

APPLE-BUG

is the Newsletter of APPLE-Q: the Brisbane Users' Group.

Post Office Box 721 - South Brisbane - Qld 4101.

June 1987

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NEXT MEETING: - 21st JUNE 1987

(We got the date right this time)

<<< CREDITS >>>

Graham Black	->	He typed it all in
Tony Truscott	->	He added the mistakes
ZARDAX II	->	Word Processing
EPSON LQ-1500	->	Typesetting
The Hooper Centre	->	Printing & Distribution
The APPLE Computer	->	The reason for it all

[Executive Committee]

Terry Sweetser	- President	Ph.(07) 203-4210
Bernie Benson	- Vice-President	Ph.(07) 345-1545
Vince Crosdale	- Secretary	Ph.(07) 351-3090
Eric Conolly	Treasurer	Ph.(07) 261-1860
Graham Black	- Registrar	Ph.(07) 883-1525
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Peter Lane-Collett	- Assistant Editor	Ph.(07) 398-9282
Richard Egglesfield	Hardcopy Librarian	Ph.(07) 349-8888
Bob Godbehere	- Software Librarian	Ph.(07) 808-3892

[Bulletin Board System (BBS)]

Apple-Q BBS : online 24 hrs
Telephone : (07) 284-6145 (DATA)
 : (07) 883-1525 (VOICE)
Baud Rates : 300, 1200/75, 1200 and 2400 (CCITT and BELL)
Data Specs : 7 Data bits - 1 Stop bit - No Parity (Full Duplex)
Sysops : Graham Black - ph.883-1525
 : Vince Crosdale - ph.351-3090

BBS equipment : Apple //e 128k
 : 1 x 800k 3.5" drive
 : 2 x 1 meg. Ram Cards

Calls to the system : 4146
Registered Users : 277 (as of midnight 7th June)

SYSOP stands for: SYStem OPERator
BBS stands for: Bulletin Board System

The BBS will be on show at each Open Day.

[What's When]

Sunday 21st June 1987
Open Day at the Hooper Centre.
Hours: 9.00.am. till 4.30.pm.

Monday 22nd June 1987
Committee Meeting at the Hooper Centre.
Starts: 6.30.pm.

Sunday 19th July 1987
Open Day at the Hooper Centre.
Hours: 9.00.am. till 4.30.pm.

Monday 20th July 1987
Committee Meeting at the Hooper Centre.
Starts: 6.30.pm.

[Special Attraction]

* * * * * MAC II DEMONSTRATION * * * * *

Peter Newland from Computer City will be bringing the MAC II along with the MAC SE and the //GS, to this months meeting. Peter will also be displaying some software for the //GS.

[Registrar's Notes]

Mailing labels. Please take note.....

Your membership number and membership expiry date are on the first line (at the top) of the mailing label. *This is the only notice you will receive that your membership is due to expire. If your membership is in arrears by more than six (6) months, you will be required to pay the joining fee of \$10.* If you do not receive a newsletter, then either your membership will have expired, or you have changed your address without telling us.

Example:

```
-----  
MBR # 0999 - Exp: JUNE 87  
  
BLOGGS.JOE  
  
34 BLOGGS CRESENT  
BLOGGSVILLE.QLD      4999  
-----
```

Many thanks to the few members who have taken the time to fill in the Membership Renewal forms, and return them to us so we could update the club records.

At the March Executive Committee meeting, the matter of increasing the membership fees was discussed at length, and increased.

- Joining Fee: \$10
- Adults/Family: \$20
- Students/Pensioners: \$12
- Corporate Membership: \$50
- Associate Membership: \$10 till MAY 88 (BBS users only)

(Students under 21 years - Pensioners on production of Pensioner Card)
(at the discretion of the Executive Committee)

ooooo000ooooo

The coffee machine at the Hooper Centre does not belong to the club. We have been given permission to use it, but the coffee costs 20 cents per cup, with or without the contents. The cups are not to be used as buckets in the sand pit, and they are not there to be used as ashtrays. If you require a cup for some reason other than coffee, then please get one from the bin. The 20 cents for the coffee should be left on top of the coffee machine in the container provided.

[Editor's Notes]

by Tony Truscott

Hello, this is the first newsletter that I have edited and so in this issue I have been mainly learning the procedures used in getting the newsletter to press. When I learn more about the setup I hope to instill some new ideas into the newsletter and I would like to hear your views. If there is something you would like to see in the newsletter then I want to know about it. You can either leave a message on the BBS or leave a note for me at the Open Day.

I have been told that I must write enough in my notes to fill up a page! So let me give you with some background information about myself (they'll never force me to write too much again!).

