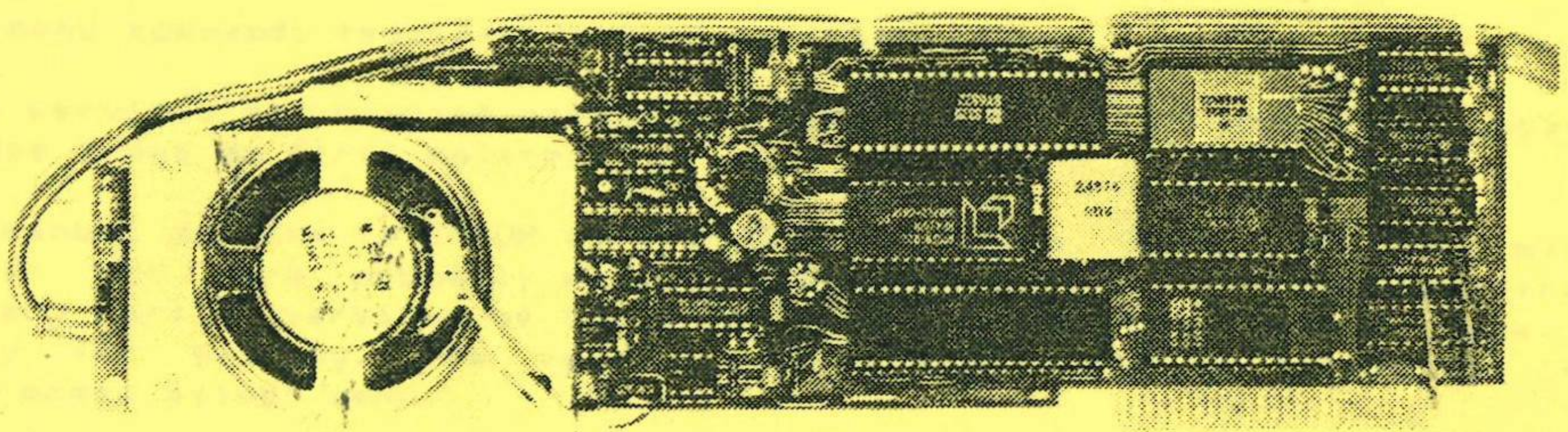


AUTOMATIC ICE CO. INTELLIGENT MODEM CARD



Dennis O'Keefe

*Buy again
and stay*

FOR APPLE II & IIE

AUTOMATIC ICE CO. 10 SMITH ST. CHARLESTOWN 2290.
PHONE (049) 633188.

SPECIAL NOTES

1. Viatel and other Videotext services must be accessed using the (Videotext) option, otherwise the graphics will not be decoded and the screen will fill with rubbish.
2. If in trouble, pressing the "ESC" key once or twice will usually display menu.
3. Take care with DOS commands "PR#3" and "PR#6". Both disconnect the modem, set input to the keyboard and output to the screen. Under these circumstances the modem may not automatically hang up on loss of carrier.
4. If the modem hangs up prematurely when trying to dial another autosearch modem, it may help to add "X" to the phone# (see the section on "DIALLING").
5. When dialling, adding "L", "I" or "H" to the phone# will determinate the baud rate, irrespective of the default setting (see section on "DIALLING").
6. Some menu commands require input to be upper case.
7. Some services may require pasword or logon in the exact format of upper and lower case input as first entered.
8. This manual applies to EPROM version 2.64 or later. Some features may be absent or not work properly with earlier versions. We will replace, free of charge, any earlier versions of the EPROM returned to us. Please pack them carefully for posting. The version number is displayed at the bottom of the "(A)lter modem setup" menu.
9. When operating under ProDos, the volume prefix must either be set or supplied as part of the filename. (e.g. /USERS.DISK/ANIMALS). Failure to do this will elicit "ERR #40".
10. Please read the instructions in appendix X before installing an updated EPROM. Some early supplied modems had a 64K EPROM and need a minor modification to suit the current 128K EPROM.
11. A printer card capable of doing graphic screen dumps is required to print Videotext pictures to a printer. An Automatic Ice Co printer card or an Apple Super Serial card is required to print online at 1200 baud. Ways around this are discussed later.
12. In this manual, "A" means "control A" - hold down the key marked "CONTROL (sometimes CTRL)" while pressing the "A" key. "<CR>" means "Carriage Return" - press the key marked "RETURN". The double commas are not pressed but are included for illustration.
13. A special EPROM is available to show full Videotext colour and print full colour pictures on the new Apple IIGS and Imagewriter printer. These are supplied at no extra charge if requested at purchase or are subsequently available for updates at \$12-00 each.
14. If you know anyone with an Automatic Ice Co. modem who has not received his manual tell them to contact us for a "no charge" copy.

AUTOMATIC ICE MODEM FOR APPLE II, IIe & IIgs

GETTING STARTED

In terminal mode the modem is designed to be extremely easy to use and the menu driven operation makes a manual almost superfluous but the following text is useful for those concerned with operating the modem from within programs and writing programs.

We start with simple instructions for those of you who wish to get going immediately and follow with a more detailed description of the various menu functions.

1. Important - Turn off the power to the computer before installing the modem. Failure to do so can damage both the computer and modem.

2. Insert the modem in slot #2. It won't work in any other slot unless you have a special EPROM (not recommended - most programs expect the communications device in slot #2). With the Apple IIe it may be necessary to bend the speaker plug slightly.

3. Insert the modem phone plug into the telephone wall socket. You can plug it in instead of an existing phone or use one of the telephone plug double adaptor devices available from hardware stores or electronics suppliers. The modem can be left permanently connected and will not answer or interfere with normal phone operation unless the computer is on and the modem is specifically set to answer the phone. It may be necessary to remove the plug cover to pass the telephone plug through the hole in the metal back plate of the Apple IIe.

4. Power up your Apple and boot DOS 3.3 or ProDOS if you wish to send or receive files to disk. Some functions will not work without DOS resident and will show the message "Can't find DOS".

5. From the basic prompt "]", type "IN#2 <CR>", where <CR> means a carriage return. Now press the key marked "ESC". The main menu as shown in fig. 1 immediately appears. This menu can only be obtained by pressing the "ESC" key and this infers that you wish to operate in terminal mode (i.e. by typing at the keyboard and not from within a program such as a bulletin board) so the terminal mode flag in the modem is automatically set.

If you get the message "SYNTAX ERROR", you have done something wrong and the Applesoft interpreter can't parse it properly. Press "CONTROL RESET" and try "IN#2<CR>" again. The old original Apple II starts off in the machine language monitor with the "*" prompt after reset. Typing "^B<CR>" will get the Applesoft prompt ")]".

The menu is labelled "Icemodem Terminal", and displays a list of functions which are selected by typing the first character on the line

At the top, the word ONLINE or OFFLINE indicates the phone status, the memory and printer status are shown as OFF or ON, the 1200/75 status is shown as ")", "(" pointing to the 1200/75 receive speed or "-" indicating no V.22 connection. The free buffer memory is displayed in hexadecimal as signified by

"*". \$1000 equals 4096 decimal bytes so the default memory buffer is capable of receiving 36352 characters.

The functions on the main menu are selected by typing the first character on the line - a <CR> is not necessary. The menu selections are for ease of use and don't necessarily correspond to the modem control codes of table 1. Selections from the terminal menus cause the modem to issue these control codes internally but the same effect is achieved by typing the appropriate "CONTROL A" commands (see table 1) from the keyboard when a menu is not visible. This is useful when you want to retain the screen text - pressing "ESC" for a menu clears the screen and previously received text is lost. The modem can also be switched on from the monitor ("*" prompt) by the command "2^K<CR>".

Pressing the spacebar clears the menu and continues terminal communication.

6. In terminal mode the modem will answer incoming telephone calls and automatically set itself to match the baud rate of the incoming call or hang up if it can't find a valid carrier after 30 seconds.

7. The modem can operate as a self contained Videotext terminal and this aspect is completely separate from the normal communication mode. For Videotext (Viatal), the (V)ideotext option must be used. Type "V" from the main menu and read the section labelled "Videotext". If you set the correct baud rate and parity you can connect to Viatal in communication mode but the incoming data will not be graphically decoded and will appear as mostly rubbish interspersed with recognisable text. The command "^A#<CR>" will turn on the Videotext decoding but this is the same as using the (V)ideotext option.

8. When first powered up the communications mode defaults to "75 BAUD SEND" but this can be changed by the "A" selection. (Alter - see later).

9. To call a 75/1200 BAUD service from the main menu, type "K" for (K)eyboard Dial. The screen clears and the message "Dial Phone#?:" appears. Type in the phone number followed by <CR>. Additional characters as described later can be added to modify the dialling. The modem will loop the line, wait for dialtone and dial the number. It will then display the message "Icemodem : Await modem" and search for carrier for approximately 30 seconds. When carrier is found it will display the message "Icemodem : connect 75 baud" and you can now communicate with the other modem from the keyboard. Pressing "ESC" will give you the main menu and its functions. If the modem does not connect, check that the baud rate matches that of the modem being called. See the section on dialling for a more detailed description.

10. To hang up, select the main menu with the "ESC" key and press the "H" - (H)ang up key.

11. The modem will automatically hang up if the other modem hangs up or loses carrier.

12. Since pressing the "ESC" generates a menu, you must type "^A" followed by "ESC" to actually send the "ESC" character from the keyboard. (not necessary from within a program).

13. If you have any problems see appendix X "step by step connecting to a database"

DETAILED DESCRIPTION

OPERATING COMMANDS

To make the modem easy to use, it is organized so that pressing the "ESC" key in terminal mode presents a simple menu explaining the current options and you select from these by typing the first character.

This scheme is not sophisticated enough for program operation and has the disadvantage that the text previously displayed on the screen is obliterated by the menu and not restored. The menu arrangement is merely an overlay that issues commands from a more complex set tabled below.

These commands begin with "^A" and finish with "<CR>", the only two exceptions being "Send ESC" and "Send ^A" which do not need a "<CR>". In this manual, "^A" means "Control A" - hold down the key marked "Control" and press the "A" key. "<CR>" means press the key marked "RETURN". The double commas are only included for illustration and are not typed. These commands are the same as for the Apple Super Serial where possible but include many additional commands not relevant to the SSC. (The Apple Super Serial Card will be referred as SSC from now on).

The commands can be issued from a program or directly from the keyboard and they will not bring up a menu. They can also be sent to another Icemodem by preceding them with a "BREAK". This is covered in the section "Send Break".

Don't let this section on commands put you off, if you need to know it you will understand it easily otherwise you can ignore it.

TABLE 1 MODEM CONTROL COMMANDS (CONTROL A COMMANDS)

ALL COMMAND CHARACTERS MUST BE IN UPPER CASE.

<CR> means press the "Return" key
 ^A means Control A. Hold down the "Control" key and press the "A" key.
 -- means Filename.

