

48K Spectrum

MICRODRIVE
MANAGEMENT
AND
RECOVERY
SOFTWARE

ROYBOT

SPECTRUM MICRODRIVE MANAGEMENT AND RECOVERY PACKAGE

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SPECTRUM MICRODRIVE MANAGEMENT AND RECOVERY PACKAGE (RAMDOS UTILITIES)

RAMDOS

RAMDOS or Random Access Micro Drive Operating System provides extensions to BASIC which allow effective business type programs to be written and managed. File handling statements include facilities for random access operations, the use of multiple cartridges on one drive and the ability to copy or compare any type of file. Text processing statements provide on screen editing, formatting, searching and sorting capabilities. Other statements provide facilities for tape back-up and other recovery management features, designed to overcome the many irritating problems associated with microdrive operation.

RAMDOS UTILITIES

The RAMDOS UTILITIES are a set of 5 BASIC programs, using some of the extensions to provide easy to use management and recovery facilities: The programs are:

1. Main selection menu - loads RAMDOS machine code, allows selection of other routines and provides easy to use formatting capabilities.
2. EDIT - provides a sensible catalog, showing file sizes and type of file, erase and a range of copying facilities for copying any type of file (not just data as the standard software) from one cartridge to another or to copy complete cartridges. This makes use of the unique RAMDOS feature of allowing the copying to be carried out, in a foolproof manner, on just one drive. The copies can also be made to or from cassette tape.
3. STATUS/RECOVERY/TEST - for displaying a second catalog that shows details from the 180 or so sectors on the tape, to identify the reason for reading problems. The next section reads chosen files, displays any records having errors, allows the faulty records to be re-read (which they often can be for intermittent problems), then facilitates either saving again in the same sector or in a different one. The last section is for testing suspect sectors and busying them so they cannot be used again, if required.
4. REBUILD/PEEK - to read whatever is readable, convert to the correct format and save on a different cartridge. An example of use is a large BASIC program which indicates "File not found" after reading part: the beginning and end can be read and saved for subsequent loading and merging. The second feature is to read any sector and display the contents. These routines ignore the usual error checking, which prevents reading of faulty information, but data may be read with just one bad character: this can be identified and recovered from.
5. CARTRIDGE COPY - a small program with most of the memory available for data buffering, to allow cartridges to be copied and verified reasonably quickly.

MICRODRIVES GENERAL

As indicated in the Interface I Manual, a formatted cartridge can hold over 85,000 bytes. The formatting procedure writes about 180 sectors, of 512 bytes. To start with, the only meaningful information on the tape is a sector header which contains the sector number, the cartridge name, a checksum and an indication whether the sector is free for use. Following the sector header there is a gap for a data header and 512 bytes of data.

On saving, the sector headers are read then, if free for use and the addition of the numeric values of contents equates to the checksum, the data header and data are written, each with their own checksum. The data header contains the file name, a record number (for each 512 bytes of the file), the record length and a flag which indicates the type of file and end of file record.

For successful reading, both headers must pass certain validity tests and all three sunchecks must be correct.

PROBLEMS

The most frequent problems met are:

1. a program or file taking excessive time to read. This problem may develop with age but is frequently encountered on new tapes due to marginal conditions. When this is apparent, copy the files to another cartridge. An old cartridge may still have life in it when reformatting. The RAMDOS recovery and copy procedures are designed to overcome these marginal conditions.
2. "File not found" indications, when a record cannot be identified or read properly after a number of passes of the tape loop. The tape may have become damaged or partially demagnetised, although the formatting procedure is far from perfect in identifying bad spots on the tape. Before RAMDOS, this was an irretrievable condition.
3. "Microdrive not present" messages when a cartridge is in the drive. This indicates that, on starting the motor, no signals were received by the computer. It is caused by the tape sticking, wrapping round the drive roller or the cartridge not being inserted in the drive properly. The former may right itself but, if it does not, it may be possible to tug the tape, free it and push the released tape into the cartridge; this is rather drastic action but, as the tape is useless anyway, it is worth trying. Do not rely upon cartridges where the tape has stuck once, they will do it again.
4. microdrive incompatibility - the read/write head alignment, signal levels or tape driving speeds may be slightly different. This may make it impossible to read a tape produced on a different drive but, more frequently, will give the reading problems described above.

