5. STREAMER SMEA 07

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5.1 General

Streaming is a method of recording on magnetic tape where the tape is continuously moving and data blocks are continuously recorded.

The tape drive can be utilized for either Winchester backup or general data storage in the streaming, start/stop or data distribution mode.

5.1.1 Tape cartridge loading unloading

The tape is loaded into the drive by pushing it into the front loading slot. The tape is loaded bei pushing forward until the cartridge is latched.
The tape cartridge is unloaded by simply pushing it into the drive until it stops, thus releasing the cartridge and unloading the head/carriage assembly, allowing it to be ejected from the drive.

NOTE:
The tape cartridge can be unloaded during a read/write operation.

The tape cartridge used is a standard 1/4-inch tape (Figure 5.8)
The following tape cartridges are recommended to be utilized with the tape drive:

DC 600A	600ft Data Cartridge	60 MB
DC 300XL	450ft Data Cartridge	45 MB

The type of cartridge being used is transparent to the user, due to the drives automatic capability to select the proper write currents and read gains for the respective cartridge being utilized.

To eliminat alignement differences of tapes generated by other drives.
The drive seachs a Track-Referenz-Burst between BOT and LP (Load Point Fig. 5.8) and positions the heads to kompensate for alignement differences.
If a reference burst is not found in the Read Data mode, the drive automatikally defoults to a mechanikal Track 0 referece.

The Basic-Drive-Mikroprocessor Nr. 20461 enables the seeking of the Track-Referenz-Burst if a reset is received.
The Basic-Drive-Mikroprocessor Nr.20585 enables the seek funktion only on selekted drives.

5.2 Technical Data

Capacity:

Tape-Cartridge	DC 300XL	DC 600A
Tape lenght	450 Feet (137m)	600 Feet (182m)
Formatted-Capacity	45 MByte	60 MByte

Drive Parameter:

Head Type	Read after write with Erase-Bar and Cleaner-Blade
Recording	9 Track serpentine
Recording-Code	GCR 0.2 (Group Code Recording)
Nominal Density	10000 Flux Transition per Inch
Tape speed	90 IPS (during read/write)
Speed Variation (during read/write):	
Short Term	+-7%
Long Term	+-3%
Start/Stop-Time	300 msec. max.

Data Transfer:

Data Transfer Rate	86.7 KBytes/Second
Read/Write retries	16 max.

Installation Parameter:

Weight	ca. 2 Kg
DC Voltage	+12VDC und +5VDC
Current +12VDC	1,6A
Current +5VDC	3,5A
Power Disipation	32 Watt
MTBF	8000 Hours
Temperature (operational)	+5 to +35 Degrees
Relative Humidity	20% to 80%
Acoustical Noise	48,6 dB (A)
Shock (operational)	11 msec 2,5 G/s

5.3 Drive Components

The streaming tape drive is a innovative, high reliable 1/4 inch wide cartridge tape drive. It consist of two components:

