FERRANTI

FERRANTI INSTRUMENTATION LIMITED

MAVIS

Microprocessor–based Audio Visual Information System
for the
Disabled

Operating Instructions

SETTING UP MAVIS

1. Place MAVIS on a flat surface preferably in front
    of the operator.

2. Release the fasteners, raise the lid through 120°,
    then remove from case body.

3. Place the keyboard, or the user's personal operating
    device in a position suitable for convenient operation.
    Plug in the interconnection lead from the device to the
    socket marked PUFF/SUCK.

4. Place the colour TV set in view of the operator.
    Plug in the aerial lead from the TV to the socket
    marked UHF output.

5. Plug into the mains both MAVIS and the TV.
    Plug the interconnecting leads from the peripheral
    equipment such as printer mains controller, etc.
    into the appropriate sockets.

6. Switch on the TV and adjust the volume control to OFF.

7. Switch on MAVIS; the switch should light and the TV
    will display the Default Matrix shown opposite.

MAVIS connected to the Television set
with an operator about to use the keyboard.

KEYBOARD

As the operator reads through the following key descriptions
we suggest that he tries them out for himself to assist his
understanding.

DESCRIPTION OF KEYBOARD

Although many of MAVIS operators will not use the keyboard,
it would be helpful if they understood its main features.
The keyboard is similar to that of an electric typewriter
with one or two additional keys.   Almost every key is duplicated
on at least one matrix and if their function is understood,
then the equivalent matrix control function will also be understood.

SHIFT	Holding this key depressed, selecting any other key will display the upper case letter (capital), or upper symbol, graph or clear on two function keys.
SHIFT LOCK	Pressing this key will set MAVIS into the shift condition. Until SHIFT LOCK is depressed a second time all other keys selected will print the upper case letter (capital) or upper symbol, graph or clear on two function keys.
ESC	This is the escape key. After pressing this key, instructions will be written on the Command Line.
NEW LINE	Moves the cursor to the beginning of the next line of text. Is also used to complete an instruction on the command line.

| DEL | Delete key; operation of this key causes the character to the left of the cursor to be deleted. Anything to the right of the cursor will be moved one space to the left. |

| TAB | Tabulate key. This is the same as the tabs key on a typewriter. Operating the key moves the cursor along the line to a preset position. |

| RPT | Holding this key depressed and then pressing any other key will repeat the character or instruction until one of the keys is released. |

| UP | These keys move the cursor around the user area by one line or space for each depression. Note if SHIFT is selected then the symbols will be displayed. |

| HOME | Operating this key moves the cursor to the HOME position at the top left hand corner of the screen. |

| CLEAR | Pressing this key and answering Y (for yes) to the question "ARE YOU SURE" will clear the screen. |

```
GRAPH
ALPHA
```

There are seven of these keys, each having
a different colour. Pressing one of these
keys introduces the associated colour to all
characters printed previously or subsequently
to the right of the cursor on that text line.

If SHIFT is selected, the function is similar
but MAVIS is now put into the Graphic Mode
(see "Drawing with MAVIS").

NOTE:

When this key is operated in either shift
a blank space is inserted at the cursor position
on the screen.

OPERATING MAVIS WITHOUT USING THE KEYBOARD.

MAVIS is primarily for the use of severely disabled people
who are capable of little or no useful limb movement. Operation
is through a simple two stage switch which may be adapted for
use by even the most critically disabled.   In the photograph
the switching device is a pair of pushbuttons which are being
manipulated by the heel of the operator's hand. This arrangement
would suit many quadraplegics, whose lesion has resulted in loss
of finger movement.

DESCRIPTION AND USE OF MATRICES.

The matrix is the collection of commands, letters or symbols
found at the bottom of the page.   Its use is to allow selections
to be made without the keyboard using a suck puff tube or other
two switch devices.

Try printing your name on the screen.

