INTRODUCTION

Well, you have bought a S.P.E.M. video digitizer that,in addition to its low cost,has many unusual features and can transform your QL into a powerful graphic workstation.

The best hardware system,to use all the characteristics of the digitizer, is:

- A colour monitor with RGB input (or a TV color using the RGB input called SCART).
- A standard QL (although it is better to have some memory expansion).
- Some source of standard B/W or COLOUR video signal as a Tv camera ,a Video recorder or a Tv receiver.

HARDWARE CONNECTIONS

To connect the digitizer to your QL and your monitor:

- Power down your QL.
- Detach the video connector from the rear of QL and attach it to the similar connector on the rear side of the digitizer.
- Remove the plastic cover of the QL rear connector marked "ROM" pulling it out with a little screw-driver.
- Connect the end of digitizer flat cable to the "ROM" connector paying attention to the position of the slot and pushing.
- Check the digitizer switch marked "DIG"/"QL" to be in "QL" position.
- Check the digitizer switch marked "BW"/"COLOR" to be in "COLOR" position.
- Check the three sliders on the right side of the digitizer to be in the maximum position.
- Power up the QL.
- If the image on the monitor screen is different from the normal power down the QL and repeat all the sequence.

VIDEO IMAGE AND COLOURS

Now you can make some experiments with the right part of the digitizer (slider regulators and BW/COLOR switch).

This section of controls processes the image that goes from the QL to the monitor.

It has been added to expand the control on the QL video signal,altought it is not essential to the digitalizing operations.

There are three base colours and each slider controls the brightness of each of them.

The colours are   BLUE - RED - GREEN and when they are mixed in the same proportions the resulting color is white.

Altough we talk about 'same proportions' the contribute in brightness to the white light of each base-colour is different:

- BLUE   gives a brightness of 1
- RED   gives a brightness of 2
- GREEN   gives a brightness of 4

So if you see a colour image on a black and white screen each colour is transformed in a different grey level.

Because this phisical disposition of base-colours when we speak of colours the best sequence is BLUE - RED - GREEN and not the most common R.G.B. notation.

The QL video-signal is based on the presence or absence of each base colour and ,in this way,it can normally generate eight COMPOSITE colours:

BLACK - BLUE - RED - MAGENTA - GREEN - CYAN - YELLOW - WHITE

Using the slider regulators ,you can mix base colours in different proportions obtaining all possible mixture of them.

Try this on some QL screen.

Then switch on B/W with the control situated on the digitizer right side and you will see a black and white image.

When this control is set in B/W position ,to simulate the grey scale of a B/W monitor ,the right setting of sliders is:

- BLUE   in A QUARTER position.
- RED   in MIDDLE position.
- GREEN   in MAXIMUM position.

This is not done automatically to give complete control freedom for particular effects.

DIGITALIZER SECTION

Now switch the control DIG/QL in DIG position and you will see.. nothing at all.

This control is used to check the video signal that comes to the digitizer with the rear connector marked VIDEO-IN.

Connect a suitable source of signal to this input and use the left side controls BRIGHTNESS and CONTRAST.

The image you see is processed with a very speedy ANALOG to DIGITAL circuit that transforms GREY LEVEL INFORMATIONS into a combination of three BASE COLOURS.

Now experiment by various images ,by the controls of digitizer, changing the focus of the TV camera and the light sources.

Remember that this phase is very important to obtain well defined final images.

Remember that ,we have 256 x 256 points with 8 colours and even if the product of them (524'288) seems to be high, a TV image has this product of 30'000'000 (about 50 times more) and a little photo can give about 1000 times more informations that the QL screen.

So you can't push a button and pretend a good image in the memory.

Only a great experience and care in the selection of the subject, distance, cut, light, focus and setting of contrast and brightness can compress the real word in 524'288 positions with good results.

The slider regulators BLUE RED and GREEN, the switch BW/COLOR and the switch DIG/QL are in the output video section of the system, they will have no side-effect neither in the memory of the QL nor in the images you put in a disk or copy on a printer.

READING THE IMAGE IN THE VIDEO MEMORY

When the pre regulation of the image,which you make with the switch in DIG position,is OK. you can switch it in QL position and keep the image in the video memory.

This is done using the program 'Look&Show' that starts with the BOOT file and has a complete set of easy commands to keep video files and operate with them.

You can also read an image from SUPERBASIC using the machinecode called digcode.

- Reserve 500 bytes of memory using RESPR or ALCHP.
  ```
  digit=RESPR(500)  or  digit=ALCHP(500)
  ```

- Load digcode in this space.
  ```
  LBYTES mdv1_digcode,digit
  ```

- Call it.
  ```
  CALL digit
  ```

It reads from the digitizer and fills the video memory in five seconds then it returns the control to the basic,during this time interrupts are disabled.

You can add two parameters in the call statement as in the line:

```
CALL digit,8,10
```

The first parameter is the number of lines that it must not read from the upper side of video signal and has the effect to translate the digitalized image in the up direction. (valid numbers are 0 to 30-50 depending on the video signal with a default of 0)

The second parameter is the number of columns that it must not read from the left side of video signal and has the effect to translate the digitalized image in the left direction. (0 to 255 with a default of 0)

With a normal PAL video signal the right setting of those parameters is '20 to 35' and '0' like in the following line:

```
CALL digit,27
```

TESTING TV CAMERA AND DIGITIZER

If you have not yet the SPEM tv camera and you think to buy a camera for the digitizer (especially if you look for a low cost video camera) please be sure that its video signal is standard PAL.