- Basic-Drive
- Formatter

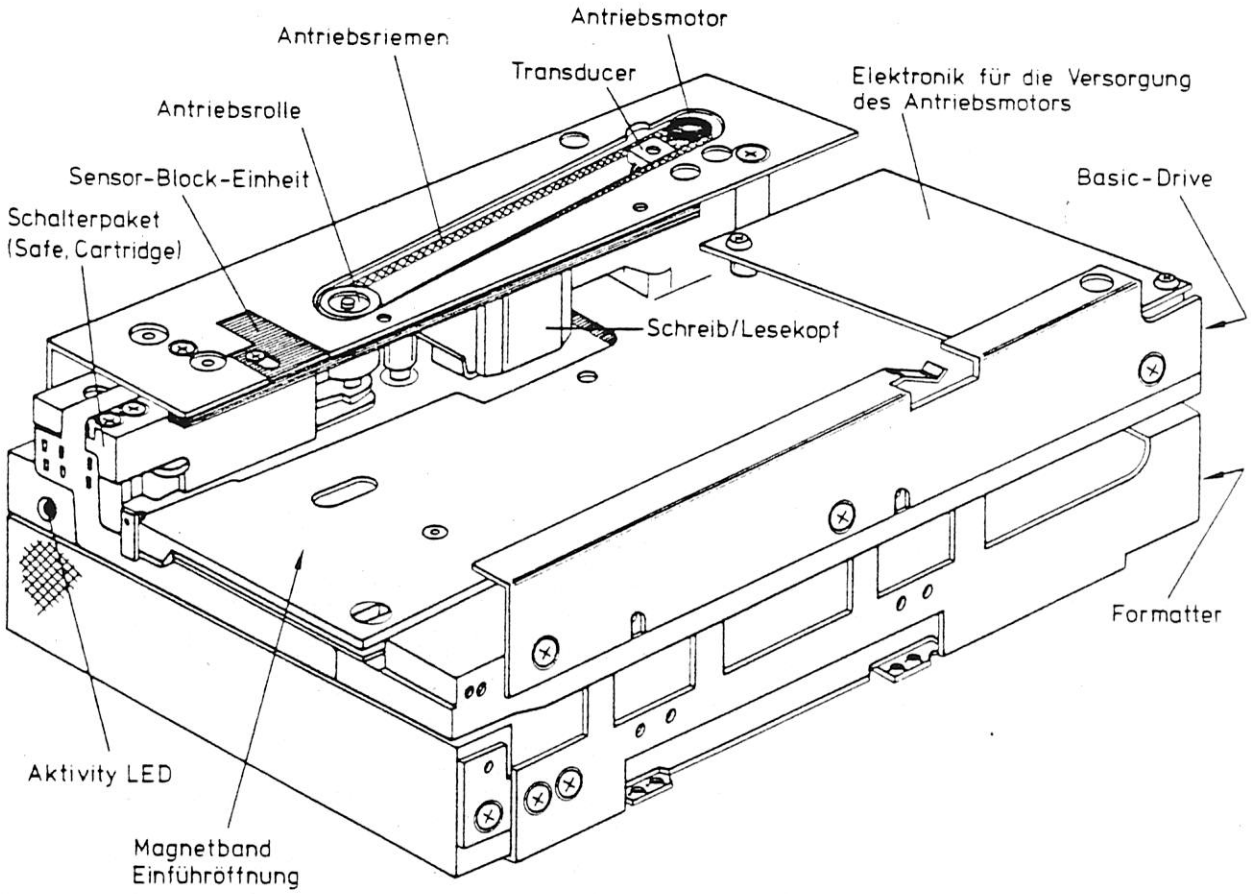


Fig. 5.1 Streamer-Drive

5.4 Functional Description

5.4.1 Basic-Drive

The Basic-Drive consist of the follows components:

- Head Carriage and Stepper Motor Assembly (Fig. 5.4)

  Positioning of the head to the desired track is accomplished by a stepper motor lead screw positioning mechanism. The drive signal to the stepper motor is generated by the CPU on the formatter, and interpreted by the drive microprocessor.

- Read/Write Head Assembly

  Reading and writing on the tape in 9-track format is performed by a two channel serpentine recording head, arranged with "read, after write" poles with a full tape erase bar.

  CH0: used during the forward direction only
  CH1: used during the reverse direction only

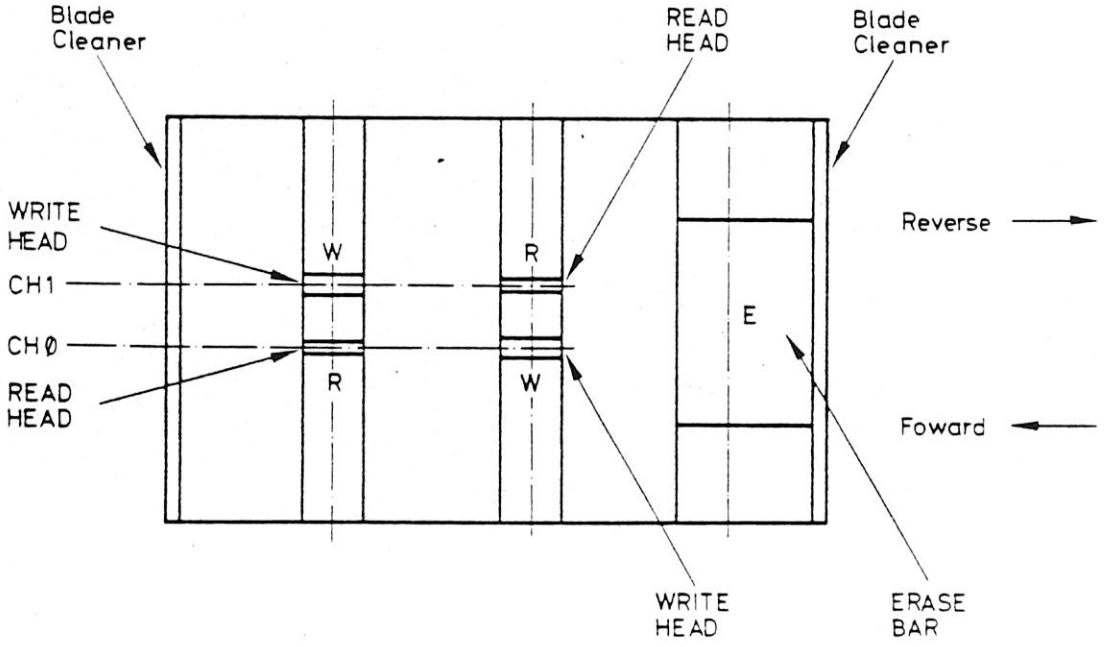


Fig. 5.2 Read/Write

- Capstan Motor System

The capstan motor assembly is controlled by the drive microproccesor. The speed is also monitored by the formatter, which uses a signal derived from a tachometer. Instantaneous speed variation is held within +/- 7%, while long term speed variation is limited to +/- 3%.