5. sometimes the drive motors will start up by themselves, random error messages given or other peculiar happenings. These may be caused by interference on the electrical mains supplies or through dirty contacts on the cable or interface connection. If this occurs, firstly switch the computer off and on; then, if this does not clear the condition, switch off again and unplug/replug the connections or use a proprietary contact cleaning fluid.

PREVENTION OF PROBLEMS

1. Follow the instructions given in the manual on handling cartridges.
2. Clean the heads occasionally, using cassette head cleaning fluid applied with a cotton wool bud (obtainable from chemists).
3. Make frequent back-up copies of programs and data on different cartridges and cassette tape. The RANDOS facilities overcome limitations of the standard software and make this easy to do.
4. When problems occur, use the RANDOS UTILITIES for problem identification, testing and recovery.

OPERATION

COPYING THE SOFTWARE

The first step on obtaining the software is to make a back-up copy on a new cartridge. The utilities should be used for this purpose:

1. Switch the computer on or press NEW and ENTER.
2. Insert the ROYBOT cartridge in drive 1; press RUN and ENTER. This loads the first program and the RANDOS machine code. A menu is displayed and, as for all other menus, selection is by pressing the appropriate number and ENTER.
3. If the new cartridge has not been formatted, select 5 "Format cartridges". Carefully follow the instructions given on the screen. The new cartridge should be given a name, but not RANDOS UT".
4. Select 1 "Edit utilities" to load the copy routines.
5. The menu displayed gives the option of using more than one drive. If only one drive is available, go to step 7.
6. The RANDOS cartridge goes in the main drive. As it should already be in drive 1, select 2 "Second drive", then input the drive number for the new cartridge.
7. Select 5 "Copy/compare" to display the next menu.

8. Select 2 "Copy cartridge". Follow the instructions given on the screen for inserting cartridges to open them.
9. If two drives are being used, programs copycart, edit, rebuild, recover, run and scode will be copied.
10. If one drive is being used (and providing the new cartridge is not named RAMDOS UT), instructions will be displayed to insert the appropriate cartridge for each copy (and compare).
11. After copying press ENTER, when requested, to verify. All files are re-read and compared.
12. If there are any problems on writing the new cartridge, put it aside for evaluation by the utilities and start again with a new cartridge.
13. If a second copy is to be made, firstly select 8 "Close cartridge 2".
14. When finished, put the ROYBOT cartridge in a safe place and only use in an emergency.
15. Select 9 "Other routine". When requested, insert the new cartridge in drive 1 and press ENTER to read the initial menu. You can then use the new copy.

Once you have completed the copying exercise, you will see how easy the package is to use and that detailed instructions are not required.

ERRORS

The BASIC programs have many built in checks to prevent them from being interrupted, but if, for example, a cartridge has not been inserted the program will stop with "Microdrive not present" indicated; in this case, press CONT to continue when the cartridge has been inserted. With other error messages, it may be necessary to restart the program. Do not use RUN as this will close any cartridges in use; instead press GOTO 100 and ENTER. To stop during file copying etc., press BREAK. See also page 9.

DISPLAY CATALOG

Select 1 "Edit utilities" from the initial menu and, on loading, a different main drive number, if required. The catalog display shows cartridge name, number of files, free sectors, file names, file sizes in sectors and type of file.

The catalogs are held in a BASIC array (v\$) with a size large enough for 105 files. The initial catalog display shows up to 38 files. For more than 38 "scroll?" will appear; press ENTER for the remaining entries.

Once a cartridge is open, the catalog can be re-examined without re-reading. For a different cartridge, select 7 "Close cartridge 1", then select the catalog entry again.

FILE SELECTION

Erase, copy file, recover and rebuild require a file to be selected. This time, up to 51 file names are shown on the screen. If there are more than this, press d for the next page or u for the previous one. Use the up, down, left and right arrow keys to move the flashing cursor to the required file; press ENTER to execute the particular function. Pressing c cancels the selection and returns to the previous menu.

ERASING FILES (Edit menu)

Erase deletes the entry from the catalog, besides erasing the file. Afterwards, the program returns to the file selection routine for further choice of files or cancellation.

RANDOS database files will not be fully erased in one go. To erase them completely, close and re-open the cartridge and erase a second time.

COPY OR COMPARE FILES AND CARTRIDGES (Edit menu)

These require two cartridges to be opened (they can be the same one). For copying, the source file is selected. If a file of the same name is in the destination catalog, an option is given to type in a new name. To create two files of the same name see DUPLEXING FILES.

