DEVELOPMENT STANDARD

QIC-158
Revision B
20 Jun 96

MAGNETIC HEAD FOR USE WITH
QIC-3080-MC RECORDING FORMAT

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QIC DEVELOPMENT STANDARDS

REVISION HISTORY

QIC-158

Revision Level	Detail	Revision Date
Revision B	Added paragraph 7.0, page 7; Caution statement	20 Jun 1996
	to heading cleaning provisions	

1.0 GENERAL SPECIFICATIONS

This specification defines a single-channel, single bump, thin-film head for mini-cartridge tape drives, as defined in QIC Development Standard #QIC-3080-MC.

1.1 Write Head - Thin film inductive, 2 terminal

1.2 Read Head - Thin film magnetoresistive, shielded element

1.3 Transport - Mini-cartridge drive class

1.3.1 Tape Speed (FWD/REV)34.8, 51.9, and 77.8 ips
1.3.2 Backward Compatible: N/A

1.4 Tape and Cartridge - DC2000 minicartridge with 400' of ,250"or .315" width 900 Oe media. Tape tension is 0.5 to 3.5 ounces at rated speeds.

2.0 ENVIRONMENTAL CONDITIONS

2.1 Operation

2.1.1	Temperature	+5˚C to +45˚C
2.1.2	Temperature Gradient	3˚C per minute, MAX
2.1.3	Relative Humidity	20% to 80%, noncondensing 29˚C MAX Dew Point
2.1.4	Atmospheric Pressure	10.9 to 15.1 psi

2.2 Storage and Transportation

2.2.1	Temperature	-40˚C to + 60˚C
2.2.2	Temperature Gradient	3˚C per minute, MAX
2.2.3	Relative Humidity	O% to 90%, noncondensing
2.2.4	Vibration	5 to 63 Hz, 0.1 in. peak-peak displacement; 63 to 500 Hz, 1.5 g's MAX
2.2.5	Shock	20 g's MAX, 11 msec 1/2 sine wave

2.3 Test

2.3.1	Temperature	22˚C ±5˚C
2.3.2	Relative Humidity	40% - 70% 18˚C MAX Dew Point
2.3.3	Acclimation Prior to Testing	24 hours (head, tape cartridge and test equipment)

3.0	MECHANICAL SPECIFICATIONS		
3.1	Channel Width		
	3.1.1	Read	0.00200" ±0.00004"
	3.1.2	Write	0.00390" ±0.00008
3.2	Gap-to-Gap Distance		0.000350" MAX
3.3	Read Channel to Write Channel Centerline Mismatch		0.000150" MAX
3.4	Read Gap to Write Gap Parallelism		1 minute MAX
4.0	STATIC TEST SPECIFICATIONS		
4.1	DC Resistance		
	4.1 1	MR Read Element	160 ohms MAX total
	4.1 2	Write Coil	10-25 ohms, full coil
4.2	Resonant Frequency		
	4.2.1	Write (Full Coil)	30 MH z MIN, measured at connector with 33 pF external parallel capacitor
4.3	Inductance		
	4.3.1	Write Coil (at 2 MHz)	400-600 nH
5.0	DYNAMIC TEST METHOD		
5.1	Tape Speed		78 ips
5.2	Read Load		400 ohms ref
5.3	Integrating Read Channel		
	5.3.1	Bandwidth (3 dB Points)	20 kHz 24 dB/Octave HPF, 3 MHz 6dB/Octave LPF
	5.3.2	Schematic	See Figure 3 and Note 5
5.4	Tape Cartridge ID		per QIC-143
5.5	Read Sensor Current		12 mA nominal, fixed
5.6	Write Equalization		Per QIC-3080-MC, See Fig 2

6.0 DYNAMIC TEST SPECIFICATIONS

NOTE: Do not expose the head to externally generated fields in ex-cess of 5 Oe. The following tests are to be completed with write equalization, with write current set per item 6.1.

6.1 Find the lowest write current which produces 95% of the maximum 45,000 ftpi output (IREF).

I-write: IW = 1.15 x IREF = 10 - 28 mA

NOTE: This write current (IW) shall be used for all subsequent test items.