HORIZONTAL
SELECTION   Depress Switch 1 (suck on the suck/puff tube)
                             and the cursor will move from the Matrix Home
                             Position and travel horizontally across the screen.
                             Release the button when it reaches the column
                             containing your initial.   If you are late in
                             releasing and miss your column, press Switch 1
                             (suck) again so that the cursor travels off the
                             screen to the right. Release the switch 1 and
                             the cursor will return to the Home position.
                             Try again as necessary until you get the timing
                             right.

NONAME   Page   1;

⊞ TYPING   FASTER   LOUDER   INDEX
  COMMANDS   SLOWER   QUIETER   CONTNTS
  ALARM   3-STEP   2-STEP   MFILE

DESCRIPTION AND USE OF MATRICES   cont.......

**VERTICAL
SELECTION.**

Once the cursor has stopped above the required column, depress Switch 2 (puff). This will cause the cursor to move downwards vertically. Release the switch when the cursor is against your initial. If you allow the cursor to travel off the screen it will return to the top of the matrix.

**PRINT
SELECTION.**

Depress Switch 1 (suck) and your initial will be printed on the screen in the user area and the top cursor will move to the next character position and the matrix cursor will return to home.

**REPEAT FOR
REMAINING LETTERS
& SPACES.**

Repeat this exercise for the remaining letters and spaces in your name. Continue with other words until sufficient practice is obtained to stop the cursor readily at any letter.

FASTER

As timing improves the cursor can be speeded up. Select FASTER on the matrix and its speed of travel will be increased.   Select FASTER again, and it will speed up even faster.   This can be repeated until the speed of the cursor reaches the upper limit.

SLOWER.

If cursor movement is too fast, selecting SLOWER will reduce the speed. Consecutive selections will reduce the speed until the lower limit is reached.

```
NONAME                    Page      1;



                    ⌗
                    SWITCH        1 2 3 LINES      ON
                    INSERT        4 5 6 PAGES      OFF
                    ERASE         7 8 9 CHARS      MTX1
```

NONAME   Page   1;

█

▦   #
        E A S L M C P J RUB   ↑   ∨   ←   →
        T H N D U Y G K X TAB   TOP   DIGITS
        O I R W F B V Q Z ESC   NEWLINE MTX1

NONAME   Page   1;

```
#
1 2 3 4 5 6 7 8 9 0       ↑ ← #  LETTERS
! " £ $ % & ' ( ) *       → @ 3/4  1/4
+ , . - / : ; < > =       ? - ½ II
```

CURSOR

This is a moveable white or coloured dot
which appears on the screen. Its purpose is
to tell you where your next selected character
will appear. A second cursor also shows when
using a matrix. This is used to select letters
from the matrix and is moved on operation of
suck/puff tube or other operating device.

2 - STEP
3 - STEP

After practice you may feel confident enough
to try 2 - step selections. Horizontal selection
is then as normal but stopping the cursor on any
character during vertical selection will cause
that character to be printed on the screen.
If after trying 2- step selection you wish to
return to 3 - step selection, make the appropriate
selection on the matrix.

MAVIS to control a User's Environment

The greatest frustration suffered by a severely disabled
person is his complete dependence on others for the smallest
attention.   Using MAVIS such a person can control a
variety of electrical appliances to not only increase his
comfort but also his independence.   In the photograph, MAVIS
is connected to a mains controller with both a fan and a
reading lamp connected to two of the outlets.   Using his
personal switch and the Command Matrix he can switch these
and an undefined number of other appliances On or Off.   In
this way he could adjust the temperature or lighting of his
environment, open an electrically activated door to let in
visitors, even make a hot drink.   Every independent act is
a major victory on the road to rehabilitation.

USE OF CONTROL FACILITY

Electrical appliances, plugged into the mains controller,
can be switched On or Off using MAVIS.   Each outlet on the
controller is numbered and the instruction to MAVIS is
"Switch 'N' On" or "Switch 'N' Off".   This can be entered
via the keyboard or the command matrix.