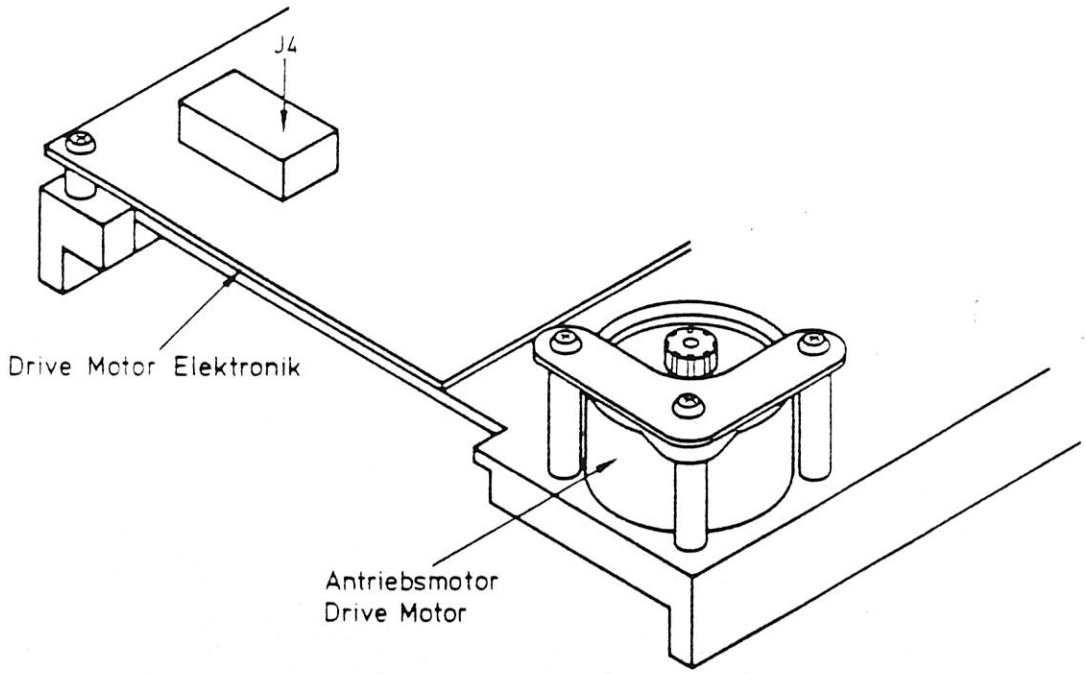


Fig. 5.3 Capstan Motor

Tape Hole Sensor Assembly

The system for detection of End of Tape (EOT), Beginning of Tape (BOT), Load Point (LP), and Early Warning (EW) holes utilizes optical sensor assemblies, the output of which are synchronously clocked into the formatter`s CPU.

- "Safe" and "Cartridge In" Switches (Fig. 5.1)