I bought my first Apple II in January 1979 and I have used only Apples since, so you can say that I am a dedicated Apple user. I watched as all the new versions of the Apple were released, but nothing could sway me from my old Apple (without the Autoboot Rom). I always enjoyed the way it started up in the monitor when it was turned on, no grinding disk noises for me. But now this has all changed with the release of the Apple IIgs, let me explain.

Through the years of using my computer I acquired an interest in music - I started with the Mountain Hardware Music System which entailed two cards and allowed you to connect to your amplifier. The basic input system used a light pen and allowed you to enter notes by pointing the pen at the screen. This was fine if you had 6 months to spare to enter one song! Somehow I managed to enter quite a bit of music over the years, mostly original songs (if you could call them songs?).

Well then along came MIDI which is the standard interface for Musical Instruments. This opened up the world of Music to computer users and vice versa. Now it is possible to play back tunes, stored on your computer, on a musical instrument (mainly keyboard oriented at present). You can create your own songs and enter it on your computer even if you can't play a note.

This is why I weakened and purchased an Apple IIgs - it's got a built in synthesizer and using the mouse to input your notes it now takes only 2 or 3 days to enter a complete song. Lets hear it for technology.

Well I hope this has not bored you too much and if anyone is interested in knowing more about MIDI and computer software, then I'll write some articles in forthcoming issues for you. Please let me know!

I haven't quite filled a whole page, as ordered, so I've stuck the Treasurer's Notes in the space left and it fits perfectly! This editing is fun.

[Treasurer's Notes]

by Eric Conolly

Finances are starting to build up nicely after our large expenditure in purchasing the BBS equipment. We currently have \$1,400 in the bank, but before you get too excited we have a couple of bills to look after.

The 5 Meg Hard Drive for the BBS is \$400. This has been purchased at Apple staff discount rates and should be received before the next meeting. Stock in the trading table has diminished somewhat over the past 6 months and we will need to allocate about \$600 to restock. We will also have to look at purchasing a printer shortly as we are still using Graham's printers for the trading table, the BBS and of course the newsletter.

[**BBS Report**]

by **Graham Black**

The on-line games, Stock Market, Casino, and the 'Land of Spur' are increasing in popularity. As the funds become available, we will improve these areas of entertainment.

There has been a Fee introduced to Non-Financial Members of Apple-Q, to allow them access to the system. As of 19th May, they are required to pay \$10 till the end of May 1988. This ensures that only Financial Members will gain Full Access to the system. This fee will entitle the user to Associate Membership, with no voting rights, and they will gain access to boards 1 - 6 and the Games Machine, only.

[**Secretary's Notes**]

by **Vince Crosdale**

June, one of my favorite times of the year, the time when the exam timetables are posted on the notice boards at QIT. I am sure that many of you out there would feel this way as well. But we can't let such trivial matters as exams worry us, we have a newsletter to do.

The month of May has been a busy one for certain members of the Executive Committee, in particular Bernie Benson. Bernie has been working like the proverbial Trojan Horse in a bid to prepare a Constitution for the club to allow for incorporation. At the Special General Meeting on the 18 May, it was voted unanimously that the club proceed with the matter of incorporation. Many thanks must go out to Bernie for an excellent piece of work in the preparation of the new Constitution.

There has been a regular flow of mail into the club over the past month, containing the usual advertisements and a number of letters from new members, current members and non-members. We have endeavoured to answer all requests, but if you feel that you have been missed out, don't despair, we will get around to you in the near future. There have been a few new magazines arriving and interested people may obtain these from Richard. Thanks must also go out to Pat Bridges for her donation of several magazines to the club. There were quite a number of magazines in the box and we are very grateful for this donation.

A matter that has come to the attention of the Executive Committee during the Open Day on the 17th May, was a member selling disks at the meeting. Now we do not frown upon members selling goods at the meeting, but in relation to the goods being 'brand new', we feel that something should be said. The selling of goods at the meetings, that is, second hand goods, is welcomed by the Executive Committee. However at the May meeting, one of the members was selling boxes of disks that were brand new. Now, this is in direct competition with the Trading Table, and the Trading Table is the clubs only major source of income. We would like it to be known that we will sell new items through the Trading Table for members, but this is the only way that brand new items such as disks may be sold at the meetings. To compound the matter, a certain gentleman at the meeting, who is not a member of the club, approached the Trading Table after the offender was asked to stop selling the