^AH<CR>	- Hang up.	
^AD??<CR>	- Dial phone number (???) - See below for dialling enhancements	
^AD<CR>	- Dial immediate - Modem goes online in current transmit mode.	
^AA<CR>	- Answer - Modem goes online and searches to match rec. carrier.	
^AOP<CR>	- 8 bits no parity.	(DEFAULT)
^AIP<CR>	- 7 bits odd parity.	
^A3P<CR>	- 7 bits even parity.	(VIDEOTEXT MODE)
^A3S<CR>	- Turn on 80 column card.	
^AIS<CR>	- Send received data to printer.	(SPECIAL PRINTER CARDS ONLY)
^AOS<CR>	- Turn off printer.	
^A6B<CR>	- 300 baud full duplex.	
^A2B<CR>	- 75 transmit/1200 receive.	(DEFAULT)
^A8B<CR>	- 1200 baud transmit/75 receive.	
^A5B<CR>	- 300 baud bell.	(AMERICAN SYSTEM)

^AOB<CR>	- Turn line around (V23 only - status in sendflag)
^AB<CR>	- Send break to other modem.
^AB<CR>^A^A*	- Send command to remote Icemodem. "*" = command (e.g. OB<CR>)
^A^A	- Send ^A to other modem. (NO <CR> USED)
^A ESC	- Send "ESC" to other modem. (KEYBOARD USE ONLY)
^AL* <CR>	- Dial and connect to Teletext entry "*" where A<*(W
^AM<CR>	- Engage Videotext mode.
^A^C	- DOS Command. - "Basic System" must be resident for ProDos.
^AW<CR>	- Memory Wipe. - Resets pointers to clear receive buffer.
^AV<CR>	- View Memory. - Any key stops/starts - "ESC" terminates.
^A^T--<CR>	- Transmit file - Esc terminates file transmission.
^A^R--<CR>	- Receive file - Esc terminates - 5 secs. silence terminates.
^A^V--<CR>	- Save file as BASIC. (CONSTRAINTS UNDER DOS 3.3)
^A^U--<CR>	- Save file as TEXT.
^A^S--<CR>	- Save file as BINARY.
^A^Q--<CR>	- Puts name in buffer - but nothing else.
^A^W--<CR>	- Load file but not send.
^A^P--<CR>	- Save as AWP (Appleworks Word Processor). (ProDos ONLY)
^A^O--<CR>	- Save as ADB (Appleworks Database). (ProDos ONLY)
^AT<CR>	- Enter terminal mode.
^AQ<CR>	- Quit terminal mode. - Does not reset hooks.
^AZ<CR>	- Zap. - ^A commands (these) not recognized.
^AU--<CR>	- Same as ^AQ but goes through DOS without doing anything.

The following commands have a format similar to the Apple SSC card where "E" is added to the command to (E)nable the function and "D" to (D)isable. The SSC requires a space between the command and E/D but this card doesn't care. For illustration some of the commands are shown being disabled and others enabled.

^AE E<CR>	- Echo - Half/full duplex
^AX D<CR>	- Xon/Xoff - Xon disables Christansen Protocol.
^AC E<CR>	- Christansen Protocol. - Disables Xon/Xoff.
^A^ D<CR>	- Debug - makes control characters visible.
^A- E<CR>	- Filter - Removes all control characters except <CR> and <LF>
^AM D<CR>	- Memory capture buffer ON/OFF
^AP E<CR>	- Phantom modem mode - simulates ringback if no carrier.
^AJ D<CR>	- Ignore remote ^A - stops another modem issuing these commands.

The following characters can be added to modify the dialling command. They can be placed anywhere between the "^AD" and the "<CR>". See the dialling section for a fuller discussion.

M?	- "?" no. of multiple dial retries, where "?" is a single digit.
:	- Wait up to 8 seconds for another dialtone at this point.
,	- Pause for 2 seconds at this point - multiple commas allowed.
L	- Dial out in (L)ow speed send (75 baud) irrespective of setting.
I	- Dial out in (I)ntermediate (300 baud) irrespective of setting.
H	- Dial out in (H)igh speed send (1200 baud) irrespective.
V	- Voicecall-use as an automatic dialler-does not seek carrier.
X	- (X)tend carrier valid search time - use for premature hangup.

```

--
| Icemodem Terminal      OFFLINE  |
| (ESC=^A ESC)
|
| Memory ON/OFF          OFF
| Keyboard dial
| Send a file
| Receive a file
| Hang up
| Quit terminal
| Notepad/memory
| Videotext
| Teletext
| Break
| Alter modem setup
| 8-80 col. card on
| & Function
| Line reverse (1200<rec>75) -
| Print ON/OFF          OFF
| DOS Command
|
| Which (M-D)? - Spacebar to resume
|
| Free buffer memory: *BE00 bytes |
--

```

FIGURE 1 -- MAIN MENU

MENU FUNCTIONS

After typing "INW2 <CR>" and then pressing the "ESC" key, the main menu (figure 1) appears. This menu can be always available in terminal mode by pressing the "ESC" key but it clears any text already received on the screen. To avoid this you can accomplish all menu functions by using the "CONTROL A" commands (table 1) whenever a menu is not present. When a menu is visible, typing the first character on the line initiates the command. Any unrecognised key (e.g. spacebar) will return the modem to the terminal communication mode.

The menu displays "ONLINE or OFFLINE" at the top to show the modem phone connect status. The character "ESC" can be transmitted by typing "^A ESC" without generating the menu. We shall now describe each of the menu functions in detail.

MEMORY_ON/OFF

When communicating with another party or receiving information from a database/bulletin board, it is often useful to have a permanent record. Incoming data can be saved by turning on a memory capture buffer. From the terminal menu, this is toggled ON or OFF using the "M" key and the current status is displayed on the menu page. "^AM E<CR>" & "^AM D<CR>" sent from the keyboard or from a program will also (E)nable or (D)isable memory capture. At power up or after reset, the memory capture buffer defaults to the range *0801 - *9600, a total

of 36352 decimal bytes. This overlaps the memory normally occupied by BASIC but these limits can be easily changed. (see later section "Limit memory buffer").

Bulletin boards and other hosts often transmit nulls (*00) as time filling characters. These are not displayed and do not affect printers but they are disastrous to some wordprocessors, especially those using DOS 3.3 textfiles which interpret a null as the "end of file" character. They will regard the first null encountered as the end of the text. To counter this, the modem strips all nulls and characters *FF (decimal 255) from the data stream before writing it to memory. This is fine for textfiles but plays havoc with program files or those files that must be received exactly as transmitted. Such files must be recorded with the "(R)ceive a file" command. The "Notepad/memory" command (see below) is closely associated with this section and contains commands to erase, print, load and save memory. Files saved to memory can be edited in the Notepad word processor. The amount of free space left in the memory buffer is displayed at the bottom of the main menu page. Approximately 256 bytes before the buffer becomes full, the computer will beep and the message "MEMORY FULL" will be displayed. Data received after the memory reaches the top buffer limit is not recorded. The memory can be turned ON or OFF at any time to collect material of special interest and ignore other data.

The operations "(S)end a file" and "(R)ceive a file" both clear the current memory and substitute the sent or received file but sent files can be concatenated using the Notepad. The save commands save the current memory buffer contents as the nominated filetype.

The high byte of the lower buffer limit is stored at *EB, the low byte is always *01. The high byte of the maximum upper buffer limit is stored at *EC, the low byte is always *00. Zero page locations *ED & *EE contain the current buffer READ/WRITE address. *EF & *F0 hold the address of the end of the buffer as currently filled.

Note that when returning from (V)ideotext mode the memory buffer must be erased or the system reset as the memory management for Videotext mode is completely different.

KEYBOARD DIAL

Option "K" from the main menu clears the screen and presents the prompt "DIAL PHONE #?". Enter the phone number, including any required enhancements (see below). The modem will pick up the phone and wait 8 seconds for a 0.3 second period of continuous noise. If this is not successful it will hang up the phone with the message "ICEMODEM:HUNG UP - ICEMODEM:NO DIAL TONE".

If a dialtone is detected, "DIALLING" appears on the screen, a small square flashes as the number is dialled and the modem awaits a continuous noise which may be ringtone, engaged signal, data carrier or voice. If this is not successful it hangs up otherwise it displays "ICEMODEM:AWAIT MODEM". If it gets this far, the modem will generate the carrier for the currently set baud rate or as determined by the dial enhancement character. If "L" is added to the phone# (e.g. 01923L --- Low speed send), it will dial and set itself at 75 BAUD SEND irrespective of the current baud rate setting. Similarly "I" will set the (I)ntermediate rate of 300 baud and "H" will set the (H)igh speed send rate of 1200 baud. Using "L", "I" or "H" only affects the current call and does not alter the default transmit speed for the next call.

It now searches for matching carrier from the other modem for 30 seconds. If none is received, it hangs up with the message "ICEMODEM:HUNGUP -- ICEMODEM:NO CARRIER". If the correct carrier is detected within 30 seconds, it samples it for 2 seconds of continuous carrier and gives the message "ICEMODEM:CONNECT 75 BAUD" (if set to 75 send). The 2 second sampling time discriminates against

other telephone tones which can fool the modem. It will now communicate with the other modem until you hang it up. If the other modem drops its carrier for more than 0.5 seconds, this modem will attempt to find the alternate carrier if in 1200/75 mode (see "Line reverse") and will hang up if unsuccessful. Pressing any key in the period after the number has been dialled and before a successful carrier will cause the modem to hang up with the "NO CARRIER" message.

When some modems are called, they try to match the baudrate of the calling modem by sending out carrier of different operating modes and detecting received carrier. If the called modem has a large number of operating modes, some of the tones it transmits in one of its incorrect modes can be perceived as valid carrier by the calling modem (this one) which will then believe it has a successful link. Meanwhile the called modem doesn't like our carrier and moves on to a different mode after a few seconds. Our modem loses what it thought was the correct carrier and may hang up before the other modem moves to the correct operating mode. To counter this, if "X" is added to the phone#, the modem will not accept a carrier as valid unless it has been continuous for 6 seconds. The called modem is not likely to stay in an incorrect search mode for this length of time. Occasionally the modem may encounter some non data noises with sufficient energy in the carrier passband to fool it but this is rare and it will quickly decide the carrier is incorrect and hang up.

If it gets an engaged signal, it will wait 30 seconds for a carrier and then hang up.

If "V" is added to the phone#, the modem will not attempt a data link but the computer will "beep" and "VOICECALL!" shows on the screen. You can then pick up the phone and press any key to hang the modem up. Used in conjunction with the TELELIST feature (see later) this provides a handy automatic dialler. If you do not take the call, the modem hangs up after 40 seconds.

Adding "M" followed by a digit (1-9) causes the modem to attempt (M)ultiple retries as specified by the digit, if dialling is unsuccessful.

A colon inserted in the phone# causes the modem to wait for another dialtone at that point in the dialling sequence. If it is not obtained within 8 seconds, the modem hangs up with the "NO DIALTONE" message. A comma inserted in the number generates a 2 second pause at that point. This is useful when calling out through a PABX where you dial an access digit and then wait for a line. Multiple commas can be used to give longer pauses.

If you press the "Return" key in answer to the prompt "DIAL PHONE #? :", the modem will not dial but will pick up the phone and wait 30 seconds for carrier appropriate to its currently set transmit speed. Failing this, it will hang up with the "NO CARRIER" message. The command "^AA<CR>" issued from a program or from the keyboard when a menu is not present, causes the modem to pick up the phone and try for 30 seconds to match a received carrier. (see "Waiting for the phone to ring" for a full discussion on the "answer" command). Using these commands you can establish a data link after verbal discussion initiated by a manual phonecall. One party issues "Return" as the required phone# in response to the (K)eyboard dial prompt or types "^AD<CR>" when the menu is not present and the other party agrees to issue the "^AA<CR>" command.

All the dialling commands can be sent from within a program when the modem is not in terminal mode. For BASIC programs, make the modem the output device with the "PR#2" instruction and print to it using the "CONTROL A" commands in table 1. Since the "A" character is non printing in a BASIC program it is wise to define it as a string to make it visible.

After dialling from a program, it is wise to look at "RINGFLAG" by a PEEK(2042) to find the result of the dial attempt. A list of possible results for various values of PEEK (2042):-

VALUE	RESULT
39	Hung up - no carrier. Timeout waiting for carrier or keypress abort.
51	Connect 300 - carrier detected at 300 baud.
61	Connect 1200 - 75 baud carrier detected on receive channel.
72	Connect 75 - 1200 baud carrier detected on receive channel.
117	No Dialtone - 8 seconds elapsed without 0.3 seconds continuous noise.
143	Hung up - Result only available from a Voicecall using "V" in phone#.

