1541 PROBLEMS And How To Solve Them

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It has been estimated that over 90% of the buyers of new Commodore systems acquire a disk drive and most of these drives are 1541's. The 1541 is the cheapest disk drive available from an original manufacturer, but unfortunately, while the price is right, the quality has been erratic.

We have all heard the horror stories of 1541 owners who are on their third 1541 drive — they really do exist. However, there are many more 1541 owners who have had trouble with their drive overheating and becoming misaligned or gradually drifting out of alignment; this in turn has caused read errors and scrambled directories. Let's look at this matter using information gathered from various BBS's, club discussions, newsletters and many other sources.

During any question period at club meetings the same set of questions seem to re-occur so let's first clear the stage by covering some basic information again.

1. (Q) Can I double-side my disks?

(A) Yes, as long as you do not care if the data is lost from that disk because you have a backup. Your chances of losing the material stored on a two-sided disk seem to increase geometrically with time and use.

2. (Q) Can I write on my TPUG disks?

(A) No. TPUG'S disks are 4040 format which are NOT write-compatible with 1541 disk drives (although they are read-compatible). Don't write on any one else's disk — instead, you should copy the material onto one of your own disks, on your own drive unit.

3. (Q) Why does the drive sometimes refuse to read my own disks?

(A) Try to centre the disk in the drive by starting the load and then, as the motor spins, gently close the drive door. If this is not the answer you may have a bad disk or an alignment problem — read on.

4. (Q) What does a file with a "•" mean?

(A) This is an improperly closed file and a short-fused disaster. You must "COLLECT" or "VALIDATE" the disk before you write on it again — i.e. **immediately!** See the User's Guide for instructions on how to do this. If collecting doesn't work you must use a copy program to transfer the material to a fresh disk and re-format the original as a new disk to wipe it clean.

5. (Q) Write-protect tabs are provided with disks — why do so few people use them?

(A) The answer lies in an oversight by the original engineers who didn't put into ROM an instruction to re-set on a write protect error. If you try to write to a disk with a tab and get an error message, re-set the drive by switching it off and on again or by typing in immediate mode: OPEN 15,8,15,"U:": CLOSE 1, both of which will re-set the drive. Most disks do not need the write protect tab on (unless you have small children!).

6. (Q) What disks should I buy?

(A) The best answer is to buy the best ones that you can afford because it is generally true in disks, as with other merchandise, that you get what you pay for. I suggest you buy some high quality (expensive) disks that are "verified" to backup your favourite (expensive) programs.

7. (Q) What is the disk ID?

(A) This is a two-character code that tells the drive what disk it is working on. Each disk should have its own ID so that the drive cannot get confused and continue to write on another disk by mistake.

Many of these questions are not covered in the 1541 User's Guide or in any recent reference. It is important that you are aware of 1541 disk drive issues, because this machine is your link to large-scale data storage.

If your 1541 is an early model it may be subject to overheating because of the design of the early circuit boards. The internal heat was not sufficiently dissipated and it was possible for some of the chips on the board to break down. The only sure cure seems to be the addition of a tiny low speed fan and I have seen these advertised in U.S. magazines for about $30.00. To make a good job of it, the fan should blow only filtered air gently into the drive unit.

A number of 1541 problems have been associated with the drive going out of alignment. I have read some detailed explanations of how to re-align your drive head, but I still believe this is a job for a professional. Just opening the case of your 1541, for example, will void the warranty — not to mention that you may do other damage at the same time. Speaking of professional alignment, I came across some useful information presented by Ray Cadorin in the Vancouver Commodore Computer Club *NEWS*. According to Cadorin, " . . . industry-standard

alignment disks are available for the 1541 drive. These disks have a pattern on them called a "cats-eye", which is used to perfectly align a disk, and is the only accurate way of aligning a disk drive."

The major reason that a 1541 drive goes out of alignment is that the mechanics involved in the positioning of the read/write head are cheap. The stepper motor (which moves in precise steps — thus the name) is attached to the head by a steel band passing over a pulley. These parts are designed to be attached "flexibly". Each time the head re-sets itself it bangs against a bumper or stop and it is the constant knocking of the

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> ...each time a copy-protection error is read, the drive head is thumped repeatedly...