disks, and proceeded to advise the Committee on the legal aspects of selling items, how the club should be run and how the Education Department was kind enough to allow us to use the premises, and that he was from the Education Department, and therefore he was entitled to tell us how our business should be conducted. Well sir, I would like to inform you that we have been in touch with the Hooper Centre over your little outburst, and we have been advised that we may eject you from the Education Centre next time you decide to air your opinions about the running of the club. Unfortunately, your status as a lecturer at Queensland University gives you no right to come to the meetings and inform the Executive Committee on how to operate the club. It also gives you no right to place yourself in a position where you feel as though you have the power to stop the club from using the Hooper Centre. The people who allow us to use the Hooper Centre have no knowledge of you, nor do they believe that you have any right to advise the club on its operations. Therefore, we would like to inform you, that if you wish to have a say in the operation of the club, then please pay your membership fees as everyone else does. Otherwise, we would like to ask you to please keep your comments to yourself, and leave the operation of the club up to us as we leave teaching students up to you. I trust that Doug will show you this.

Another problem from the meetings. At the last meeting a number of people were approached about a lack of a membership card on their machines. A large number of people stated that they had 'forgotten' their membership cards. Therefore, we ask that any member who attends a meeting and forgets their membership card, would they please come to the Trading Table and obtain a slip of paper to place on their machine for the duration of the meeting. We will ask for your membership number and validate your current membership. This measure has become necessary due to the large amount of people attending the Open Days and the number of members being inconvenienced by non-members having their equipment in the Centre. We would also ask all members and visitors attending the Open Days to please sign the attendance book provided at the entrance to the Hooper Centre.

Our powerboards are disappearing. This is causing a large deal of concern amongst the Committee as these powerboards are extremely expensive. Therefore, we ask that any one who takes a powerboard for their use, leave their name, membership number and a \$2 deposit when taking one of the clubs powerboards. The \$2 will be refunded to you when you return the powerboard, or you can find another person who will sign for the powerboard. The powerboards cost the club approximately \$15 each, and of late have been disappearing at a rather alarming rate.

The club is looking for a new source of Public Domain Software (PDS). The present collection of PDS is getting extremely out of date and we would like to start updating the clubs PDS library with new disks. If anyone knows of a source of PDS or has any thoughts on the sort of PDS that the club should try to invest in, could they please let us know.

Well that is about it for this month. Again I would ask members for contributions to the newsletter. Many thanks must go out to Brett Dutton for the excellent articles that he has been providing for the newsletter. Remember, contributions may be sent to us via mail, the BBS or left at the Trading Table on Open Days. All care will be taken and disks sent in will be returned.

So until next month, Good Computing.

[Software Library]

Softdisk Volumes:

The files are divided into sections, and the files in each section are required for the particular applications. The prefix before each file name represents the file type. i.e. B=Binary T=Text A=Applesoft I=Integer. Each section is separated by a string of '-'s and each volume is separated by a string of '='s.

Volume # 43 - Disk 1 - Side 1 : FREE SECTORS = 9 (2.25k)

A HI	A HELLO
A MENU	B SOFTCOVER
B SIDE NUMBER 43	B S.D. RESET MSG
B PACK/UNPACKER	

A ACES UP II	A ACES UP II.INST
A ACES UP II.PROG	B ACES UP II.PAC
B SOUND1	B PACK/UNPACK
B SUPER-SHAPES	T ABOUT.ACES UP II

A RAINBOW START	A RAINBOW GAME
B PICTR.SQUARE.PAC	T ABOUT.RAINBOW GAME

A CARDIO-PULMONARY RESUSCITATIO	T ABOUT.CPR

A BEGIN	B INTRO.PAC
B FIRST.PAC	B OUTSIDE.PAC
B INSIDE.PAC	B LAST.PAC
B FOILTHEORY.PAC	T ABOUT.FOIL THEORY

A GRAPH MSTR	T ABOUT.FLEXI-GRAPH

A RHYMER	T ABOUT.RHYMER

A CUSTOM CHARACTERS	T ABOUT.CUSTOM CHARACTERS

A MAKE DISK DOSLESS.DOC	B MAKE DISK DOSLESS
T ABOUT.MAKE DISK DOSLESS	

B CATALOG SORT V2.0	T ABOUT.CATALOG SORT V2.0
=====	

Volume # 43 - Disk 1 - Side 2 : FREE SECTORS = 16 (4k)

A HELLO	B SIDE NUMBER 43
B S.D. RESET MSG	

A SOFTDISK PRESENTS	B LOWER MUSIC
B LOWER TEXT	B PLAYER
T STASH HI	T RESTORE LOW
A RECON	T RECONT

A CONTENTS MAP	T CONTENTS MAP.T

A NUMBER 43 COVER	B COVER.NUMBER 43.PAC

B COVER ANIM	B PACK/UNPACK

T FEATURES21	T SOFTGAB
T RECIPE OF THE MONTH	T QUOTE OF THE MONTH
T SOFT SPOUT	T WHEN YOU GET AN ERROR
A Q & D SOFTDISK SCANNER	B Q & D RWTRACK