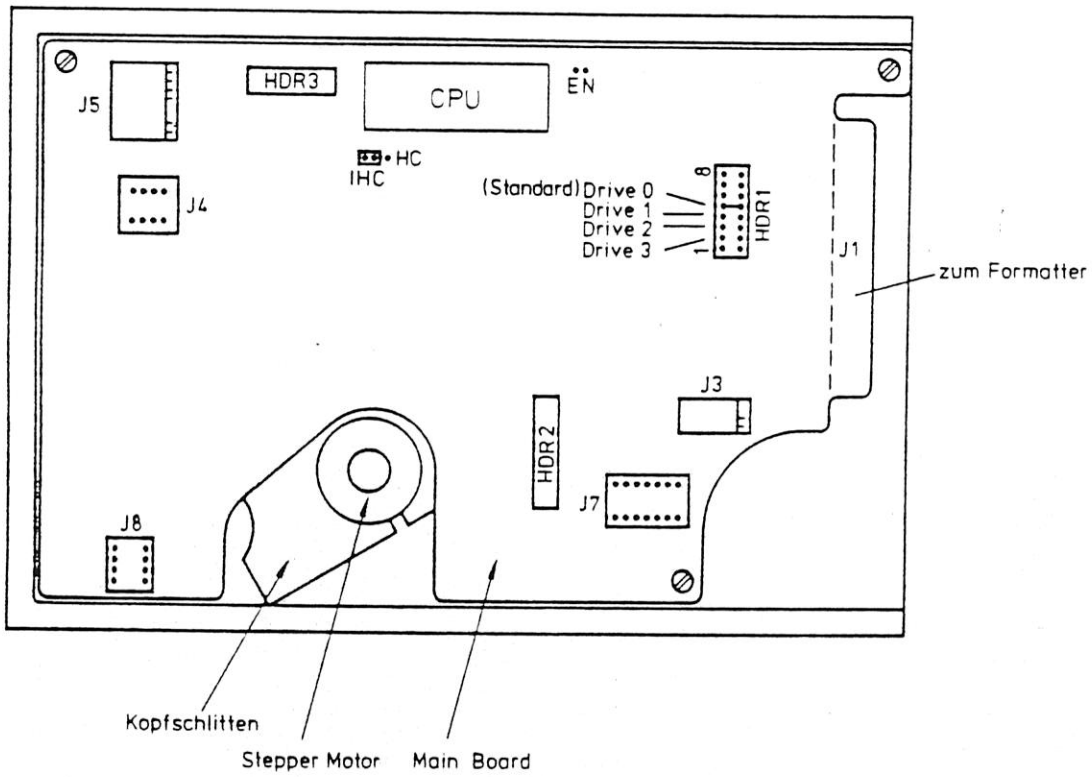
The first switch controlls, if the tape is loaded.
The second switch controlls, if the tape is write protected.

- Motor Drive Board (Fig. 5.3)

All motions from the Capstan Motor (FRW and REV) consists of the Motor Drive Board.

- Main Board

The Main Board with its microprocessors are the kernel for the drive operation, and maintains control of the stepping mechanism, drive motor, and decodes all the commands from the formatter.



HDR1: Select Jumper
HDR2: Res.
HDR3: Phase of Stepper Motor

Fig. 5.4 Main Board

- Aktivity LED (Fig. 5.1)

The activity LED is illuminated when the drive is selected and busy. It is enabled by the select lines in conjunction with the user selectable DIP shunts.

5.4.2 Formatter

All Streamer-Functions are controlled by the Formatter.
The formatter provides a communication path from QIC 02 (Host-Interface C. 5.5.1) to QIC 36 (Basic-Drive-Interface C. 5.5.2)
The Data-Recording-Format is specified by the QIC 24 (Cha. 5.5.3)