Here is an example program running under DOS 3.3 which dials AUSPAC's 1200/75 mode.

```
10 DS=CHR$(4): REM REQUIRED FOR DOS
20 AS=CHR$(1): REM DEFINE CONTROL A
30 PRINT DS;"PR#2":REM TURN ON MODEM FOR OUTPUT
40 PRINT AS;"D01923L": REM ^AD PHONE# AND SET TO 75 SEND IRRESPECTIVE
50 PRINT DS;"PR#0": REM TURN OUR SCREEN BACK ON FOR OUTPUT
60 IF PEEK(2042) <> 72 THEN 1000: REM WAS THE RESULT "CONNECT 75" ?
70 PRINT "SUCCESSFUL CONNECTION AT 75 SEND"
80 PRINT: GET Y$: REM REST OF PROGRAM FOLLOWS HERE
```

```
1000 PRINT "NO LUCK"
1010 PRINT DS;"PR#2": TURN MODEM BACK ON
1020 PRINT AS;"H": REM HANG IT UP - JUST IN CASE
```

SEND A FILE

This command prompts for "FILENAME?" and then searches the currently logged drive for the file. If it finds it, it loads it into the memory buffer, overwriting any previous material and then attempts to transmit the file. If the modem is hungup, it comes back with the message "NOT ONLINE - OK" with the file still in memory.

You can now dial up another modem and use the (S)END again, but this time if you enter RETURN when prompted for "FILENAME?", it will transmit the file in memory. This is useful if you have a large file and don't want to waste time loading it while online. The modem knows whether it is ProDos or DOS 3.3 and it is not necessary to nominate the filetype but you MUST include the prefix for ProDos files.

XON/XOFF and MODEM7, an error correcting protocol, can be used in conjunction with sending a file. These are discussed separately later in the manual and should be read to fully understand the (S)END command.

Material can be composed offline, using the NOTEPAD and then sent by entering "<CR>" in response to "FILENAME?".

VIDEOTELETEXT

This discussion on Videotext operation mentions pressing the "ESC" key obtain the Videotext menu and then selecting the first character of the command to execute it, but since these commands automatically revert to Videotext display they can be thought of as "ESC?", where ? represents the command character.

In this text "Viatel" is to be regarded as synonymous with Videotext service in general. FRAME is the same as PICTURE.

For convenience and ease of use, Videotext is implemented as a separate entity.

Install the modem as previously described and turn the computer on. If you require to save or load pictures to disk you will need a disk in the drive formatted under one of the Apple operating systems, DOS 3.3 or ProDOS.

As you turn the computer on the disk drive will spin until the operating system is loaded into the computer. If no disk is installed, you can stop the drive by pressing the "CONTROL" and the "RESET" key at the same time.

When the drive stops the screen should display the prompt for the BASIC operating language, a right square bracket "]". Depending on the startup program resident on the disk this may not always occur but pressing "CONTROL" and "RESET" together will usually generate the "]" prompt.

Having got the "]" prompt with the flashing cursor next to it, type in IN and press the "Return" key. Now press the "Esc" key and the main menu as shown in figure 1 should appear. Press the "V" key to select the (V)ideotext option and the Videotext menu will appear as :-

```
--
|
| Videotext (D-S)
```

```
  Dial#
  Memory save
  Catalog
  Print
  New#
  Hang up
  Telesoftware
  Quit
  View memory
  Erase memory
  Load<disk
  Save>disk
```

```
--
```

Normally you would choose "D" for (D)ial# but since we are using the system for the first time we must enter the phone numbers and ID so select "N".

"N" - (N)ew# - allows phone numbers and identity codes to be permanently stored in the modem's battery backed memory. The screen clears and displays -

#?(1-4)

5-Set printer

Press the "1" key and "Phone:" is displayed. Type in the phone number of the Videotext service (01955 for Viatel) and press the "Return" key. Overseas numbers can be entered with country access codes as well as time delays and PABX access codes (see previous section on dialling). The screen now displays

"ID-".

Here enter your identity code followed by "Return" or just press the "Return" key if you want to send it manually.

When you subscribe to Viatel, you will receive the following:-

(a) A nine digit Viatel customer number, the digits related to your phone number. This is mainly for billing and need not concern us here.

(b) A 10 digit "Customer Identity" number. This is the code to enter in response to the screen prompt "ID-".

(c) A four digit "Personal Password". For security this is not held in the modem memory but is typed in from the keyboard at the Viatel request "Enter your personal password". You can change this to other digits or a four character word. Instructions are on the Viatel system.

Some systems (e.g. Elders Farmlink) have the identity and password combined in a single field. Here you enter the whole code at the "ID-" prompt or reply with a carriage return and type the code in from the keyboard when prompted by the service.

After typing in your identity code and pressing the "Return" key, the screen will go blank. This is the currently displayed picture (there isn't any). Press the "ESC" key and the Videotext menu reappears. You can now use the (D)IAL command to connect (see next).

There is provision for permanent installation of four separate services labelled (1-4). Backspace (Rubout) is not allowed in NEW# entry. If any mistakes are made you must start again. New entries overwrite the previous one.

The phone numbers and passwords are permanently stored in the battery backed memory and need the batteries installed. Some modems are fitted a nickel cadmium cell instead of batteries, this requires that the modem be powered up initially for some time to charge the cell before it will remember the entries. If you have problems, see the earlier section on memory and batteries.

"D" - (D)IAL#. This would normally be your first selection after you enter the Viatel menu. The menu clears and the screen displays the digits 1 - 4 each on separate lines with the phone numbers entered from the "NEW#" command beside them or a blank space beside the digits not used.

The only input the computer will accept at this stage is the digits 1-4. A carriage return is not necessary. Choose the required digit and the modem will pick up the line and dial the Videotext service as described in the "KEYBOARD DIAL" section.

You can hear the dialling result over the loudspeaker and when the modem senses carrier it will clear the screen ready to receive the Viatel frame.

Viatel first transmits the enquiry character CHR\$(5) and the modem replies by sending the 10 digit ID entered against the phone number.

If this is correctly transmitted, Viatel will respond by sending a frame which asks you to "Enter your personal password". Here type in the four character password issued to you by Viatel.

You should then see the Viatel "Welcome" frame mentioning you by name. If this is unsuccessful, Viatel will tell you that you have entered the wrong ID or password. Most likely this is true, but it's possible that the phone line corrupted the transmission and they received incorrect data.

Viatel will retransmit the "Enquiry" character a number of times (typically five), the modem retransmits the 10 digit ID and if still unsuccessful, Viatel will send a frame advising an unsuccessful result and hang you up.

If you're sure that the ID and password are correct, you could try dialling again on the assumption that you picked up a noisy phone line. If the ID is incorrectly transmitted the first time, you may see corruption at the top of the picture as it is sent again.

This is not a problem, the only time the modem doesn't continuously poll the incoming Videotext signal is when it is reading the ID from the memory. The distortion merely indicates that it has missed a few characters of the "repeat ID" frame, but this rarely happens.

If the system hangs with a number of horizontal dashes in the top left hand corner of the screen, it is waiting for additional ID input. Type a few digits to clear the system and continue, but this is a good indication that something is wrong with your logon data.

Even if you successfully log on, you will occasionally get pictures which are continually distorted. This indicates a noisy phonenumber and the best cure is to hang up and try again.

"M" - (M)EMORY SAVE. This command allows you to quickly save Viatel pictures to memory while ONLINE so that you can review them at leisure without incurring extra online charges. To save a picture, press the "ESC" key to reach the Videotext menu and then "M" to save the currently displayed picture to memory. After this the menu disappears and the picture is again visible. Pictures "SAVED" to memory can subsequently be "VIEWED", "PRINTED" and "SAVED TO DISK".

The total size of the memory buffer is 22,000 bytes and Viatel frames are limited to 850 bytes maximum but generally are less than 500 bytes, so you can save approximately 40 frames. However there is no upper limit set on the buffer and no warning given if the buffer size is exceeded. This means that you can overwrite DOS and be unable to READ/WRITE to disk if you save too many pictures before (E)RASING MEMORY. Probably safest to limit yourself to 30 pictures.

"C" - (C)ATALOG. The function of this command is self explanatory. It is included in this menu for convenience.

If operating under ProDOS, BASIC SYSTEM must be resident for this to function.

"P" - (P)RINT. This graphically prints out the currently displayed Videotext picture. The picture can be printed while online to Viatel, loaded from disk or

the memory buffer. It internally issues a command for the printer to do a printout of the HI-RES graphic page and for this reason, will only work with intelligent printer cards capable of graphics dumps such as the Automatic Ice, Grappler or Digitek.

Before using this command for the first time, you must load into memory, the command string applicable to your combination of printer and interface card. Use "ESC" to get to the Videotext menu and select "N" - (N)EW#. The screen displays "N?(1-4) 3-Set printer". Choose "5" and the screen changes to "String?".

Now type in the command string that your printer interface card needs to print a page 1 HI-RES graphics dump. This string typically begins with "^I" followed by "G" and another character particular to the printer and finally a carriage return. For example, "^IGM<CR>" is the string for an Automatic Ice printer interface connected to an Epson printer or "^IGDM<CR>" if you want a double sized picture. If you make a mistake entering the string, you must start again.

The Apple printer interface cards do not have a graphic dump capability, but you can save the pictures to disk and print them out using a software program such as "Triple Dump". We will soon make available a software program on disk to print out the pictures using non graphic interface cards.

"H" - (H)ANG UP. This hangs up the phone and disconnects you from Viatel. You may wish to log off first by typing "*90#" and Viatel will tell you if there are any messages.

"T" - (T)ELESOFTWARE. Telesoftware is a method of downloading computer programs from the Viatel system. There are a number of Service Providers who supply programs for the Apple II, some are free others you have to pay for. MICROTEx 666 can be accessed by typing "*666#" to view a range of Apple II style programs.

The programs are encoded and transmitted on a number of successive Viatel frames each with an error correcting checksum appended. The Telesoftware function in the modem decodes these frames, checks for errors and if necessary instructs the system to retransmit the frame. When it receives the last frame of the program, it acknowledges it and saves the program to disk. If there are any charges for the program, they are usually incurred on the last frame.

To receive a program, follow the Viatel instructions which will lead to the program header page. This page contains details about the program such as its name, length, description, computer type, cost and exit procedure if you don't want to take it. It will also show an instruction such as "START DOWNLOAD FUNCTION". To download the program, key "ESC" for the Videotext menu and select the "T" - (T)ELESOFTWARE option. The modem will send the start sequence and they will send you the program frames.

In our implementation, the received code is only displayed as a single changing character and the frame number currently being received is displayed as a lower case alphabet (a-z). If an error occurs in the frame reception, the modem requests retransmission and displays "ERR" on the screen without advancing the frame number display. We don't limit the number of retries. If you consider the errors are excessive, you can abort the download by pressing the "ESC" key, then hangup and try again for a better connection. After the last frame has been successfully received, the modem acknowledges it and prompts you for "FILENAME?". Type the name and it will be saved as a textfile. Most suppliers transmit their programs as textfiles even if the original source is a binary file, because textfiles are much more computer and memory

independent. Any other sort of file can be converted to a textfile.

Having recorded your program as a textfile, you can then exit the modem to Applesoft and use the DOS command, "EXEC" to put the textfile into the computer in the correct format and then save the program. These instructions are usually given on the Viatel frames by the program provider. When you EXEC a textfile the computer sees it as if you had typed the text at the keyboard.

Note that selecting the "T" - (T)ELESOFTWARE command any time other than at the program header frame may cause the system to hang and the only recovery possible is "CONTROL-RESET". Due to limited space on our EPROM, our telesoftware downloader is a "bare bones" implementation and the operation may hang under certain rarely experienced error/timeout situations. Again, the only recovery is "CONTROL-RESET".