T FEATURES22	T DOS ERROR MESSAGES 1 3
T DOS ERROR MESSAGES 4-5	T DOS ERROR MESSAGES 6-9
T DOS ERROR MESSAGES 10-13	T DOS ERROR MESSAGES 14 15

A DOS TUTORIAL MENU	T DOS TEXT.12
B DOS DEMO 1.12	T TEXT.DOS DEMO 2.12
T BITS TEXT.12	T TEXT.BITS DEMO 1.12

T FEATURES23	T MATHEMATICAL REFLECTIONS
T NUMBER THEORY	T THE EUCLIDEAN ALGORITHM
T THE GCD OF TWO INTEGERS	T THE LCM OF TWO INTEGERS
T NEXT MONTH	A GCD

Volume # 43 - Disk 2 - Side 1 : FREE SECTORS = 91 (22.75k)

A HELLO	B SIDE NUMBER 43
B S.D. RESET MSG	

A GRAPHIC FANTASIES 4	B GF.OBJ
B GF.PIC	B UNPK
A GF.GO.4	B GF.DATA.4.1
B GF.DATA.4.2	B GF.DATA.4.3
A GF.DEMO.4.1	A GF.DEMO.4.2
A GF.DEMO.4.3	A GF.DEMO.4.4

A ASTRONOMY MENU	A STARS
A VENUS	A GAS GIANTS
A CONFIGURE	A WINTER SOLSTICE
A FULL MOONS	A MOON CONFIGURATION
A ALMANAC	A MARS
A SEE STARS	A SS
A COMET	A FEASTS
A CHINESE NEW YEAR	B CHARACTER.B
B TABLE.B	T STARDATAFILE

A ALFREDO'S TRANSPORT TROUBLE	A ALF.PROGRAM.A2
B ALF.SHAPES.A2	

Volume # 43 - Disk 2 - Side 2 : FREE SECTORS = 23 (5.75K)

A HELLO	B SIDE NUMBER 43
B S.D. RESET MSG	

A SOFTDISK PRESENTS	B LOWER TEXT
B LOWER MUSIC	B PLAYER
T STASH HI	T RESTORE LOW

A RICH & FAMOUS	T RICH & FAMOUS DATA
A AD.ONE STEP BEYOND	B PM
B PD	A AD.PRINCESS & VALLEY OF FIRE
B PVF.1	B PVF.2
B PVF.3	B PVF.4
B PVF.5	

T FEATURES41	T BACK ISSUES
T SOFT REWARD	T SOFT DEAL
T HELP THE CAUSE	T ABOUT HARVEST
T ABOUT PIPELINE	T ANNUAL SUBSCRIPTION

A FORMS.MENU	A ORDER.BLANK
A SIGN-UP.FORM	

T FEATURES42	T ADVENTURE HINTS
T ADVENTURE REQUESTS	T BBS INFORMATION
T BUGS & STUFF	T HARDWARE AID REQUESTS
T HARDWARE HINTS	T PAL CORRESPONDENCE
T PRINTER HINTS	T PRINTER REQUESTS
T PRINT SHOP TALK	T PROGRAM REQUESTS #1
T PROGRAM REQUESTS #2	T REVIEW - FAMILY ROOTS
T REVIEW - LIFESAVER	T REVIEW - XYPHUS

B PS.GA.CUB WOLF	B PS.WELCOME MAT
B PS.KEY	B PS.CASTLE
B PS.HEART	B PS.FUNNY MAN
B PS.HAPPY DOG	B PS.WATCH
B PS.FACE	B PS.CAMERA SLR

A PIPELINE	B PIPELINE.OBJ
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EXTRA HCOLORS

by Brett Dutton

An extra six HCOLORs can be obtained on the HIRES screen by 'miving' certain standard HCOLORs. This is done by plotting different coloured horizontal lines on alternative rows. Except black and white, all the other HCOLORs can be 'mixed' together. eg. Mixing purple and red will give you a magenta colour.

```

20 REM *** HCOLOR MIXER ***
30 HOME : HGR
40 READ A,B : IF A = 8 THEN END
50 HCOLOR = A : FOR I = J TO J+8 STEP 2
60 HPLOT 0,I TO 279,I : NEXT
70 HCOLOR = B : FOR I = J+1 TO J+9 STEP 2
80 HPLOT 0,I TO 279,I : NEXT
90 VTAB 22 : HTAB 1 : PRINT "HCOLORS";A;"AND";B
100 PRINT "PRESS ANY KEY TO CONTINUE";
110 GET A$ : J = J + 12 : GOTO 40
120 DATA 1,1,2,2,3,3,4,4,5,5,6,6,1,2,1,5,1,6
130 DATA 2,5,2,6,5,6,8,8
    
```

[Feature Article]

by: *Brett Dutton*

BEATING THE RS-232 BLUES

A serial interface should be the simplest way to connect two pieces of computer gear together. Unfortunately, RS-232 complicates matters.

