CONTROL DATA CORPORATION

SPEC 76192089
CD
REV A
DATE JUNE 25, 1980

PRODUCT SPECIFICATION
FOR
LARK MODULE CARTRIDGE
MODEL 1208

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NOTE: The dimensions on all of the figures are nominal values.

1.0 SCOPE

This specification describes the characteristics and usage of the CONTROL DATA® Preformatted Lark Module Cartridge (LMC) 1208. This disk cartridge is used on the Control Data 9455 series front-loading Lark Module Drive (LMD).

NOTE: Dimensional units used in this specification are in Imperial units (inches, etc.). Metric units are shown for reference only.

2.0 APPLICABLE DOCUMENTS

PUBL. 77641922 - 9455 Product Specification

3.0 REQUIREMENTS

3.1 General

The Control Data 1208 LMC is a removable, high density, single disk data storage cartridge designed for use with the Control Data 9455 LMD. When removed from the drive, the disk is protected from contamination by a spring loaded head access door. The LMC consists of an oxide-coated disk clamped to a hub and encased in a plastic housing. Both surfaces are used for data storage, servo positioning and index/timing. Pre-recorded information includes servo positioning data and format data.

3.2 Cartridge Mechanical Characteristics

3.2.1 Housing

The LMC includes a plastic housing with a head access door. As the LMC is inserted into the drive, a door actuator arm opens the head access door. As the disk and hub assembly is lowered onto the drive spindle, the top and bottom housing surfaces are compressed toward each other to provide disk to housing running clearance. The cartridge is designed for 5,000 insertion/removal cycles. The top surface is provided with a ribbed area (Figure 4.1) to aid in handling the LMC. The disk and hub are constrained to prevent disk contact with the interior of the housing during all phases of normal handling. Housing dimensions are given in Figure 4.2

3.2.2 Weight

The weight of the cartridge is 1.5 lbs (0,68 Kg).

3.2.3 Write Protect Tab

The write protect tab is operator changeable to prevent inadvertant overwriting of data. The write protect tab location is shown in Fig. 4.1.

3.2.4 Hub Holding Force

The drive spindle magnetic chuck exerts a nominal gross force on the cartridge hub armature plate when mounted in the drive.

3.2.5 Cartridge Operating Speed

The cartridge is designed to operate at 3510 RPM. The hub-disk assembly rotates in a counterclockwise direction when viewed from above.

3.2.6 Dust Jacket (Optional)

To provide additional protection against contamination from handling or storage, a customer option dust jacket can be provided (Fig. 4.1).

3.3 Individual Disk Physical Characteristics

3.3.1 Material

The material and construction of the disk cartridge is such that the dimensional, inertial, balance and other functional operating requirements are met. Each disk is composed of a base material of aluminum coated with a layer of ferromagnetic material dispersed in an organic binder.

3.3.2 Recording Surface Durability

The magnetic coating is compatible with CONTROL DATA read/write heads used in the 9455 Drive operated within the specified environments.

3.4 Data Surface Recording Characteristics and Track Format

3.4.1 General

The CDC 1208 cartridge is designed to operate with a recorded track density of 237 tracks/inch with either a 32 or 64 sector/track format. The nominal flux reversal density at the inner diameter is 6,774 flux reversals/in. (FRI), and the nominal data bit rate is 9.677 megabits/sec.

3.4.2 Capacity

The unformatted storage capacity of the LMC is 8M bytes in the primary data area. Each recording surface contains up to 202 primary data tracks and four alternate tracks. The primary tracks are located in cylinders 0 through 201 and the alternate tracks in cylinders 202 through 205. Each track is addressed by a cylinder and head number which is pre-recorded in the home address area of the track.

3.4.3 Read Errors

3.4.3.1 Definition

Read errors normally occur if a bit is absent (reduced in amplitude) or shifted significantly from its nominal position. The cartridge will operate with systems having error correction capabilities of up to eleven bits of errors within one burst location providing the rest of the sector is error free. Therefore, a data sector containing one or more errors within eleven bits is considered a correctable error sector. A sector which contains errors that exceed 11 bits is considered an uncorrectable error sector. One defective sector within a track will result in labeling the entire track defective.