"Q" - (Q)UIT. This command hangs up the phone and exits the Videotext mode to the main modem menu. Note that it does not clear the memory buffer and it leaves the modem set to 7 bits, EVEN parity and 75 SEND. You might want to modify this before the next communication call.

"V" - (V)IEW MEMORY. This command sequentially displays the Viatel pages which have been saved to memory using the "M" command above. The first page is always blank and the frames are displayed in the order they were saved to memory. They advance each time "ESC V" is pressed and revert back to the first blank page after the last frame. There is no provision for stepping backwards, if a prior frame is to be re-viewed you must step forward through the sequence. Any time a picture is on display, it can be printed or saved to disk. This feature allows you to save a large number of pictures to memory quickly while online, hang up and do the time intensive operations offline.

"E" - (E)RASE MEMORY. This command resets the pointers to indicate that the memory buffer is empty. It doesn't immediately erase the stored pictures, they are visible for one more flick through, but it makes the entire buffer available for new pictures.

"L" - (L)OAD(DISK). This prompts for "FILENAME?" and searches the currently logged disk (usually drive 1) for the file. If unsuccessful it displays a disk error message otherwise it loads it into a temporary buffer and displays the picture. This command merely makes the picture visible, it does not put it in the (V)IEW MEMORY buffer. If needed this must be done explicitly using the "M" command.

"S" - (S)AVE(DISK). This prompts for "FILENAME?" and saves the currently displayed picture to disk as a binary file of that name. The file is a straight binary representation of the data stream as sent by Viatel, always starts with the screen clear character \$0C and is less than 850 bytes long. The file can be BLOAD'ed into any memory location and you can write software programs to manipulate data from the file as for example extracting and plotting share prices from MONEYWATCH frames.

As time permits we intend to write and make available general Videotext utility programs including perhaps a simple frame composition editor but should you wish to try some of your own, we have provided a hook to this Videotext decoding and display firmware. A explanation of Videotext encoding is beyond the scope of this manual but the accompanying chart may help.

To use our firmware, place the character to be printed at memory location 646

decimal (\$286) and CALL 49868 (JSR \$C2CC). A frame should always start with the screen clear character \$0C.

Included is a BASIC program to demonstrate the use of this hook.

Some general points - The view memory buffer starts at \$4000 and pictures saved to memory are added above this with each picture separated by \$0C (screen clear) and \$FF signifies the end of the last memory saved picture. An online received or disk loaded frame is placed temporarily above this and the pointers are incremented to cover it if it is saved otherwise it is overwritten.

The Videotext format is 7 bits/even parity with 75 baud send. Programs can be written in BASIC to capture frame and manipulate the data provided these parameters are set by the program. The character that appears as "M" on Videotext is actually the underline character chr\$(95) and this must be used for "M" when writing BASIC programs. The ID, password and frame numbers can be PRINTED from BASIC and the (R)ECEIVE A FILE command can be used to capture the frames. They should be save as BINARY files to be consistent with the modem firmware and memory buffer limits must be moved so that the file does not overwrite the BASIC program.

The Videotext firmware uses the upper part of the keyboard buffer as temporary memory locations and the HI-RES zero page locations, so it should not interfere with BASIC programs.

The picture you see is HI-RES page 1 graphic display in the range \$2000-\$4000. It is not possible to display the picture in colour on the Apple II or Apple IIe because the Videotext display requires 40 text characters horizontally and with a dot matrix width of 5 for the character and 1 for the space between characters, you require a horizontal colour definition of 240 dots each capable of 8 colours. Even the IIe with the double HI-RES colours is only capable of 140 dots across in colour.

The picture is well displayed on a monochrome TV monitor but a colour monitor will show slight colour fringing typical of text displayed on the HI-RES screen.

However we have a special modem EPROM for use with the new Apple IIGS machine, which displays Viatel in spectacular full colour and also prints the picture in colour on the IMAGEWRITER II.

VIX DISPLAY

```

10 REM A PROGRAM TO VIEW OR FIND BYTE VALUES OF A VIATEL FRAME
20 D* = CHR* (4)
30 HOME
40 PRINT "VIEW OR FIND BYTES (V/F)? : "
50 GET V*: PRINT
60 TEXT : IF V* ( ) "F" THEN 110
70 HOME
80 PRINT "PRESS SPACEBAR TO ADVANCE TO NEXT CHAR": PRINT
90 PRINT "PRESS '?' FOR VALUE, 'E' FOR NEXT FRAME": PRINT
100 GOTO 140
110 HOME
120 PRINT "PRESS SPACE TO STOP WHEN FRAME COMPLETE": PRINT : REM WE DON'T
KNOW HOW LONG THE FILE IS AND VIATEL HAS NO EOF CHARACTER
130 PRINT "PRESS ANY KEY FOR THE NEXT FRAME": PRINT
140 INPUT "NAME OF FRAME? (0 FOR CATALOG):" INM*
150 IF NM* ( ) "0" THEN 180
160 PRINT D*;"CATALOG"
170 GET K*: PRINT : GOTO 60
180 PRINT D*;"BLOAD" INM*;"",A*4000"
190 POKE 49168,0: REM CLEAR KEYBOARD
200 A = 16384
210 B = A + 850: REM MAX 850 BYTES ON VIATEL FRAME
220 POKE 646, PEEK (A)
230 CALL 49868
240 A = A + 1
250 IF A = B THEN 360
260 IF V* ( ) "F" THEN 350
270 GET K*: PRINT
280 IF K* = "E" THEN 60
290 IF K* ( ) "?" THEN 220
300 TEXT : HOME
310 PRINT "BYTE LOCATION = " JA - 1: PRINT
320 PRINT "BYTE VALUE = " J PEEK (A - 1)
330 GET K*: PRINT
340 GOTO 220
350 IF PEEK (49152) ( ) 128 THEN 220
360 POKE 49168,0
370 GET K*: PRINT : TEXT : GOTO 60

```

		0				1				1				1			
B7		0				1				1				1			
B6		0				1				0				1			
B5		0				1				0				1			
COL		0				1				2				3			
ROW		0				1				2				3			
B4	B3	B2	B1	COL	ROW	0	1	2	3	4	5	6	7	8	9		
0	0	0	0	0	0	NUL		Sp	␣	␣	␣	␣	␣	␣	␣		
0	0	0	1	1		DC1	!	␣	␣	A	ALPHA RED	G	GRAPHICS RED	a	q		
0	0	1	0	2		DC2	"	␣	␣	B	ALPHA GREEN	R	GRAPHICS GREEN	b	r		
0	0	1	1	3		DC3	£	␣	␣	C	ALPHA YELLOW	S	GRAPHICS YELLOW	c	s		
0	1	0	0	4		DC4	\$	␣	␣	D	ALPHA BLUE	T	GRAPHICS BLUE	d	t		
0	1	0	1	5		END	%	␣	␣	E	ALPHA MAGENTA	U	GRAPHICS MAGENTA	e	u		
0	1	1	0	6			&	␣	␣	F	ALPHA CYAN	V	GRAPHICS CYAN	f	v		
0	1	1	1	7			'	␣	␣	G	ALPHA WHITE	W	GRAPHICS WHITE	g	w		
1	0	0	0	8		BS	CANCEL	(␣	H	FLASH	X	CONCEAL	h	x		
1	0	0	1	9		HT)	␣	␣	I	STEADY	Y	CONTIGUOUS GRAPHICS	i	y		
1	0	1	0	10		LF	*	␣	␣	J	END BOX	Z	SEPARATED GRAPHICS	j	z		
1	0	1	1	11		VT	ESC	+	␣	K	START BOX	←		k	␣		
1	1	0	0	12		FF	,	␣	␣	L	NORMAL HEIGHT	1/2	BLACK BACKGROUND	l	ll		
1	1	0	1	13		CR	-	␣	␣	M	DOUBLE HEIGHT	→	NEW BACKGROUND	m	ml		
1	1	1	0	14			CURSOR HOME	.	␣	N		↑	HOLD GRAPHICS	n	nl		
1	1	1	1	15			/	␣	␣	O		⇄	RELEASE GRAPHICS	o	ol		

COLUMNS 7a,3a,6a,7a produced after Graphics select code
COLUMNS 4a,5a produced after ESC code

viewdata code table

(A)ALTER MODEM SETUP

```
-----
| STATUS |
|-----|
| TRANSMIT SPEED          75 SEND |
| BIT/PARITY              NONE 8 BITS |
| DEBUG                   OFF |
| FILTER                  OFF |
| MODEM7                  OFF |
| XON/XOFF                OFF |
| HALF DUPLEX             OFF |
| PHANTOM MODEM          OFF |
| IGNORE REMOTE ^A       OFF |
| CLOCK SET |
| LIMIT MEMORY BUFFER *0800 - *9600 |
|
| SPACEBAR TO RESUME. T-L TO CHANGE |
|
| V2.64 |
|-----|
```

ALTER MENU

This is a discussion of the various functions that appear on the (A)ALTER MODEM SETUP menu. Commands shown as ^AC E/D<CR> mean type capital A while holding down the key marked CTRL (sometimes CONTROL), let go of both keys, press capital C, press the space bar (optional), press capital E to (E)nable the function OR capital D to (D)isable the function and then press the key marked RETURN.

TRANSMIT SPEED

Pressing "T" (T)RANSMIT SPEED on this menu toggles the default dialling out baudrate between the various options. From powerup, RESET and on exit from Videotext, it is always set to 75 SEND. It steps to 1200 SEND, 300 CCITT (Australian) originate, 300 BELL (American) and then back to 75 SEND. This only affects the dialout baudrate, the baudrate for incoming calls is determined by the autosearch routines. Unless the TRANSMIT SPEED is set to BELL 300, the autosearch will not look for BELL 300 baud (American).

The baudrate, word length and parity cannot be changed online, if necessary you must hangup, alter them and redial.

The addition of "L", "I" or "H" (see dialling section) to the dialling command overrides the default baudrate for that call only and does not change the default. The (V)IDEOTEXT selection inherently sets it to 75 SEND and leaves at that on return to the main menu.

The default baudrate can be altered from within a program by the following ^A commands which agree with the Apple SSC:-

- ^A6B<CR> - 300 baud full duplex
- ^A2B<CR> - 75 transmit/1200 receive
- ^A8B<CR> - 1200 send/75 receive
- ^A5B<CR> - 300 baud BELL (American system)
- ^A0b<CR> - Turn the line around (V23 only) - status in sendflag

When online, the program can determine the current baudrate by PEEKING a memory location 1274 decimal (*4FA). If this value is 192 (*C0) or larger, the modem is operating at 300 baud. A value of 127 or less is 1200 SEND and a value between the these two is 75 SEND. When offline, this memory location always shows 300 baud and memory location 1530 decimal (*5FA) is 226 (*E2). Online, it is 236 (*EC).

BIT/PARITY

Data is transmitted over the phone line by varying the frequency of a sine wave to represent a "mark" (binary one) at one frequency and a "space" (binary zero) at the other frequency. In asynchronous communication (our type), each character begins with a start bit (space), followed by 8 data bits and ends with at least one stop bit (mark) followed by continuous marks until the next character starts. This is a minimum of 10 bits/character giving a possible speed of 30 characters/second at 300 baud. There are other configurations possible but they are extremely rare in general asynchronous modem communication and are not supported by this modem.

With 8 data bits, you can represent 256 separate characters and this is normally the format selected for binary or program files. Textfiles can be completely specified by 128 separate characters which requires only 7 data bits. The eighth bit is generally set to zero in conventional ASCII coding although Applesoft under DOS 3.3 sets it to one, but since it is redundant, it can be put to use for error detection. This is called PARITY, it can be ODD or EVEN. The eighth bit is always adjusted to make the total number of ones (and hence zeroes) odd or even. The start and stop bits are not included in the parity determination.