Only two pieces of wire are needed to allow one computer device to talk to another, and three if you want a two-way conversation. So you would think that hooking together computer equipment with serial interfaces would be easy - provided, of course, that the various equipment manufacturers had adopted a standard for their interfaces. And herein lies a problem.

The 'standard' which was adopted for serial interface was known as 'RS-232'. RS-232 is a standard of the American Electronics Industries Association, and was originally intended to interface between 'Data Terminal Equipment' (DTE - in other words a computer 'dumb' terminal) and 'Data Communication Equipment' (DCE - equipment which facilitates communication to a remote computer, like a modem).

The standard specifies the electrical characteristics of the interface signals, along with the shape and pin assignments of the connectors to be used. In addition there are certain other conventions which go along with this standard, like the commonly used data rates and formats.

Now, although it's possible to borrow the electrical and timing conventions from this standard, many aspects are ambiguous. As mentioned above, RS-232 specifies two different 'sexes' of equipment, terminal equipment and communications equipment, each with its own sex of connector, and their own connector pin assignments. But the standard is now being applied also to computers, printers, digitising tablets, speech synthesizers and so on, which don't fall conveniently into the category of either sex. Consequently any piece of equipment has more or less arbitrary sex assignments.

Furthermore, RS-232 contains specifications for using its connectors and signals for a large number of applications. Since today's equipment needs only the simplest of such arrangements, most RS-232's features are not used, and in fact merely add to the confusion as manufacturers arbitrarily select the few features they need for their interfaces.

OK, the fact that the interface is somewhat arbitrary on any piece of equipment would be compensated if the equipment manual told you how it worked. Not the case. In fact the description of how the RS-232 interface works is almost universally the worst described part of the manual, ranging from extremely ambiguous to downright wrong.

In the following I am going to describe the theory of how RS-232 is supposed to work. If anyone is interested and very keen I will forward a document that describes a test unit that will patch any two devices together, and monitor what they are saying. So if you wish to build one or borrow the principles to understand how to test and interface by some alternative method, send your request to:-

Brett Dutton
c/o The Registrar
Apple-Q: the Brisbane Users' Group
P.O.Box 698
Redcliffe 4020.

communications line sits at 'mark' or low. Along comes bit one, which is a high, and immediately the receiver knows a character is coming in. Now, assuming that the receiver and sender are set so they agree to how long each bit is, the receiver will then be able to recognise a high, then a low, then another low, and so on until the 'B' has been received.

However, suppose that instead the letter 'A' was sent, which is \$41 Hex, and therefore is represented as in Figure 2:

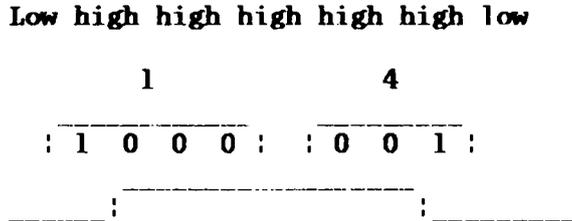


Figure 2. The letter 'A' (hex 41) represented in RS-232 voltage levels.

This time, by the time the receiver finds out something is happening, it's already on the second bit! And what if you had a character consisting only of lows?

The way around this problem is to prefix every character with a 'start' bit, which is invariably high.

Stop Bit

This still leaves one problem. Suppose we send several hundred characters in a row. It would be unreasonable to expect that the sender and receiver agree as to the time-per-bit to such great accuracy that they would still be in step after so many bits. To overcome this each character is suffixed with one or two (according to how the devices are set) 'stop' bits, which are always low. After each character we always have a low-to-high transition which can be relied upon to keep the two devices in step.

Notice that there is nothing particularly special about the start and stop bits. They look like any other bits except there is always a low to high transition at least once per character, and it's between these two bits. I point this out because it means, for example, that if you are sending serial data to a printer, if the signal is momentarily disconnected (transmission continuing but reception interrupted) then upon reconnection the printer will probably not be able to interpret the incoming stream of highs and lows. The printer will be confused until the next pause in transmission, unless the combination of received characters enables the printer to determine where the stop-start location is.