3.4.3.2 Read Error Acceptance Criteria

No read errors of any type at cylinders 000, 205 and Sector 00 on all cylinders.

Not more than 3 correctable errors per surface.

Not more than 2 uncorrectable errors per surface.

The total number of errors not to exceed 4 per surface.

3.4.4 Data Surface Format and Initialization Requirements

3.4.4.1 General Format Requirements

All tracks are formatted with a Home Address (HA). Format data for each track starts 16 bytes after index which is derived from the embedded servo signal. The basic recording unit is the eight-bit hexadecimal byte which corresponds to 1.65 usec. Figure 4.3 shows a suggested sequential pre-recorded format required of every track in a disk cartridge.

3.4.4.2 Error Track Format (ETF) Requirements

Each sector is analyzed for correctable and uncorrectable error conditions. If either error condition exists, it is logged in an error map located on cylinder 205, Sector 00. If no errors are detected, the track is written, with the flag byte set to 00. If a correctable error is detected, the flag byte is set to 01. If an uncorrectable error is detected, the flag is set to 02. Detailed initialization data is shown in Figure 4.3.

3.5 Cartridge Environmental Requirements

3.5.1 Temperature Range

The LMC should be allowed to stabilize at the ambient LMD input temperature for at least one hour.

Operating: +50°F (10°C) to +135°F (57°C)

Maximum rate of temperature change shall not exceed 0.2°F (0.1°C) per minute.

Non-operating (Storage & Transit): -30°F (-35°C) to +150°F (+65°C)

Maximum rate of temperature change shall not exceed 20°F (11°C) per hour.

3.5.2 Relative Humidity

Operating: 8% to 80%

Nonoperating: 8% to 80%

3.5.3 Wet Bulb Reading

Operating: 78°F Maximum

Storage conditions in shipping carton: 85°F maximum

3.5.4 Shock

The cartridge shall be subjected to the two tests in Fig. 4.4. After completion of the tests, the radial shift of the disk shall not exceed 50 uin. (1.25 um).

