

TRACKER

1.0 INTRODUCTION

The Rodime 'TRACKER' is a hand-held exerciser which simulates a host controller and allows the user to exercise any 5 $\frac{1}{4}$ " Winchester disk drive which operates via the ST506 interface. This is a useful tool for checking a drive which is believed defective or which has been repaired. The 'TRACKER' comes complete with interface connectors for data and control and with a 5V supply connector. It basically comprises a keypad for parameter and instruction input and six LED's for response. The 'TRACKER' would typically be used with an oscilloscope and allows such operations as head/media and actuator verification.

2.0 'TRACKER' FUNCTIONS

- o Recalibrate
- o Seek tracks from 0 to 1023
- o Select head 0 to 7
- o Continuous seek between two tracks
- o Key selectable step rate (30 μ s to 25.5mS in 0.1 mS increments)
- o Seek demonstration routines (random, planet-satellite, alternate)
- o Write pattern select (1F, 2F, DB Hex)
- o Write/erase for one revolution
- o Write/erase for one surface (head)
- o Continuous write
- o Check index tracks -2 and -3 for Rodime disk drives

e.g. Press in Sequence to do seek

←→

300

←→

φ to abort
Recal to recalibrate

3.0 INTERFACE

The 'TRACKER' connects to the drive via the usual Data and Control bus. The flying lead is used to provide +5 volts.

4.0 COMMAND FORMAT

The 'TRACKER' accepts commands in the form of a decimal number (N) followed by one of the ten command keys. N must be in the range (0..1023) and may be entered by up to four digit-key depressions. N > 1023 will result in an error and N will be reset to 0. The RECAL command key may be used to correct mistakes and clear N to 0. N will be 0 if no digit key is pressed prior to any command key.

5.0 COMMANDS

5.1 NOTATION

N: (X..Y) N is a member of the set of positive integers between X and Y inclusive.

5.2 COMMAND DESCRIPTIONS

> N

Function:- Will seek to cylinder N at the step rate defined by the rate command. Sets 'REDUCE WRITE CURRENT' true if N > Reduce write current cylinder (RWCCYL). Sets 'REDUCE WRITE CURRENT' false if N < RWCCYL.

Errors:-

- (a) N > Maximum cylinder (MAXCYL)
- (b) 'SEEK COMPLETE' not true prior to seek
- (c) Should now be on cylinder 0 but 'TK000' not true.

<->

Function:- Will continuously seek between Present position (P) and cylinder N, 1000 times. Sets 'REDUCE WRITE CURRENT' accordingly (see >N command). Push key 0 to abort.

Errors:-

- (a) N > Maximum cylinder (MAXCYL)
- (b) 'SEEK COMPLETE' not true prior to seek.
- (c) Should now be on cylinder 0 but 'TK000' not true.

Press <->
Press 100 to go to cyl 100
Press <->

NOTE:

- (1) Flag Zero signal should be grounded prior to the execution of this command, short TP8 to TP9 on master board. The 'TRACKER' will indicate an error if this is not done.
- (2) HEAD selected will be changed to HEAD 0.
- (3) Heads will be re-positioned over track 1.

Errors:

- (a) If $N=0$ or $N : (7..1023)$.
- (b) If writes have not been enabled using $S.F.=1$.

Recal

Function:- Will recalibrate drive to TK000 if $N=0$.
This key can be used to correct mistakes and clear N to 0. No recalibrate will be performed if $N > 0$.

Errors:- None.

6.0 LED STATUS DISPLAY

LED's are provided to monitor status. They are:-

- (a) Power on. The 'TRACKER' is connected to a drive and +5V.
- (b) SEEK COMPLETE. The drive has completed the previous seek command.
- (c) WRITE FAULT. The drive has a fault.
- (d) READY. The drive is ready to accept commands.
- (e) TK000. The heads are on cylinder 0.
- (f) STATUS. The 'TRACKER' is busy executing a command. Push key 0 to abort.

7.0 ERRORS

Errors will be indicated by four consecutive notes on the buzzer. N will be reset to 0 and the command will be ignored.

Max N

Max N 320
320 cylinders

Function:- Used to set the Maximum cylinder register,
MAXCYL:=N.
MAXCYL remains set until another MAX
command.
Default:- MAXCYL:=191 on power on.
Errors:- None.

Head

Function:- Used to select one of eight heads
Head:=N (N:(0..7).
Head remains set until another HEAD
command.
Default: HEAD:=0 on power on.
Errors:- If N:(8..1023).