Transmission Speed: (Baud Rate)

Naturally, both sender and receiver must be set to the same nominal communications speed. This speed is measured in bits-per-second, a unit also known as the baud. (One bit per second is one baud.) Commonly used baud rates are: 110 and 133 (for Selectric terminals, for example), 300 baud (modems communicating via telephone), 600, 1200, 2400, 4800 and 9600 baud. Some devices also communicate at 19.2k, 38.4k, and even 76.8k baud, but such are rare.

Parity

An embellishment which is occasionally seen is the use of 'parity' as an

error checking method. In a seven bit code, for example, an extra bit may be added after the last bit (but before the stop bit). The sender counts the number of 'one' bits in the character, and if the answer is even it sets the parity bit to 'one', if not it is made 'zero'. (This is the even parity convention. There's an equally little-used odd parity convention which makes the parity bit 'one' for an odd total.)

When the receiver gets the character it does the same arithmetic and compares it's answer to the parity bit received with the character. If it has the same answer it knows all is well; if the answer is wrong an error has occurred somewhere. for example, suppose an 'A' is transmitted (seven-bit, even parity). This would be represented as in Figure 3.

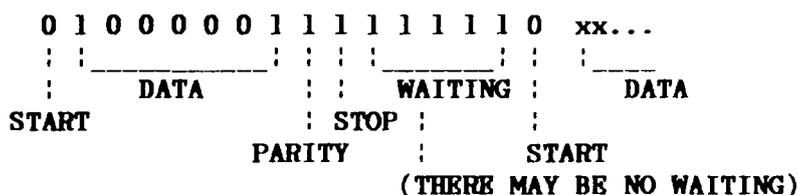


Figure 3. Representation of the letter 'A' in seven-bit even parity code. Note that a '1' is a low voltage and a '0' is a high. The line normally sits at low or '1'.

You can probably see that this scheme cannot show where the error occurred or how to fix it, nor does it signal double errors. It is basically a low-overhead warning device.

In fact parity is generally ignored, since most personal computer equipment is not operated in electrically noisy environments where such errors are likely to occur, and in any case such equipment has no convention for requesting that the sender resend the faulty received data. (often the receiving device may be set to expect the parity bit but not use it.) However, I have included this description so that you know what parity is when the equipment has a switch to select or deselect its use.

Lots of Options!

As you can see, even this far there are plenty of options to choose from. In a typical device many of these options may be switch selectable, usually miniature DIP switches inside the box, or perhaps soldered jumpers. In some cases, such as terminals and computers, some of these features may be programmed from the keyboard or from the software.

So there are plenty of ways in which your two little darlings won't be able to talk to each other! But wait, there's much more!

How Many Duplexes?

Although not strictly of direct concern in the RS-232 interface, some equipment, particuallly terminals and modems, provide a 'Full/Half Duplexes' switch.

'Full Duplex' means that when the terminal transmits a character to the remote computer the computer immediately echoes the character back to the terminal, whereupon it appears on the terminal screen (or paper, if a teletype). If there is no echo then the character you typed will not appear on the terminal's screen. This is a kind of insurance method to let you know that the computer is listening.

'Half Duplex' means it is assumed that the computer will not echo the

characters from the terminal, and thus the terminal puts the typed characters on the screen whether or not the computer is awake.

The surprise comes if you have your terminal (or modem) set to Half Duplex, and the computer you are talking to, echos the characters. Then if you type 'FRED' you'll see 'FFREEDD'.

Not so Fast!

A commonly needed feature is the ability to tell the sending device to slow down. I don't mean to send at a lower baud rate, but rather to pause for a moment. A typical situation where this occurs is in slow printers. When the carriage reaches the end of the line the printer must tell the sender to wait until the carriage returns before sending more characters.

Such a signalling system is known as 'handshaking'. Typically this is implemented by adding an extra wire to the interface cable. The receiver maintains this wire at a 'high' signal level while it's OK for the sender to send, pulling it 'low' to tell the sender to halt the flow of data. Sometimes an interface will have handshaking lines both ways, so that either device can halt the other.

A complete two-way interface would consist of two data wires, two handshaking wires and ground - a total of five wires. Most RS-232 hook-up problems occur because one piece of equipment needs some of these signals which the other does not provide, or because the wires in each piece of equipment are not connected to the corresponding pins in the interfacing connectors.

