

# TEST CD

## For Checking CD Drives

### TCDR-701/ -704

#### 1. Purpose of use, Features

TCDR-701/ -704 are Test Discs designed for various kinds of evaluation, measurement and adjustment of CD-ROM Drives et It is recorded 270,149 block on TCDR-701, 341,999 block on TCDR-704 (outer utmost of a disc).

User data of TCDR-701/ -704 are processed with the same generating algorithm.

User data at each block are processed from address information of disc, location on disc conforms to Block number address.

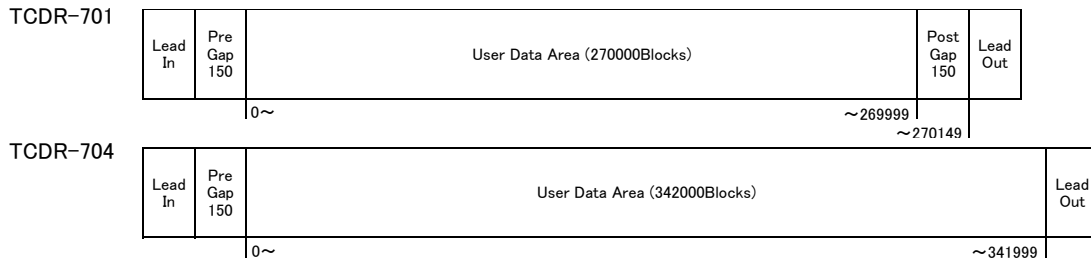
User data consist of Block Number (hex), Block Number (BCD), CD Time (BCD), CD Time (ASCII), M-sequence data and Check Sum. It is available to confirm particular block by using computer.

It is managed mechanical characteristics (Eccentricity, Vertical deviation and unbalance) and Block Error Rate for high-speed operation.

#### 2. Specifications

- Disc type : CD-ROM
- Format : CD-ROM Mode1  
note) Since it is used for various purposes, file system is not ISO9660 File Format.
- Capacity
  - TCDR-701 : 553, 267, 200 Bytes (Block 0 to 270, 149, including Post Gap)
  - TCDR-704 : 700, 416, 000 Bytes (Block 0 to 341, 999)
- User data area
  - TCDR-701 : 0 ~ 269, 999 Block
  - TCDR-704 : 0 ~ 341, 999 Block

- Disc layout (refer to 3. Details of Disc structure)



- Physical Characteristics : Complies with Compact Disc Read Only Memory System.  
However, following parameters are managed as described specifications.

Parameters	Managed Specifications		CD Specifications
	TCDR-701	TCDR-704	
Outer diameter	120 ± 0.3 mm	←	120 ± 0.3 mm
Center hole diameter	15.0 +0.1/ -0 mm	←	15.0 +0.1/ -0 mm
Substrate thickness	1.20 ± 0.03 mm	←	1.2 ± 0.1 mm
Scanning velocity (for reference)	1.30 m/s	1.20 m/s	1.2 ~ 1.4 m/s
Track pitch (for reference)	1.60 μm	1.55 μm	1.6 ± 0.1 μm
Eccentricity	≤ 40 μm(0-p)下	←	≤ 70 μm(0-p)
Radial tilt (β angle)	≤ ± 0.2° (ave.) at R38mm	←	≤ ± 0.6
Unbalance	≤ 0.2 g · cm	←	≤ 1.0 g · cm
Jitter (3T Pit)	≤ 25 ns下	←	≤ 35 ns
Block Error Rate	≤ 70 (max.)	←	≤ 220

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### 3. Details of Disc structure

#### • TCDR-701

Area	Type of content	User data	Block address Min : Sec : Block	Number of blocks	Sequential block number	Mode	Sub code	
							Ton.	Index
Lead In	Type A	-	-	-	-	1	00	-
Pre Gap	Type A	All '00'	00 : 00 : 00 00 : 01 : 74	150	-	1	01	00
User Data	Type B	Specified	00 : 02 : 00 60 : 01 : 74	270, 000	1 ~ 270, 000	1		01
Post Gap	Type A	All '00'	60 : 02 : 00 60 : 03 : 74	150	-	1		01
Lead Out	Type A	All '00'	-	-	-	1	AA	-

