1. POINT 4 LOTUS 710 DISC CONTROLLER FEATURES

1.1 IMPROVED LARK PERFORMANCE

The LOTUS 710 Disc Controller provides an efficient handling of LMD-type drives such as the CDC 9455/9457 (LARK). Previously, the seek-after-head-change option had to be enabled on a LARK drive. Enabling this option resulted in more overhead because an extra on-track seek was required for every head change.

With the LOTUS 710 controller, the seek-after-head-change option should be removed from the LARK drive. Instead, a software change is required to allow the specification of a head number before issuing a seek command. The result is a significant improvement in LARK performance.

1.2 MARK 3-TO-LOTUS 710 DISC-TO-DISC CONVERSION

The LOTUS 710 board has a switch located at the right side of the board (see Figure 1-1). This switch has two settings: RB and RR. When set to the RB (read buffer) position, the LOTUS 710 performs the same functions as the LOTUS 700 in an identical manner. For example, it reads an entire track and checks for errors and may be used to run the DC700 diagnostic programs.

When the switch is set to the RR (read regardless) position and the read-FIFO command (see Section 1.3) is issued, a read-regardless operation is performed. The LOTUS 710 reads a sector in the MARK 3 format without error checking by the hardware. This feature enables the user to convert the disc data in installed MARK 3 format to the LOTUS 710 format quickly and efficiently by using the conversion option of DISCUTILITY 2.1 (see Section 1.2).

> **NOTE**
>
> When the LOTUS 710 Disc Controller is in RR-mode, the FIFO reset bit is inhibited. This may result in 18 extra words being read into the FIFO buffer if the read-FIFO command is a read or write command (see Section
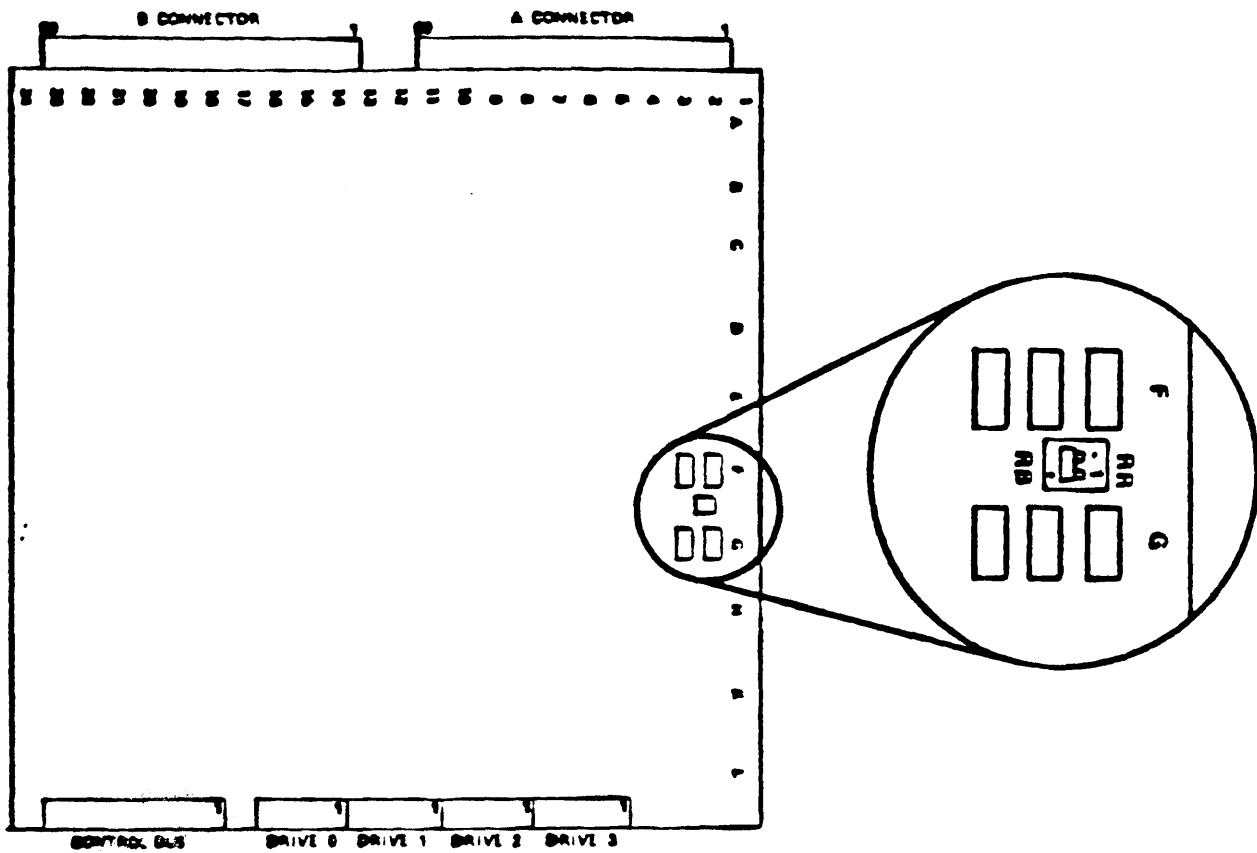
Figure 1-1.   LOTUS 710 Disc Controller Board

1.3 READ-REGARDLESS OPERATION

The read-regardless operation should be used only for discs formatted on a MARK 3 system. The RB/RR switch on the LOTUS 710 board must be set to the RR position. When a read-FIFO (1101) command is issued, one sector of data is brought into memory. The number of words written into memory depends on the previous command issued.

