AEROTECH, INC.

AEROTECH

Magnetic Tape Storage

Instruction Manual

Addendum to

Smart

Instruction Manual

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1.2 Features

Cartridge	3M, DC100A Data Cartridge
Operating Speed	30 inches per second
Transfer Rate	2400 bytes/second, average
Cartridge Capacity	100,000 bytes, average
Duty Cycle	7 start/stop operations/second, maximum

1.0 GENERAL INFORMATION

1.1 Introduction

The Magnetic Tape Storage Option to Aerotech's SMART microprocessor based motor controls provides a convenient means of storing and loading programs. Programs are first entered into SMART memory from the keyboard. These programs can then be stored (written) on magnetic tape for future use. The 100,000 byte capacity of a single cartridge is equivalent to 800 feet of paper tape. The SEARCH function allows multiple programs (records) to be stored on the tape and searched for when needed.

3.0 OPERATION

All functions of the magtape option are controlled by the SMART front panel keyboard in the EXT mode. A summary of the commands is given below:

-   Rewinds to the Beginning of Tape.

STEP Winds past 1 record on magtape.

0 Sets the Memory Pointer (MP) to the Beginning of Memory (BOM).

ERASE Clears the display.

ENTER Reads the next record from magtape to the location specified by the MP.

START Writes to magtape, from the location specified by MP, until M30 is encountered.

SRCH Searches for the record displayed and reads it into the location specified by MP.

SHIFT 2 Selects the Mag Tape.

3.1 REWIND, -

Rewind must be the first command after loading the cartridge. Press - to rewind to the beginning of tape.

3.2 WRITE

Writing from SMART memory to magtape is initiated by pressing START. The memory pointer points to the first byte of data to be written. (Data will continue to be written until an End of Tape code, M30, is read).

Example: Write Program 1, which is located at the beginning of memory, to magtape

2.0 INSTALLATION INSTRUCTIONS

No special installation is required for the Magtape Option since this has been taken care of at the factory before shipment. Check that the interconnecting cables, shown in Figure 1-2 and Figure 2-5 of the accompanying 3M DCD-1 Data Cartridge Drive Instruction Manual, have not been dislodged during shipment.

pointer to the start of Pgm 2.

Search for N1500 (start of Pgm 2).

MDI: SHIFT N1500

EDIT: SHIFT SRCH

The number of bytes from the beginning of memory to
N1500 are displayed. Press STEP and N1500 is displayed :
the memory pointer is now pointing immediately following
N1500. Press - and the pointer is now just before N1500.
Write the program to tape

EXT: START

3.3 READ

Reading the next record on magtape to Smart memory is
initiated with the ENTER key. Set the MP to the desired start-
ing location (press 0 if the program is to be loaded to the
BOM) prior to pressing enter. To set the MP to any other
location, use the EDIT mode.

Example: Read the next record on magtape to BOM.

EXT: 0

EXT: ENTER

Example: Read the next record on magtape to the end of Pgml
(End of Pgml is N250 M2). Search for the end of Pgml.

MDI: SHIFT N250

EDIT: SHIFT SRCH

EDIT: STEP STEP (display now reads M2)

Enter the program

EXT: ENTER

Enter M30 at the end of Pgm. 1. Assume the first block of PGM 1 is N 100 and the last block is N250.

```
N 100          ⎤
   .           ⎥
   .           ⎬     Pgm 1
   .           ⎥
N250 M2        ⎦

N1500          ⎤
N2000 M2       ⎬     Pgm 2
M30            ⎦
```

To enter M30, search for the last block (N250) of Pgm 1.

MDI: SHIFT N250

EDIT: SHIFT SRCH

The display now shows the number of bytes from the beginning of memory to N250. Press STEP and N250 will be displayed. Press step again and M2 will be displayed. The memory pointer is now between M2 and N1500 and any data entered will be inserted between M2 and N1500. Enter M30.

MDI: ERASE   SHIFT   M   30   ENTER

The end of tape code has now been inserted at the end of program 1, to terminate the magtape write command so that only Pgm 1 is written onto the tape.

Set the memory pointer to the beginning of memory

EXT: 0

Write Pgml on the magtape

EXT: START

When the program has finished loading, the keyboard will be active to accept further commands.

Example: Write Pgm2 to magtape. Program 2 already has M30 at its end, so it is only necessary to set the memory

3.5 Wind Past One Record, STEP

Each program written on magtape has in IRG (inter-record gap) following it, to distinguish between records. Pressing STEP causes the tape drive to wind until an IRG is recognized, causing a single record to wind by. This is only true in the forward direction. Rewind(-) runs back until the beginning of tape.