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head against the stop that deteriorates the drive-head alignment. Each time you header a disk, the head smacks against the stop many times. Similarly, each time a copy-protection error is read, the head is thumped against the stops repeatedly and the read/write head drifts out of alignment after a time. The more you use heavily protected software, the greater the problem.

Your next problem is to know when your drive needs alignment. The obvious way is to wait until the drive will not read/write to your disks, but by this time you will have accumulated a number of disks that you may never be able to read again!

The fact that the head drifts at different rates on different machines can produce some interesting errors when you try to trade TPUG programs with your friends.

The program you saved on their disk from your 1541 will not load from their drive unit and subsequently all of the other programs on their disk become a jumbled mess. You are in big trouble. You can try shrugging it off by explaining that track separation is 1/100 of an inch, so your alignment must be very accurate to be sure of compatability. You might wish to enlist in the armed services.

To determine your drive's performance you need one standard disk and program. One obvious answer is to use the 1541 TEST/DEMO disk that was included with your drive. The program called **Performance Test** on that disk is a good start, but it writes as well as reads the disk. You can add this read-only routine to your disk to check the alignment of each track:

```
100 OPEN15,8,15:OPEN8,8,8,"#"        :open the error and a random file channel
110 FT=1:FT$=STR$(1):LT=35          :set the first and last tracks to #1 and #35
120 LT$=STR$(LT)                    :set string value
130 PRINT#15,"U1:";8;0;LT;0         :block-read a 256 byte block
140 T$=LT$:GOSUB500                 :check status
150 PRINT#15,"U1:";8;0;FT;0         :block-read track 1
160 T$=FT$:GOSUB500                 :check status
170 LT=LT-1:IFLT>1THEN120           :decrement the last track
180 CLOSE8:CLOSE15:END              :shut down all files and quit
500 PRINT"READING TRACK: ";T$       :screen prompt of track being read
510 INPUT#15,NU,ME$,TR,SE           :get the error messages
520 PRINTTAB(12)NU;ME$;TR;SE        :print errors to screen
530 IF NU<2 THEN RETURN             :status OK? - yes - go on
540 PRINT:PRINT"DRIVE FAILURE!!"  : oops ... that's a Boo Boo
550 GOTO 180
```

Steven Niers of the Windsor PET Users Group originally wrote this program and I have modified and added notations to it.

The "U1" command is similar to the "B-R" or BLOCK-READ command except that it reads an entire 256 byte block of information into the the buffer by forcing the buffer-pointer to 255. This is an example of a "user" disk command, and is used here to check the contents of each track.

The purpose of this exercise is to have a standard against which you can measure any deterioration of your drive. Most people will find that their drive will last for years without error—some heavy users should include a monthly check as part of their maintenance program. If you find that the head "chatters" more than it used to, or the error light flashes frequently when loading programs, you can run this disk through the drive and determine if it is time to have the heads re-aligned by a professional. One software developer has his drives checked each year whether they need it or not. He says it's cheap insurance and I agree with him. *TPUG*

commodore 1541 problems ???

If you have ever experienced loading problems with the 1541 Disc Drive, i.e. a persistent but inconsistent blinking red light or the inability to find the directory '$', it is because the read/write head has fallen out of alignment in the drive. What you are experiencing is the inability of the read/write head to access the information already stored on the diskette.

You may have noticed with each formatting of a diskette, that a succession of tapping noises will occur as you begin the formatting procedure. The noise occurs as the read/write head swings to establish a track zero reference point. With each subsequent formatting, the hammering will eventually put the read/write head further and further out of alignment. Also, if you use a lot of copy protected programs that incorporate the hammering, it, too, will not be long before it falls out of alignment. The ultimate result is the complete inability of the disc drive to read the material which you had generated months or just weeks previous.