If a transmission error occurs it can be detected because the parity on the received character will be incorrect. However if an even number of bit transmission errors occur, they will cancel out and the character will still show correct parity.

Pressing "B" (B)IT/PARITY from this menu will toggle through the options of 8 BITS/NO PARITY and 7 BITS with ODD or EVEN parity. The modem does not check parity on received characters, but it should be set to match the other modem which may do so. This modem always masks the eighth bit for proper screen display (a low shows as inverse) so BIT/PARITY is not important in many cases.

Note that for MODEM7, it MUST be set to 8 BITS/NO PARITY which is the normal default. Videotext automatically sets it to 7 BITS/EVEN and leaves it set at that on return to the main menu.

The program operable ^A commands agree with the Apple SSC:-

- ^A0P<CR> - 8 bits/no parity (DEFAULT)
- ^A1P<CR> - 7 bits/odd parity
- ^A3P<CR> - 7 bits/even parity (VIDEOTEXT MODE)

BIT/PARITY cannot be changed while online.

DEBUG

Of the 128 ASCII characters, there are 32 control characters that are not normally visible on terminal screens and printers. Control characters include linefeed, carriage return, form feed, backspace etc. When trying to set up macros or investigating unusual screen and printer behaviour it is sometimes useful to be able to see the invisible characters being sent by the other modem. Selecting "D" (D)EBUG, displays the control characters on the screen as

their alphabetic equivalents in inverse, e.g. "control M" (<CR>) is displayed as "M" on an illuminated background. Reference to a chart of the ASCII character set will show the functional names of the various characters.

Note that the characters are converted so that their control function is destroyed. Thus carriage returns and line feeds will not format the page properly. The programmable command "^A E/D<CR>" toggles (D)EBUG on/off but this is probably not much use. (D)EBUG and (F)ILTER are mutually exclusive. The default setting is OFF.

FILTER

"F" (F)ILTER is a toggle command that removes all control characters except "<CR>" from the incoming data stream. It does not affect files received under the (R)ECEIVE A FILE option but does alter files which are captured under the MEMORY ON/OFF procedure. It is useful when the incoming data interferes with the screen, printer or other output device.

The default setting is OFF, it is mutually exclusive to (D)EBUG and it is toggled ON/OFF by the program command "^A- E/D<CR>".

MODEM2

This is a commonly used error correction procedure, often referred to as Christensen Protocol after its originator. Error correction is not so important in ordinary textfiles because it merely causes an obvious misspelling but it is much more crucial when sending figures, financial data and program files which may not run even with a single error.

From terminal mode, it is toggled ON/OFF by the "M" (M)ODEM2 on the (A)ILTER MODEM SETUP menu. From a program the command is "^AC E<CR>" to turn it on and "^AC D<CR>" to turn it off. It can be set on before or after dialling but hanging up always turns it off and it must be turned on again if required for the next phone call. Pressing the "ESC" key during transfer aborts it.

Our implementation is strictly speaking not "MODEM2" but a slightly different version called "XMODEM", however this name conflicts with "XON/XOFF".

The file transfer involves both the sender and receiver and MUST take place using 8 data bits with no parity and involves no restrictions on the data being sent but of course the receiver must be operating under a compatible version of XMODEM.

The transmitter divides the file into blocks of 128 bytes and adds a three byte header and a one byte checksum to the block. If the file ends in the middle of a block, the last block is filled out with "Z" characters. There is no short block. The following characters are used in the transmission control:-

NAME	DECIMAL VALUE	HEX VALUE	
SOH	01	01	^A
EOT	04	04	^D
ACK	06	06	^F
NAK	21	15	^U
CAN	24	18	^X

Each block consists of:

SOH | block number | 255-block number | ----128 DATA BYTES ---- | CHECKSUM

The block number starts at 01 and wraps around to 00 after reaching 255.

Each block starts with SOH and the sum of the first three bytes of the block

must always equal zero, giving an error check on the block number. The checksum is the 8 bit addition of all data bytes in the block.

The receiver starts first and sends a NAK every 5 seconds until it receives data. If no data is received within approximately 70 seconds, it gives the message "CONTACT LOST" and installs the value 163 (\$A3) at memory location-2042 (\$7FA). This can be read by a program and acted upon.

When the sender starts, it waits to receive a NAK. If it does not receive a NAK within 70 seconds, it displays the message "CONTACT LOST" and gives up.

Upon receipt of NAK the sender transmits the first block. The receiver checks for the first character as SOH and the sum of the first three characters to be zero and then adds up the next 128 characters and puts them in the next block in the file. It takes one more character, the checksum, and compares it to its own addition of the previous 128. If they match, the receiver sends an ACK and the sender transmits the next block. If the calculated and received checksums do not match, the receiver sends NAK and the transmitter retransmits the block. After 10 attempts to retransmit the SAME block, the transmitter displays the message "10 FAILURES" and gives up. The receiver also does the same after 10 tries and additionally puts the value 187 (\$BB) in memory location 2042. If an out of sequence block is received, this is regarded as a fatal error and the receiver abandons with the message "CANCEL" and puts the value 178 (\$B2) in 2042.

If no character is received for 6 seconds, the block is corrupt and the receiver sends a NAK. After the last block has been sent, the transmitter waits for the ACK and then sends EOT. When the receiver gets EOT as the first character of an expected block it puts the value 158 (\$9E) in 2042 signifying a successful transfer and if in terminal mode displays:-

SAVE AS: (1)BIN (2)BASIC (3)TEXT (4) A/W?

It then polls the keyboard and the other modem for an input between 1 and 4 and saves the file to disk under that filetype. Any other character input causes the file to be abandoned. It polls the remote modem so that it can tell it what type it was and can control its loading to disk. The first one in, keyboard or remote modem gets control, so press the key before the other modem sends ANY more characters, unless it is intended for the other modem to nominate the filetype. Usually at the end of a file transfer, they would be waiting for input from you before sending any more characters but if they beat you to it, the file is still in memory and can be saved by typing the "A" commands (below) when a menu is not visible. This also allows saving an additional filetype, Appleworks Database.

If operating under non terminal program control, it returns to the operating program as described above with the various values in 2042. If the value is 158 (OK), the program can then issue the "A" command to save the program:-

- ^A^V(filename)<CR> - Save as a BASIC program file
- ^A^U(filename)<CR> - Save as a TEXT file
- ^A^S(filename)<CR> - Save as a BINARY file
- ^A^P(filename)<CR> - Save as Appleworks word processor file (ProDos only).
- ^A^D(filename)<CR> - Save as Appleworks database file (ProDos only)

If these commands are used, the file is saved under the associated filename irrespective of the filename used in the (R)ECEIVE command, if the selection (1-4) is used, it is saved under the filename associated with the (R)ECEIVE

command. The Prefix must be included in ProDos filenames.

Due to a programming oversight, the result of the XMODEM transmission attempt is not written to memory location 2042, but location 225 (\$E1) contains the count number of the block to be transmitted next and location 229 (\$E5) contains the total block count+1. If a successful transfer occurred, these two values are equal (i.e. PEEK(225) = PEEK(229)), otherwise the transfer failed due to errors, timeout, lost contact etc.

If there were any disk errors (e.g. "file not found", "disk full"), memory location 702 (\$2BE) will be non zero. See the section on DOS error codes.

If you attempt to (S)END A FILE when hung up, the terminal will load the file, display "NOT ONLINE - OK", place the value 189 (\$BD) at 2042 and abandon the transmission. (R)ECEIVE A FILE does not test for "hung up". If the other modem drops carrier and causes the sending modem to hang up, the sending modem will timeout and place 255 in location 2042.

File sizes are NOT limited to 256 blocks but there is no provision in our XMODEM routine to prevent sent or received files exceeding the size of the currently set memory buffer if the file is large enough. If this happens the file may overwrite DOS or a resident operating program. These limitations are due to the space available on the EPROM.

XON/XOFF

When this is turned ON, the modem will stop transmission if it receives the XOFF character ("^S") from the other modem and resume only when it receives the XON character ("^Q"). This feature is toggled ON/OFF by selecting "X" (X)ON/XOFF from this menu or by the program command "^AX E/D(CR)". The default condition is "non operational". This and (M)ODEM? are mutually exclusive.

It is only applicable to the modem transmitting the file. The receiving modem sends the XOFF character to temporarily stop the incoming data because it is busy doing something else, such as saving the buffer to disk or servicing another modem.

It is often used on databases where the host computer has to service a number of clients and could get overloaded. It is up to you to find out if the host requires it, but it does no harm when you are sending files, however if the host does not support it, it may send you a "^S" as an incidental character and unintentionally block your transmission.

Telememo requires it when you are sending files to them and if you don't use it you will find parts of your file have not been accepted.

If you want to receive files larger than your buffer space, you can send the host "^S" to stop its transmission before your buufer is full, save the buffer with a "^A" command, clear it with "^AW(CR)", (R)ECEIVE [filename part II] and send them a "^Q" to resume transmission.

HALF DUPLEX

The modem supports full and half duplex. The Apple SSC refers to this function as "ECHO" and we have retained compatibility with their command. "^AE E(CR)" enables half duplex and "^AE D(CR)" sets the modem to full duplex. The powerup or default operating condition is full duplex. This means that what you type on your keyboard gets sent to the other modem but not displayed on your screen. This is fine for terminal mode contact with most bulletin boards and databases because they operate with echoback where they retransmit the characters you send them. If your screen shows what you typed you can be sure it was not corrupted. If you see something different you cannot be sure whether it was corrupted on the way from you to them or back from them to you. Better to retype it. This tells nothing of the errors in the data they transmit to you.

Echoback is the situation mentioned above where the host sends back to the terminal everything it receives from the terminal as well as sending its own material. It only makes sense for one end of a link to echoback otherwise a useless load of rubbish bounces back and forth.

Half duplex is useful when you are talking to another modem which is operating in full duplex without echoback. What you type is sent to your own screen at the same time as it is sent to the other modem. It helps when you can see what you are typing but it gives you no idea of the accuracy of reception by the other modem. If you see every character displayed twice on your screen it means you are communicating in half duplex with an echoback modem. The cure is to change to full duplex.

PHANTOM MODEM

Phantom modem mode operation is a feature we believe is unique to this modem. When set to answer the phone with this feature engaged the modem will immediately pick up the phone and search for modem carrier at the same time generating a simulated ringing tone back to the calling party and continuously beeping the Apple bell, allowing you approximately 40 seconds to pick up the phone and answer a voice call if the modem can't identify a valid data carrier. When you pick up the phone, press the space bar and the modem immediately hangs up leaving you in control of the line with the phone.

If no carrier is detected the modem generates a short carrier of its own to cater for modems which search on dialout and then it hangs up.

Should it find a carrier, it locks on and proceeds as if it had answered the phone normally as illustrated in the following program.

Note that the modem picks up a 300 baud or a 1200 baud carrier quicker and more reliably than a 75 baud carrier so it may be appropriate if calling another ICEMODEM, to ring at 1200 SEND and reverse the line as required.