6.2 Write a write-equalized 11,250 ftpi signal. Read back and compare the amplitude of the positive pulses (PP) and the negative pulses (NP) of a write equalized and integrated 11,250 ftpi signal. Compute the amplitude asymmetry per the following equation:

Asymmetry : (PP - NP)/(PP + NP) x 100 = $\pm$10%

6.3 Measure the 45,000 ftpi output (V1).

Output: V1 = 1.0 to 3.8 mV

6.4 Measure the write-equalized and integrated 11,250 ftpi output (v2).

Resolution: V1/V2 x 100 = 35-55%

6.5 Record a 45,000 ftpi signal in the forward direction, turn off the write head, and measure output (V1). Leave read sense current on, and move the tape over the head 10 times (5 FWD, 5 REV). Read the remaining signal in the forward direction (v3).

Self Erasure: V3/V1 x 100 = 90% MIN

6.6 Measure the amplitude of the fundamental (V1) and 2nd Harmonic Component of the write-equalized and integrated 11,250 ftpi signal (N1).

2nd Harmonic: 20 log N1/V1 = -22 dB MAX

6.7 Write a write-equalized 11,250 ftpi signal, measure its fundamental amplitude (V1), then overwrite with a 45,000 ftpi signal. Measure the amplitude of the residual 11,250 ftpi signal (N3).

Overwrite: 20 log N3/V1 = -26 dB MAX

6.8 Measure the output of a 45,000 ftpi signal in the forward direction (F1) and in the reverse direction (R1).

FWD/REV Ratio: (F1-R1)/(MAX, F1, R1) x 100 = $\pm$10%

6.9 Using an AC-Voltmeter (10 MHz bandwidth), measure the broadband signal level through the test filter circuit when running AC-erased tape over the head (N4). Write a 45,000 ftpi signal, and measure the output (V1).

Signal-to-Noise Ratio: 20 log V1/N4 = 24 dB MIN

NOTE: Signal-to-Noise Ratio measurement to be made without integrator circuit, using a flat read chan-nel response. (See Note 5.)

6.10 Measure the variance in peak-peak envelope of a 45,000 ftpi signal, recording the minimum (VMIN) and maximum (VMAX) envelopes observed.

Modulation: (VMAX-VMIN)/VMAX x 100 = 10% MAX

NOTES FOR DYNAMIC TEST SECTION:

1. During testing, the write current waveform shall conform to the following criteria:

Write Current Rise Time	20 nS MAX
Write Current Overshoot	10% MAX

2. All static parameters to be measured at the flex or cableconnector.

3. All performance criteria shall be met in both forward andreverse directions.

4. The Read Output shall be calculated by dividing the measured output by the gain of the test preamp and filter circuit. See Figure 3 for definition of the test circuit.

5. All measurements except Signal-to-Noise ratio to be made using integrator circuit detailed in Figure 3. Signal-to-Noise measurement to be made without integrator circuit, with a flat read channel response having 3 dB points at 20 kHz and 3 MHz.

7.0 HEAD CLEANING

CAUTION: The use of any head cleaning system, whether employing wet, dry, or scrubbing actions, must be extremely care-fully tested and evaluated for efficacy and validated not to cause damage to the tape head structure in ways outlined below, but not limited to those areas described in the following section.

7.1 The following solvent(s) may be used to clean the head without:

(a) causing damage to its structure;

(b) permitting head fabrication glues and epoxy products to wick to the head to tape interface;

(c) causing damage to the media in the event that small amounts do not evaporate immediately;

1. Reagent grade anhydrous isopropyl alcohol

7.2 Head cleaning cartridge methods must:

(a) limit the solvent applied to a quantity sufficient to clean the head without leaving or redepositing debris;

(b) not permit solvent to seep into the head surface bond lines and contour airbleed slots; and

(c) not contribute to electrostatic discharge problems which damage the head.

