bit previously verified by a read-after-write operation.

10.2 Recoverable Error Rate

Less than 1 bit in 10^6 . A recoverable error is one which occurs during the first try at read-after-write or read only but corrects itself on the second read attempt.

11.0 ENVIRONMENTAL CHARACTERISTICS

11.1 Temperature and Humidity

11.1.1 Operating: Over a temperature range of 0°C to $+50^{\circ}\text{C}$ with an RH from 0% to 90% with no condensation at altitudes up to 10,000 feet.

11.1.2 Non-Operating: Capable of withstanding a temperature range of -55°C to $+85^{\circ}\text{C}$ with an RH from 0% to 95% with condensation at altitudes up to 30,000 feet without suffering any adverse effects when it is put into operation.

11.2 Vibration and Shock

11.2.1 Vibration: The cassette recorder shall be capable of withstanding a vibration having an amplitude of 0.06 inches maximum total excursion or 0.2g if less, from 10 to 300 cycles per second in any one plane while operating without any effect on its operation or reliability.

11.2.2 Shock: The cassette recorder shall be capable of withstanding a shock of 0.5g in any one plane while operating.

11.3 Radio Frequency Interference

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12.0 MAINTAINABILITY

Design criterion shall be minimum and ease of maintenance. Maintenance manual shall specify inspection and cleaning procedures.

13.0 QUALITY ASSURANCE

13.1 Workmanship

The recorder assembly shall conform to creditable commercial workmanship standards with respect to materials, mechanical and electrical construction, finish and appearance.

13.2 Design Reports

Vendor shall supply to COMTEN, prior to acceptance, a design report on each circuit which shall include worst case analysis taking into account component parameter variations, voltage extremes, thermal extremes and frequency response to switching time analysis where applicable. The report shall also demonstrate that the calculated components stress levels do not exceed those specified in G10,002. The above paragraph shall apply unless so deleted in purchase agreement.

Vendor shall also furnish COMTEN, prior to acceptance, a design report which includes logic design parameters or rules such as circuit loading, timing, etc. used during the design of the unit, unless so deleted in purchase agreement.

13.3 Acceptance Test

The acceptance test specification on the recorder shall be submitted to COMTEN for review approval. The acceptance test specification, after approval by COMTEN Engineering, shall be subjected to the control requirements of COMTEN G10,007. An approved copy of the approved acceptance test check-off list shall accompany each recorder.

A recorder returned to the manufacturer for repair shall be repaired and returned to COMTEN with a copy of COMTEN's Reject Material Form stating reasons for failure or a Failure Analysis Report and an approved copy of the acceptance check-off list.

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14.0 DOCUMENTATION14.1 Manual

An operations-maintenance manual shall be provided with each recorder. The manual shall include as a minimum complete electrical schematics, mechanical installation information, theory of operation, adjustment procedures (if any), recommended preventive maintenance and test equipment.

The electrical schematics and their revisions are preferred on reproducible 11 x 17 (B) size sheets. Changes to the recorder system which are not interchangeable with COMTEN field recorders shall be coordinated with the COMTEN Engineering Department.

14.2 Spare Parts List

A recommended spare card and spare parts list for the recorder shall be provided. All components shall be labeled with industry standard numbers, wherever applicable, rather than vendor proprietary numbers.

14.3 The Engineering Change Order procedure per COMTEN's G10,007 shall apply as specified to engineering and documentation changes.

15.0 RELIABILITY REQUIREMENTS15.1 Underwriters Laboratory

The cassette recorder shall be designed to meet Underwriters' Laboratory requirements.

15.2 MTBF

The calculated MTBF per MIL-HDBK-217A @ 50°C shall be \geq 2000 hours.

16.0 SHIPPING

It shall be the responsibility of the manufacturer to provide a shipping container that will preserve the integrity of the recorder during shipping and storage.

IDENTIFICATION

COMTEN Part No.	Description
1,000,586-000	Cassette Tape Recorder w/o Cassette plus manual.

See Sheet 4 for Central Log.

COMTEN

SHEET 11 REV. ANI
SPEC. NO. 1,000,586

AN	ECO D022	Vendor request change	1/23	7/20/77	LJP	7-21-77
AM	ECO C681	Vendor request	1/23	11/15/76	LJP	11-16-76
AL	ECO C556	Change 6.5-3	1/23	8/20/76	LJP	8-23-76
AK	ECO C539	Change track width	1/23	8/6/76	LJP	8-6-76
AJ	ECO-B835	Vendor update of equip.	1/23	2/7/75	QWR	2-7-75
AH	ECO-B789	See ECO	1/23	12/24/74	QWR	12-24-74
AG	ECO B768	Add para. 5.2	1/23	11/12/74	QWR	11-12-74
AF	ECO B228	Add lock post to conn.	1/23	4/12/74	QWR	4-12-74
AE	ECO-A815	Add supporting documentation	H. J. Gunn	12/5/72	QWR	12-5-72
AD	ECO-A740	Update cassette requirements	H. J. Gunn	8/24/72	QWR	8-24-72
AC	ECO-A655	See ECO	H. J. Gunn	5/23/72	QWR	5-23-72
AB	ER-290	INITIAL RELEASE	W. J. Seal	1-7-72	QWR	1-6-72
REV	CONTROL NO.	DESCRIPTION	DES. ENGR.	DATE	APPROVAL	DATE

COMCET

SHEET 122 REV. AC
SPEC. NO.
1,000,586

Remove This Sheet Prior To Submitting This Document To A Vendor.

Source of Supply:

Cipher Data Products; San Diego, California

COMTEN Part No.	Cipher Part No.
1,000,586-000	C 200 plus description with manual, CDP200-1A