Some little camera has only a signal 'similar' to the standard PAL and ,although it is possible to use them ,the converting precision will be greatly reduced.

If the camera is not interlatched or if it is not a colour camera it not important,but it must produce a signal of 1 volt on 75 ohm ,it must have a positive DC-coupled out-signal with a sync level of 0 volt ,a line frequency of 15'625 Hz and a frame frequency of 50 Hz.

The line frequency must be lied (locked) to the frame frequency and not 'free running' and timing of syncs must follow the PAL STANDARD.

All serious cameras like SONY, PHILIPS etc... meets completely this requirements.

You can construct a test image for the camera with a white paper and a medium black pen.

```
    |                                 |
    |---------------------------------|
    |                                 |
```
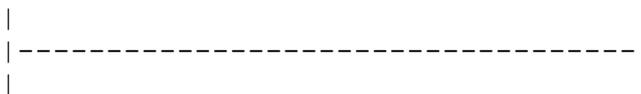
The pre processed image of this test mustn't have double vertical lines,must be still and have a good contrast.
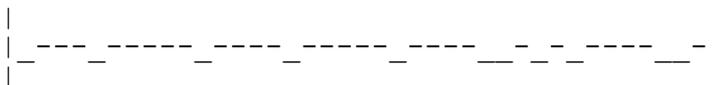
Don't you succeed in regulating the brightness ?

- if it is always dark the signal is too low
- if it is always bright the signal is too high

The paper must possibly have the same colour on the complete plane but also the best cameras can give same changes from center to the border.

Check now to digitalize this image switching in QL position and starting 'digcode' or using the program 'Look&Show'.

If the image seems like the following example it means that the frame and line frequency aren't connected one with the other or that timing of syncs is not standard PAL.

```
    |                                 |
    |_---_-----_----_-----_----__-_-_----__-|
    |_  _     _   _     _    __ _ _    __|
    |                                 |
```

TECHNICAL CHARACTERISTICS

General characteristics:

- POWER SUPPLY   5 volts +/- 10% , 60 mA
                    (from QL ROM connector)
- EXTERNAL DIM.   6.6 x 5.5 x 2 inch.

Digitizer section:

- INPUT   75 ohm / 1 volt / positive video / PAL standard / interlatched
                       or not / BW or COLOR video signal.
- BLACK LEVEL   0.25 volt   +/- 20%
- SYNC LEVEL   0 volts   +/- 20%
- LINE FREQ.   15'625 Hz   +/- 5%
- FRAME FREQ.   50 Hz   +/- 5%
- CONTROLS   Brightness and contrast.
- CONV.TIME   5 seconds.
- COLOURS   8
- RESOLUTION   256 x 256
- A/D CONV.   0 to 6 Mhz 'flash' converter.

Video section:

- INPUTS   from QL: BLUE RED GREEN and SYNC
                       (4 volts on 75 ohm)
- OUTPUTS   to the monitor: BLUE RED GREEN and
                       SYNC (3 volts on 75 ohm)
- FREQ.BAND   0 to 5 Mhz
- CONTROLS   BW/COLOR,BLUE RED and GREEN regulators,
                       QL/DIGITIZER switch.

The program Look&Show

The normal method to start the program is 'LRUN BOOT'

BOOT loads some extensions in a safe RESPR space and calls Look&Show with the command EXEC_W.

If you stop the program you can restart it with the command 'EXEC_W Look&Show'.

Don't boot it another time because extensions are yet ready in the memory.

If you want to load others extensions probably is a good idea to know something about the extensions used by L&S.

- run_ext   is the runtime for this program, use it.
- ram_obj   is the only ram_disk extension with RAM_USE
                 and with no FORMAT problems.

- mixcode -
- digcode -   are short lm_codes used from 'Look&Show'
- sc_pres -

The program L&S is easy to use and has a complete built_in HELP file, so it do not need explainations.

This program is not intended for Image_processing but has all the utilityes that you need to aquire, save, load, view, recolour and hardcopy SCR_files.

In addition, if you must make a greater work on images, you can save it in a RAMfile, EXECUTE an external task, and then reenter to the same program position.

Some problem may arise with hardcopy:

You can convert the supplied hardcopy tasks with the basic program HRDconverter but the convertion cannot change the number of points of your printer nor change the basic structure of the task.

After the cure the task will work on your printer but it is not guaranteed that circles will be printed correctly.

The hardcopy drivers supplied with this program are the only capable of 'SPOOLING' the screen, because this very interesting feature, we include the ASM source listing of them.

It is possible to use others hardcopy drivers but Look&Show don't know them and you must indicate the calling method when requested. (EXEC EXEC_W or CALL)

Another method is to use some GRAPHIC program that you like, executing it with the command EXECUTE_EXTERNAL_TASK, and using it to perform the hardcopy.

If your QL is unexpanded you will find that you cannot 'EXEC' the drivers HRDslow_xxx, HRDmed_xxx.... because they use a great section of memory to store temporarly the screen.

You can already use them from SUPERBASIC with :

```
    LBYTES mdv2_xxxx_SCR,2^17 : EXEC mdv1_HRDslow_eps
```

(2^17 is the screen_start) : (use EXEC, not EXEC_W)

Also the command 'Execute_external_task' is not possible if the called task is longer than a very little task.

A little expansion (64K) is enought to overcome these difficulties.

All the other possibilities of the program are not reduced with an unexpanded QL.

                    END.