

THOR Professional Computer system.

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Main board parts list. November 1986.  
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Semiconductors.

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IC 1.           74 LS 245  
IC 2.           74 LS 04  
IC 3.           74 LS 74  
IC 4.           PAL 16 L 8 Custom logic  
IC 5.           74 LS 139  
IC 6.           74 LS 04  
IC 7.           74 LS 08  
IC 8.           74 LS 03  
IC 9.           74 LS 113  
IC 10.          74 LS 04  
IC 11.          74 LS 05  
IC 12.          74 ALS 638  
IC 13.          PAL 16 L 8 Custom logic  
IC 14.          74 LS 245  
IC 15.          74 LS 245  
IC 16.          74 LS 257 or 258  
IC 17.          74 LS 257 or 258  
IC 18 to 33    256K x 1 D-RAM CAS before RAS refresh  
              (NEC D-41257-15 or equivalent) (MITSUBISHI 41256-15)  
IC 34          74 LS 04  
IC 35.          74 LS 74  
IC 36.          MC 6850 P  
IC 37.          MC 6821 P  
IC 38.          WD 1772 PH  
IC 39.         \* MC 146818P \*   HITACHI HD146818P  
IC 40.          74 LS 05  
IC 41.          74 LS 03  
IC 42.          74 LS 04  
  
Q 1.           MP5A 2369 A  
Q 1.           MP5A 2369 A  
  
D 1.           IN 4148  
D 2.           IN 4148  
  
ZD1            4v3 400Mw zener diode

Passive components.

-----  
R 1.           1K 1/4 Watt  
R 2.           10 K 1/4 Watt  
R 3.           150 K 1/4 Watt  
R 4.           5 M 6 1/4 Watt  
R 5.           150 R 1/4 Watt  
R 6.           1K 1/4 Watt  
R 7.           10 K 1/4 Watt  
R 8.           10 K 1/4 Watt  
R 9.           1K 1/4 Watt  
R 10.          1K 1/4 Watt  
R 11.          1K 1/4 Watt.  
  
RP 1.          8 x 150 Ohm DIL pack  
RP 2 to 4.     7 x 1K SIL pack

Xtal 1.        8.000 MHz HC-18 U  
 Xtal 2.        32768 Hz watch crystal  
  
 C 1.           0.1 Microfarad 30 Volt  
 C 2.           4n7 30 Volt  
 C 3.           22 Picofarad 30 Volt  
 C 4.           22 Picofarad 30 Volt  
 C 5.           0.1 Microfarad 30 Volt  
 C 6.           0.1 Microfarad 30 Volt  
 C 7.           \* 22 Microfarad Tantalum 16 Volt or    \* now 0.1uF  
                  \* 100 Microfarad Electrolytic 16 Volt \* Issue 4 onward  
 C 8.           0.1 Microfarad 30 Volt  
 C 9 to C 44   0.1 Microfarad 30 Volt (Decoupling)

NICAD battery 3v6 100 Mah capacity for real-time clock  
                  VARTA Mempac or equivalent.

#### Connectors and sockets.

IC 4.           20 way dil socket  
 IC 11.          14 way dil socket  
 IC 12.          20 way dil socket  
 IC 13.          20 way dil socket  
 IC 15.          20 way dil socket  
 IC 36.          24 way dil socket  
 IC 37.          40 way dil socket  
 IC 38.          28 way dil socket  
 IC 39.          24 way dil socket  
  
 Keyboard       5 pin 180 degree din PCB mounting socket  
  
 Printer         26 way long latch 90 degree ribbon header  
  
 Mouse          DB-9 90 degree PCB mounting female plug  
  
 Floppy disc    26 way double row PCB pins  
  
 SCSI            34 way double row PCB pins  
  
 EPROM board   34 way double row 90 degree PCB pins  
  
 Expansion      Special 64 way DIN 90 degree KB mounting  
                  male socket with 13 mm pins.  
  
 Link board     Special 64 way 90 degree double row  
                  pins with 10 mm long tails.  
  
 Card guide     Special moulded plastic guide to take  
                  single eurocard in expansion socket.  
  
 Spacers        M 3 clear by 3 mm long between card-guide  
                  and expansion socket.  
  
 Screws         self -tapping screws M 3 by 10 mm to fix  
                  card-guide to expansion socket.