If the preceding command was also a read FIFO, each of the following is read into memory:

- Five words from the header including the header CRC (see Figure 1-2)

- 256 data words

- One data CRC word

If the preceding command was a read or write-type command, the following is read into memory:

- 18 words from the FIFO buffer

- Five words from the header including the header CRC

- 256 data words

- One data CRC word

The first 18 words should then be ignored.

```
┌─────────────────────────────────────────────────────────┐
│                                                         │
│              18-WORD FIFO SECTION†                      │
│           (DEPENDING ON PREVIOUS OPERATION)             │
│                                                         │
├─────────────────────────────────────────────────────────┤
│              CYLINDER NUMBER                            │  ┐
├─────────────────────────────────────────────────────────┤  │
│  SECTOR NO. •256 + HEAD NO. + 16 (IF FIXED PLATTER CMD)†│  │ HEADER
├─────────────────────────────────────────────────────────┤  │ SECTOR 1
│       ALTERNATE CYLINDER NO. (CHAINING)                 │  │
├─────────────────────────────────────────────────────────┤  │
│                  RESERVED                               │  ┘
├─────────────────────────────────────────────────────────┤
│                 HEADER CRC                              │
├─────────────────────────────────────────────────────────┤
│               DATA – WORD 1                            │
├─────────────────────────────────────────────────────────┤
│                      ▲                                  │
│                      │                                  │
│  1 SECTOR {          │                                  │
│                      │                                  │
│                      │                                  │
│                      ▼                                  │
├─────────────────────────────────────────────────────────┤
│               DATA – WORD 256                          │
├─────────────────────────────────────────────────────────┤
│                 DATA CRC                               │
└─────────────────────────────────────────────────────────┘
```

†VALUES ARE GIVEN IN DECIMAL

Figure 1-2. Read-Regardless Operation

After a sector is read into memory, an error check may be
performed by testing the data CRC as follows:

1. Set the controller into alternate mode 2.

2. Issue a DIA instruction. In the resultant word, the most
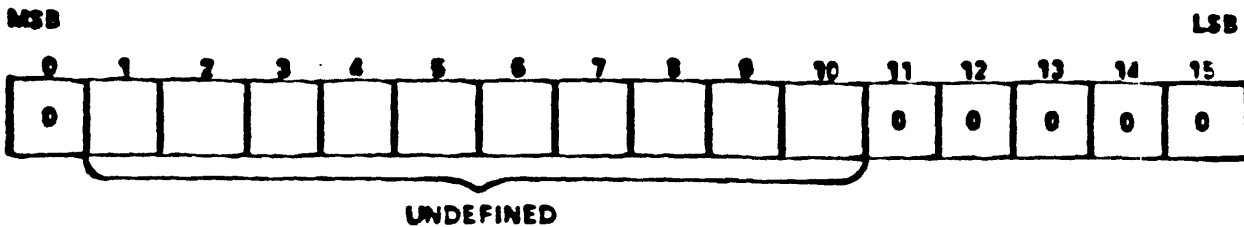significant bit (bit 0) and bits 11-15 should be zero (see
Figure 1-3).

MSB   LSB

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0											0	0	0	0	0

UNDEFINED

Figure 1-3. Data CRC Test Following a DIA Instruction

3. Issue a DIB instruction. In the resultant word, bits 0, 1,
2, and bits 9-15 should be zero (see Figure 1-4).

MSB   LSB

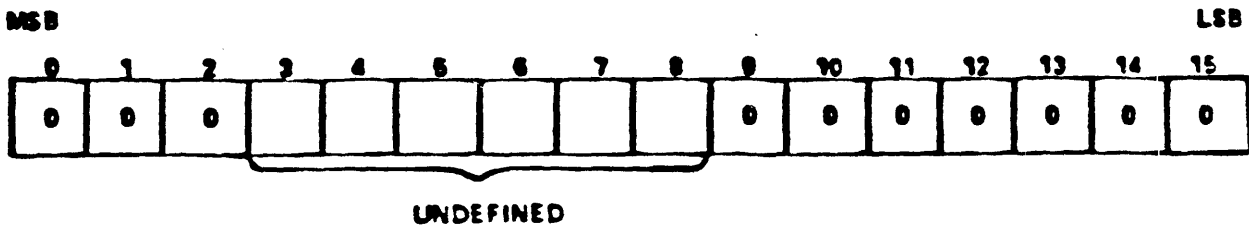| 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0							0	0	0	0	0	0	0

UNDEFINED

Figure 1-4. Data CRC Test After a DIB Instruction

If any of the bits mentioned in steps 2 and 3 are set to one, a
CRC error occurred. It may be possible to correct the data CRC
error by retrying the read-regardless operation. Currently,
there is no similar method available for testing the header CRC.