When it answers the phone, it will eventually either hangup or connect at one of the baudrates, leaving the relevant value in the RINGFLAG memory location. (Decimal 2042 - \$7FA).

```
5 REM A PROGRAM TO DEMONSTRATE PHANTOM MODEM MODE ON THE ICEMODEM
10 D$ = CHR$(4)
20 PRINT D$;"PRM2"
30 PRINT CHR$(1);"P E": REM TURN ON PHANTOM MODEM MODE
40 PRINT D$;"INM2"
50 INPUT RI$: REM WAIT FOR PHONE RING
60 FOR I = 1 TO 10000: NEXT : REM WAIT FOR THEIR AUTOSEARCH
70 PRINT "HELLO THIS IS AN ICEMODEM"
80 PRINT : PRINT
90 REM MODEM WOULD BE HUNG UP NOW IF THIS WAS A VOICE CALL
100 IF PEEK(2042) = 143 THEN 40: REM WAIT FOR THE NEXT PHONE CALL IF HUNG
    UP
110 PRINT "THIS WOULD NORMALLY CONSTITUTE THE REST OF THE PROGRAM"
120 PRINT : PRINT
130 PRINT "TYPE RETURN AND I WILL HANG UP"
140 INPUT A$: REM GET INPUT FROM THE OTHER MODEM
150 PRINT : PRINT
160 PRINT "THIS IS AN EXAMPLE OF OUR PHANTOM MODEM MODE - BYE"
170 PRINT : PRINT
180 PRINT CHR$(1);"H": REM ISSUE OUR HANGUP COMMAND"
190 GOTO 40: REM WAIT FOR NEXT PHONE CALL
```


shelf life. Watch the batteries for corrosion towards the end of their life. Some modems are fitted with a rechargeable nickel cadmium cell instead of batteries. This is charged from the Apple power supply and the modem must be plugged into the computer for a reasonable period initially and at least occasionally thereafter.

The clock as supplied is fairly accurate but if greater precision is required it can be finely adjusted by the trimmer capacitor C1. Although this rotates continuously the total range of adjustment is only half a turn and then the adjustment repeats itself. Rotate it fraction of a turn and check the time after one days operation until trial and error achieve the desired accuracy.

Here is a simple Basic program which reads and displays the time/date on the screen:-

```

5 HOME
10 VTAB 8
20 CALL 49672
30 PRINT "THE DATE IS "
32 PRINT PEEK (518) - 176; PEEK (519) - 176;
33 PRINT "-";
35 PRINT PEEK (512) - 176; PEEK (513) - 176;
37 PRINT "-";
39 PRINT PEEK (530) - 176; PEEK (531) - 176
40 PRINT : PRINT
50 PRINT "THE TIME IS "
60 PRINT PEEK (521) - 176; PEEK (522) - 176;
70 PRINT ":";
80 PRINT PEEK (524) - 176; PEEK (525) - 176;
90 PRINT ":";
100 PRINT PEEK (527) - 176; PEEK (528) - 176
110 GOTO 10

```

The clock can be read by CALL 49672 from Basic or JSR \$C208 from machine language. After this the clock data is in the top seventeen bytes of the keyboard buffer as below. The value in each byte is the ASCII equivalent of a digit in the range 0-9 with the high bit set. To get the correct figure to print in Basic, PEEK the memory location and subtract 176 (ASCII zero). As an example, if the units value of the seconds were 3, the PEEK(528) would be 179.

ADDRESS	DATA
DEC	HEX
512	\$200 Tens digit of month.
513	\$201 Units digit of month.
514	\$202 Always a comma. (DEC 172).
515	\$203 Always zero (DEC 176).
516	\$204 Day of week (0-6) - 0 = Sunday.
517	\$205 Always a comma.
518	\$206 Tens digit of date.
519	\$207 Units digit of date.
520	\$208 Always a comma.
521	\$209 Tens digit of hours - 0,1 or 2.
522	\$20A Units digit of hours.

523	\$20B	Always a comma.
524	\$20C	Tens digit of minutes.
525	\$20D	Units digit of minutes.
526	\$20E	Always a comma.
527	\$20F	Tens digit of seconds.
528	\$210	Units digit of seconds.
529	\$211	Always a comma.
530	\$212	Tens digit of years.
531	\$213	Units digit of years.

LIMIT MEMORY BUFFER

When the modem is first powered up or "CONTROL RESET" is pressed, at the first INPUT or OUTPUT character or call to the INITIALIZATION subroutine, it undergoes a primary initialization and amongst other things, it sets the upper and lower limits of the memory capture buffer to occupy the total free memory of a 64K Apple with DOS resident. Subsequent INITIALIZATION or turning on the modem card may partially reinitialize it but the buffer limits will not be altered.

When a file is to be sent, it is loaded into the buffer starting at the address of the lower limit+1 and a received file is put into the buffer starting at the same place. The NOTEPAD and MEMORY ON/OFF also start here. The original limits of the buffer are set at \$800 to \$9600, a total size of \$8E00 bytes. The decimal limits are 2048 to 38400 a total of 36352 bytes. This is fine for terminal operation because it gives the largest available buffer size and reduces the chance of memory overflow but if you are operating from within a program, some of this memory is needed to house the program and its variables. BASIC programs start at \$800 and occupy memory above this according to their size. The variables that the program generates fit into the top buffer memory area, so the buffer must be contracted at both the upper and lower end to make room for a BASIC program.

We have included a subroutine to take care of this. First you must initialize the modem either by printing to it, inputting from it or initializing as per the firmware routines. If you don't do this, the primary initialization will overwrite your newly installed limits. Next write the value of the HIGH BYTE of the lower and upper limits to 237 (\$ED) and 238 (\$EE) respectively. Then CALL 49820 or JSR \$C29C to install the new limits.

The limits can only be moved in 256 byte increments, the low byte of the lower limit is always 01 and the lower byte of the upper limit is always 00.

As an example, to change the buffer to \$2600 - \$4300, the high byte of the lower limit is \$26 or (6x1)+(2x16)=38 decimal and the high byte of the upper limit is \$43 or (3x1)+(4x16)=67 decimal:-

```

10 PRINT CHR$(4);"PR#2:PRINT:REM DO PRIMARY INITIALIZE IF NOT DONE PREVIOUSLY
20 POKE 237,38:POKE 238,67:CALL 49820:REM INSTALL NEW LIMITS
30 REM THIS IS ALL THAT IS REQUIRED FOR A PROGRAM - THE REST ALLOWS YOU TO SEE
THE NEWLY INSTALLED LIMITS ON THE ALTER MENU

```

```

40 PRINT CHR$(1);"T":REM TURN ON TERMINAL MODE
50 REM PRESS 'ESC' THEN 'A' TO VIEW THE (A)ALTER MENU

```

From machine language:-

```

SETLIMIT JSR $C2A0 ; INITIALIZE IF NOT PREVIOUSLY DONE
LDA #$26 ; HIGH BYTE OF LOWER LIMIT

```


(S)end you will be prompted for "Filename?". If you just press return, the modem will transmit the text currently in the word processor, using the currently set modem parameters. Don't enter a filename other than <CR> or the modem will attempt to search the disk for the file and overwrite the current wordprocessor text. If you try to send a file when not connected to another modem the system will respond with "Not Online OK". You can then ring someone and try again. This allows you to load a large file offline, saving phone connect charges.

"N" selection from the main menu will return you to the word processor at any time.

"V" - (V)IEW MEMORY. This is the same as the program command "^AV<CR>". It displays the contents of the memory buffer on the screen starting at the low buffer limit (beginning). Hitting any key stops and starts the scrolling and the "ESC" key terminates the viewing. The effect is similar to stepping through the text with the UP/DOWN arrows but is faster.

"E" - (E)RASE MEMORY. This is the same as the program command "^AW<CR>". It clears the contents of the current memory capture buffer. This command is automatically at powerup and by the other commands "(S)END A FILE" and "(R)ECEIVE A FILE".

"L" - (L)oad (disk gives the prompt "Filename?". When you reply the system attempts to find the file on the currently logged disk and if successful will load the file into the word processor. If the word processor already contains some text this file will be appended to the existing text.

Thus a file for transmission can be assembled from a number of sources, edited and then transmitted as one larger file. The modem examines the signature byte at \$BFO0 to determine whether DOS 3.3 or ProDOS 8 is present and returns with the error message "Can't find DOS" if it doesn't find \$D3 (DOS 3.3) or \$4C (ProDOS 8). Some non standard or Fast DOS programs may not have the correct byte value and will not be recognised. Should any problem occur the error message will be displayed under DOS 3.3 or the MLI error code number under ProDOS. When supplying the filename for ProDOS, you must include the Prefix or you will receive the message ERR \$40, which is "Invalid pathname syntax".

The wordprocessor text starts at the beginning of the currently set memory buffer and the remaining free memory is shown at the bottom of the Notepad menu page. The value \$FF marks the beginning and \$00 the end of the text. For this reason, the text cannot contain these characters as they would prematurely terminate the file. This is fairly normal for most text files as they also don't like these characters but some files and received text may not work in this wordprocessor. If you get the file using the "(R)ecieve a file" it is highly likely to contain \$00 characters and hence be unusable in the WP. To counter you can receive text files by switching on the memory (see MEMORY ON/OFF) and then using the Notepad "(S)AVE>DISK" or "^A^U<CR>" command to save the final textfile. The "MEMORY ON/OFF" function strips all \$00's and \$FF's ensuring that the file will work in the notepad but this may not be too good for program files.

Text is stored as 7 bit ASCII with the eighth bit set. If you load a file with the eighth bit low, it will appear in inverse but moving the cursor through the file will make it appear normal. When you resave the file, the eighth will be set, so be aware of this if you have other uses for the file.

Appleworks files cannot be loaded into the Notepad because they have a

special format involving preamble and modifier commands throughout the text, but they can be transmitted using "(S)END A FILE".

This command is the same as the program command "^A^W--<CR>".

"S" (S)AVE>DISK. This command is the same as the program command "^A^U--<CR>". It saves the total current contents of the memory capture buffer as a textfile.

It prompts with "FILENAME? " and as above you must include the prefix for ProDOS files.

"P" - (P)RINTER ON/OFF. This command toggles the printer ON or OFF and starts printing from the current cursor position so you must move the cursor to the beginning if you want to print the entire text. It then prints to the current end of the text but does not turn itself off. You can continue working with the Notepad while printing.

This uses the same routines as the ONLINE PRINTING discussed earlier and hence only works if an Apple Super Serial or an Automatic Ice Co. printer card is installed. The IIGS version EPROM supports the inbuilt serial card.

"D" - (D)OS COMMAND. This allows you to issue DOS commands such as CATALOG without leaving the Notepad. If using ProDOS, BASIC SYSTEM must be present for this to work. It displays the prompt "FILENAME? " but it really means "COMMAND? ".

Commands such as PR#3 and PR#6 may do strange things, but INIT and CATALOG are OK.

ProDOS ERROR CODES

Unlike DOS 3.3, ProDOS does not display full error messages but the MLI generates error code values for the conditions below. As there is insufficient space on the EPROM to decode these, the modem displays ProDOS errors in the form "ERR \$40". The error is described by matching to the value in the column "HEX" below. This value is also written to memory location \$2BE (702 decimal) and can be read by a program to check the result of disk operations. (e.g. If PEEK (702)=0 THEN 1000). It is good programming practice to do this. DOS 3.3 also writes an error value as specified in the back of the DOS manual, to this location. Not all of the following error codes can be generated by the modem firmware. The most common error is "ERR \$40" which the table shows to mean "Invalid pathname syntax", usually the result of not including the prefix in the filename. (e.g. /USERS.DISK/ANIMALS). When operating in terminal mode under DOS 3.3, the modem displays the full error message.

Dec	Hex	Description (error value is written to \$2BE-702 dec).
0	\$00	No error present.
1	\$01	A non-existent command was issued. Bad system call number.
4	\$04	Bad system call parameter count. Parameter list improper.
37	\$25	Interrupt vector table full. Only four are allowed at once.
39	\$27	I/O error. General error number.
40	\$28	No device detected or connected.
43	\$2B	Diskette is write-protected.
46	\$2E	Disk switched while file on previous diskette was open.
64	\$40	Invalid pathname syntax.
66	\$42	File Control Block table full. maximum 8 files may be open.
67	\$43	Invalid reference number. Value does not match any open file
68	\$44	Path not found.
69	\$45	Volume directory not found.
70	\$46	File not found.
71	\$47	Duplicate filename encountered.
72	\$48	Overrun error.
73	\$49	Volume directory full.
74	\$4A	Incompatible file format.
75	\$4B	Unsupported storage type.
76	\$4C	End of file has been encountered.
77	\$4D	Position out of range.
78	\$4E	Access error.
80	\$50	File is open.
81	\$51	Directory count error.
82	\$52	Not a ProDOS disk.
83	\$53	Invalid parameter.
85	\$55	Volume Control Block table error.
86	\$56	Bad buffer address.
87	\$57	Duplicate volume.
90	\$5A	Bit map disk address impossible.