-----

TRAP #3 D0=\$4E

FS.WATER

Read a field of the machine's watermark

Call parameters

Return parameters

D1.W number of field

D1.W length of field read

D2.W buffer length

D2.L preserved

D3.W timeout

D3.L preserved

A0 channel ID

A0 preserved

A1 base of buffer

A1 top of buffer

A2

A2 preserved

Error returns:

NC not complete

HO channel not open

BO buffer overflow

OR field number not in range 0..max

-----

A field of the machine's watermark is read into the buffer. The contents of the watermark may be used to identify the machine and its type etc.

The following fields are currently defined:

D1=0: machine name, the letters "THOR" (4 bytes)

D1=1: serial number/identifier. The first 4 bytes are a 32 bit integer indicating the machine's serial number; the second 4 bytes are a 32 bit semi-random number.

-----  
TRAP #3 D0=\$3A

SD.TOPW

Bring window area to top

Call parameters      Return parameters

D1	D1	???
D2	D2.L.	preserved
D3.W timeout	D3.L	preserved
A0 channel ID	A0	preserved
A1	A1	???
A2	A2	preserved

Error returns

NC not complete

NO channel not open  
-----

The window area associated with the channel's job are restored if needed, and output allowed. This call will not fail "not complete" if the window area is obscured.

To perform high priority screen output (e.g. an alarm clock), use normal screen i/o with zero timeout and issue SP.TOPW calls on ERR.NC failures.

## 2. Qdos Traps.

### 2.1 Open a channel (enhanced)

-----

TRAP #2 D0=\$1, D3=3

Open a channel

Call Parameters      Return Parameters

D1.L	job ID	D1	job ID
D2		D2	preserved
D3.L	code	D3	preserved
	3 new (overwrite) file		
A0	address of channel name	A0	channel id
A1		A1	???
A2		A2	preserved
A3		A3	preserved

Error returns:

NO not opened - too many channels open  
NJ job does not exist  
OM out of memory  
NF file or device not found  
IU file or device in use  
BN bad file or device name

-----

This call implements a Qdos defined function not in the standard machine driver.  
The effect is to open a file for writing, deleting it if it already exists

## 2.2 Rename file

---

TRAP #3 D0=\$4A

Rename a file

Call Parameters

Return Parameters

D1

D1 ???

D2

D2 preserved

D3.W tiweout

D3.L preserved

AQ channel id

A0 preserved

A1 address of new filename

A1 ???

A2

A2 preserved

A3

A3 preserved

Error returns:

NC not complete

NO channel not open

NF file or device not found

---

## 2.5 Create a directory.

---

```
TRAP #3  D0=$4D
          Replace an existing file by a directory
Call Parameters      Return Parameter
D1                  D1 ???
D2                  D2 preserved
D3.W timeout        D3.L preserved
A0 channel ID        A0 preserved
A1                  A1 ???
A2                  A2 preserved
A3                  A3 preserved
```

Error returns:

```
NC not complete
NO channel not open
IU in use (see text)
DF drive full
BN bad name (see text)
RO read only channel
```

---

This call replaces an existing file with a directory of the same name unless the name of the file was invalid for a directory (i.e. longer than 34 characters or shorter than two characters, not ending in '\_', or ending in '\_\_'), then 'bad name' will be given. If a file exists which would have been in the directory if it had existed previously, then the call will fail 'in use'

### 3 Truncate file

-----  
TRAP #3 D0=\$4B

Truncate to current file pointer

Call Parameters	Return Parameters
D1	D1 ???
D2	D2 preserved
D3.W timeout	D3.L preserved
A0 channel ID	A0 preserved
A1	A1 ???
A2	A2 preserved
A3	A3 preserved

Error returns:

NC not complete  
NO channel not open  
RO read only channel

This call truncates the file corresponding to an open channel to its current file position.



#### 4 Set or read file dates

-----  
TRAP #3 D0=\$4C

##### Set or read file dates

Call Parameters	Return Parameters
D1.L key	D1.L date read
-1 read date	
0 set to current date	
else set date to D1	
D2.W date field	D2 preserved
0 update date	
1 reference date	
2 backup date	
D3.W timeout	D3.L preserved
A0 channel ID	A0 preserved
A1	A1 ???
A2	A2 preserved
A3	A3 preserved

##### Error returns

NC not complete  
NO channel not open

-----

This call allows the reference, update and backup dates of a file to be set to either the date provided or to the current clock setting