Not so Fast Type Two

A quick note here that on some intelligent printers handshaking is carried out using a method called 'X-on, X-off'. Instead of a separate handshaking wire, the printer has a data output wire (normally printers only receive data). If the printer wishes to halt the sender the printer sends a control character to the sender (usually control-S, hex 13, which is also known as 'Direct Control 3'). Subsequently sending the same character will restart the data. Note that this is the same character which you use in Apple (and CP/M) to stop and start a continuous display to the screen from the keyboard.

Handshaking and Buffers, etc

How necessary is handshaking in practice? A major sore point in the small computer industry has been the need for handshaking in printers. The Epson MX-80, for example, was available at one time with a serial interface known as 8141. This interface could only remember a maximum of two characters as they arrived from the computer. Since the 'line-feed' time exceeds the time of two characters, even at the slowest baud rates it was necessary for the interface signal to halt after each line. The standard Exidy Sorcerer and the standard Apple printer interface board do not have any handshaking inputs, and consequently it would be impossible to make this combination of equipment work serially. (This particular problem rarely comes up since the MX-80 has a parallel input which is usually used. The Sorcerer has a parallel, and the Apple has various parallel cards available.)

A solution to this dilemma which is finding widespread adoption is to incorporate a 'buffer' into the serial interface. Such is the Epson 8145 interface, which has a 2000-character (approx.) buffer. Since the MX-80 chugs along at 80 characters-per-second (cps), if the computer transmits at 300 baud (30 cps) the buffer is normally virtually empty. At line-feed time the buffer fills up a little as the computer continues to transmit. But the MX-80 catches up on the next line. There is thus no need for handshaking. You can, however, get into trouble if the computer sends a large number of form-feeds,

which take a long time.

Wires and Connectors and Stuff

The connector used with RS-232 is known as a 'DB25', which has 25 pins in the male, and 25 receptacles in the female. But why 25 pins?

RS-232 was endowed with a pile of features not now used, and these were implemented using most of the 25 pins. Now very few pins are used. The extra provide two opportunities for confusion and problems, however. One problem is that with such a profusion of pins it can be difficult to figure out which ones you are supposed to use for your application.

The extra problem area is that with all those extra tantalising pins available and otherwise doing nothing, many manufactures use the 'spare' pins for other purposes. Exidy uses them for the cassette interface. IDS, in their paper tiger printers, use the same DB25 for both serial and parallel interfaces. That's fine except that if between such units you use a cable with too many wires implemented (and this can easily be the case if you use a standard RS-232 cable in a set-up which does not use handshaking) then you are likely to blow something at one or both ends!

The pins which are commonly used are shown in Figure 4. Note that the naming convention can result in a variety of confusions. If the equipment is masquerading as a DCE the manual may tell you that, for example, pin 2 is 'Transmitted Data', which strictly speaking is an input. However the manual writer may not know this and instead call it 'Received Data', intending 'Received' in a looser sense.

<u>'Official'</u> <u>Signal Name</u>	<u>Abbrev</u>	<u>Pin</u> <u>No.</u>	<u>DTE</u> <u>'Terminal'</u>	<u>DCE</u> <u>'Modem'</u>	<u>Components</u>
Protective ground	PG	1	--	--	Optional
Signal ground	SG	7	--	--	Necessary
Data:					
Transmitted data	TxD	2	Out	In	
Received data	RxD	3	In	Out	
Handshaking:					
Request to send	RTS	4	Out	In)	Basically
Data terminal ready	DTR	20	Out	In)	same use
Clear to send	CTS	5	In	Out)	Basically
Data set ready	DSR	6	In	Out)	same use
Connector Sex:			Male	Female	

Figure 4. Table of signals, pin assignments, etc

Fighting Back

The first thing to do before connecting anything is to make yourself a chart like the one in Figure 5 for each piece of equipment you may have to connect together. This is especially important if you are involved with many different units. To connect two pieces of equipment becomes quite an easy task if you have a chart like this for each piece of equipment.

PIN NO.	SIGNAL ABBREV.	SIGNAL NAME	IN/OUT	OPEN OK?	COMMENTS
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

EQUIPMENT TYPE: _____ CONNECTOR SEX ON EQUIP: _____ DATE: _____

Figure 5. Interface chart to save headaches.

The point to this chart is that for each of your pieces of equipment it serves to collect titbits of information you will glean from the manuals, the schematic and so on. You end up with the info in the same format for each unit, where it can be simply compared to give the best idea of how to wire things up before you blow anything, and before you have the frustrating experience of having the system not work.

If handshaking lines are provided, try to find out if they actually do anything, or if they are dummies. For example, one printer may have an output which signals the sending computer to halt. Another printer may claim to have the same handshaking output, but it is actually internally wired permanently high, and is provided merely for the supposed compatibility to a computer which may need such an input so as not to halt. Got that?!