Compare requires source and destination files to be selected from the appropriate catalogs. The program does not stop for compare failures.

Cartridge copying in the edit program deals with up to 30 sectors at a time. For larger files, the copy cartridge program, at 55 sectors, is faster. On copying, there is a delay as the destination catalog is checked to see if space is available; if not the program returns to the menu.

TAPE ROUTINES (Edit menu)

Files dumped to tape are in a special RANDOS format, to allow large files to be copied in parts. Operation is similar to the other copy routines except messages are given to start or stop the tape.

On dumping cartridges, the catalog is saved first. It is necessary to press a key to initiate every file saved and it is wise to let the tape run on for a few seconds before doing so; this is to ensure that the tape can be stopped between files as the microdrive searches for a file to compare or for space to write. The tape length required is about 3 seconds per sector or about 10 minutes for a full cartridge.

The file name is used as the tape name for file dumps and the cartridge name for the catalog saved at the start of cartridge dumps. This tape catalog can be read and displayed via the tape menu, to identify what files are on the tape.

STATUS, RECOVERY, TEST

This program uses only one drive but the drive number can be changed. As for the edit program, if a second cartridge is to be evaluated, the first one has to be closed first, via a menu selection.

SECTOR STATUS

As for edit, this program allows the catalog to be displayed (see also PRINTING). Besides this it provides a detailed analysis of every sector on the tape. This shows sector and record numbers, record length, file names and status. It should be noted that the sector numbers are in the reverse order to file record numbers. The record number should be greater than 0 for valid files. Length should generally be 512 for valid files, except for the last record which could be between 0 and 512. Following are translations of the status and examples (?? indicates any value or name):

Status Rec Len Name

?					- Y header sumcheck correct, N incorrect
?					- V valid sector, I invalid, F free
E					- end of file (EOF) record
?					- D data, B BASIC, C code, A or \$ array
Y V	D	>0	512	Filename	- good header, saved data file, not EOF
Y V E	D	>0	<513	Filename	- good header, saved data file, EOF
Y V	B	1	512	Filename	- good header, saved BASIC file, record 1
Y V		>1	512	Filename	- good header, saved non-data file, not EOF
Y V E		>1	<513	Filename	- good header, saved non-data file, EOF
Y F	D	??	0	Filename	- deleted file
Y F	D	??	0	??????????	- good sector, as formatted
N	?	?	??	<513	Filename - header read wrongly for good file
			??	8224	?????????? - sector not found
?	I	?	??	8224	?????????? - bad sector, marked as such
Y F	D	??	8224	??????????	- good header, data not read (dangerous)

NEWLY FORMATTED CARTRIDGES

A perfect cartridge should have sectors 1 to about 190 with identical displays (see example). The name is likely to be an odd mix of characters. One or two invalid sectors may identify the join in the tape but more than this indicates a bad tape or poor performance of the drive during formatting. Sometimes, apparently good sectors on either side of these blemishes can have intermittent problems.

If the tape sticks during formatting, there will probably be one or more large gaps in the sector display and valid sectors above 200 may be apparent (at least reformat).

READING ERRORS

When files are written on a new tape, they generally appear 2 sectors apart and, for a permanent error, it is usually obvious which is the faulty sector. The sector may be recoverable using the rebuild program. Intermittent problems may always have good headers but, anyway, they should be recoverable, using the status and recovery routine.

PRINTING

The catalog and status information can be printed via the recovery program. This is set up to drive a printer on the Interface 1 (using LPRINT). For other printers, the BASIC program can be changed. For a ZX printer, change line 1210 to LET print=2. For others, change line 1990 as appropriate. Type GOTO 9999 to erase and resave the program.

RECOVERY

On entry, the file selection procedure has to be followed. Up to 10 records are read and the status displayed. This shows the record number, sector and data sumcheck status for the 10 records, besides filename and length. An indication is given if a sector is not found or for sumcheck errors. For reference, the sector status table can be displayed at the bottom of the screen (via Display secs.).

If errors are indicated, select the appropriate range of records using the re-read option. If this is successful, select re-write to save them in the same place or, preferably, duplex to make another copy in a different sector. After the latter, use test/busy to disable faulty sectors, so that they cannot be used again. When the first records are finished with, for longer files, select read more for the next 10 records.