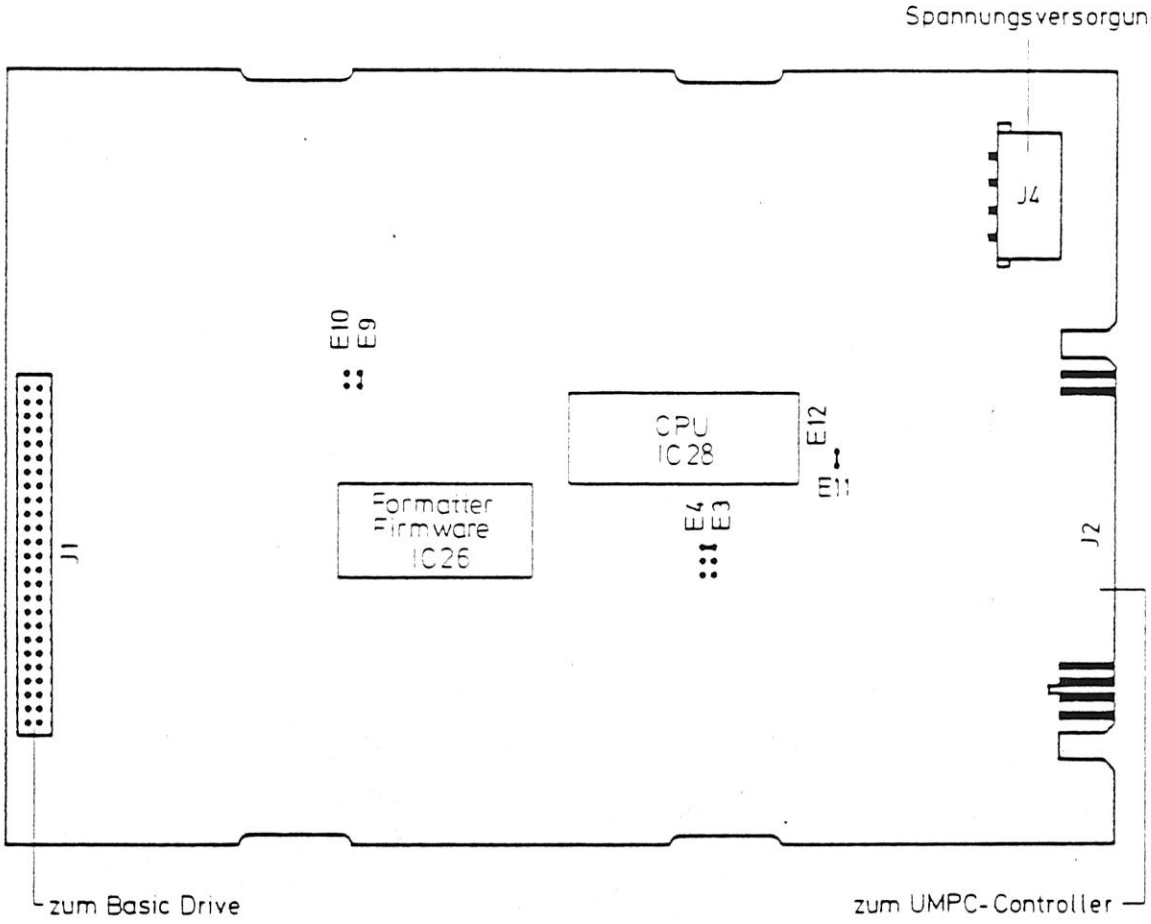


Fig. 5.5 Formatter

5.5 Interfaces and Signal-Plugs

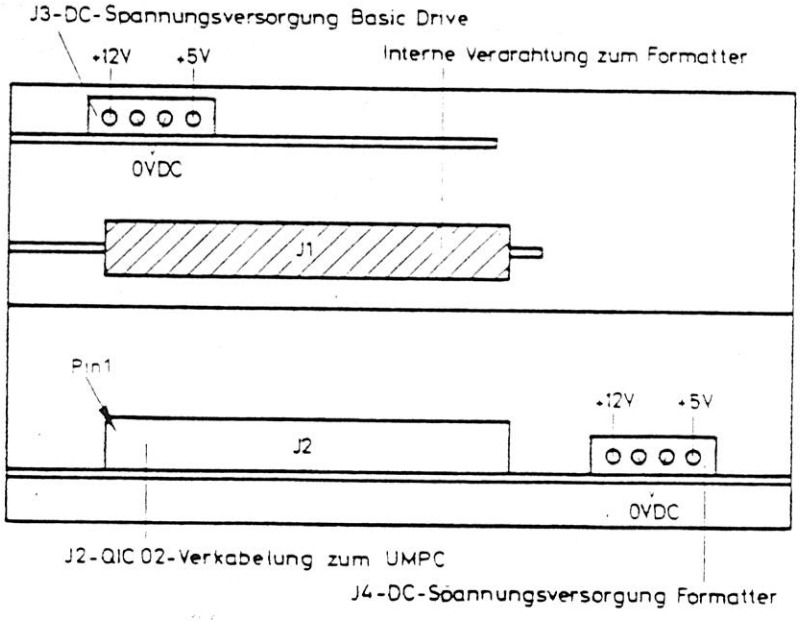


Fig. 5.6 Signal-Plugs connection

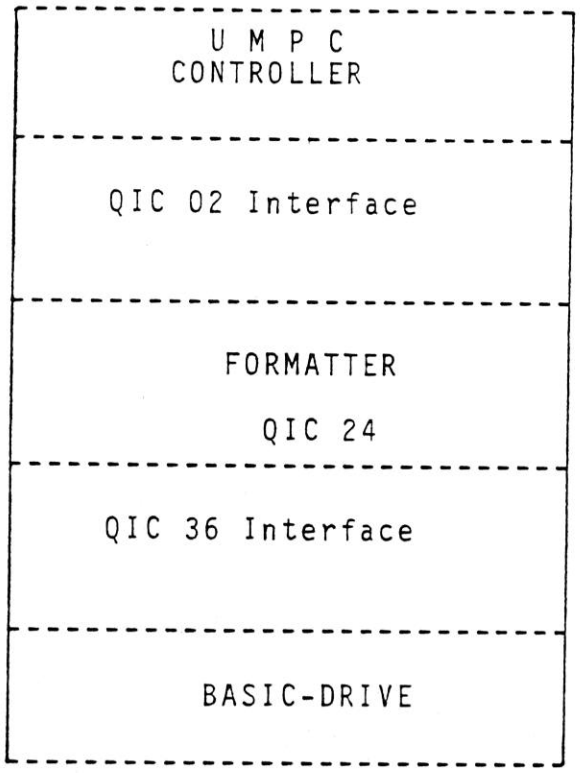


Fig. 5.7 Streamer System Interface Configuration

5.5.1 QIC 02 (Host-Interface)

The QIC 02 Interface is an 8 Bit-Parallel-Interface. It whas designed to attach tape devices. The UMPC-Controller and the streamer are connected with a 40-wired cable.