Wiring Up The Cable

You will notice that if one of your units is a true DTE and the other is a true DCE then a standard cable (pin 1 goes to pin 1, 2 to 2 and so forth, which is called a 'straight through') will work. You are unlikely to see this situation very often, which is something you should know before you buy such a cable made up (they're likely to be expensive ready-made), or before you get convinced by the salesman that the printer hook-up is trivial.

So you decide to wire your cable. First, of course, you must obtain the appropriate sexes of connectors to mate with what you have on the equipment,

and a cable with sufficient number of conductors. If it's over 20 feet you may wish to use shielded cable, but I've heard of unshielded, up to several hundred feet. Next, no matter what the equipment involved, wire pin 7 to pin 7. If it's a straight-through you are making, then go right ahead, 2 to 2, 3 to 3, etc.

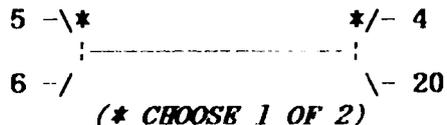
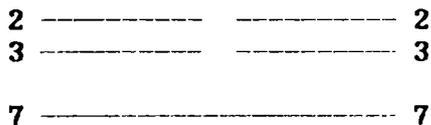
The next-most-delightful situation is where the two units are of the same sex and need no handshaking lines. For the data lines simply wire 2 to 3 and 3 to 2.

If handshaking lines are needed then determine which handshaking outputs actually mean something (as opposed to the dummies). Then connect these to the handshaking inputs of the opposite units.

You may have a sender which is not sending to a receiver which does not need to halt the sender. If this is the case you need to decide what to do with the sender's handshaking input. In some units it can merely be left open (unconnected), and this is seen as the same as 'high'. On other units open is taken as a 'low' and halts transmission. The handshaking input may be wired permanently high by jumpering it to a handshaking output on the same device. This is normally done inside the plug on that unit's end of the cable. Figure 6 shows some typical cable configurations.

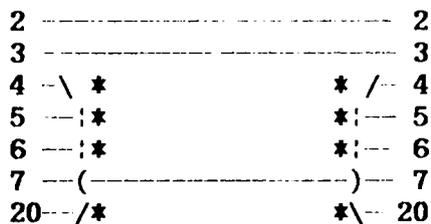
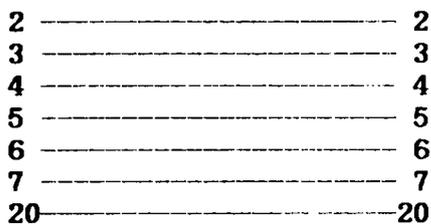


6a. The simplest cable, opposite sexes, no handshaking.



6b. The next simplest cable DCE to DCE or DTE to DTE, and no handshaking.

6d. Joining same sexes with handshaking (one possibility).



(* SOMETIMES ONE OR TWO OF THESE MUST BE OMITTED.)

6c. Cable to join opposite sexes with handshaking. ('Standard' straight-through cable).

6e. Joining opposite sexes, with defeated handshaking at both ends.

Figure 6. Some typical cable hookups

The Initial Hook-up

Armed with the appropriate (we hope) cable, plug in and see if it works! It probably won't, so refer to Figure 7, which is a summary of all the things to check to make the two pieces of equipment compatible communicators.

1. Number of bits per character: 5, 6, 7 or 8.
2. Number of stop bits: 1 or 2.
3. Baud rate: 110, 150, 300, 600, 1200, 1800, 2400, 9600 or other
4. What to do with Parity:
 - On transmission: No parity, Even parity, Odd parity, Parity bit set to 0 or Parity bit set to 1.
 - On reception: No parity expected, Ignore parity, Expect Odd, or Expect Even.
5. Full or Half Duplex.
6. Make sure machines are online if they have the ability to be offline.
7. A rather rare final item which can cause problems is an option on a few machines which allows of the polarity of the data signals and/or handshaking signals. You should set these to: Negative Mark for the data lines, and handshaking lines should indicate OK to proceed with a high level, STOP with a low level.
8. Any more problems and you'll have to get in contact with Apple Q to get the instructions for the RS-232 checking device.

Figure 7. Quick check list

A Test Box to Defeat All Problems

So perplexing are some RS-232 problems which I have encountered that I highly recommend obtaining a test unit of some kind if you are going to be involved with many such situations, or contact Apple Q for the details of a device which is designed to handle these problems, and which also permits quick patching together any trial interface configuration. Unlike commercial units, it will even enable you to determine the inputs and outputs of a completely unknown interface with no documentation.

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