Note: When using the keyboard the instruction should begin
         with ESC and end with New Line.   (NL)

MAVIS with printer connected.

TYPING

Normally a new file or a page on an existing file would be selected before commencing typing. This is done by referring to the section headed "Making a New File", in the Operating Instructions.

Typing may be carried out using either the keyboard or the typing matrix. Mistakes may be deleted by selecting RUB and the previous character is then erased.

TABS

ESC
TAB
↑↑↑

NL

There are set TAB positions at convenient locations across the page. Selecting TABS either from the matrix or the keyboard will cause the cursor to travel to the first successive position. If required, other TAB positions may also be set. This is done by writing TAB on the command line and then positioning upward pointing arrows at appropriate points on the same line. Up to three TAB positions may be set.

PRINTOUT

If required, and provided a suitable printer is connected, the contents on any page may be printed out so that MAVIS may be used for typing letters or other communications.

Before printing out any information ensure that it has been finalized and that all necessary editing has been completed.

COPY

ESC
~~PRINT~~
NL

To print out the information on the displayed page, write 'print' on the command line using either the keyboard or the matrix.

Before PRINTOUT can be selected, a file called DIREC/C *COPY/C*
must have previously been loaded from the cassette.

Name	Type	Name	Type
NONAME	T	A	T
DIARY	T	DRAW	T
TUNE	T	PHONE	T
DIRECTORY	T		

Done- hit any key█

PRINT   EDIT DIARY   #   CONTROL
INDEX   MFILE PHONE   LETTERS
FORWARD   BACK

EXAMPLE of an index.

USING THE INDEX

If index is typed or selected on the matrix, a list of all
the files in the system will be displayed.

Against each file will be given an abbreviation indicating the
type of file included.   These abbreviations are as follows :

     P - Private: the titles of these files are
             not displayed.

     L - Locked: these files are available, but the
             information contained is locked and cannot be
             amended until the password is entered.

     T - Text: otherwise specified.

     C - Command: this is a programme file. It
             cannot be displayed.   It is used to add
             commands to the system, e.g. after recalling
             file PRINT/C from cassette, then typing
             ESC, PRINT, NL , the current page will be
             printed out on the printer.

OPENING AN EXISTING FILE

Using the cursor and the TYPING matrix select ESC, ED, the
appropriate filename and complete the instruction with NL.
The first page of this file is now displayed on the screen.
If the file is locked the cursor will be fixed at the bottom
left-hand corner.   Otherwise, the file may be changed as required.
Information deleted will be lost and new information retained.

NOTE: If the mains is disconnected the filed information
           stored in MAVIS will be lost unless it has been
           recorded on a cassette.

File used for Diary.

MAKING A NEW FILE

Using the cursor and the typing matrix, type ESC, ED, NEW TITLE
NL.   A file will be displayed that is headed with the new title.
This file will now appear in the Index.

ADDING PAGES TO A FILE

Using the cursor and the typing matrix, type ESC, I (INSERT) n
PAGES as necessary to extend the file.   Complete the instruction
with NL.   These pages will now appear on the file contents.

SELECTING ANOTHER PAGE

Using the cursor and the typing matrix, type ESC, the appropriate
page number and complete the instruction with NL.   If the contents
of the file are not known they can be displayed if ESC, CON(TENTS)
followed by NL are selected.

LOCKING FILES.

A file can be locked, that is all attempts to edit or change it will
fail. This is done by writing LOCK 'FILENAME' on the command line.
To unlock a file, write UNLOCK 'FILENAME'.

EDITING.

Editing which includes amending text and rearranging it on the page or across several pages is easily carried out using a few basic commands. These are as follows:

P'n'   Display page 'n' of the current file. If 'n'
                is zero, page 1 will be displayed. If 'n' is
                greater than file contents the last page of the
                file will be displayed.