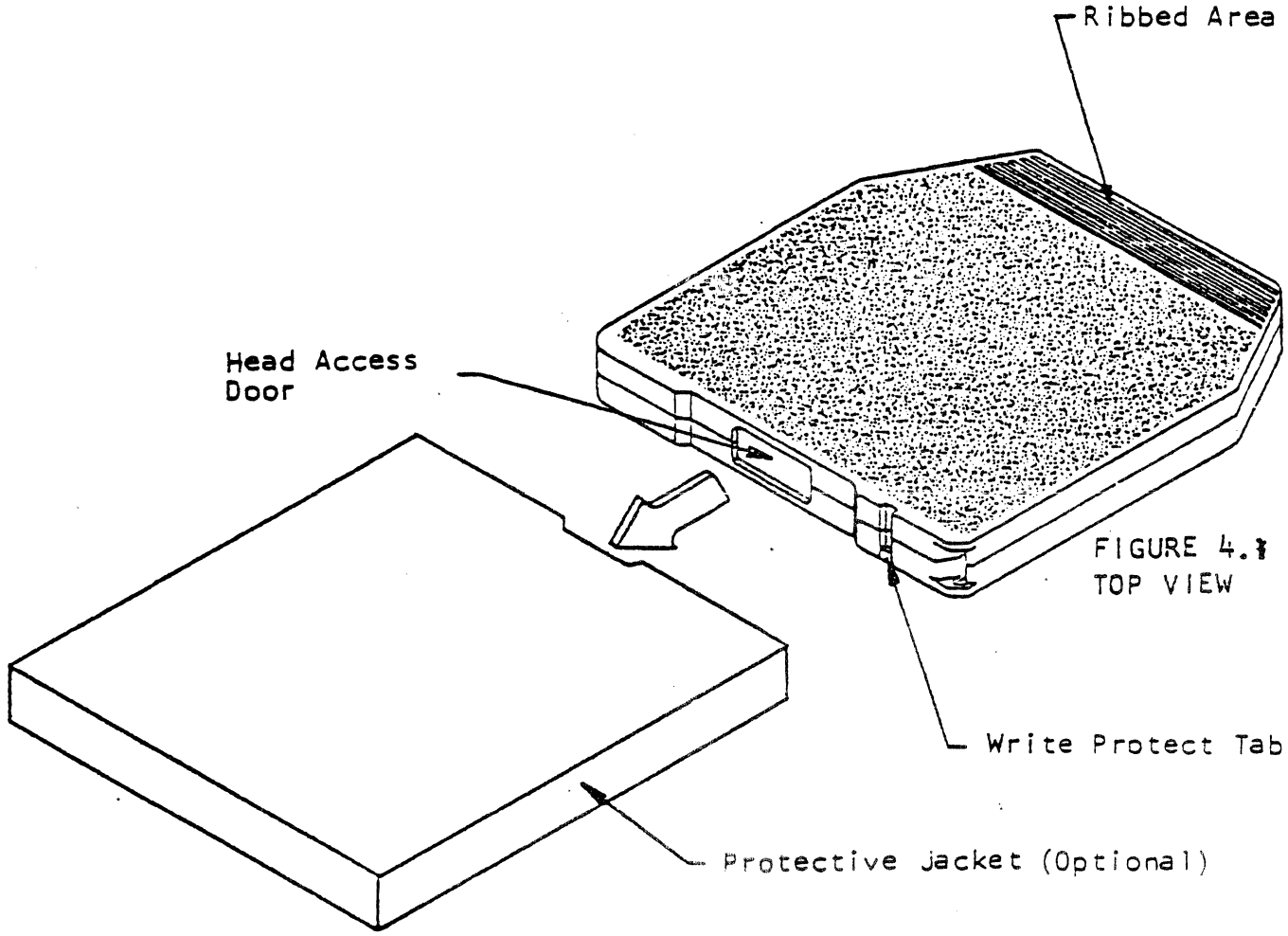


FIGURE 4.1
TOP VIEW