Data

Function:- Used to select one of three data patterns
for the WRITE command.
(i) N=1 then Pattern=1F (55)
(ii) N=2 then Pattern=2F (00)
(iii) N=3 then Pattern=Peak Shift
(DB)
DATA remains set until another DATA
command.
Default:- Pattern:=2F (00) on power on.
Errors:- If N=0 or N : (4..1023).

RWC N

Function:- Used to set the Reduce Write Current
register. RWCCYL:=N.
RWCCYL remains set until another RWC
command.
NOTE: The drive interface signal 'REDUCE
WRITE CURRENT' is not directly changed
by this command. (See commands $\rightarrow$ N
and $\leftrightarrow$).
Default: RWCCYL:=96 on power on.
Errors:- None.

Rate

Function:- Sets the step rate for all seek
operations.
Step rate := N*100us if N : (1..255)
Step rate := 30us if N=0
Step rate := 25.5ms if N=255
The step rate remains set until another
S.R. command.
Default:- Step rate:=30us on power on.
Errors:- If N : (256..1023)

S.F.

Function:- Special Functions Command.
Functions performed for each value of N are :-

- 1 Enable the WRITE command
- 2 Disable the WRITE command
- 3 Random seek sequence.
Seek 1000 random cylinders in the range 0 to MAXCYL.
End on cylinder 0. Push key 0 to abort.
- 4 Planet-satellite seek sequence.
Seek from cylinder 0 to all cylinders sequentially until MAXCYL. Then seek from cylinder MAXCYL to all cylinders sequentially from 0 until MAXCYL. Push key 0 to abort.
- * The following two commands can be used to check the special calibration tracks on -2 and -3. Flag 0 should be grounded prior to the execution of these commands, short TP8 to TP9 on master board.
The 'TRACKER' will indicate an error if this is not done. Push key 0 to abort.

5 Go to track -2

6 Go to track -3

Errors:-

If N=0 or N : (7..1023)

Write

Function:- Will write to the disk if writes have been enabled with S.F.=1. Writes will be performed on the selected Head.

CAUTION Take great care not to erase valuable data.

Functions performed for each value of N are :-

- 1 Write DATA pattern for one revolution of disk.
- 2 Erase track.
- 3 Write DATA pattern on one surface, from Present Position until MAXCYL.
- 4 Erase one surface, from Present Position until MAXCYL.
- 5 Write DATA pattern continuously until key 0 is pushed.
- 6 Write INDEX calibration tracks -2 & -3.

S.F.

1

S.F.

WRITE

3

WRITE

TRACKER_USER_MANUAL_USM_0072

RODIME "TRACKER" USER GUIDE

1.0 INTRODUCTION

The purpose of this guide is to provide users of the Rodime "Tracker" with all the information required to understand and operate the device as an aid in drive fault diagnosis.

The "Tracker" is a hand-held exerciser which simulates a host controller and allows the user to exercise any Winchester disk drive which supports the ST 506 interface (ref. Fig 1 & 2). The "Tracker" comes complete with interface connectors for data and control and with a +5V supply connector. It comprises a keypad for parameter and instruction input and six LED's for response.

The "Tracker" would typically be used with an oscilloscope and allows head/media and actuator verification prior to final system test.

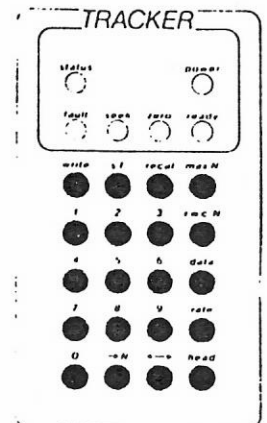
2.0 ASSOCIATED DOCUMENTS

2.1 RO 200 SERIES DRIVES

RO 200 series user manual USM 0023 Rev C
RO 200 product specification PRO 0020 Rev 4
RO 200 interface specification INT 0021 Rev 4

2.2 RO 200E SERIES DRIVES

RO 200E series user manual USM 0038 Rev A
RO 200E product specification PRO 0033 Rev 4
RO 200E interface specification INT 0034 Rev 4



2.3 R0 350/250 SERIES DRIVES

R0 350/R0 250 user manual USM 0040 Rev B

R0 350/R0 250 product specification PRO 0039 Rev 3

3.0 SCHEMATICS

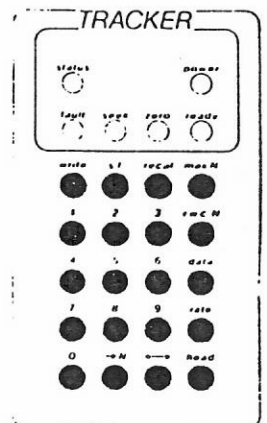
PCB Schematics are contained in the relevant user manual.

