Adding Machine

We wrote a simple program on the BBC Micro to use the Grafpad as an input device for an adding machine. An overlay with all the number keys for the adding machine is placed under the pad's perspex cover. Touching the relevant key with the stylus will operate the software

```
10 REM GRAFPAD DEMO
20 REM
30 REM An adding machine using the Grafpad
40 REM
50 MODE 1
60 PRINT "ADDING MACHINE":PRINT
70 HIMEM=&29FF
80 XADJUST=7
90 REM
100 REM set up co-ordinate table
110 REM
120 DIM B(15):FOR I=1 TO 15:B(I)=I*25:NEXT I
130 R1=0:R=0
140 REM
150 REM load Grafpad driver program
160 REM
170 *LOAD "PADREAD" 2A00
180 PEN%=&2A00
190 REM
200 REM MAIN PROGRAM STARTS HERE
210 REM
220 REM wait for pen to be pressed
230 CALL PEN%
240 !X%=!X%-XADJUST:IF !X%<0 THEN !X%=0
250 IF ?U%>0 THEN 230
260 REM beep to register pen press
270 SOUND 1,-15,120,1
280 X=!X%
290 REM convert position to 0-12
300 I=0
310 IF X>B(I) THEN I=I+1:GOTO 310
320 REM interpret codes 0-12
330 IF I<10 THEN R=R*10+I
340 IF I=10 THEN PRINT R:" +":R1=R1+R:R=0
350 IF I=11 THEN PRINT R:" =":PRINT "        ":R1=
R1+R:PRINT R1:R1=0:R=0:PRINT:PRINT
360 IF I=12 THEN PRINT:PRINT"CLEAR":PRINT:R=0:R1=0
370 REM wait until pen is lifted again
380 CALL PEN%
390 IF ?U%=0 THEN 380
400 REM loop for next pen press
410 GOTO 230
```



```
                                    ADDING MACHINE

                                       34 +        4 +
                                       96 =        8 =
|  |  |  |  |  |  |  |  |  |  |  |  |   130         12
|  |  |  |  |  |  |  |  |  |  |  |  |
|0 |1 |2 |3 |4 |5 |6 |7 |8 |9 |+ |= |Clear
|  |  |  |  |  |  |  |  |  |  |  |  |    3 +    19876 +
                                        9 +     8876 +
                                        6 +     8864 +
                                       28 +     1243 =
                                      126 =
                                      ----     ------
                                      172       38859
```

tiny switch. When you push the stylus down on the perspex cover of the pad, a ULA (uncommitted logic array) chip pulses each of the wires in turn until it detects the position of the pen by a change in capacitance. This scanning takes place 2,000 times a second, making locating the stylus a very fast process. The stylus should be held by the earthed metal band around its nib to help the system work reliably.

When the stylus is placed on the pad, the computer receives the 'stylus down' signal and a report of its co-ordinates on the pad. The exact effect it creates is determined by the software. A cross-shaped cursor might appear on the screen in a corresponding position, or a particular command might be triggered. It's here that the Grafpad's economy begins to show. The stylus can only be detected on a grid of 320 by 256 positions, making it difficult to draw very smooth or fine detail. The pad is also quite small – a sheet of A4-sized paper is a sensible work area.

The Grafpad has three software packages; ranging from a simple demonstration routine, via a simple drawing program, to a complex CAD
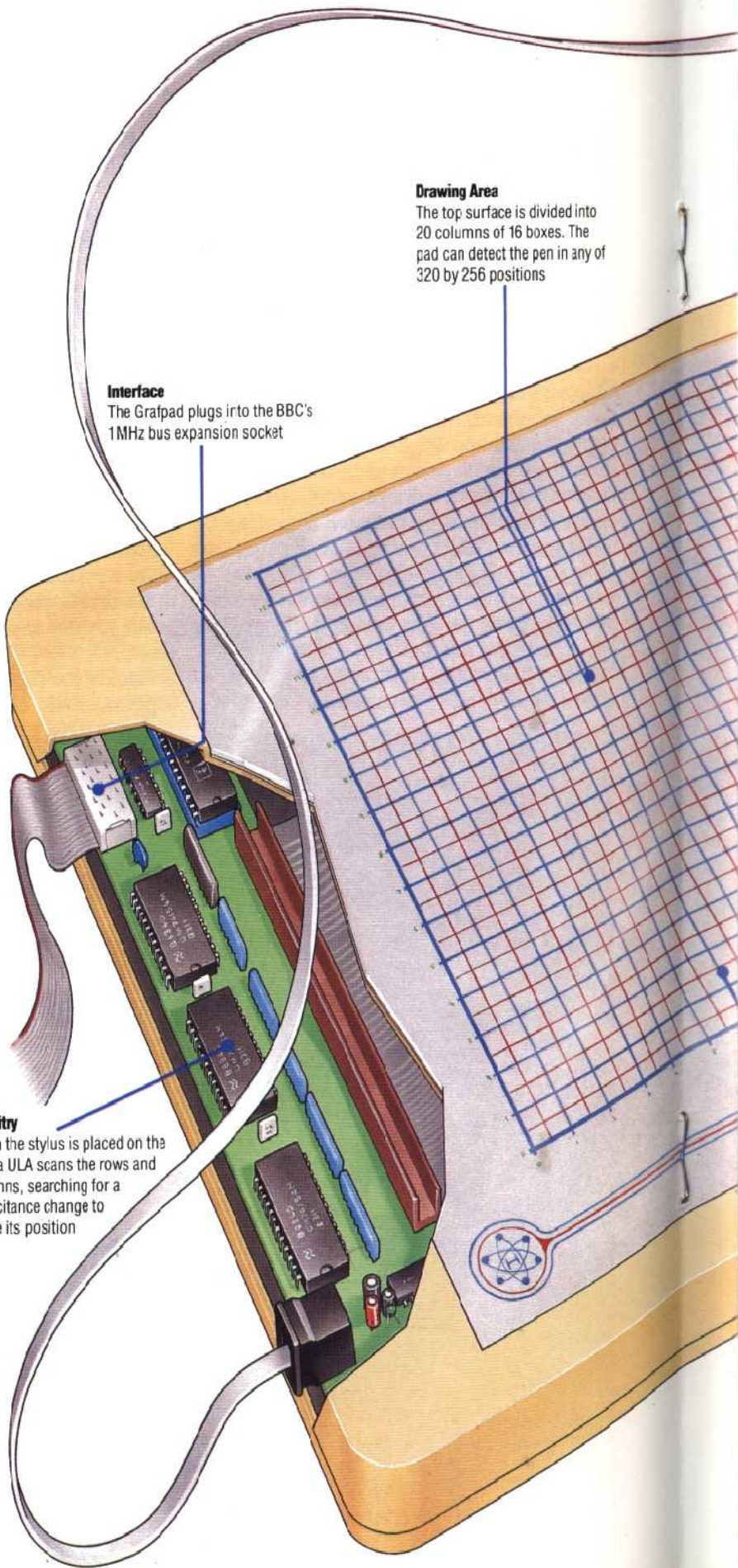
Drawing Area
The top surface is divided into 20 columns of 16 boxes. The pad can detect the pen in any of 320 by 256 positions

Interface
The Grafpad plugs into the BBC's 1MHz bus expansion socket

Circuitry
When the stylus is placed on the pad, a ULA scans the rows and columns, searching for a capacitance change to sense its position