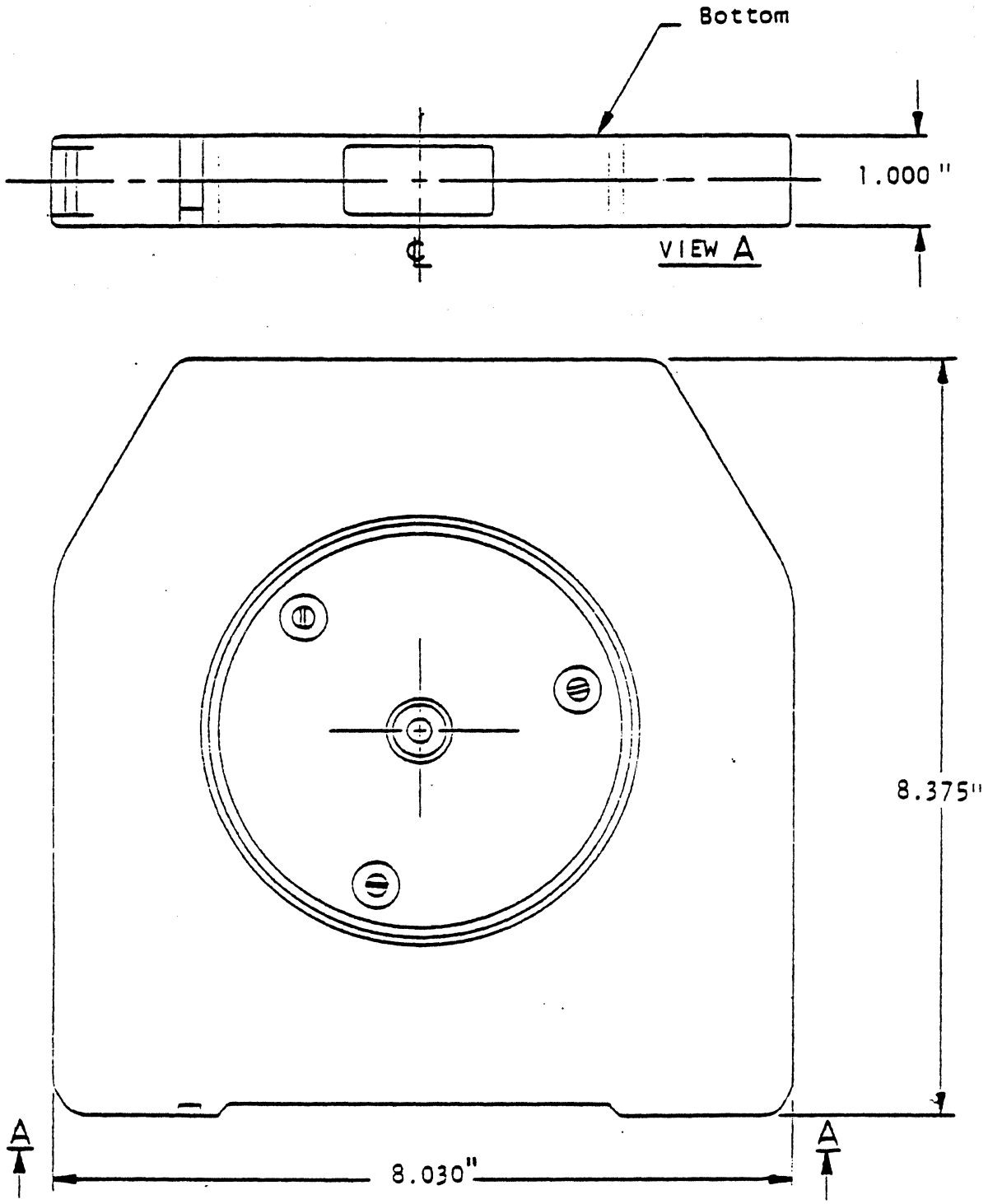
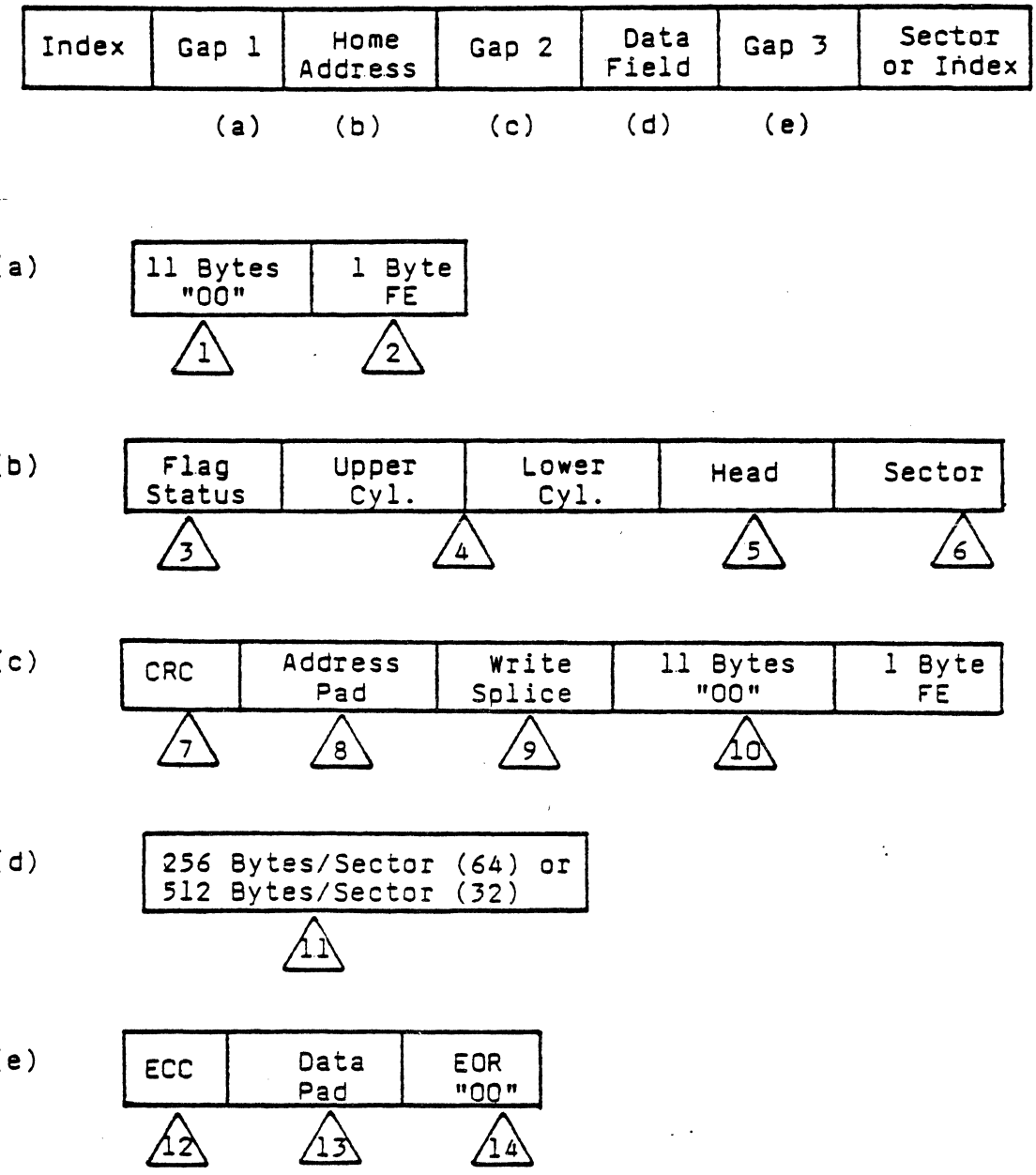