5.5.2 QIC 36 Interface

The QIC 36 interface is a serial device interface between formatter and basic drive. The dates are in this case since coded (GCR=Group Code Recording). This interface is standard.

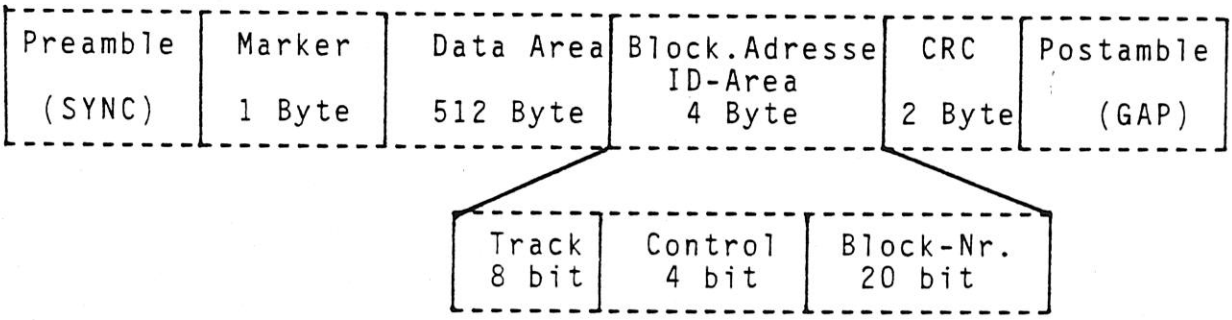
5.5.3 QIC 24

This section defines the QIC 24 format and recording standard for the streaming 1/4 inch wide magnetic tape cartridge to be used for information interchange among information processing system, communications system and associated equipment.

The following data format is defined in the QIC 24:

- Data recording in 9 tracks, track 0 to 8.
- Even numbered tracks are recorded serially in the forward direction of tape movement. Odd numbered tracks are recorded in the reverse direction of tape movement.
- Tracks are recorded sequentially in the order 0,1,2,3,...7,8.
- Track spacing 0,024 inch (0,61 mm)
- Track width 0,0135 inch (0,34 mm)
- If recording on track 0, then the erase head is enabled.

Recording Format of the Date Block



Recording Code

Recording on tape is done with the GCR-Code. The conversion of the datas starting with NRZ to GCR (Group Code Recording) does the formatter and looks as follows: Each 8-bit data byte is separated into two 4-bit groups (nibbles). Each 4-bit data nibble is encoded into a 5-bit GCR nibble for recording on the streaming magnetic tape cartridge. The most significant nibble is recorded first. The encoded data has the property that no more than two consecutive "zeros" occur. The translation table for data nibbles (B3, B2, B1, B0) and GCR nibbles (G4,G3,G2,G1,G0) are as follows:

Hex Value	Halfbyte B3	B2	B1	B0	GCR Code G4	G3	G2	G1	G0
0	0	0	0	0	1	1	0	0	1
1	0	0	0	1	1	1	0	1	1
2	0	0	1	0	1	0	0	1	0
3	0	0	1	1	1	0	0	1	1
4	0	1	0	0	1	1	1	0	1
5	0	1	0	1	1	0	1	0	1
6	0	1	1	0	1	0	1	1	0
7	0	1	1	1	1	0	1	1	1
8	1	0	0	0	1	1	0	1	0
9	1	0	0	1	0	1	0	0	1
A	1	0	1	0	0	1	0	1	0
B	1	0	1	1	0	1	0	1	1
C	1	1	0	0	1	1	1	1	0
D	1	1	0	1	0	1	1	0	1
E	1	1	1	0	0	1	1	1	0
F	1	1	1	1	0	1	1	1	1

Preamble

This information is done automatically with the write action of the formatter and is used to synchronize the phase locked loop in the read electronics to the data frequency. Also gives the preamble informations, in which mode the write datas are recorded:

- Streaming Mode: 120 - 300 flux transitions
- Start/Stop Mode: 3.500 - 7.000 flux transitions
- Beginning of Tracks: 15.000 - 30.000 flux transitions

Data Block Marker

The data block marker identifies the start of data and consists of the following GCR pattern: 11111 00111

Data Block

The data block contains 512 bytes of data for interchange encoded into GCR bytes in accordance with the CODE.

Block Number

The block number uniquely identifies a block over a group of 256 blocks and is used in error detection and tape positioning. The first block on the tape is block 1 and subsequent blocks are numbered sequentially.

CRC (Cyclical Redundancy Check)

The cyclical redundany check (CRC) consists of two bytes calculated over the 512 bytes of interchange data and the 1 byte block number.