F'n'   Move forward 'n' pages within the current file and
                display this page.

B'n'   Move back 'n' pages or to page 1 whichever is highest.

SPL   Divide the displayed page in two at the current cursor
                position. The character the cursor is on and all
                following characters are placed in the same position
                on the succeeding page in the current file.

J'n'   The text on the next page is joined beneath that on the
                displayed page and the next page is deleted. If N>1
                then an attempt would be made to join the text of n number
                of pages beneath that of the current page.

E'n'P   Erase 'n' pages.
           This command causes the current page and n-1
           succeeding pages to be erased.   The remaining pages
           are then re-numbered and the new current page displayed.
           Erase cannot be used to erase every page of a file
           since files must always contain at least one page.

I'n'P   Insert 'n' pages after the current page and re-number
           the following pages.   The first inserted page will
           then be displayed.

A'n-m'   Add pages n-m of a specified file after the current
FILENAME   page.   The remaining pages will then be re-numbered
           and the last of the added pages will be displayed.

I'n'SP   Insert a specified number of spaces after the current
           cursor position.   If there is insufficient space on
           the line, as many spaces as possible will be inserted.

I'n'L   Insert a specified number of lines at the current cursor
           position.   If there is insufficient space, the number
           of lines inserted will be enough to bring the text to
           the bottom of the screen.

DIRECTORY   Page   1;
NUMBER NOT FOUND
Dr Foster:-Surgery   6812571
          -Home   6335221
Mr Evans,Grocers   6812152
John Smith   023148234
M.A.V.I.S:-Information   0616812071

ANSWER   DIAL   Y 1 2 3 FORWARD
FINISH   GO   N 4 5 6 BACK
DIREC   RUBOUT   O 7 8 9 EDIT DRAW

E'n'L   Erase a specified number of lines including the
             one to the right of the cursor.   The remaining text
             is also moved up.

E'n'C   Erase a specified number of characters.
             These characters including the character the cursor
             is on, and the appropriate ones to the right of it
             up to the end of the line, are replaced by spaces.

S 'text'   Search the file from the current cursor position
             to the last page for a specified word or group of
             words.   When the text is found the appropriate page
             will be displayed with the cursor positioned immediately
             after the text.

R   Repeat the previous search.

T 'text'   Retitle the current page.   The text for the new title
             may be up to 16 characters long.

MAVIS used for making telephone calls

TELEPHONE DIALLING

In the photograph MAVIS is connected to a telephone specially
adapted for use without a handset.   Dialling is carried out
using the matrix.

MAKING A CALL

To call Dr. Foster (see photograph) select DIAL 6812571 New Line
on the matrix or ESC DIAL 6812571 New Line on the keyboard.
This has the effect of lifting the receiver and dialling the
appropriate digits.   To make other calls use the same procedure
but substitute the correct number.

ANSWERING A CALL

If the 'phone rings, select PHONE on the matrix or ESC PHONE NL
on the keyboard, the call will be connected through to the telephone.

CLEARING A CALL

At the end of the call, select BYE on the matrix or ESC BYE New Line
on the keyboard.   This will terminate the call.

AUTOMATIC TELEPHONE DIALLING

A directory of telephone numbers in common usage can be assembled
and stored on cassette.   The directory is used for automatic
dialling which occurs when any name is selected by the cursor.

Before AUTO DIALLING, a file called DIREC/C must have previously
been loaded from the cassette.

DRAWING

A special graphics facility allows pictures, patterns or
designs to be constructed in colour on the TV screen.   This
is of tremendous advantage in the education of children whose
ability to communicate is seriously impaired by their inability
to manipulate a pen or pencil.

To enter the drawing mode type ESC, DRAW, NL Z or select DRAW
on the Graphics Matrix.   *← Newline*

A drawing or graphics cursor is now positioned in the centre
of the screen. To move it across, diagonally or up and down
the screen the following selections should be made.

