4-4 DEBUG

Debug, when active, enables selected information to be reported on to *PC Monitor* (or a connected terminal), to assist engineers/programmers to locate machine faults.

Debug is normally accessed from the Top Level menu *see chapter 4.2.* When selected, options exist for several different report areas to be made active (or inactive). They may be activated individually or collectively.

When using *PC Monitor* to access debug, it will be necessary to pause the monitor after the investigation scan ("Run" switch showing), in order to scroll back through the messages.

Some debugs are of limited use in the field, requiring detailed SCSI program code knowledge, however several of the debugs report usable messages, and in the case of the PIC debug, the code displayed may be interpreted using the information given in this chapter.

DEBUG MENU

When debug is selected the following menu is displayed. Selecting a debug option prompts to change the state (active **a** or inactive **i**), or to exit **x** without making any change. The **r** and **all** options enable the current settings to be displayed or collectively made active/inactive.

Debug

adc	Adc board	**msel**	Mode select	**sout**	SCSI Output
auto	Auto restart	**msens**	Mode sense	**step**	Stepper motor
cmds	Commands	**pic**	Pic Communication	**tptr**	Tputer Generated
inq	Inquiry Command	**scan**	Scan mode	**all**	Change all flags
mech	Mechanical bits	**sin**	SCSI input	**r**	Report flags
x	Exit				

ADC DEBUG

When ADC debug is set active, the ADC parameters such as EHT values, Clamp values, ADC circuit constants, Look up table constants, etc. are reported typically as shown below. The debug is likely to be of use in the field when investigating balance problems.

```
Setting EHT: c71 c9d bab, Clamp: 587 5e5 5d0
Loop divider set
1500( /60) + 1024(RT) + 1(T2) + (928 + 4(L)) + 3064(N)
65536 + 4(P) + 16(T) + 1000
Fadc = 17.429492
loop_divider_1 written 504   loop_divider_2 written 3064
filter setting for filter 17.429602 latch written 9
```

red look up table
fff fff f12 ce5 ad2 90e 77d 60d 4dd 3e6 313 26d 1f2 181 131 131 131
green look up table
fff fff f12 ce5 ad2 90e 77d 60d 4dd 3e6 313 26d 1f2 181 131 131 131
blue look up table
fff fff f12 ce5 ad2 90e 77d 60d 4dd 3e6 313 26d 1f2 181 131 131 131

AUTO (RESTART) DEBUG

The auto restart routine is used to reboot the transputer in the event of malfunction when the debug is active. With debug inactive, no restart is attempted.

CMDS (COMMANDS) DEBUG

This debug, when active, collectively reports all the SCSI commands sent between the Macintosh and the scanner PC in a simple form. The reports will include:

SCSI reserve/release commands.
Scan command
Mode Sense commands, which are requests for information.
Mode Select commands, which are instructions to set up the Mode pages, viz:
- Image page: holds the image details, (size, type, etc.)
- Luminosity page: holds the current colour and gradation range
- Measurement page: holds the current measurement units
- Photometric Set Up page: holds the current balance, clamp and focus details
- USM Set Up page: holds the current sharpening parameters

With the CMDS debug active, the Mode Page commands are reported in full, but the remaining commands are only acknowledged as happening - see example below.

Measurement Units Page
Mode Select Page 3 - Measurement Units
Basic Measurement Unit: mm
Distance in mm/50, Resolution in pixels per 1000 mm
Scsi Command
Mode Sense Command
Scsi Command
Mode Sense Command
Scsi Command
Mode Select Command
Secondary Scsi Data
Mode Select Command
Image Details Page
Mode Select Page 20H - Image Details
CT Resolution: Around Drum = 14173 pixels per 10000 Basic Measurement
Along Drum = 14173 pixels per 10000 Basic Measurement U
Start Offset: Around Drum = 0 CMU
Along Drum = 0 CMU
Pixel Count: Around Drum 674 pixels, Along Drum 453 pixels
Bits Per Pixel: 8, including padding
Data to be sent: Reversed