4.0 "TRACKER" FUNCTIONS

- o Recalibrate
- o Seek any cylinder from 0 to 1023
- o Select any head from 0 to 7
- o Continuous seek between two cylinders
- o Key selectable step rate (30 us to 25.5 ms in 0.1 ms increments)
- o Seek demonstration routines (random, planet-satellite, alternate)
- o Write pattern select (3 user selectable data patterns available)
- o Write/erase for one revolution
- o Write/erase for one surface, current track to max. track
- o Continuous write
- o Selectable RWC (reduced write current)
- o Check index track -2 for Rodime drives.

5.0 COMMAND FORMAT

The "Tracker" accepts commands in the form of a decimal number (N) followed by one of the ten command keys. N must be in the range 0... 1023 and may be entered by depressing the appropriate numeric keys.



The RECAL command may be used to correct mistakes and clear N to 0.

6.0 LED STATUS DISPLAY

LED's are provided to monitor status. They are:

- (a) **POWER** The "Tracker" is connected to a powered on drive and a +5V supply.
- (b) **SEEK** The drive has completed the previous seek command
- (c) **FAULT** The drive has a fault
- (d) **READY** The drive is ready to accept commands
- (e) **ZERO** The heads are on cylinder zero
- (f) **STATUS** The "Tracker" is busy executing a command. Push key 0 to abort

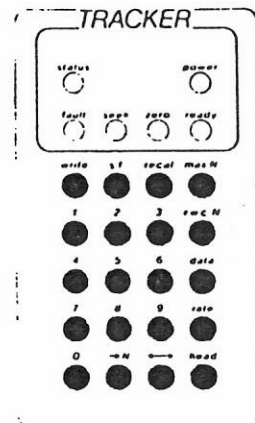
7.0 ERRORS

Errors will be indicated by four consecutive tones of the buzzer. N will be reset to zero and the command will be ignored.

NOTE Enter numeric 9, followed by command, head to demonstrate this condition.

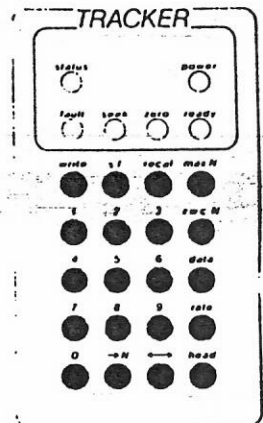
8.0 INTERFACE

The "Tracker" connects to the drive via standard data (20 way) and control (34 way) cables. The flying lead (coloured red) is used to supply +5V, either from the drive itself or from an external power supply.



8. Enter numeric 3 followed by command DATA thus selecting data pattern DB_{hex}.
9. Enter numeric 1, followed by WRITE, thus writing the data pattern selected in step 8 for one disk revolution.

Using an oscilloscope it will now be possible to identify DB_{hex} pattern on TP2/TP3, TP4 and TP5 of the master electronics PCB.



9.0 COMMANDS

9.1 NOTATION

N: (X..Y) is a member of the set of positive integers between X and Y.

9.2 COMMAND DESCRIPTION

9.2.1 MAX N

FUNCTION : Used to set the maximum cylinder register, max cycle N.
Max cyl remains set until another MAX N command or until the tracker is powered off.

DEFAULT : Max cyl = 191 on power on

NOTE : Select and enter the maximum cylinder number for the drive under test by selection from the following list:

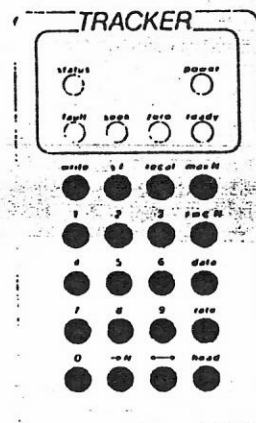
Drive_Style	Max_Cylinder_No
RO 100	191
RO 200	319
RO 200E	639
RO 350	305
RO 250	305

ERRORS : Failure to enter the appropriate parameter followed by Max N will result in the "Tracker" being unable to seek to any cylinder greater than 191.

9.2.2 → N

FUNCTION : Will seek to cylinder N at the step rate defined by that command

ERRORS : a) $N > \text{maximum cylinder (MAXCYL)}$
b) 'Seek Complete' not true prior to seek



- c) Should now be on cylinder 0
but 'TK 00' signal not true

EXAMPLE : Enter numeric 65 followed by
command N will result in a seek
from the current position to
cylinder 65

9.2.3 ↔

FUNCTION : Will seek between the current
position and cylinder N, 1000 times

- ERRORS :** a) $N > \text{Maximum cylinder (MAXCYL)}$
ref Max. N command
- b) "Seek Complete" not true prior
to seek.
- c) Should now be on cylinder 0,
but TK 00 signal not true.