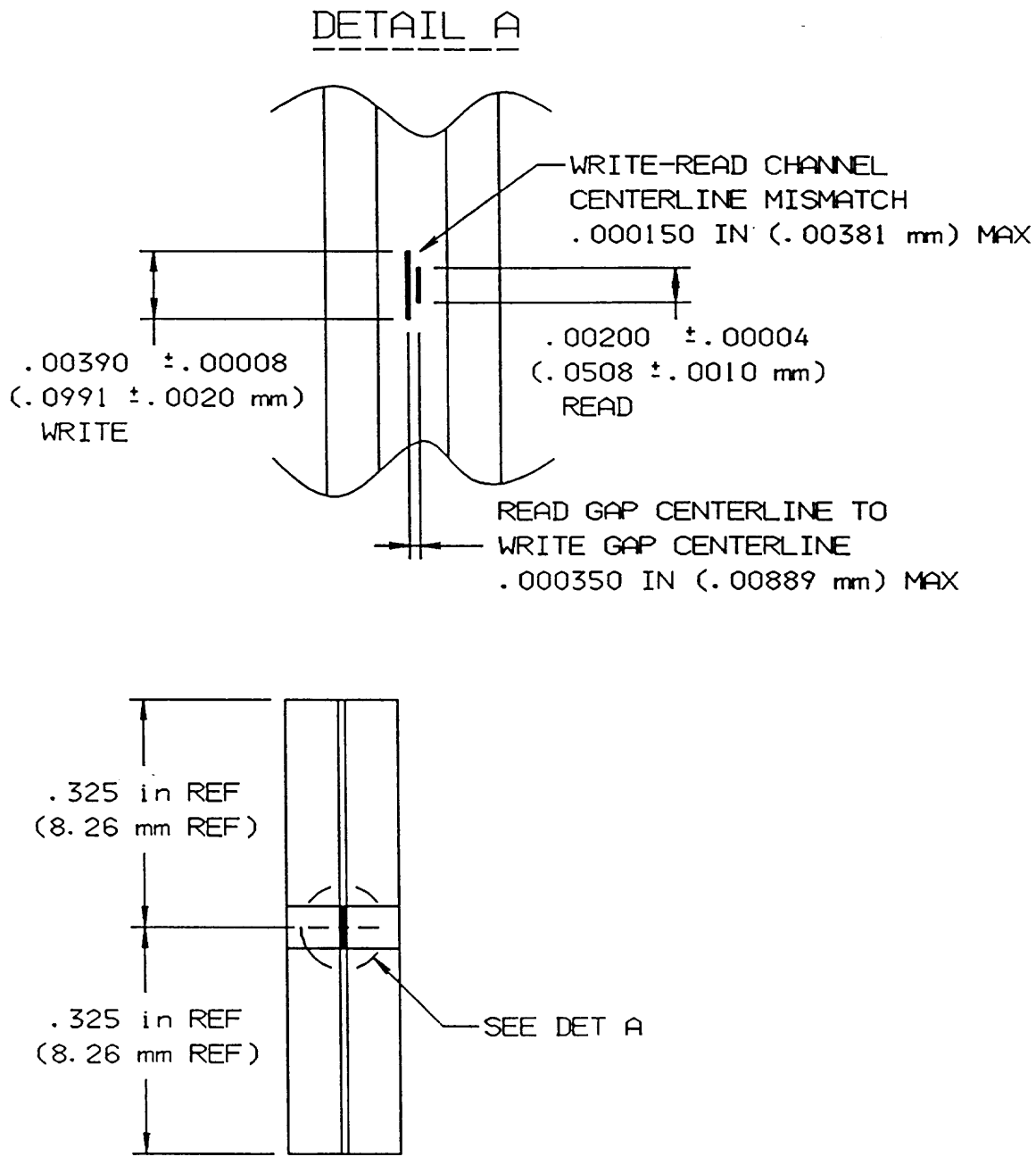


FIGURE 1: MECHANICAL DIMENSIONS

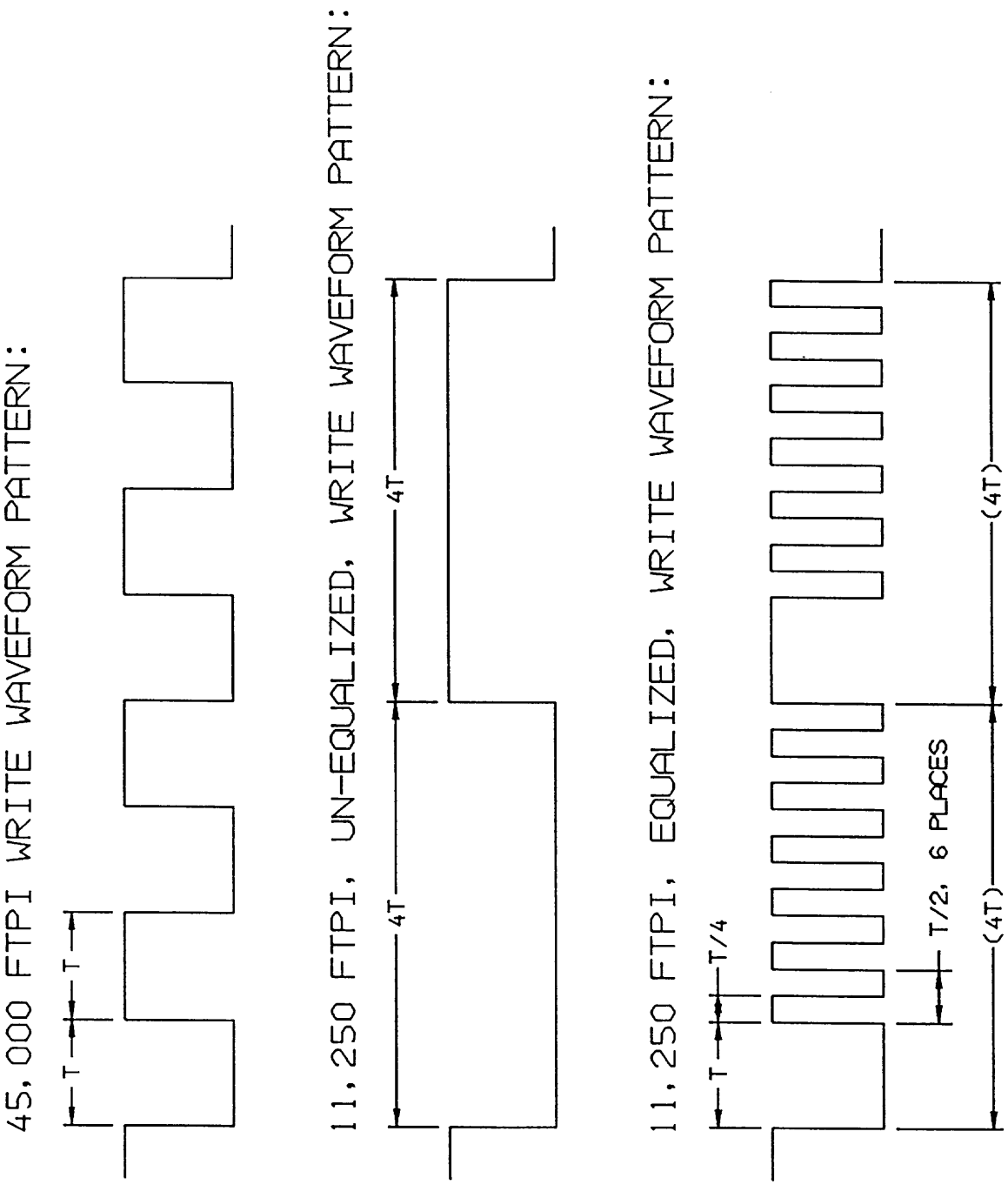
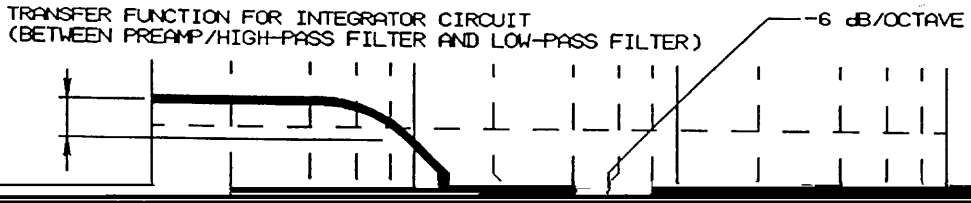


FIGURE 2: WRITE EQUALIZATION PATTERN DEFINITION


TRANSFER FUNCTION FOR INTEGRATOR CIRCUIT
(BETWEEN PREAMP/HIGH-PASS FILTER AND LOW-PASS FILTER)
-6 dB/OCTAVE