DOS 3.3 ERROR CODES

9	\$09	Disk full
5	\$05	End of data
10	\$0A	File locked
6	\$06	File not found
13	\$0D	File type mismatch

8	\$08	I/O error
1	\$01	Language not available
12	\$0C	No buffers available
15	\$0F	Not direct command
14	\$0E	Program too large
2	\$02	Range error
3	\$03	Range error
11	\$0B	Syntax error
7	\$07	Volume mismatch
4	\$04	Write protected

WAITING FOR THE PHONE TO RING

Whenever the modem is plugged into the phonenumber and switched on for input by the software command INW2, it will answer the phone after approximately three rings provided input is requested from it. If the "Phantom modem mode" is not engaged (see later) it will search through its various CCITT (Australian system) operating modes trying to find a matching carrier from the calling modem and if successful, will raise its own appropriate carrier, print a message such as "Connect 1200" and place a value in the Ringflag memory location. It will not search for the American Bell 103 standard unless the default transmit speed is set to Bell standard.

The modem does not search by the normal method of switching to different baud rates and testing for received carrier because this method is easily deceived by voice and various Telecom tones which may have considerable energy in the carrier passband. Instead it uses a very reliable method in which the incoming carrier waveform is amplified, clipped and its frequency accurately measured by a zero crossing detector. If 95% of the zero crossings over a two second period agree with one of the baud rates, it connects and prints a message.

If this modem answers the phone and does not detect a valid carrier after 20 seconds, it raises its own carrier in the 1200 baud receive mode to cater for some modems that insist on an audible carrier from the called modem because they attempt to autosearch when they call out. It tries to connect for a further 10 seconds before hanging up.

Here is an example of BASIC programming which waits for the phone to ring and then sends a "HELLO" message if successful:-

```
10 PRINT CHR$(4);"INW2": REM SET MODEM FOR INPUT
20 INPUT R$: REM WAIT FOR NULL STRING WHEN PHONE RINGS
30 PRINT CHR$(4);"PRW2": REM SET MODEM FOR OUTPUT
40 PRINT: REM SEND A CARRIAGE RETURN
50 IF PEEK(2042)=143 THEN 100: REM IS RINGFLAG VALUE 'HUNGUP'
60 PRINT "HELLO - THIS IS AUTOMATIC ICE CO"
70 REM REST OF PROGRAM GOES HERE
```

```
100 PRINT CHR$(4);"PRW0": REM TURN THE SCREEN ON FOR OUTPUT
110 PRINT "WE RECEIVED A NON DATA CALL - THEY HAVE HUNG UP"
120 GOTO 10
```

Line 10 turns the modem on for input, line 20 asks the modem for input. The program hangs here while the modem waits for the phone to ring and when this occurs, the modem returns the null string. (a carriage return). A disadvantage of this program is that it waits indefinitely for an input at line 20 and cannot perform any other tasks in the meantime. To overcome this, we have included a special subroutine to test for phone ring input without tying up the computer. CALL 49764 and then PEEK (1402). The PEEK value is 32 decimal for "no" and 255 for "yes". This procedure can also be used to test for general availability of input characters before issuing a BASIC INPUT OR GET statement. Should the other modem hangup or lose carrier while we are receiving input characters, ours will also hangup, wait for the next phonecall and hang the system in the meantime.

If this is a problem, it is preferable to drive the modem from machine language and use the status call prior to reading a character.

When the modem is hung up, a call to the status routine will return with the carry set for "ringing" and clear for "not ringing" as described in the section

on firmware programming. You can test whether the modem is hungup by examining memory location \$5FA. This is \$E2 for hungup and \$EC for online. The decimal memory location is 1530 which has the value 226 for hungup and 236 for online.

If online, the current sending speed can be determined by PEEKING a location called SENDFLAG at decimal 1274 (\$4FA). If this value is 192 (\$C0) or more operation is at 300 baud. If it is 127 (\$7F) or less, we are at 1200 send, and a value between these two indicates 75 baud send.

If possible, it is always preferable to program the modem in machine language, especially at 1200 baud because BASIC is quite slow and the firmware interface with its status calls for Read/Write is much better structured. See the programming examples for answering the phone in machine language.

The modem will always answer the phone in terminal mode because it continually polls for input from the keyboard elsewhere, but in remote mode it will only answer if it is being polled for input by the program. This infers that INW2 is active and the program is executing an input statement or the machine language equivalent.

Note that dialling out on a phone connected in parallel with the modem is similar to the phone ringing as far as the modem is concerned and it may answer the phone.

You may wish to dial up another party manually, have a verbal discussion and then bring the modem online to exchange data. Provided your modem is connected across the phonenumber and they have a modem at their end, you agree amongst yourselves who will take the "ORIGINATE" role and who will take the "ANSWER" role.

If you are "ORIGINATE", enter the command "^AD<CR>" when a menu is not visible and your modem will pick up the phone, go online at the currently set default transmit speed and search for 30 seconds looking for a matching carrier.

If you are "ANSWER", enter the command "^AA<CR>" and your modem will loop the line and act as if it had just answered a call as described at the beginning of this section. It is necessary to define the "ORIGINATE" and "ANSWER" modems to decide which one does the autosearching.

Once the link has been established, you must both hang up your phones or the surrounding noise will cause errors in the data.

USE WITH THE APPLE IIGS

We have available a special version of the modem to suit the new Apple IIGS computer, but the standard version can be used in the IIGS if the loudspeaker is removed or moved to the integrated circuit side of the modem board. The speaker is glued to the plastic isolation box with contact cement. The ordinary version is a tight fit in the IIGS, so it helps to cut a small triangular corner off the front lower corner of the modem printed circuit board and trim a little off the front lower edge of the plastic isolation box.

The modem must be installed in slot #2. Enter the IIGS control panel and select "SLOTS". Use the down arrow and return to select "SLOT 2" and the right arrow and return to select "YOUR CARD" on slot#2, then "QUIT" the control panel.

The standard modem EPROM will work in the IIGS and show Viatel in monochrome, but we have a special EPROM which displays it in spectacular full colour. It will also print the pictures in full colour, using the IIGS serial port and the Imagewriter II printer with a colour ribbon.

1A
#END OF PASS 1

#END OF PASS 2

0800	1	ENTRYPAGE	-ADDRESS BUFF
0900	2		
0600	3		
C200	4	ORG	8C200
C200	5	OBJ	8C200
0036	6	CSWL	EP2 836
0038	7	RSWL	EP2 838
0039	8	KSWH	EP2 839
COA3	9	DBRA	EQU 8COA3
COA2	10	DBRB	EQU 8COA2
COA0	11	ORB	EQU 8COA0
COAF	12	AREG	EQU 8COAF
07F0	13	MSLB1	EQU 87F0
047A	14	RECVFLAG	EQU 847A
04FA	15	SENDFLAG	EQU 84FA
06FA	16	STATFLAG	EQU 86FA
067A	17	IORESULT	EQU 867A
057A	18	TEMP	EQU 857A
05FA	19	IMPAGE	EQU 85FA
077A	20	OUTPAGE	EQU 877A
F0ED	21	COUT	EQU 8F0ED

LISA 2.5

F0F0	22	COUT1	EQU 8F0F0
COAC	23	PCR	EQU 8COAC
02C0	24	BILCOUNT	EQU 82C0
0200	25	SAVECHAR	EQU BILCOUNT-5
C200	26		
C200	27		
C200	28		
C200	29		
C200	30		
C200	31		
C200 00	32	BASICIN	PHP
C201 70	33	SEI	
C202 20	34	PLP	
C203 50	35	HEX 50	
C204 30	36	HEX 50	
C205 30	37	HEX 30	
C206 70	38	HEX 70	
C207 10	39	HEX 10	
C208 10	40	CLOCKREAD	CLC
C209 90 40	41	BCC	CLOCK2
C20B 01	42	HEX 01	
C20C 41	43	HEX 41	
C20D A0 6F	44	LBY	806F
C20F	45	16F 16	BUNNY & IS READ OFFSET
C20F 80 51	46	BNE	CLOCKWRIT
C211 20 BA C2	47	INITIAL2	JSR SV2
C214 A0 F6	48	LBY	80F6
C216 0C AF C0	49	SIT	AREG
C219 A2 B6	50	HENR1OFF	LBY 80B6
C21B 4C F5 C2	51	TRANSIT	JMP SV2
C21E EA	52		NOP
C21F EA	53		NOP
C220 70 04	54	BASICIN1	BVS ENTRY
C222 10	55	OUTENTR1	CLC

ICLOCKID
IFILLIN
ICLOCKID
JMEANS 'BVC'
150 IS CLOCK ID
IPASCAL ID
ICLOCKID
IPASCAL BYTE
1149672)
IGENERIC SIG & CLOK TYPE ENTRY
IDEVICE TYPE MODER
1LBY =ACHIS INIT OFFSET
1DO IS WRITE OFFSET-851 IS STATUS OFFSET
1INITPAGE
1OUT SIGNIFIED IN CARRY

C223 80 FE	56	BCS	8
C224	57	ORG	8-1
C224 30	58	INENTRY	SEC
C225 80	59	CLV	
C226 80 7A 05	60	ENTRY	STA TEMP
C229 EA	61		NOP
C22A 8A	62		TXA
C22B 40	63		PMA
C22C 90	64		TYA
C22D 40	65		PMA
C22E 50 30	66	BVC	SERIALIN
C230 20 11 C2	67	JSR	INITIAL2
C231 50 3A	68	BVC	SERIAL2
C235 80	69		CLV
C236 A9 FF	70	SERLOUT	LBA 80FF
C238 40	71		PMA
C239 A0 7A 07	72		LBA OUTPAGE
C23C 80 AF C0	73		STA AREG
C23F 2C 7A 04	74	BIT	RECVFLAG
C242 70 30	75	BVS	WHICHRET
C244 50 29	76	BVC	SERIAL2
C246 80	77	EXITIMP	PLA
C247 80	78		TAY
C248 80	79		PLA

LISA 2.5			
C249 A4	80		TAY
C24A A0 7A 05	81		LBA TEMP
C24D 09 80	82	ORA	8080
C24F 80	83		RTS
C250	84		
C250	85		
C250 EA	86		NOP
C251 AC FA 05	87	STATUS	LBY IMPAGE
C254 80 54	88	BNE	STAT2
C256 A0 54	89	CLOCK2	LBY 8054
C258 20 BA C2	90	JSR	SV2
C25B 80 50	91	BNE	SV1
C25D 2C 62 C2	92	TRANSIT	BIT CLOCKWRIT
C260 70 C4	93		BVS ENTRY
C262 60	94	CLOCKWRIT	RTS
C263 60	95	INITRET	RTS
C264 A9 FF	96	BASICIT	LBA 80FF
C266 20 51 C2	97		JSR STATUS
C269 90 3C	98	BCC	BASICNO
C26B 80 38	99		BCS BASICYES
C26D 90 C7	100	SERIALIN	BCC SERLOUT
C26F A9 FF	101	SERIAL2	LBA 80FF
C271 40	102		PMA
C272 A9 E2	103		LBA 80E2
C274 80 AF C0	104	SWITCH	STA AREG
C277 2C 7A 04	105	BIT	RECVFLAG
C27A 50 F3	106		BVC SERIAL2
C27C 2C FA 06	107	WHICHRET	BIT STATFLAG
C27F 30 C5	108		BVC EXITIMP
C281 A0 7A 05	109		LBA TEMP
C284 29 FF	110		AND 80FF
C28A AE 7A 06	111	RE10	LBY IORESULT
C289 A0 20	112		LBY 8020
C28B 60	113		RTS
C28C 80 AF C0	114	PRNRET	STA AREG
C28F A0 7A 05	115	PRNTOUT	LBA TEMP
C292 20 E0 F0	116		JSR COUT
C295 2C FF CF	117		BIT 8CFFF
C298 A9 C2	118		LBA 80C2