1 ↑		5 ↓	
2 ↗		6 ↙	
3 →		7 ←	
4 ↘		8 ↖	

D   If D is preselected, each subsequent move will leave
         a line on the screen.

E   If E is preselected the cursor will erase any lines
         passed through.

M   Selections after M allow the cursor to be moved
         without drawing or erasing.

F   Any area within a previously drawn closed boundary can
         be filled. The cursor must be positioned within that
         boundary before F is selected. If the drawing cursor
         is not within a closed boundary the entire screen will
         ultimately be filled.

S1 - 9   This determines the size of the steps the cursor takes
         at each selection.

Colours These are selected on the graphics matrix with shift
         also selected.

TUNE

moqtrrvttyxytqmoqrtvtrqoqmlmohlorqoqmoqt
rrvttyxytqmoqjtrqomhmlmqtytqmmm

qqqqqqrrrttttttzttttrrrrrrqqq
ohjlomorqrolhlorqo
qqqqqqrrrttttttzqqqoqrqqqooo
mqtytqmqtwtqmqtvrolortqmjmqrolhlorqoqmoq
trrvttyxytqmoqjtrqomhmlmmm

A C E F H J L M O #   PLAY   MFILE A
Q R T V X Y B D O G   FORWARD
1 K N P S U W Z   RUBOUT   EDIT

PLAYING TUNES

MAVIS has an audio output giving a variety of tones.   Each tone is allocated to a letter of the alphabet and by typing the letters in a appropriate sequence, simple tunes can be composed or played.

The tones are in an ascending scale corresponding to each letter of the alphabet from A - Z.

To select the Tunes facility, type ESC, Ed, Tunes, NL or select Tune on the matrix.   All subsequent characters typed will be accompanied by the relevant audio tone.

An example for practice is :-

m o q t r r v t t y x y t q m o q r t v t r q o q m l m o h
l o r q o q m o q t r r v t t y x y t q m o q j t r q o m h
m l m q t y t q m m .

Type ESC, Play, NL or select Play on the matrix and the tune "Jesu Joy of man's desiring" will play back.

Before PLAYING TUNES, a file called DIREC/C must have previously been loaded from the cassette.

MATRICES   Page   1;

#■S6V5H
  ↳SWITCH‖←p³₄1³₄2³₄3³₄4³₄5³₄6³₄7³₄8↳ON‖pM↳OFF‖pM
  ↳FASTER   i↳LOUDER   k³₄‖   ↳RUBOUT   P
  ↳SLOWER   j↳QUIETER l↳₄   ↳LETTERS   b

#■   ³₄ ³₄E³₄A³₄S³₄L³₄M³₄C³₄P³₄JⅡ↳RUBP↳F1‖z↳↑→↓↳v↓₂³₄0³₄1
  ³₄T³₄H³₄N³₄D³₄U³₄Y³₄G³₄K³₄XⅡ↳INS   Ⅱ←p ↳←Y↳→Z³₄2³₄3
  ³₄0³₄I³₄R³₄W³₄F³₄B³₄V³₄Q³₄ZⅡ↳LINⅡpM↳SP‖pM↳CMNDSb

#■   ³₄ ■
  ↳PRINT   ‖z↳EDIT DIARY ‖z‖↳CONTROLb³₄‖
  ↳INDEX   ‖z↳MFILE PHONE‖z‖↳LETTERSa³₄‖
  ↳FORWARD‖z↳BACK‖z³₄‖

▣
   TYPING   FASTER   LOUDER   INDEX
   COMMANDS   SLOWER   QUIETER   CONTNTS
   ALARM   3-STEP   2-STEP   MFILE

Construction of a Matrix.

SETTING UP MATRICES

As the user becomes more familiar with MAVIS he will want to construct his own matrices so that he can tailor it more exactly to his own personal requirements.

When setting up a matrix, programming instructions must also be included.   These appear complicated in the first instance but once the concept is understood are logical and surprisingly easy to manipulate.