Postamble

A postamble recorded at the maximum nominal flux density is recorded following the CRC as a guard band. With this postamble, written by the formatter automatically at end of each block, is given an information also:
- Streaming Mode: 5 - 20 flux transitions
- Start/Stop Mode: 3.500 - 7.000 flux transitions

File Mark
=========

The file mark block format is identical to the data block format except that the data field contains 512 bytes consisting of the following GCR pattern: 00101 00101

Rewritten Block
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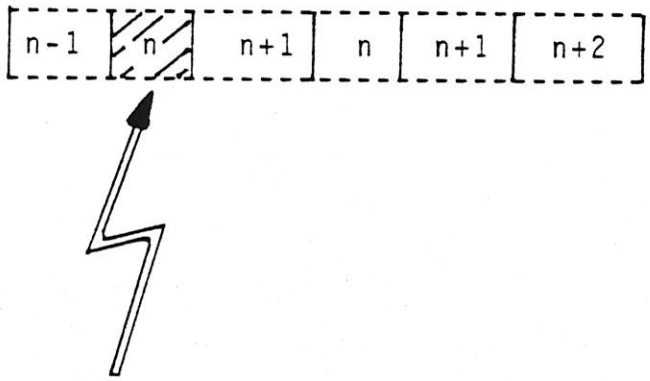
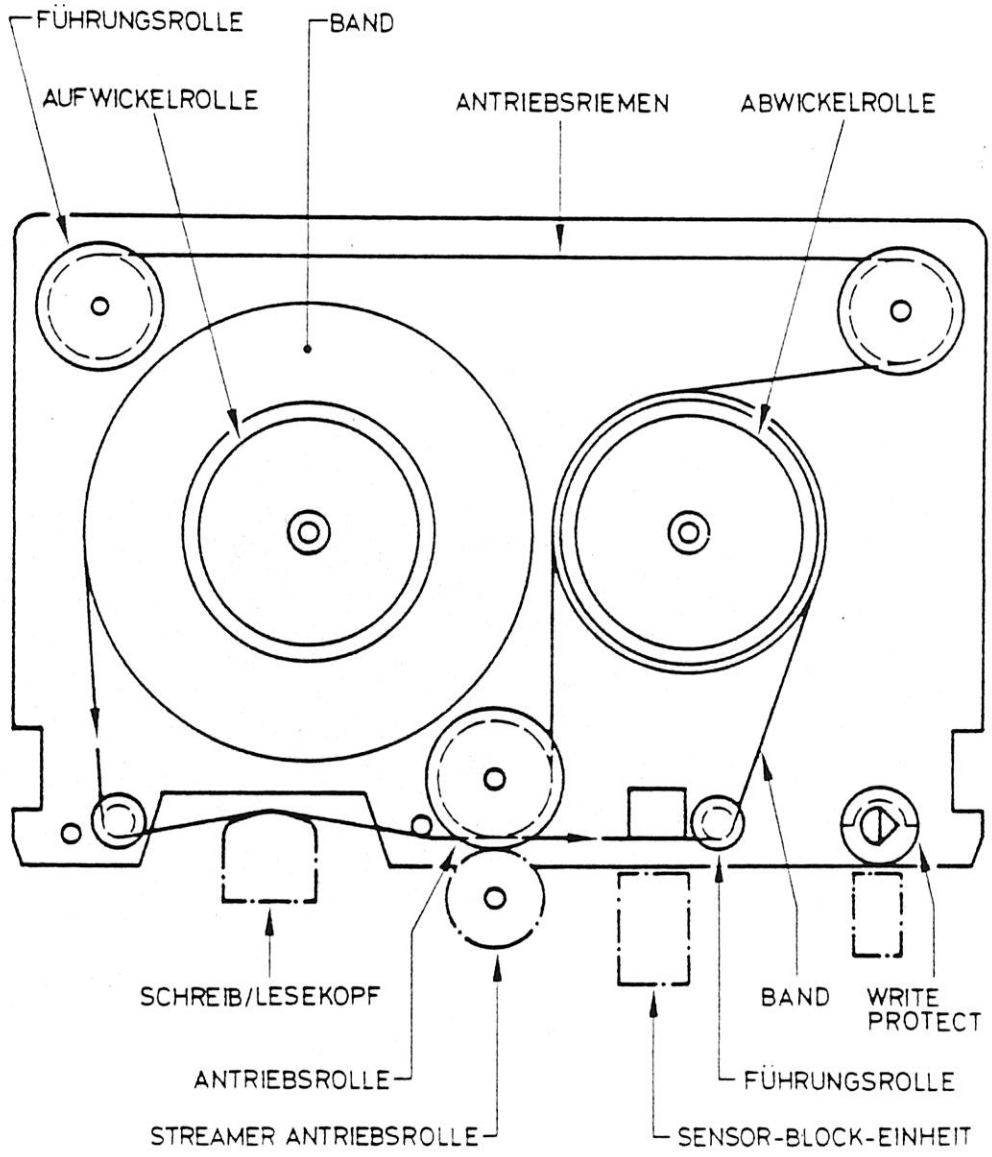
A data block is tested for interchange requirements during the read after write check. If a block does not satisfy the requirements for interchange, it is written up to 16 times before the recording operation is aborted.