#### • TCDR-704

Area	Type of content	User data	Block address Min : Sec : Block	Number of blocks	Sequential block number	Mode	Sub code	
							Ton.	Index
Lead In	Type A	-	-	-	-	1	00	-
Pre Gap	Type A	All '00'	00 : 00 : 00 00 : 01 : 74	150	-	1	01	00
User Data	Type B	Specified	00 : 02 : 00 76 : 01 : 74	342, 000	1 ~ 342, 000	1		01
Lead Out	Type A	All '00'	-	-	-	1		AA

#### • Type A block structure

Sync	'00 FF FF FF FF FF FF FF FF FF 00'		12 Bytes
Header	Block address	Minutes in BCD (1 byte)	4 Bytes
		Seconds in BCD (1 byte)	
		Blocks in BCD (1 byte)	
	Mode	"01" (1 byte)	
User Data	All bytes are '00' (HEX notation).		2048 Bytes
Auxiliary data	Error Detection Code: EDC		4 Bytes
	All bytes are '00' (HEX notation).		8 Bytes
	ECC *	P-Parity(26,24) Read solomon codes	172 Bytes
		Q-Parity(45,43) Read solomon codes	104 Bytes

#### • Type B block structure

Sync	'00 FF FF FF FF FF FF FF FF FF 00'		12 Bytes
Header	Block address	Minutes in BCD (1 byte)	4 Bytes
		Seconds in BCD (1 byte)	
		Blocks in BCD (1 byte)	
	Mode	"01" (1 byte)	
User Data	'Test Data'		2048 Bytes
Auxiliary Data	Error Detection Code: EDC		4 Bytes
	All bytes are '00' (HEX notation).		8 Bytes
	ECC *	P-Parity(26,24) Read solomon codes	172 Bytes
		Q-Parity(45,43) Read solomon codes	104 Bytes

\* ECC = Error Collection Code

#### 4. Test Data Construction

(1) Data are recorded with described length, consisting 2048 bytes as CD-ROM 1 block.

Block No., Time code, M-Sequence data, Check Sum and specific ASCII data are recorded.

Group	Byte Number In User Data	Contents	Code	
A	0	LSB	Binary	
	1	Sequential Block Number		
	2	MSB		
	3	Character Code " " (20h)	ASCII	
	4	LSB	BCD	
	5	Sequential Block Number		
	6	MSB		
	7, 8	Character Code " " (20h)	ASCII	
	9	MSB	BCD	
	10	Block Number		
	11	LSB (min., sec., Block)		
	12	Character Code " " (20h)	ASCII	
	A	13	MSB	ASCII
			Minute	
14		LSB		
		Character Code "m" (6Dh)		
16		MSB		
		Second		
17		LSB		
		Character Code "s" (73h)		
19		MSB		
		Block		
20	LSB			
	Character Code "f" (66h)			
21	Character Code " " (20h)	ASCII		
22, 23	Character Code " " (20h)		ASCII	
B	24	M-Sequence( $2^{32}-1$ )Data	Binary	
C	2043			
C	2044, 2045	Character Code " " (20h)	ASCII	
D	2046	LSB	Binary	
	2047	MSB		
		Check Sum		

MSB = Most Significant Byte , LSB = Least Significant Byte

(2) Generation of M-sequence data

· The following function is used for the generation polynomial equation that generates M-sequence data.

Polynomial = 1E0000401h

The data notation adopts the method of making MSB to the left and LSB to the right.

· The default value of M-sequence data is used Sequential Sector Number +1 of each sector, the direction of bit shift move to lower bit.

Sequential Block Number = (Min x 60 + Sec) x 75 + Block +1 - 150

※ The value "150" of above formula is 2 second x 75 Block of Pregap.

(3) Generation process of M-sequence data

① The primitive polynomial equation is shifted by 1 bit to the lower bit and the result is stored into IFED (32bits data).

