

Coleco ADAM SD DDP Info Pack

ADAM DIGITAL DATA PACK (DDP) TAPE INFORMATION

Tape Specifications

Effective data transfer rate	1.4K per second
Tape Speed	
Normal	20in per second
Fast Forward/Rewind	80in per second
Tape Capacity	256K bytes
	2 tracks
	128 blocks per track
	1 block = 1K

Encoding

Data on the tape is encoded using Differential Manchester Encoding (DM) also called bi-phase mark encoding. DM encoding is a line code in which data and clock signals are combined to form a single 2-level self-synchronizing data stream.

From Howard Eglowstein:

"...a game tape uses the format developed by Gerry Wheeler who worked with Walter Banks. Tape blocks are identified by the letters 'GW'. After I put the tape drive on Adamnet and we decided to make the alternative format for files, they became 'HE' format tape blocks."

GW format (Right Directory)

Block Layout

Track 0 blocks 00-7F
Track 1 blocks 80-FF

Block Physical Layout

Track 0 blocks 00-7F Directory starts at block 01h
Track 1 blocks 00-7F

HE format (Center Directory)

Block Layout

Track 0 blocks 40-7F, 0-3F
Track 1 blocks 80-FF

Block Physical Layout

Track 0 blocks 00-7F Directory starts at block 41h (65)
 Track 65 as block 1
Track 1 blocks 00-7F

Track Format

Tape Block Header

```
2-byte header ID
    4757h = GW
    OR
    4845h = HE
2-byte block number, this is translated block to the tape physical
    block. The tape 6801 uses the routine CALC_PHYS to calculate
    this. (00h...7Fh)
2-byte one's complement of block number
2-byte max block number
    number of blocks on this track, this is always: 80H = 128
1-byte Checksum
    one's complement sum of above
```

The Coleco ADAM SD DDP uses the HE (center directory format).

CALC_PHYS code in C:

```
//calculate tape physical block
phys_block = 64 + WantedBlock;
if (phys_block > 128)
    phys_block = 128 - phys_block;
```

Track Data (1048 bytes) sent to Tape 6801

Sync character 16H

```
0 byte | 0 byte | 0 byte | SYNC byte 16H | TAPE HEADER (9 bytes) | 0 byte | 0
byte | 0 byte | 0 byte | SYNC byte 16H | DATA (1024 bytes) | 0 byte | 0 byte
| SYNC byte 16H | CRC hi byte | CRC lo byte | 0 byte
```

ADAM DDP Drive Connector Pinout

```
1-1    Brake (active high)
1-2    Go reverse (active low)
1-3    Go forward (active low)
1-4*   Stop (active high)
1-5    Speed select 0 = slow or 1 = fast
1-6    Ground
1-7*+  MSense 1 tape is moving, 0 tape is stopped
1-8    -12V
1-9*+  Tape indicator (active low tape inserted)

2-1    Data in - from Tape 6801 to drive
2-2    Track A/B high track A, low track B
2-3    Ground
2-4    +5V
2-5+   Data out - from drive to Tape 6801
2-6    +12V
2-7*   Write Mode write logic 0, read logic 1
2-8    No Connection
```

+ = pins the data drive can write to

* = pins that are independent for each data drive

Motherboard Pinout Diagram

TAPE A	1	2	3	4	5	6	7	8	9
TAPE B	1	2	3	4	5	6	7	8	9

TAPE A	1	2	3	4	5	6	7	8
TAPE B	1	2	3	4	5	6	7	8

Signals needed for SD DDP

TAPE A	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9
--------	-----	-----	-----	-----	-----	-----	-----	-----	-----

TAPE A	2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8
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NOTE: DO NOT connect anything to the pins marked in RED. These either have live voltages or are not needed!

Tape Drive Notes

The tape drive is dumb. It does not know what block the 6801 wants to read. The only commands sent to the drive are BRAKE, STOP, FORWARD, REVERSE, SPEED, TRACK, MODE (READ or WRITE).

The only data sent to the tape 6801 from the drive is the Track Data (see above).

The only data sent to the drive from the tape 6801 is the Write Data (see below).

When the tape drive receives signal to fast forward start clock. When fast forward stops, stop clock and calculate how many blocks have passed:

Length of time for 1 block to pass under the tape head:
15000 bits @ 714.3 bpi = 21.00 in.

At 80 ips, 21.00 in. travels by in 0.26 seconds
1 block = 0.26 seconds

When writing the tape 6801 sends 1035 bytes for each block in the following sequence:

Write Data

0 byte | 0 byte | 0 byte | 0 byte | SYNC byte | Data 1024 bytes | 0 byte | 0 byte | SYNC BYTE | CRC High Byte | CRC Low byte | 0 byte |

ARDUINO MEGA2560 PIN ASSIGNMENTS

PIN	FUNCTION	ADAM DDP PIN
2	MODE (Read or Write)	2-7
3	STOP	1-4
10	CS for SD card	
13	LED	
18	TX to Tape 6801	2-5
19	RX from Tape 6801	2-1
20	SDA for OLED	
21	SCL for OLED	
22	Button (File Up)	
24	Button (File Down)	
26	Button (Mount/UnMount)	
32	REVERSE	1-2
34	FORWARD	1-3
36	SPEED	1-5
38	MSENSE (Tape Moving)	1-7
40	TAPEIN	1-9
42	TRACK	2-2
50	SD MISO	
51	SD MOSI	
52	SD SCK	
3V3	SD card power	
GND	SD Ground	
5V	Breadboard 5V to OLED	
GND	Breadboard Ground to OLED	
GND	Ground	1-6
GND	To Breadboard	
5V	To Breadboard	

CONNECTION DIAGRAM