Examples of three matrices are shown in the photograph opposite. These include the programming characters which are not seen when the matrix is displayed for use.

MATRIX AREA

The matrix is restricted to four lines in depth (including the $\#$ line) and 40 characters across.

SPECIAL CHARACTERS   "$\frac{3}{4}$" & "$\frac{1}{4}$"

These special characters precede each element of the matrix but do not appear when it is displayed.

$\frac{3}{4}$ This precedes single characters or words which are not commands.

$\frac{1}{4}$ This precedes all commands, including those only associated with the matric facility.

EXAMPLE FOR PRACTICE

We recommend that the following instructions, together with
explanations on matrix construction be followed as an aid to
understanding the concept.

#   #   #   #

```
A B C D    Ø 1 2 3    HOME    TAB    LETTERS

E F G H    4 5 6 7    RUBOUT         COMMNDS

I J K L    8 9 + -    RETURN         GRAPHCS
```

This is an example matrix which we will attempt to construct.

1)   Select a suitable empty page in preferably a file
           entitled MATRIX.

2)   With the cursor two or three lines down the page and at
           the extreme left type the first #

3)   Beneath this and one space to the left, type the top line
           as follows:

        #   #   #   #

$\frac{3}{4}$ A $\frac{3}{4}$ B $\frac{3}{4}$ C $\frac{3}{4}$ D || $\frac{3}{4}$ Ø $\frac{3}{4}$ 1 $\frac{3}{4}$ 2 $\frac{3}{4}$ 3 || $\frac{1}{4}$ HOME↑ $\frac{1}{4}$ TAB# $\frac{1}{4}$ LETTERS a

    Type also # in position on top line.

Explanation

$\frac{3}{4}$ A   Letter A appears on displayed matrix.

$\frac{3}{4}$ D|| Letter D appears on displayed matrix || fills space beneath #
       otherwise a space would also appear every time D was selected.

$\frac{3}{4}$ 3|| (see $\frac{3}{4}$ D||)

A second example is given below and this is followed with
explanations of the programming codes used:

```
 I I I I I I I I I I I I  I I I I I I I I I I I I I I I I I I I I I I I I I I I
 #■S6V5H              ■ ■ ■ ■ ■ ■ ■ ■#■        ■
  ¼SWITCH ‖←p ¾1¼2¾3¼4¾5¼6¾7¼8¾ON‖pM¼OFF‖pM
  ¼FASTER   i¼LOUDER   k¾        ¼RUBOUT        P
  ¼SLOWER   j¼QUIETER  l¼        ¼LETTERS       b
 I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I
```

S6	cursor speed value 6	M	New Line
V5	audio volume value 5	P	Delete
H	Hold flag	b	Display 2nd matrix
$\frac{1}{4}$	Carry our following instruction	i	Faster instruction
‖	end of displayed test	j	Slower instruction
←	escape	k	Louder instruction
p	send preceding text	l	Quieter instruction
$\frac{3}{4}$	display following		

"Faster" & "Slower" are matrix functions so do not need ←
"Switch" is an incomplete editor function. The complete command
 would be $\frac{1}{4}$ SWITCH ‖ ← p $\frac{3}{4}$ 1 $\frac{1}{4}$ ON ‖ p M with the equivalent
keyboard command of ESC SWITCH 1 ON NL

EXAMPLE FOR PRACTICE   cont.....

$\frac{1}{4}$ HOME ↑   HOME appears on Matrix, ↑ is equivalent matrix
                 function character.

a

        # Tabs inserted on top line to facilitate speedier
          selection.

4) .   Type second line immediately beneath first
        $\frac{3}{4}$ E $\frac{3}{4}$ F $\frac{3}{4}$ G $\frac{3}{4}$ H ‖ $\frac{3}{4}$ 4 $\frac{3}{4}$ 5 $\frac{3}{4}$ 6 $\frac{3}{4}$ 7 ‖ $\frac{1}{4}$ RUBOUT   P $\frac{1}{4}$ COMMNDS b
                                                                    4 spaces

Explanation

$\frac{1}{4}$ RUBOUT P   RUBOUT appears on matrix, P is equivalent matrix
            function character.   Spacing is enough to fill area
            beneath HOME and TAB on line above.

b

5)   Type ■ above each $\frac{3}{4}$ or $\frac{1}{4}$ symbol.