FIGURE 4.2 CARTRIDGE DIMENSIONS



For notes, see pages 10 & 11 of this specification.

FIG. 4.3 INITIALIZED DATA TRACK FORMAT

NOTES FOR FIGURE 4.3
(See Preceeding Page)

1. This area is required when reading to allow the drives phase locked oscillator (PLO) to become phase and synchronized with the data bits recorded on the media.

2. This field is defined in the standard format. This byte indicates to the user's controller the beginning of the address field information and it establishes byte synchronization.

3. Flag Format:

   Bit 0 - 5 = 0
   Bit 6 = 0 - If the sector is normal.
   Bit 6 = 1 - If the sector contains a noncorrectable error.
   Bit 7 = 0 - If the sector is normal.
   Bit 7 = 1 - If the sector contains a correctable error.

4. Physical Cylinder Address:

   Second Byte - Low Order Cylinder Address
   First Byte - Bit 0 = High Order Cylinder Address, 256
   Bit 1 = High Order Cylinder Address, 512
   Bit 2 - 7 = 0

5. Head Format:

   Bit 0 - 1 = 0, Head Address 00
   Bit 2 - 7 = 0

6. Sector Format:

   Bit 0 - 6 = 0, Sector Address 00
   Bit 7 = 0

7. The appropriate error detection mechanism, such as cyclic redundancy check (CRC) codes are generated by the user's controller and written on the media when the address field is written. The following is a suggested polynomial to use: $X^{16} + X^{12} + X^5 + 1$.

8. The pad area must be a minimum of two bytes in length and written by the controller. This is required by the drive to ensure proper recording and recovery of the last bits of the CRC codes. This area is 2 bytes long.

9 The write splice area is required by the drive to allow time for the write drivers to turn on and reach a recording amplitude sufficient to ensure data recovery. This area is 1 byte long.

10 This area has identical requirements as area (a). These bytes are used for data field synchronization.

11 The data field contains the Host Systems data files.

Sector 00, Head 00, Track 205 will contain the following flaw map:

Month	Day	Year	Catagory of Disk	Error Listing	
(a)	(b)	(c)	(d)	(e)	(f)

(a) 1 byte: 01 - 12
(b) 1 byte: 01 - 31
(c) 1 byte: 80 -
(d) 1 byte: 0C
(e) Most Significant Byte (MSB): Head 00 - 01
Byte 2: Track 00 - 205
Byte 3: Sector 00 - 32/64
Byte 4: Error Type - 00 = Correctable
01 = Uncorrectable

(f) Fill rest of data field with "FF".

12 Error correction codes (ECC) are user defined and provide error detection and correction capability on the data field. The use of an ECC is recommended for the drive but is not mandatory. This area is 7 bytes long.