# THOR COMPONENT LIST.

## Enclosure.

No.	Item	No. off	Supplier	Ref . No
0	Base	1	Propak )	
1	Front end plate	1	Propak )	
2	Back end plate	1	Propak )	
3	Cover	1	Propak )	
4	Blank panel, full ht.	1	Propak )	
5	Painting	1	Propak )	
6	Feet	4	RS	543-513
7	Screws M3x5 Superdrive	8	D. B. Fasteners	
8	Screws M3x8 Superdrive	4	D. B. Fasteners	
9	Screw self tap 4 x 10mm	3	D. B. Fasteners	
10	Screw self tap 4 x 8mm	7	D. B. Fasteners	
11	Screws M3 x 16mm	7	D. B. Fasteners	
12	Screws M3 x 20mm	1	D. B. Fasteners	
13	Screws M3 x 30mm	1	D. B. Fasteners	
14	Screws 6/32 UNC x 25mm	4	D. B. Fasteners	
15	Screws 4/40 UNC x 25mm	8	D. B. Fasteners	
16	Spacers 3mm (metal)	3	Harwin	R2303-14
17	Spacers 8mm (plastic)	6	Verospeed	87-25984E
18	Spacers M3x8mm (metal tap)	1	Verospeed	87-25977J
19	Spacers M3x1 Omm (metal tap)	1	Verospeed	87-25978E
20	Spacers 18mm (plastic)	8	Verospeed	87-25989G
21	Spacers M3x25.4mm (plastic)	2	RS	543-743
22	M3 nut	8	D. B. Fasteners	
23	Panel anodising	1	Neon Care	
24	THOR panel (screen print)	1	J.G. Printers	

## Eprom Board

No.	Item	No. off	Supplier	Ref . No
1	PCB - Eprom	1	Stev. Circuits	
2	34 way Skt. dual row.	1	VSI	DUP76282-417
3	28 way, IC Skt.	6	RR (Bicc-Vero)	681023
4	0.1, 63V Cap	6	RR (E.C.C.)	471004
5	128K EPROM	1	Impulse (NEC)	27128D2
6	256K EPROM	1	Impulse (NEC)	27256D2

## Cables & Connections

No.	Item	No. off	Supplier	Ref . No
1	Mains input skt. & switch	1	Belling & Lee	L2724
2	Mains outlet socket	1	RR (Bulgin)	274283
3	Mains lead, 2.5m, fused 5A	1	RR (Bulgin)	274261
4	Mains Supply cable loom	1	RR	
5	DC P.S. cable loom, dual f 1	1	RR	984107
6	DC P.S. cable loom, Win & f 1	1	RR	984108
7	34-52way SCSI cable assemb	1	RR	981259
8	26-34way Flop cable assemb	1	RR	981261

9	34-26-34way dual floppy	1	RR	981260
10	2 Amp Fuse 20mm anti surge	1	RR	591058

#### Additional Modules

No.	Item	No. off	Supplier	Ref . No
1	3.5 inch 720K Floppy	1	PCML	FD 1036A
2	3.5 inch 20Meg Winchester	1	Peripheral Sol.	ROD652
3	'QL' PCB	1	Applied Technology	

#### THOR Module

No.	Item	No. off	Supplier	Ref. No
1	PCB motherboard	1	Stev Circuits	THOR Mb
2	PCB Con. Board	1	Stev Circuits	THOR Cb
3	64way DIN41612 Skt	1	RR (Bixx-Vero)	685062
4	64 Way 90 deg. Pins	1	Flair	SPL 118
5	8 way power supply pins	1	RR (Molex)	406034
6	100mm Card guide	1	Conec	ERG 100
7	5 w 180 deg. DIN SKT	1	RS Components	473-278
8	26 way Header long lever	1	RR (Molex)	402025
9	'D' 9 way plug 90 deg	1	RR (McMurdo)	421125
10	64 way 90 deg. W/w plug	1	RR (Panduit)	299017
11	26 way un. Straight header	1 )		
12	34 way un. Straight header	1 )	RR (Molex - 80w)	407154
13	34w 90 deg. Un.header	1	Flair	DR250150-34T
14	0.1 63V Caps	39	RR (E.C.C.)	471004
15	SIL res. 8 pin 1K	3	RR (Kyocera)	3001011
16	DIL res. 16 pin 150R	1	RR (Piher)	057001
17	150R 1/4 W	1	RR (Piher)	PR16 5%
18	1K 1/4W	5	RR (Piher)	PR16 5%
19	10K 1/4W	2	RR (Piher)	PR16 5%
20	150K 1/4W	1	RR (Piher)	PR16 5%
21	1M 1/4 W	1	RR (Piher)	PR16 5%
22	5.6M 1/4W	1	RR (Piher)	PR15M
23	15pF Caps.	2	RR (Mullard)	814119
24	47pF caps.	1	RR (Mullard)	814125
25	100uF electrolytic 10V	1	RR (Dubilier)	342003
26	Crystal 32.768 kHz	1	Davitron	DTFW26
27	Crystal 8.00 MHz	1	Davitron	8 MHz HC1
28	Nick. Cad. Bat 3.6v	1	RR (Varta)	313157
29	14 way IC skt	1	RR (Bicc-Vero)	681018
30	20 way IC skt	4	RR (Bicc-Vero)	681021
31	24 way IC skt	2	RR (Bicc-Vero)	681022
32	28 way IC skt	1	RR (Bicc-Vero)	681023
33	40 way IC skt	1	RR (Bicc-Vero)	681024
34	IN4148 Diode	2	RR (Mullard)	801001
35	MPSA 2369	2	RR (Motorola)	444030
36	SN74LS03N	2	RR (Motorola)	432153
37	SN74LS04N	2	RR (Motorola)	432154
38	SN74LS05N	2	RR (Motorola)	432155
39	SN74LS08N	1	RR (Motorola)	432156
40	SN74LS74AN	2	RR (Motorola)	432184
41	SN74LS113AN	1	RR (Motorola)	432200