II. LOTUS 710 SOFTWARE - DISCUTILITY 2.1

POINT 4's DISCUTILITY for the LOTUS 700 and 710 Disc Controllers has been redesigned to offer most of the options previously available only on the MARK 3 DISCUTILITY programs. The new version is DISCUTILITY 2.1. It will be included in the standard IRIS 7.5 and 8.1 templates and stand-alone tapes starting in March 1983.

2.1 DISCUTILITY 2.1 (LOTUS 700 AND 710) PROGRAMS

DISCUTILITY 2.1 for the LOTUS 700 and 710 Disc Controllers is fully interactive and offers the following options:

- Copy* (disc-to-disc)

- Verify* (disc-to-disc)

- Format and 8-pass analyze

- Quick format and 2-pass analyze
  (for specialized hardware testing only)

- MARK 3 nonzero LU-to-LOTUS 710 nonzero LU disc-to-disc
  conversion* (requires the same drive type on both systems)

- Re-IPL option

- Automatic chaining of bad disc media to alternate tracks

*Allows optional selection of starting cylinder number and number of cylinders.

2.2 MARK 3-TO-LOTUS 710 FORMAT CONVERSION

The MARK 3 disc format uses a method by which sectors are interleaved on a two-to-one basis resulting in more efficient disc access. When the convert option is used, the DISCUTILITY (2.1) program rearranges the MARK 3 sectors into the order required for the LOTUS destination (see Figure 2-1).
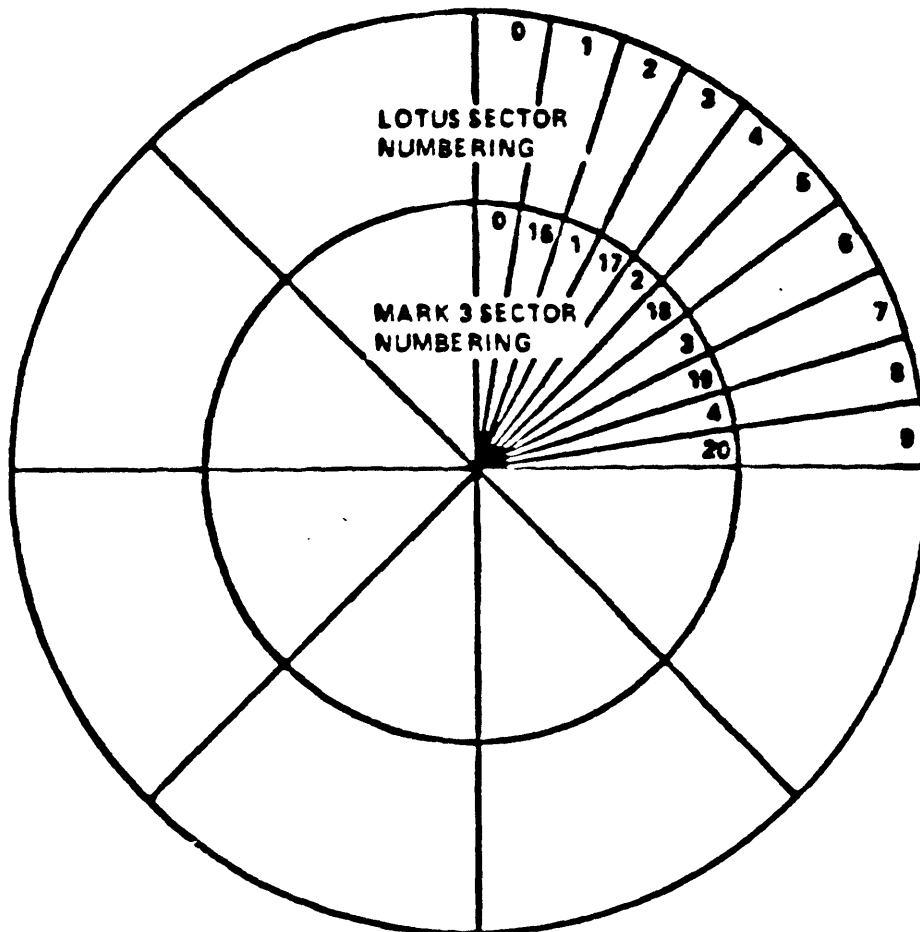
Figure 2-1. MARK 3-to-LOTUS 710 Format Conversion