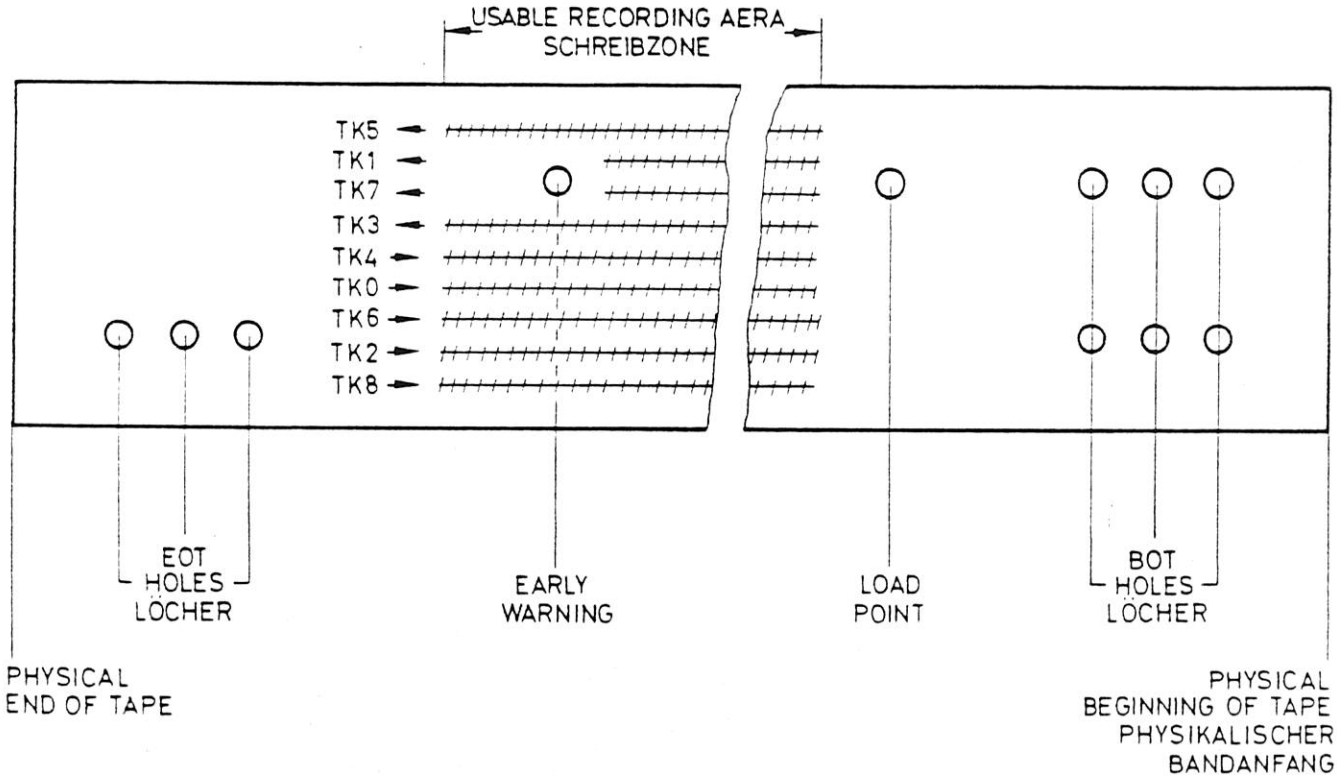


5.6 Magnetic Tape Cartridge

The used cartridge is a standard 1/4 inch magnetic tape (see sketch 5.8)
The cartridge is to protect against dust, moisture and extreme temperature. Also the user never shall open the tape-cover and therefor to expose the tape.
The cartridge is write protected, when the arrow of the write protect knob is turned to SAFE.



scetch 5.8 (Magnetic Tape Cartridge)



scetch 5.9 (Physikal Tape Structure)

5.7 Maintenance

No maintenance necessary.
Expection: Clean the Write/Read Head

5.7.1 Cleaning the Write/Read Head

Cleaning the head should done weekly with the Cleaning Cartridge (Part E 700.60045) in SWITCHED OFF state of the streamer.
Please see the operating instruction of the cleaning cartridge.