42	SN74LS139N	1	RR (Motorola)	432211
43	SN74LS245N	3	RR (Motorola)	432249
44	SN74LS258N	2	RR (Motorola)	432326
45	SN74ALS638	1	Online (Texas)	854043
46	MC6821P	1	RR (Motorola)	446127
47	MC6850P	1	RR (Motorola)	446137
48	HD146818AP	1	Impulse(Hitachi)	HD146818P
49	WD1772PH00	1	Pronto	1115442
50	PAL 1 - CST 1.2	1	Online	963025
51	PAL 2 - CST 2.1	1	Online	
52	256K x 1 DRAM	16	Impulse (NEC)	41257C15

Thor Software Status.

18/11/1986

\*\* 4.03 \*\*

SuperBASIC Commands.

CLOCK.

\*\* 4.00 \*\*

The clock now uses a window owned by SuperBASIC, ensuring that it gets displayed in the windowing environment.

EX.

\*\* T.04 \*\*

EX, when invoked from a job other than zero, e.g. when used from a Supercharged program, sets the holding job correctly now. This ensures that sub-jobs go away when the main job completes {or is deleted}.

This problem was reported by Helmuth Stuvén of Dansoft.

The "option string" parameter, i.e. the one preceded by a semicolon, now accepts an expression, as well as explicit strings and names. This is particularly useful with Xchange, which takes a single numeric parameter for its workspace. For example:

EX Xchange; 40

would invoke Xchange with 40K workspace. Variables must still be converted to expressions if necessary: this is most neatly done by placing them in parenthesis. The above example is equivalent to:

workspace = 40: EX Xchange; (workspace)

Previously it was necessary to use the even less obvious form:

workspace = 40: EX Xchange; workspace & ""

Incidental with this change is the acceptance of numbers by many procedures and procedures which specify a name. This will be appreciated by users of numeric file names; care must be taken to remember that, for example, "SPL 1000000" will attempt to spool a file called "FLP2\_1E6" (or "win1\_user\_1E6" etc)!

EW when invoked from a job other than zero did not wait: now fixed. Complex job structures crashed machine when they set their priorities to zero: now fixed(?). Priority now defined within module (internal change only).

EXTRAS.

\*\* T.05 \*\*

The EXTRAS command now ignores functions and procedures in the Thor roms, as they are conceptually part of the machine and not 'extra'.

HEX\$, BIN\$.

\*\* T.05 \*\*

HEX\$ and BIN\$ now accept a single parameter and a second parameter of zero. The effect of both of these is to display the value in the smallest number of digits possible without truncation.

E.g. HEX\$(0) = HEX\$(0,0) = '0'  
HEX\$(42) = HEX\$(42,0) = '2A'

```

HEX$(-1) = HEX$(-1,0) = 'FFFFFFFF'
BIN$(0)   = BIN$(0,0)   = '0'
BIN$(42)  = BIN$(42,0)  = '101010'
BIN$(-1)  = BIN$(-1,0)  = '11111111111111111111111111111111'

```

The functions previously hung if the second parameter was zero. This bug has never been reported, despite being present in all copies of the QL Toolkit and over 2,000 Q-Discs produced over a 21 month period!

SYS\_VARS. \*\* 4.02 \*\*

This is a function (no parameters) to return the address of the system variables. It should be used by all programs that are intended to be portable to later Thor machines.

WCOPY. \*\* T.04 \*\*

WCOPY now copies file headers if either the file-type field or the file-type dependent information field is non-zero. This ensures that only completely plain files are copied without header.