          The finished construction should now appear as:

SPECIAL FUNCTION TABLE

This table lists the special function characters which are used
as programming instructions when constructing a matrix.

A

a		Call up preceding matrix for display
b		Call up succeeding matrix for display
cnm		Call up selected matrix for display
d		Call up second preceding matrix for display
e		Alarm 1
f		Alarm 2
g		Alarm 3
h		Alarm 4
i		Faster
j		Slower
k		Louder
l		Quieter
m		Set caps
n		2-step
o		3-step
p		Send preceding text
gn "?"		Send word from list as indicated by following character *
r		Repeat
s		Clear repeat
t		send $\frac{1}{4}$ *
u		send $\frac{3}{4}$ *
v		Send ‖ *
w "?"		Send following character
x		Send ESC, send preceding text
y		Send preceding text, send NL
z		Send ESC, preceding text, NL

Explanation *

p   This is used in elements such as editor commands
           e.g. INDEX which would be represented in the matrix
           construction by $\frac{1}{4}$ INDEX ‖ ⟵ pM.   The p function causes
           all characters following $\frac{1}{4}$ up to the terminator ‖ to be sent.

SPEED, VOLUME, 2-STEP, REPEAT

These can be altered and set for each matrix if the programming
instructions are included on the top (#) line.   The characters
used are listed below :

S (1 - 9).   sets cursor selection speed

V (1 - 9)   sets volume control, 1 - 9 steps.

I   2-step selection.

W   3-step selection.

H

O

These instructions can be included at any convenient position
on the top line and take effect whenever the matrix is called
up for display.   They remain in effect until either:

1)   Different options appear in another matrix which
        is subsequently called for display.

2)   The user selects elements within the matrix which
        change the options.

SPECIAL FUNCTION TABLE contd.....

g   A block of consecutive pages in the matrix file
can be set aside to hold a list of words or phrases.
These are for user convenience in that he can select
one or more words without having to spell them out
character by character.

The character ‖ must precede each item in the list and
the last item must be terminated by the same character.

The following accompanying character fulfills an address
function. When the matrix program encounters q in a
selected element, it looks at the following character to
determine its position in the list. This may be from
! — Z inclusive of both upper and lower case characters
giving up to 90 items in the word store. The word or
phrase will then be typed character by character until the
next ‖ is reached.

t,u,v   Since $\frac{1}{4}$, $\frac{3}{4}$ and ‖ are treated as special characters, they
cannot be represented as elements in the matrix. Where
necessary they must be shown as 1/4 followed by t or
3/4 u

w   When using the DRAW facility, it is necessary to be able
to send special single characters such as S (for STEP).
The character following w may be any character and no
check will be made on its validity. If the user forgets
to put in the required character the following special
function character will be sent in its place.

NOTE: Because q and w require an additional character they
must be preceded with ‖ even when they are used singly
in an element.

USING THE CASSETTE.

Information other than the limited amount available
within the PROM's, and held within Mavis's memory
banks would be lost if the mains were either dis-
connected or switched off. To prevent this and give
Mavis a large memory capability, the use of a magnetic
tape cassette is available. Each cassette holds about
60 pages of text or graphics which is about $\frac{1}{3}$ of the
total volatile memory capacity.

PLAYING BACK A CASSETTE.

To recall information from a cassette carry out the
following sequence of operations:

1) Insert the appropriate tape in the cassette with
    the designated side uppermost. Close the cassette
    unit.