IFED = F0000200h

② 32bits Work Register is stored with the Sequential Sector Number +1.

③ If the LSB of the work register is 1, then Flag LSBF=1, else, flag LSBF=0.

④ The data in register is shifted by 1 bit to the lower bit bringing 0 into MSB.

(The data of LSB is cleared off.)

⑤ If LSBF=1, the work register is Exclusive-ORed with the IFED and replaced by the result.

If LSBF=0, the work register is left unchanged.

⑥ The work register is ANDed with "FFFF", in order to get the lower 16bits as the 2 bytes of the result.

The lower bytes of the result is stored into the lower address.

⑦ Keeping the work register unchanged, return to process No.3 for the next address value. This process is repeated 1009 times to generate the user data in sector.

(4) Calculation of Check Sum

In order to check data within the User Data, Check Sum is recorded in the last 2 Bytes (16bits) of this area. The Check Sum is achieved by considering 16 bits as 1 word in the User Data and accumulating all the words besides the Check Sum Bytes, and taking the lower 16 bits (2 bytes) as the result. The lower bytes of this result stored into Byte Number 2046 of the User Data, and the higher Bytes into 2047.

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5. Use data sample (Head 96 Bytes and End 32 Bytes of the sector)

(1) Head block of TCDR-701/ TCD-704

Block No. 000000 (000000h), 00min 02sec 00block \*

Address	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	ASCII
0000	01	00	00	20	01	00	00	20	20	00	02	00	20	30	30	6D	□ ... .. 00m
0010	30	32	73	30	30	66	20	20	00	02	00	01	80	00	40	00	□ 02s00f .....@.
0020	20	00	10	00	08	00	04	00	02	00	01	00	00	02	00	01	□ .....
0030	80	00	40	80	20	C0	10	E0	08	F0	04	78	02	3C	01	1E	□ ..@. ....x.<..
0040	00	0D	80	06	40	A0	81	D0	C0	68	E0	34	F0	1A	78	00	□ .....@. ....h.4..x
0050	0D	3C	06	1C	03	0E	01	05	80	00	40	80	20	C0	10	E0	□ .<.....@. ...
:																	
07E0	4E	BF	A7	5F	D3	AD	E9	D4	74	68	3A	34	1D	1A	0E	0F	□ N. .... th:4....
07F0	87	87	C3	C1	E1	62	70	B3	B8	D9	DC	6C	20	20	CD	6B	□ .....bp....l .k

(2) End block of TCDR-704

Block No. 341999 (0537EFh), 76min 01sec 74block \*

Address	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	ASCII
0000	F0	37	05	20	00	20	34	20	20	76	01	74	20	37	36	6D	.7. . 4 v.t 76m
0010	30	31	73	37	34	66	20	20	F8	9B	FC	4D	FE	A6	7F	53	01s74f ...M...S
0020	BF	2B	DF	17	EF	09	F7	06	7B	01	BD	02	5E	03	AF	01	.+.....{...^...
0030	D7	02	6B	03	B5	03	DA	03	ED	01	F6	82	7B	41	BD	A2	..k.....{A..
0040	5E	53	AF	29	D7	16	6B	09	B5	86	5A	C1	AD	E0	56	F2	^S.)..k...Z...V.
0050	2B	79	95	BE	4A	DD	A5	6E	52	35	A9	9A	54	4F	AA	A7	=+y..J..nR5..T0..
:																	
07E0	E9	B0	74	DA	3A	6D	9D	B6	4E	59	A7	2C	53	14	29	88	..t.:m..NY.,S.).
07F0	14	C6	0A	E3	85	71	C2	3A	61	9D	B0	4C	20	20	04	EB	.....q.:a..L ..

\* 75blocks = 1sec

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<Proper handling of the disc>  
 Do not write on the surface with a pen and others, nor put a sticker on it.  
 Do not expose the disc to direct sunlight, nor leave it in the place of high temperature and high humidity.  
 After playing, store the disc in its own case.

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