There is an inherent design problem in the 1541 drive. With each hammering, the fit between two critical parts that directs where the write head is to go, eventually becomes loose. This problem is easily and permanently remedied by the "keying" of the part which in the original design was held intact through a friction fit. "Keying" will prevent the slippage between the two parts that need to remain as a stable unit.

For $35.00, this repair and alignment can be done so that you will never have any further read/write problems due ti misalignment. Certified Commodore dealers charge $70.00 and a minimum of two weeks to perform this same service. I can guarantee that you will have your drive back within a 48 hour period.

P.S. If you have been copying with the 4 minute copier with the ding dong call, in a heavy way, the problem may lie in the fact that you have overextended the silicon chips and sent them up to computer heaven. Call me!!!

If you bring in this coupon, you will receive a 25% discount off a reset switch for your Commodore 64 which regularly sells for $15.00.

Using The 1541 BACKUP

By David Bradley   Toronto, ON

First of all, if you don't have the **1541 BACKUP** program and you want to copy disks using your 1541, get it. (It is currently on 3 TPUG disks. D2, D3 and (C)TS.)

Once you have the program loaded into your Commodore 64, type in **RUN** and press **RETURN**. There will be a slight pause before anything appears to be happening so don't worry if it doesn't jump into action immediately. When the program is finished setting up there should be several "boxes" displayed on the screen.

The first thing the program will instruct you to do is to **ENTER THE PROGRAM OPERATION CODE**. What the program is asking you is to decide is whether you want to do a **BAM SELECT BACKUP** or a **DIRECT BACKUP**. You choose this by typing in either a **B** or a **D** and pressing **RETURN**. If you are not sure which to choose, I will try and explain what the difference between the two are.

The **BAM SELECT BACKUP** will only copy the areas of the disk that have information on them while the **DIRECT BACKUP** will copy every track and sector whether it be empty of full. The **DIRECT BACKUP** should always take the same amount of time whereas the **BAM SELECT BACKUP** will vary depending on how full or empty the disk is.

Now it is time to get your **DESTINATION** disk formatted. The program will ask you to **ENTER DISK NAME**. The name of the disk is what you see displayed in reverse field characters when you list the directory of a disk.

After you have named the disk, the program will tell you to **ENTER ID NUMBER**. The ID is a two character code that is also displayed in reverse field characters when you list the directory. You have to be careful, when using this program, to make the ID of the **DESTINATION DISK** different from the ID of the **SOURCE** disk.

Now you will be instructed to **ENTER DESTINATION DISK INTO DRIVE**. Before you go on, get it very straight in your mind which disk is which. The **DESINATION** disk is the disk that you are COPYING **TO** and the **SOURCE** disk is the disk that you are COPYING **FROM**. So put the disk that you are COPYING **TO** in the drive and press **RETURN**. If all is well the program should display **FORMATTING DESTINATION DISK** and the disk drive should be working.

Once the **DESTINATION** disk has been **FORMATTED** the program will tell you to **INSERT SOURCE DISK INTO DRIVE**. Before trying to do this be sure that you have removed the **DESTINATION** disk. Once the **SOURCE** disk is in the drive press **RETURN**. This tells the computer that you have done your part and it is time for it to proceed with its duties.

There should once again be disk activity and the program will display **READING BAM FROM SOURCE DISK**. After about 5 seconds the computer will request that you **VERIFY SOURCE DISK FOR BACKUP**. All you have to do is press **RETURN** and the computer will check the BAM it has stored in memory against the BAM on the disk. This is done to ensure that no errors have occurred.

Then the program will inform you that it is **READING DATA INTO BUFFER**. Notice the "BAR" near the top of the screen. If all is well that "BAR" should be getting longer.

When the BUFFER is full the program will tell you to **INSERT DESTINATION DISK INTO DRIVE**. Put the **DESTINATION** disk into the drive and press **RETURN**. The program should tell you that it is **WRITING DATA FROM BUFFER**. Now the "BAR" should progressively get smaller.

When the BUFFER has been drained the program will tell you to **INSERT SOURCE DISK INTO DRIVE**. Once again put the **SOURCE** disk into the drive and press **RETURN**.