ESC
TA IND
NL

2) Write TA IND on the command line from the matrix
    or keyboard. Note: The command should be preceded
    with ESC and completed with NL.

    The Tape index will now be displayed, note the
    required filename and type of file.

ESC
REC 'FILE-
NAME'
NL

3) Write REC 'FILENAME' on the command line.
    Note: See note on operation 2.

If the file is other than text the type of file should
also be inserted after the filename.

Wait until the command disappears; this will coincide
with an audible blip.

The file is now entered into Mavis's memory banks and the
cassette may be removed unless further information is to
be retrieved.

RECORDING.

Note.   If a new tape is to be used, it must first be
                       reformatted as instructed in the relevant section
                       below.

                       Recordings are carried out file by file. When the
                       specified file is recorded it replaces any file having
                       the same name and type already on tape. This means
                       that if the original file contains information not on
                       the one to be recorded, then this information will be
                       lost.

ESC   To record type SA and wait until the command disappears
SA   from the screen. The current file is then recorded and
NL   can be recalled as necessary. This command can also be
ES   carried out without displaying the designated file.
SA   In this case include the filename in the instruction.
'FILE-
NAME' NL   Note: If a file contains irreplaceable information it
                       may be worthwhile to make at least two recordings on
                       separate cassette to insure against accidental erasure.

ERASING INFORMATION FROM THE TAPE.

ESC   Information is erased file by file. To erase a file,
UNS   write UNS 'FILENAME' on the command line. Before the
'FILE-   file is erased, the question 'ARE YOU SURE?' will
NAME'   appear on the screen. Confirm this by selecting Y
                       for yes.

                       Note: Although the file will now be erased from the
                       tape, it will remain in the volatile memory; to erase
                       this write DE 'FILENAME' on the command line. To the
                       question 'ARE YOU SURE?' select Y for yes.

FORMATTING.

New tapes or tapes having been corrupted require to be formatted. When this is carried out, all information carried on a tape, will be lost. If the instruction 'TAPE NEEDS REFORMATTING' appears, it is suggested that further attempts be made to load the tape before reformatting is executed.

ESC
FORM
NL

To Format a tape write FORM on the command line, then confirm and wait until an audible blip announces the operation is complete. This may take up to two minutes.

WARNING.

Remove tape from cassette unit before switching off mains, otherwise corruption of data on tape may occur.

ERROR MESSAGES FROM MAVIS.

If a wrong command is entered, MAVIS responds by displaying an error message on the command line.

Examples of these messages and an explanation is given below:

FILE PROTECTED.

An attempt was made to alter or delete a protected file.

END OF FILE.

An attempt was made to access a page beyond the end of the file.

STORE FULL.

An attempt was made to INSERT a page when the bulk store was full.

FILE ALREADY OPEN/EXISTS.

An attempt was made to OPEN the same file twice.

INDEX FULL.

No room was available in the file index.

FILE NOT FOUND.

An attempt was made to OPEN a non-existant file.

PROGRAM WON'T LOAD.

The data loaded into a memory location was not read back successfully.

FILE NOT FOUND ON TAPE.

        The file specified was not found on tape.

NOT ENOUGH ROOM IN MEMORY.

        The file on tape specified was bigger than the
remaining space left in memory.

NO TAPE IN TAPE UNIT.

        A tape operation was requested when no cassette
was in the tape unit.

TAPE INDEX FULL.

        The tape index was full.

NOT ENOUGH ROOM ON TAPE.

        The amount of unused space left on tape was not big
enough to hold the file specified. There might still
be enough room for a smaller file.

TAPE NEEDS RE-FORMATTING.

        A specific tape block could not be found. This implies
either that a block marker has been corrupted or that
the tape index indicates more blocks on the tape than
actually exist.

TAPE NEEDS FORMATTING.

        No data was found on the tape after 15 secs. The
cassette was probably never formatted.