Data Padding: Not padded
Colour Number: 0,Y
CT File Format: Raw data
CT Data Format: RGB
CT Data Structure: Pixel Interleaved
LW File Format: No Data
Orientation: Load from bottom right
Scan Line Padding: 0 bytes added
Window/Image No: 1
Linework Threshold: 0
Analysis Drum No: 1
SCSI Command
Reserve Unit Command
SCSI Command
Scan Command

INQ (INQUIRY) DEBUG

This debug, when active, will report commands from the Macintosh asking the scanner for its capability ("what can you do?"), e.g. What are drum size details? What measurement units are acceptable? etc.

Inquiries are normally only made when the Macintosh application is first run or restarted. It will therefore be of limited use to the service engineer.

MECH DEBUG

This debug reports the sequence and parameters associated with the traverse and rotate motor operation, typically as shown below:

SetDrumParameters(circumference(actual 4919 units, usable 4760 units), length
3300 units)
SetRotDirection(1)
SetRotSpeed(1500 rpm)
SPIN UP: OK
Fix focus moving to position 0, step 160
MOVE HEAD: OK
SetDrumParameters(circumferences(actual 4919 units, usable 4760 units),
length 3300 units)
SetCropRotStart(0 units)
SetCropTravStart(3260 units)
SetTravEnd(63.781982 units)
SetTravSpeed(7.055669 units per rev)
START SCAN: OK
Cropping Signalled

Debug

MSEL / MSENS (MODE SELECT, MODE SENSE) DEBUG

The Mode Select and Mode Sense debugs, when active will report the Macintosh to scanner set up commands ("do this"), and state reporting commands ("tell me"), respectively. A typical Mode Select command for example would be to set mode page 36H - the Luminosity page, which sets up the required colour and gradation range (highlight to shadow). A typical Mode Sense command would be to request the measurement unit values from the scanner before changing them.

The debug is of limited use to the service engineer. More information may be obtained by using CMDS debug.

PIC (MACHINE CONTROLLER) DEBUG

The 17C42 Microcontroller (PIC) located on the Machine Controller PCB is used for traverse and rotational control, and for associated safety monitoring. Making the PIC debug active will display the communication codes between the PC and controller. Using the following example and the Reference Chart, these codes may be interpreted to assist diagnosis of fault conditions.

PIC Debug Example

Referring to the Reference Chart shown later, communication with the PIC generally takes the form of a Command and Response, the latter being identified by < > brackets. Some commands require several bytes, their allocation and description also being described.

Example: **6c <6c> <80> <co> <41>**

Send Command	**Response**			
6c	**<6c>**	**<80>**	**<c0>**	**<41>**
Give Status	Here is status	Status Byte 1	Status Byte 2	Command Understood
		1000 0000	1100 0000	
		↓	↓ Safety tripped	
		Door Unlocking	Door unlocked	

Further examples may be found in the *Typical Example of a Scan Sequence* at the end of this chapter.

PIC Reference Chart

Action Commands

Hex		*No of Bytes*	*Meaning of parameters*
61	**Reset**	0	
62	**Null**	0	
63	**Rotate**	7	Speed 2:Dir 1:UTS 2:Timeout 2 *0000 = none*
64	**Position unit**	0	
65	**Traverse**	22	End 4:Crop 4:Velocity 2.2:Acc 2.2:UTS 2.2:Timeout 2 *0000 = none*
66	**Stop traverse**	0	
67	**Lamp off**	0	
68	**Set constants**	8	Crop+Sample 1:Period 1:Derivative 2:Proportional 2:Integral 2:
69	**Crop start**	2	Start 2:
6A	**Crop finish**	0	
73	**Lamp on**	0	

Status Commands

Hex		*No of Bytes*	*Meaning of parameters*
6B	**Version**	1	6B... version 1 byte after (01)
6C	**Faults**	2	6C... faults 1: status 1