From here on all you have to do is continue switching the disks when the program prompts you to until the program says **BACKUP FINISHED**. When that happens if you did everything correctly you should find that all of the programs from the **SOURCE** disk are now on your **DESTINATION** disk as well.

Good luck... ●

odore BASIC (the versions which are used by other computer manufacturers sometimes differ from this) the effect is to set the READ command to start from the beginning of the program again. No matter how many READs have already been carried out, if the program says RESTORE, the next READ will take the first item of DATA in the program.

The RESTORE command can be used with a little bit of cunning to make the computer start READing DATA from anywhere in the program. For example, look at the following piece of coding:

```
1000 DIM N$(3)
1010 RESTORE
1020 READ X$: IF X$<>"NAMES" THEN 1020
1030 FOR N=1 TO 3
1040 READ N$(N)
1050 NEXT
1060 DATA NAMES,JOHN,SUE,MARY
```

Lines 1010 and 1020 have the effect of finding an item of DATA consisting of the word "NAMES", and they will find this item no matter where in the program it occurs

and however many READ statements have already been executed. Line 1010 re-starts the READing process from the beginning of the program, then line 1020 goes through the items of DATA until it finds one consisting of the word "NAMES". It doesn't matter if there are a lot of items of DATA in the program before line 1000, or if a previous READ statement was looking at DATA in line 5000. Providing there is only one "NAMES" in the program, the above piece of coding will put 'JOHN', "SUE" and "MARY" into the string array.

If a programmer uses this technique, he can have his DATA in any order which is convenient for himself, and he can arrange for it to be read in some totally different order. Modular programs in which the different routines each contain their own DATA and READ statements are thus perfectly possible. All that is necessary is for each module to have a recognizable keyword at the start of its DATA, and for it to execute a couple of lines of code such as lines 1010 and 1020 in the routine above. ●

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READING THE ERROR CHANNEL IN DIRECT MODE

it can be done

by ELIZABETH DEAL

MALVERN PA

Commodore-64 and Upgrade PET computers normally can't look at the disk error channel the same way as Basic 4 systems since we cannot use GET or INPUT in direct mode. So we patch what we can with the DOS-wedge or POWER, POWAID, MOREPOWER, whatever we got. But sometimes those utilities get clobbered, especially the wedge since a lot of people put their code in fixed places. The alternative is to enter program lines, but that clobbers the program all too often. So it's one trouble chasing another.

We are in luck now. Howard Harrison of Philadelphia passed this gem to me: if we enter the GET# routine several instructions past it's beginning to avoid the check for direct mode we can, in fact, use GET

to read the error channel. It will not work with INPUT#, as the direct mode check is buried inside the routine. So we type, all on one line, if you wish:

```
CLOSE15:OPEN15,8,15
FORI=0TO30:SYS(51844)#15,A$:PRINTA$::
IFST=0THENNEXTI
```

This is for the PET. For Commodore-64 use SYS(43906).

It's not exactly as easy as Basic4 PRINT DS;DS$, but it does the job.

The parenthesis around the address are not needed. You can even stick in spaces between the address and the number sign. And if you keep one and the same file open to channel 15, you can skip the open/close typing. ●

Switching 1541 Device Numbers

Elizabeth Deal
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A SEMI-PERMANENT 1541 DEVICE NUMBER CHANGE

When you decide to change a 1541 device number via hardware, you may want to consider as an alternative a not-so-permanent change. The problem with a true device number change is that when drive #8 decides to go out of whack you may not be able to use the programs that LOAD from device #8 until the fix. Very few commercial programs actually check what device you're using – most assume #8. This can mean BIG trouble.

This article shouldn't be (but may be) system specific. The tail end discusses KERNAL 2 and 3. Currently I use KERNAL 3 ROMs in the C-64, one white 1541, short board, ROM set #5, one brown 1541CR (cost-reduction), short board, ROM set #5. Incidentally, I switched to supposedly 4040-compatible #5 ROMs just recently and unfortunately have no idea how all this behaves in ROM #3 or ROM #4 (if #4 existed). This article also applies to the Commodore 264, an early version of PLUS 4, not a production model. Things may change.