13 This note is the same as note 8, except it is applied to ECC instead of CRC.

14 The End of Range (EOR) byte is required by the drive to account for electromechanical tolerances. They are not necessarily read or written, but they must be allocated in the sector format design.

15 Quotation marks indicate hexadecimal expressions.

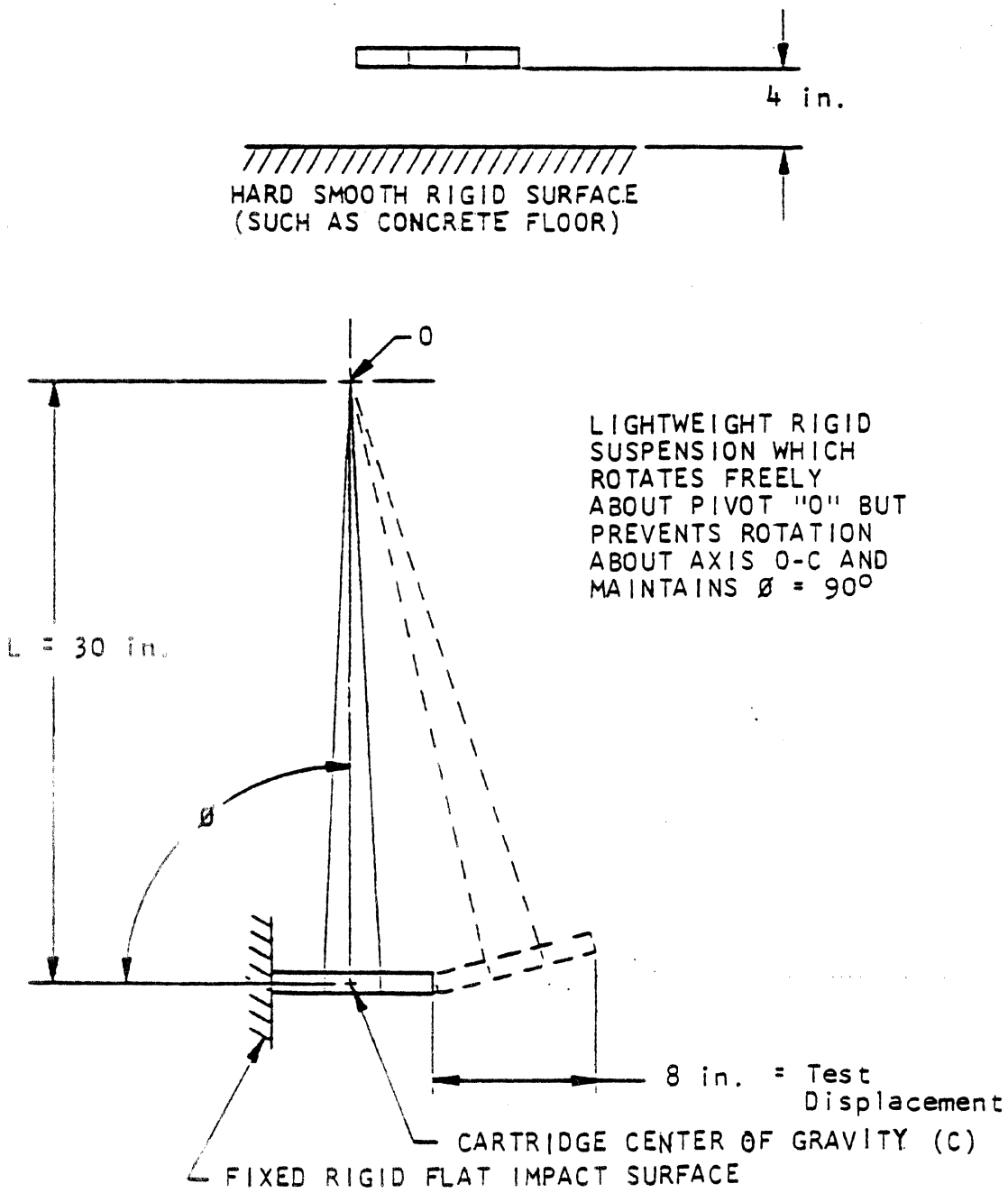


FIGURE 4.4 SHOCK TESTS