ICLEAR INITIAL ENTRY FLAG
!THIS PAGE
!TERM MODE?
!SET HIGH FOR BASIC
!ALWAYS
!TRANSIT ENTERS AT 8C250 TO AGREE WITH PASCAL VALUES
!RETURN FOR INITIAL
!TEST FOR BASIC READ STATUS
!ALSO PASCAL READ ENTRY
!FIRSTOUT PAGE CHECKS FOR KEY & THEN PASSES IT TO IMPAGE
!TERM MODE?
!BASIC
!POSSIBLY WILL NEED MASK
!ALWAYS FOR SLOT82
!TURN OFF ANY CARD
!RETURN TO SHOW! PAGE

```

C27A 00 FV 119 BNE PHINKE1
C27C A2 BA 120 BUFLINI LDX 00DA
C27E 00 55 121 BNE SW7
C2A0 122 HIGH LIMIT IS IN CRWL DEE (230)
C2A0 123 LOW LIMIT IN CRWL DEE (237)
C2A0 124 CALL 49020
C2A0 00 125 PASCINIT CLV
C2A1 40 126 PMA 0A1 !PRESERVE ACCUM.
C2A2 20 11 C2 127 JSR INITIAL2
C2A5 60 128 RETI PLA
C2A6 60 129 RTS
C2A7 130 1
C2A7 131 1
C2A7 90 132 BASICNO TYA !Y=920
C2A8 00 7A 05 133 BASICYES STA TEMP !TEMP =255 FOR BASIC STATUS OK
C2AB 60 134 RTS
C2AC 40 135 STAT2 PMA
C2AD 00 7A 05 136 SW1 STA TEMP
C2B0 A9 FF 137 LDA 00FF

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LISA 2.5

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C2B2 40 138 PMA !KNOW WHERE TO RETURN
C2B3 0C AF C0 139 STY AREG
C2B6 60 140 PLA !STATUS RETURN-GET ORIG ACC
C2B7 4C 04 C2 141 JMP RET0
C2BA A9 FF 142 SW2 LDA 00FF
C2BC 00 AF C0 143 STA AREG
C2BF 00 A3 C0 144 STA DBRA
C2C2 60 145 RTS
C2C3 A0 FA 06 146 UNZAP LDA STATFLAG
C2C6 09 10 147 ORA 0010
C2C8 00 FA 06 148 STA STATFLAG
C2CB 60 149 RTS
C2CC A2 0C 150 VIXPRNT LDX 000C !DSKMSG PAGE
C2CE 00 25 151 BNE SW7
C2D0 152 !CHAR IS IN 9206 (4461) - CALL 49060
C2D0 00 7A 05 153 WRITE STA TEMP
C2D3 A0 00 154 LDT 0000
C2D5 0C 7A 06 155 STY !DRESULT
C2D8 4C 36 C2 156 JMP SERLOUT
C2DB A2 F4 157 HENRYON LDX 00F4
C2DD 00 16 BNE SW7
C2DF EA 159 NOP
C2E0 160 BFS 010
C2F0 EA 161 NOP
C2F1 EA 162 NOP
C2F2 EA 163 NOP
C2F3 A2 FA 164 HANGUP LDX 00FA !10 RINGBACK PAGE - 49907
C2F5 20 BA C2 165 SW7 JSR SW2
C2F8 A0 FF 166 SUBRTM LDT 00FF !THIS PAGE
C2FA 0E AF C0 167 STX AREG
C2FB 60 168 RTS !ALSO RETURN FOR CLOCKREAD
C2FE EA 169 NOP
C2FF 40 170 VERSION HEX 40 !SECOND TWO DIGITS OF VERSION#
C300 171 END

```

END OF ASSEMBLY

END OF PASS 1

END OF PASS 2

```

0000 1 !SIMPLE MACHINE LANGUAGE PROGRAM THAT WAITS FOR PHONE CALL AND THEN ACTS AS A VERY DUMB TERMINAL
0000 2 1
0000 3 1
C200 4 INITIAL EQU 0C200 !OFFSET BYTE AT 0C200 = 0000
C251 5 STATUS EQU 0C251 !OFFSET BYTE AT 0C251=051
C26F 6 READ EQU 0C26F !OFFSET BYTE AT 0C26E = 006F
C290 7 WRITE EQU 0C290 !OFFSET BYTE AT 0C28F = 0000
05FA 8 INPAGE EQU 05FA
0000 9 1
0000 10 !NOTE - THESE VALUES ARE FOR THIS CARD ONLY AND ARE NOT GENERAL
0000 11 1
0000 12 1
0000 20 A0 C2 13 START JSR INITIAL !THIS MUST BE DONE ONCE IN THE PROGRAM BEFORE THE MODEM IS USED
0003 A9 01 14 RINGPOLL LDA 0001 !SIGNIFY INPUT REQUEST
0005 20 51 C2 15 JSR STATUS !IF HUNGUP, PHONE RING IS ONLY POSSIBLE INPUT-RINGING?
0008 90 31 16 BCC PROGRAM !NO-DO DO SOMETHING ELSE
000A 20 6F C2 17 JSR READ !CLEAR CHARACTER
000D A3 FA 05 18 HUNGUP? LDA INPAGE
0010 C9 E2 19 CMP 00E2 !HUNGUP VALUE?
0012 F0 EF 20 BEB RINGPOLL !YES?
0014 A1 00 C0 21 REYOUT LDA 0C000 !KEY PRESSED?

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LISA 2.5

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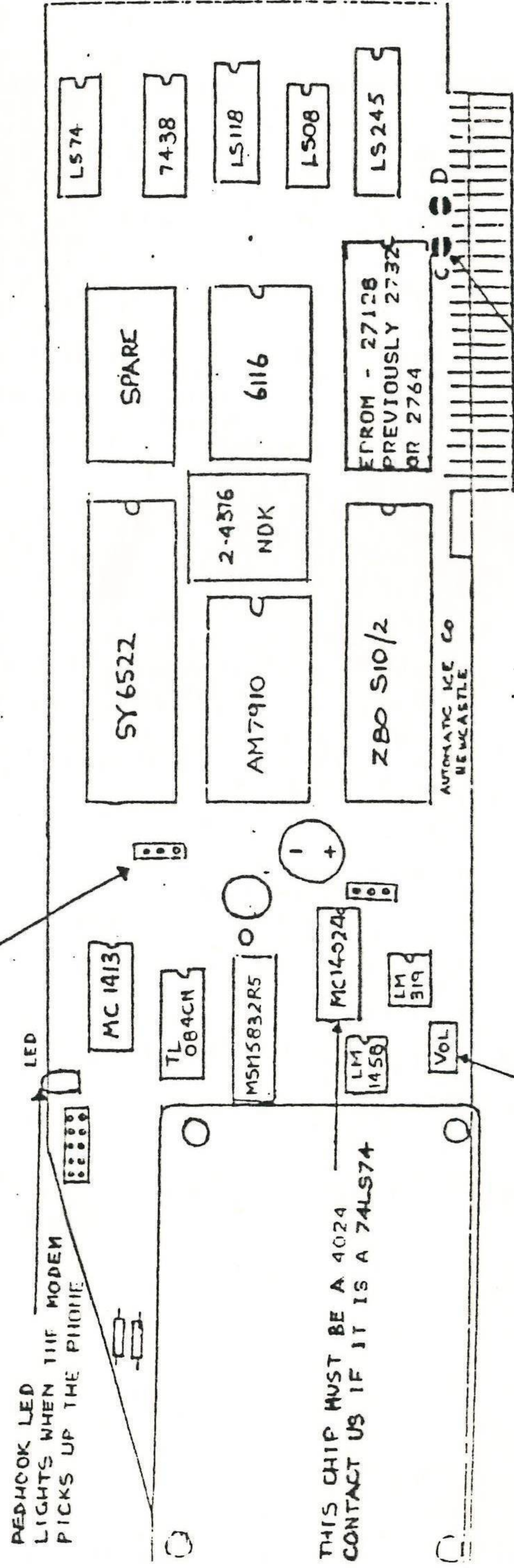
0017 10 10 22 BPL CHARIN? !NO TRY FOR RECEIVED CHARACTER
0019 A9 00 23 LDA 0000 !YES - SIGNIFY OUTPUT REQUEST
001B 20 51 C2 24 JSR STATUS
001E 90 09 25 BCC CHARIN? !CARRY CLEAR-MODEM NOT FREE TO WRITE TO.
0020 A3 00 C0 26 LDA 0C000 !IF CARRY SET THEN OK - GET KEY CHARACTER
0023 00 10 C0 27 STA 0C010 !CLEAR KEYSTROKE
0026 20 00 C2 28 JSR WRITE !OUTPUT TO MODEM
0029 A9 01 29 CHARIN? LDA 0001 !SIGNIFY A READ REQUEST
002F 20 51 C2 30 JSR STATUS
0032 90 09 31 BCC HUNGUP? !CARRY CLEAR-MODEM NOT FREE TO WRITE TO
0035 20 6F C2 32 JSR READ !CARRY SET - OK GET CHARACTER
0038 09 00 33 ORA 0000 !SET THE HIGH BIT SO AS NOT TO SHOW IN INVERSE ON APPLE'S SCREEN
003B 34 !MOST RECEIVED CHARACTERS WILL BE NORMAL ASCII WITH THE HIGH BIT NOT SET
003E 20 E3 F0 35 JSR 00E0 !PUT TO THE CURRENT OUTPUT DEVICE
0041 4C 03 00 36 JMP HUNGUP?
0043 37 1
0045 38 1
0048 EA 39 PROGRAM NOP !THIS IS OTHER PROGRAM PART
004C EA 40 NOP
004F 4C 07 00 41 JMP HUNGUP?
0050 42 END

```

END OF ASSEMBLY

SHORTING LINK TO SET CLOCK.
 JOIN TWO BOTTOM PINS TO SET THE
 CLOCK AND THEN DISCONNECT TO PREVENT
 ACCIDENTALLY WRITING TO THE CLOCK.
 THE LINK CAN BE STORED ON THE TOP
 TWO PINS. SOME UNITS HAVE ONLY TWO PINS

UNITS WERE SUPPLIED WITH 2732 (32K) EPROMS WHICH
 OCCUPIED ONLY 24 OF THE 28 PINS IN THE SOCKET. TO
 ACCOMMODATE THE EXTRA SOFTWARE WE HAVE HAD TO SUPPLY
 128K EPROMS (HITACHI TYPE HN4827128G-25) WHICH OCCUPY
 THE WHOLE 28 PINS. TO REMOVE THE OLD EPROM, GENTLY LEVER
 UP EACH END WITH A SMALL SCREWDRIVER AND REMOVE. IT IS
 IMPORTANT THAT THE NEW EPROM BE INSTALLED WITH THE SMALL
 INDENT ON THE END FACING THE WAY SHOWN IN THE DIAGRAM.



THIS CHIP MUST BE A 4024
 CONTACT US IF IT IS A 74LS74

LOUDSPEAKER VOLUME
 (ADJUST WITH SCREWDRIVER)

TO ACCOMMODATE THE NEW 128K EPROMS SUPPLIED, THE
 LINE JOINING THE TWO HALVES OF PAD "C" MUST BE
 CUT AND THE TWO HALVES OF PAD "D" SOLDERED TOGETHER.