BACKGROUND

The March 1984 issue of *TPUG Magazine* had a wonderful set of super-clear instructions for changing device numbers of the disk drive, written by Dave Powell. With this calibre of instructions, the project was a snap! I desperately wanted a hardware device change. I couldn't make any sense out of the CBM instructions. No wonder – I've got the short board!

To make device #9, the circle closest to the front of the drive needs to be cut, just as Mr. Powell suggested. Use a damp Q-Tip to remove all the solder. Don't blow it around.

A SWITCHING DEVICE NUMBER

I was a bit reluctant to make the change permanent, so we attached two wires and a switch which now comes out of the box. Flip a switch one way, it's device #8; the other way, it's device #9. Now reset the drive and you're all set. It's handy and it's flexible. When the #8 decides to bite the dust, I won't be stuck with #9 forever. A big thank-you to Mr. Powell for his superb instructions.

By the way, attaching a switch is tricky. The wires go onto two tiny flat surfaces. There are no hooks. You risk connecting the gap you just cut, and you risk a cold solder connection. It's like brain micro-surgery: it has got to be right the first time!

So practise, and practise again, and then (as the photographers do) hold your breath and do it. Good luck: and don't blame me for the idea, if you damage the drive. Considering that the switch costs 69 cents, it's surprising that Commodore did not build one in.

Carrying the switch outside the drive box is simple in theory: make a hole and fit it through. The plastic box is fairly soft – an Exacto-knife will do the job. If you scrape, saw or drill the box, be especially careful: using a wet rag, keep removing the dust and pieces as soon as they form. If you don't, the grime will find its way to the disk area and cause problems later.

USING THE SETUP

Normally you decide on the drive number as you turn the computer on. The system takes care of itself quite nicely. But don't try to flip the device number and expect it to work without resetting. I have to admit I forgot this last link for a while, and was rather puzzled at the resulting confusion.

When you do things right, everything works like a charm. You can use device #8 or #9.

When either one is turned off, the other can be used. If you try to talk to a turned-off device, you get a DEVICE NOT PRESENT error. All as it should be.

ABUSING THE SYSTEM

The C-64 works well. Surprisingly, even if you have *two* devices numbered #8, it no longer crashes. It's mixed up, but it works, with the drive closest to the computer taking priority. If that drive is empty, the other one takes over. Error messages are meaningless, of course, but it's nice to know that a mistake in switching will not wipe you out.

This is not the case with the PLUS 4/Commodore 16 computer. Here, the story is complicated. If the true device #8 is closest to the computer. If the true device #8 is closest to the computer the PLUS 4/Commodore 16 will crash about 90% of the time. On the other hand, if the "switchable" device #8 is closest to the computer, the PLUS 4/Commdore 16 does *not* crash, but there are no clear priorities: the programs might come from either drive.

HOW TO RESET THE DRIVE

The simplest (and the recommended) way is to power it up with the switch in a position you want. There is little reason to switch devices on the fly. Hence the end of that story. *TPUG*

To prevent the wings from flying off the board, use statements like:

IF X<X'MAX THEN X:+10

After having finished your 'delta wing universe', you can 'hide' it by using the following trick. Insert this statement:

5 //

Then use the commands RENUM 9999 and DEL 9999. Now try to LIST — and your program appears to have vanished! However, by using RUN and START and then some of the delta wing commands, you will discover that it is still acting backstage.

You can save your 'invisible program' by using the SAVE command, and reload it any time with the LOAD or CHAIN command — and it remains invisible!

You can now write programs that use the delta wing procedures, and still use the commands LIST, EDIT, DEL, RUN and ENTER, though not RENUM or NEW. If you want to erase all lines in the visible part of the workspace, simply use DEL-. The SAVE command can still be used, but it will save both the visible and the invisible part of the workspace. Since LOAD automatically evokes a NEW, it cannot be used to load subprograms.

You might get some more ideas about extending and using DELTA CONTROL by looking in the book *Karel The Robot* by Richard E. Pattis (Wiley 1981). *TPUG*