EXAMPLE : Following on from the above example
numeric 300 followed by command
will result in a seek between
present position (cylinder 65) and
cylinder 300, 1000 times.

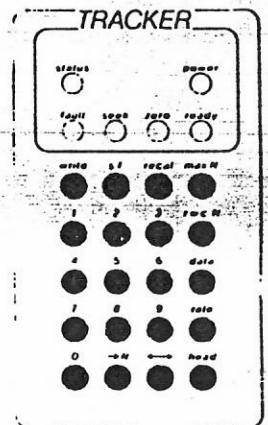
9.2.4 HEAD

FUNCTION : Used to select one of eight heads.
Head remains set until another
head command.

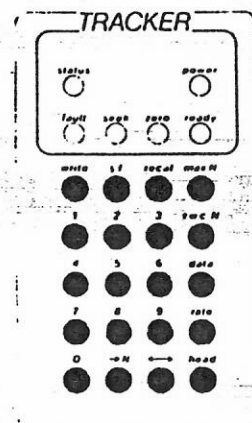
DEFAULT : Head = 0 on power on

ERRORS : If $N \geq 8 < 1023$

NOTE : Maximum head number for each drive
is given in the following table:



Drive Type	Formatted Capacity (MB)	Max Head Number
RO 101	3	1
RO 102	6	3
RO 103	9	5
RO 104	12	7
RO 201	5	1
RO 202	10	3
RO 203	15	5
RO 204	20	7
RO 201E	10	1
RO 202E	20	3
RO 203E	30	5
RO 204E	40	7
RO 351	5	1
RO 352	10	3
RO 251	5	1
RO 252	10	3



EXAMPLE : Key numeric 5, followed by command HEAD to select head 5 on an RO 103, RO 203 or RO 203E

9.2.5 RATE

FUNCTION : Sets the step rate for all seek operations

STEP RATE = $N \times 100 \text{ us}$ if $n \geq 1 \leq 255$

STEP RATE = 30 us if $N=0$ (fastest step rate)

STEP RATE = 25.5 ms if $N = 255$ (slowest step rate)

DEFAULT : STEP RATE = 30 us on power on

ERRORS : If $N \geq 256 \leq 1023$

9.2.6 RECAL

FUNCTION : Will recalibrate the drive to TK 00 if $N > 0$. This key can be used to correct mistakes and clear N to 0. No recalibrate will be performed if $N = 0$.

ERRORS : None

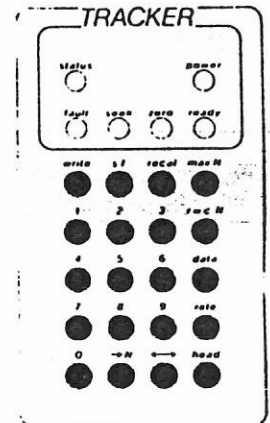
9.2.7 R.W.C. N

FUNCTION : Used to set the reduced write current register, RWCCYL: = N which remains set until another RWC command.

NOTE : The interface signal RWC (Reduced Write Current) is not directly changed by this command. The status of RWC is dependent on the present head position.

EXAMPLE : Key numeric 132 (assuming any R0 200 series drive) followed by command, RWC - thus setting RWC register to 132.

- a) If the current head position is hypothetically cylinder 100, then the interface signal RWC will be set false since :
 $N < RWCCYL \Rightarrow 100 < 132$
- b) Similarly if the current head position is hypothetically cylinder 200, then the interface signal RWC will be set true since :
 $N > RWCCYL \Rightarrow 200 > 132$



NOTE : On R0 200E series and R0 350 series drives RWC is set internally to TK 400 and TK 210 respectively. Any signal on the RWC line is ignored.

9.2.8 DATA

FUNCTION : Select one of three user selectable data patterns prior to issuing a write command (see section 9.2.9.)

- a) If N = 1 then pattern is 55
Hex = 01010101
- b) If N = 2 then pattern is 00
Hex = 00000000
- c) If N = 3 then pattern is DB
Hex = 11011011

DATA remains set until another DATA command

NOTE : This command allows the user to write selectable data patterns onto the disk when used in conjunction with the WRITE command (ref section 9.2.10). Correct use will assist in isolating read/write channel faults on any drive.

DEFAULT : PATTERN = 00 Hex on power on.