TEST, BUSY, FREE SECTORS

On entry, a sector number has to be given and the status table for this is displayed. For all routines, the sector is written (an indication is given if it is not found), then re-read to update the table and data sumcheck status (as recover). Test verifies the data after reading and indicates any comparison failures. After testing, select either free or busy, depending on whether the test was successful or not. A known bad sector can be busied (made invalid so it cannot be used) without testing. Similarly, any sector can be freed for use.

DUPLEXING FILES (Status and Recovery)

Besides for recovery purposes, duplex can be used to make a second copy of any file on a cartridge, to improve data reading times or durability. This should not be done for files which will be updated and erase needs to be carried out twice to completely erase a file.

REBUILD AND EXAMINE

This program is used in the same way as recovery routines but has the option of two cartridges, as the edit program. It also has the display sector facility.

REBUILDING BASIC OR CODE PROGRAMS

Select the file to be rebuilt, then specify a sequence of up to 10 records at a time: re-read any marginal ones; select save cartridge 2: specify type of file: give new file name. Before saving, the program will be automatically adjusted to be in a correct format, at least suitable for editing later and then, if BASIC, merged to almost recreate the original program.

PEEKING SECTOR CONTENTS

After reading, the view record selection can be made to display the information as a BASIC program, as decimal code or as data. This facility is provided to achieve the highest degree of recovery. On reading bad sectors, it will be apparent that, sometimes, data is more accurately read than others.

REBUILDING DATA FILES

These can be rebuilt in parts as programs. However, whereas BASIC programs can be remerged and code loaded to particular memory addresses, it is not so easy for data. The alternative for data is to select the file: read one faulty record at a time: re-read if not found or read the particular sector as the record: if sumcheck errors, re-read and view until most correct: select duplex to make a second copy of the faulty record (not found will put spaces in). Use the recover/busy program to disable the sector used by the original record.

Note that, in this program, duplex only works with data files.

CORRECTION

Correction ensures that only printable characters are produced: non printable ones are replaced with a graphics symbol (CHR\$ 129), which helps to identify where errors are.

The separate correction menu entry is only used when you wish to view a record as a different type of file to the chosen one.

Corrected code is given start address 0, so the required address has to be specified on loading.

INVALID NAMES

A cartridge or file name may include characters (CHR# 16 to 23) which cause the program to stop with "Invalid colour" or "Integer out of range" when displaying. The ROYBOT software displays these names via both BASIC and machine code. The invalid characters are probably included for protection purposes to prevent the catalog from being displayed and the problems caused are not regarded as a fault in the ROYBOT software.

CARTRIDGE NAMES

The separate cartridge copy program does not display the cartridge name via BASIC and, if two drives are available, cartridges with invalid names should be able to be copied without stopping. Where only one drive is available the program may stop with the error message when the instruction to change cartridges is displayed. In this case, change over the cartridges and press CONT and ENTER: the copying should then continue.

To prevent the names being displayed or printed in the other programs, the BASIC can be changed - $v\$(?,2 TO 11)$ should be changed to "2" at lines 330, 416 and 427 in EDIT, lines 416, 425 and 427 in RECOVER and lines 416 and 425 in REBUILD. To determine the cartridge name, after opening a cartridge, stop the program and type in - FOR i=2 TO 11:PRINT CODE $v\$(1,i):NEXT i$ - or $v\$(i)$ in RECOVER. The Spectrum manual gives details of the character codes.

FILE NAMES

The catalog cannot be displayed but the files can be determined from the "Display sectors" option in the RECOVER program, where the invalid characters are displayed as %.

To prevent invalid file names from being displayed via machine code during copying, after loading the initial menu, stop and POKE 62343,201.

For file selection in all programs, change the $v\$(..ixs+b#17...etc.)$ in line 813 to "?????????" (10 question marks). Note the number of files, as extra ????'s will be displayed to fill a line.

For other displaying of file names, change the following to "?" - REBUILD $f\%$ at line 862; RECOVER $f\%$ at 862; EDIT (erase) $f\%$ at 1210, (tape dump/compare) $f\%$ at 1050 and 1985, (file copy/compare) $j\%$ at 1995, $f\%$ at 1990, $j\%$ and $k\%$ at 930.

INVISIBLE FILES

When files are saved with CHR# 0 as the first character of the name, they do not appear in the normal catalog. In the ROYBOT catalog they are displayed with the first character appearing as "?" and these "invisible" files can be manipulated as any other. Occasionally on formatting, spurious invisible files are created. These give rise to misoperation during copying. However, it may be possible to erase them in the EDIT program or the offending sectors can be tested then busied or freed using the RECOVER program.