3.4 SEARCH

Entering the block number of the FIRST TAPE COMMAND into the display and searching will cause the drive to load only the record (program) whose first command matches that of the display.

The memory pointer locates what part of memory the record is loaded to.

Example: Load the program whose first command is N1500, to the beginning of memory.

    MDI: START (sets the memory pointer to the beginning of memory)

    MDI: SHIFT N1500

    EXT: SHIFT SRCH

The drive will run until a record is encountered whose first command is N1500, and load that program starting at the beginning of memory.

Example: Load the program whose first command is N 1500 to the end of Pgm1 (Pgm1 ends with N250 M2). Search for the end of Pgm1 to set the memory pointer.

    MDI: SHIFT N250

    EDIT: SHIFT SRCH

    EDIT: STEP STEP (Memory pointer follows M2)

    MDI: SHIFT N1500 (display the record search for)

    EXT: SHIFT SRCH

Note that there will be an M30 at the end of each program written to memory.

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error condition caused typically by tape dropouts) this error indication appears.

N-90012   CHECKSUM Error. When Smart writes a record on magtape it adds a checksum to the end of the tape. When this record is read back into memory, Smart compares a checksum which it generates to the one stored on tape. If they do not agree, this error message is displayed.

N-90023   IC and CHECKSUM Errors. Both an IC and checksum error have occurred.

4.2   Display

The third and fourth digits on the display indicate the tape operation when a command is given.

Display	Action
Both extinguished	The last command has been completed (step, rewind, write record to tape).
75	A tape has been inserted and is rewinding.
55	The tape is rewinding.
35	The tape is winding forward.

Normally the first indication (both digits extinguished) is the only one of concern to the user, to notify that rewind is completed, a record has been stepped past or a record has been written to tape. The completion of sequential commands can be observed by depressing ERASE (to cause all zeros to be entered into the display) and then the next command. Note that this is not required for operation, it is only a visual indication to

4.0   PROGRAMMING

In order to write a record on magtape, the program must have an M30 code at its end to notify SMART that this is the final command to be written to tape.

The memory pointer must always be set to notify SMART where in memory the program is coming from when writing a program from memory to magtape. The memory pointer must also be set to notify SMART where the record is to be read to when reading a record from magtape to memory. See Section 3 for command details.

When reading a record from magtape to SMART memory, previously stored programs are not shifted down as when entering data from the keyboard. That is, records from tape can not be inserted between existing programs in SMART memory. Records can only be added after existing programs. To place programs in SMART memory in a specific order, write all the programs on magtape and read them back into memory in the order desired.

It is not recommended that the programmed tape be left engaged in the assembly (a logic failure could cause the tape to wind off the reel end). When not using, simply push the release button and the tape will disengage from the motor drive.

4.1   Error Messages

The error messages pertaining to the magtape option are:

N-90000 No Errors.

N-90011 IC error. An incomplete character was read from the magtape. SMART sends and receives 8 bit byte to the magtape option. If a complete 8 bit byte is not read (indicating an

5.0   TROUBLESHOOTING AND MAINTENANCE

Refer to the enclosed DCD-1 Data Cartridge Drive Instruction Manual for maintenance and minor troubleshooting information.

The first step in troubleshooting should be to verify the presence of power supply voltages on the two cards connected to the tape drive assembly.

+14 VDC (+12 to +16) on J6 - 1 & 5 of the Motion Control/ RW Amp (the card connected to the tape drive assembly). Gnd is J6 - 2 and 4.

+5 VDC (+5%) on J6 - 5 of the Motion Control Card and J1 - 3 of the Data Control Card (the card with the 50 pin connector). J1 - 2 and 4 of the Data Control Card are gnd.

If power supply voltages are present, card substitutions should be made. If Smart is functioning properly except for the Magtape option, substitute the I/0 card D 690 - 1102 (first card behind front panel). Then the two cards for the magtape option (Motion Control and Data Logic Cards), then the tape drive assembly.

the user.

The numbered codes are an aid in troubleshooting to verify that the tape drive is following commands properly. For example, code 35 should never be displayed for more than a few seconds since it is indicating a forward wind to a starting position after a rewind.

MAG TAPE MANUAL ADDENDUM

To use the Mag Tape option in the Ext Mode, the SMART must be instructed to talk to a parallel input verse a serial input (TTY/RS232) by pushing Shift and "M" push buttons on the SMART keyboard. If TTY or RS232 option was also purchased, they may be selected by pushing Shift and "Z".