ERRORS : If N = 0 or $N \geq 4 \leq 1023$

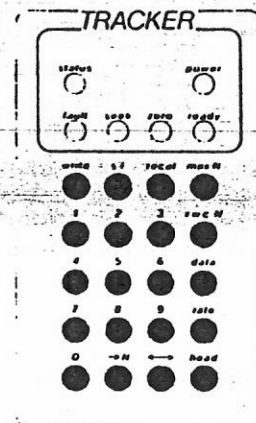
9.2.9 S.F. (SPECIAL FUNCTION)

Functions performed for each value of N are:-

1. Enable the write command
2. Disable the write command
3. Random seek sequence

Seek 1000 random cylinders in the range 0 to MAXCYL. Routine ends on cylinder 0.

Press numeric 0 to abort



4. Planet-satellite seek sequence.

The following sequence will be performed:

Cylinder	Seek To	Cylinder
0	--	1
1	--	0
0	--	2
2	--	0 etc
0	--	MAXCYL (set by Max
MAXCYL	--	N command)
0	--	0
MAXCYL	--	MAXCYL
1	--	1
	--	MAXCYL etc

NOTE : a) Test will terminate on MAXCYL
b) Press numeric 0 to abort

5. Go to Track -2

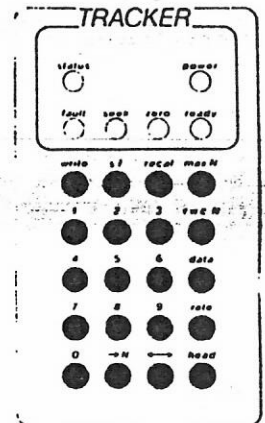
This command can be used to check the special calibration track (data burst) on cylinder -2 on all Rodime drives. Flag 00 should be grounded prior to execution of this command (see figures 3, 4 and 5). Failure to ground flag 00 signal will result in an error.

SPECIAL FUNCTION ERRORS : If $N = 0$ or $N > 6 \leq 1023$

9.2.10 WRITE

FUNCTION : Will write to the disk if writes have been enabled with S.F. = 1. Writes will only be performed on the selected head.

CAUTION : Take care not to erase valuable data.



Functions performed for each value of N are

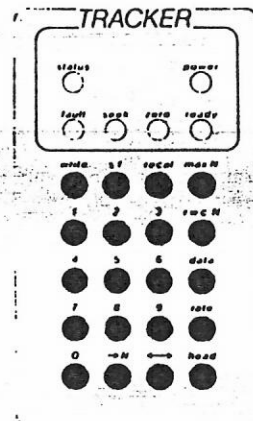
1. Write DATA pattern for one revolution of disk.
- * 2. Erase DATA pattern for one revolution of disk. See note 1.
3. Write DATA pattern on one surface from present position until MAXCYL.
4. Erase one surface from present position until MAXCYL. See Note 1.
5. Write data pattern continuously until numeric key 0 is pressed.
6. Write index calibration track on cylinder -2. Flag 00 should be grounded prior to this command (see fig. 3, 4 and 5). Failure to ground Flag 00 signal will result in an error.

NOTE 1 : On R0 200E series drives WUS (write unsafe) must be grounded by jumpering TP10 and TP11 together.

ERRORS : a) If $N = 0$ or $N \geq 7 \leq 1023$
 b) If writes have not been enabled by S.F. = 1 .
 c) If WUS has not been grounded prior to an erase command.

10.0 PURCHASE

The "Tracker" may be purchased direct from Rodime. Customers wishing to do so should contact Rodime's Marketing Department in Glenrothes, Scotland, Tel: 0592 774704 Telex 727711 or Boca Raton, Florida, U.S.A. Tel (305) 994 6200 Telex 160082.



11.0 REPAIR

Rodime operates a repair service under which "Trackers" will be repaired for a standard service charge. If the "Tracker" is required to be returned a Return Authorisation Number will be issued by contacting Rodime direct.

12.0 EXAMPLE PROGRAM

R0 200 series drive. Write A DB_{Hex} data pattern on cylinder 260, Head 3.

PROCEDURE

1. Connect "Tracker" to the drive under test.
2. Apply DC power to the drive.
3. After approximately 25 seconds, check that no error codes are indicated on the front panel LED's. (if an error code is present consult the relevant user manual for fault explanation).
4. Using the "Tracker" keypad, enter numeric 319, followed by command MAX N thus setting the maximum cylinder register to 319.
5. Enter numeric 260, followed by command N thus moving the R"W heads to cylinder 260.
6. Enter numeric 3 followed by command HEAD, thus selecting head 3.
7. Enter numeric 1, followed by command S.F. (special function), thus enabling WRITES.