	1st byte - Faults	*2nd byte - Status*
bit 0	**01** spare	**01** rotate overspeed, no encoder, excess drive
bit 1	**02** timeout rotate	**02** thermal limit on traverse amp
bit 2	**04** timeout traverse	**04** traverse current limit or excess servo error
bit 3	**08** upper / lower limit	**08** lower limit
bit 4	**10** watchdog set	**10** upper limit
bit 5	**20** spare	**20** traverse position not initialised
bit 6	**40** crop error	**40** safety tripped (inverter off or door open)
bit 7	**80** door unlocking	**80** door unlocked

6D	**R Speed**	2	6D... rotate speed
6E	**R Direction**	1	6E... rotate direction
6F	**R Time**	2	6F... rotate time left
70	**T Position**	4	70... traverse position
71	**T Time**	2	71... traverse time left
72	**T Waymark**	3	72... traverse restart position
74 xx	**Peek**	1	74... reads 4 bytes of data from ram address xx

Signals from PIC

Hex		*Meaning*
41	**ok**	Command understood.
42	**us**	Command misunderstood. Send 20 hex (space) to resync data flow
43	**failure**	Failure. Read fault status for details
44	**uts** *(Rotate*	*Up to speed rotate* Reached velocity or stopped
45	**uts** *(Traverse)*	*Up to speed traverse* Reached velocity or stopped
46	**digitise**	Reached crop position
47	**arrival**	Target position reached on trajectory / waymark taken
48	**initialised**	Initialise sensor passed on initialise command
49	**reset**	Reset code executed

ICG

Debug

SCAN DEBUG

This option, when active, reports a summary of all of the parameters that have been demanded to scan an image, typically as shown below:

```
Scan Parameters:
Crop:    around drum start 0, end 4755.520996, resolution 14.173
         along drum start 40, end 3236.218018 (0 at bottom of drum)
         (along drum limits: 40 to 3240 mm/10
Drum Speed based on linelength 674 can be 1500 rpm
Drum Speed based on clock rate of 17.429602KHz, chosen as 1500 rpm
Crop: along drum start 3260, end 63.781982 (0 at top of drum)
Drum: number 1, Rotation speed 1500 rpm, Traverse rate 7.055669 mm/10 revs
Mode: Single pixel
Automatic aperture: 1
Focus flags: < Fcson Abs >
Balance flags: < >
Media is Transparency, Data is negative
Set up Pic: return code 0
Pic is no longer in Scan Mode
```

SIN / SOUT (SCSI IN, SCSI OUT) DEBUG

These two debug reports list in hex the actual SCSI commands and data to and from the scanner. They are of little use to the field service engineer as they require a full SCSI command listing, and are interpreted to "real" messages by the CMDS debug routine. Messages are reported in the following form:

Incoming Message:	**d1**	**a**	**5a**	**0 36 0 0 0 0 0 12 0**
	Source	*Number of*	*Command*	*Data*
	e.g. d1 = SCSI	*Bytes*	*type*	
	82 = Transputer	*to follow*	*e.g. 5A = Mode Sense*	
			55 = Mode Select	

STEP (STEPPER MOTOR) DEBUG

This debug when set active reports the drive commands for each of the stepper motors in the form:

10 @ 309 *10 steps at a speed of 309 steps/second*

A typical report for the door lock motor (motor 5), showing the door unlocking, would be:

```
Motor 5: Move 280 steps anticlockwise
-10@29 -10@69 -10@109 -10@149 -10@189 -10@229 -10@269 -10@309 -10@349 -10@389
-10@429 -10@469 -10@509 -20@549 -10@509 -10@469 -10@429 -10@389 -10@349 -10@309
-10@269 -10@229 -10@189 -10@149 -10@109 -10@69 -10@29
```

TPTR (TRANSPUTER) DEBUG

When active this debug will report any transputer messages, typically a detailed identification string.