This problem was reported by Talent regarding the copying of TechniQL screen dumps.

WCOPY\_F (copy without prompting) and WCOPY\_O (copy with overwrite, \*\* 4.00 \*\*  
no prompting} have been added.

The prompt message is now in full: "Y/N/A/Q" has now been replaced by "Yes/No/All/Quit".

Much larger buffers are now used to improve performance.

The prompt mess "TO" has been replaced by "=>". \*\* 4.02(tm)

WDEL. \*\* 4.00 \*\*

Extended prompt message: same as WCOPY.

WMON. \*\* T.14 \*\*

Window #0 is now slightly larger with a black and white checkered border like #1 and #2. This is particularly useful if #1 and #2 have been closed and other jobs are using the screen, as it is much more recognisable.

Window #0 moved down exactly one pixel due to arithmetic error! \*\* 4.01 \*\*

DEVICES.  
-----

BOOT. \*\* T.06 \*\*  
-----

The special device "BOOT" is a read-only device which yields a SuperBASIC in-line file, which attempts to LRUN the file "flpl\_boot" or, if unsuccessful, the file "winl\_boot". It is invoked after the F1/F2 screen, causing the Thor to be booted from a floppy, if present, or the Winchester; this sequence ensures that a Winchester machine with an erroneous "winl\_boot" file can still be booted. The device may be used subsequently by the command:

LRUN BOOT

Unlike the Q-Disc driver, it does not boot the machine by microdrive emulation and so avoids certain name-clash problems. This has the effect that if microdrives are fitted, or a Q-Disc is fitted in the expansion port, and the built-in bootfiles are not found, these will be used to boot from.

BOOT now performs MRUN rather than LRUN to reduce screen activity. \*\* 4.00 \*\*

CLOCK. \*\* 4.01 \*\*

If the clock is invalid on reset, no attempt is made to set it to the, probably erroneous, QL clock. Reading the clock can time out if it never 'ticks'. These changes are only of significance in testing.

CON: Keyboard. \*\* T.10 \*\*

Multi-language keyboards now accepted. Pre-installed are now International, British and Danish. To change between language, type <Alt>-<Sys Req>. This changes to the next in round robin fashion.

Also changed in this version are the key strokes required for "special" Space and Enter. These are now produced by combination with Ctrl, rather than Shift: this reduces typing errors when typing SEQUENCES OF CAPITALS, without making the rarely used "special" key combinations too obscure.

French and German keyboards added. The French, in particular, is very provisional, until it can be compared with a "standard" french keyboard. The Danish version has been slightly modified, allowing the divide symbol to be produced using one of the two key combinations which previously produced c-cedilla. \*\* T.13 \*\*

Greek and Swedish keyboards added. New flag added to allow dual character sets toggled by <Alt>-<Caps Lock>. \*\* T.14 \*\*

Moving the input channel has been changed to improve the performance of multi-tasking in conjunction with the new window drivers. <Sys Req> now moves to the "next" console channel that is active (it has an enabled cursor flag or is waiting for input), or belongs to a different job, unless that job has another channel which is active. This ensures that even jobs that do not enable their cursor (e.g. Xchange) to be properly multi-tasked. \*\* T.14 \*\*

<Shift>-<Sys Req> attempts to change to a channel owned by SuperBASIC, if possible with its cursor enabled.

<Ctrl>-<Sys Req> changes to the "next" console regardless of its cursor enabled status.

<Shift>-<Scroll Lock> ("break") now releases the screen lock status. \*\* 4.00 \*\*

Greek keyboard corrected for lower case "y"/upsilon translation. Accent keys now accepted in alternate mode. \*\* 4.01 \*\*

System variables now used for shift keys (sv\_shift = \$80.w), Ctrl key (sv\_ctrl = \$82.b), alt key (sv\_alt = \$83.b) and num-lock flag (sv\_num = \$84.b) status; auto repeat count (sv\_arcnt = \$90.w) now set to -1 when no key is repeating, allowing a non-destructive test for key press together with the auto repeat buffer {sv\_arbuf = \$8a.w}.

Console channels are now opened BEFORE the active one. This ensures \*\* 4.01 \*\*

that the keyboard will return from a job to its originator unless the user explicitly changes windows using the <Sys Req> key or other jobs preempt control of the screen. This means that jobs "stack" in a fairly intuitive manner.

Except in raw mode, a page throw is added at end of file if not already present. The parallel port now checks for the presence of TRA vectors for output translation. This is not performed on "raw" channels ("parr").

Interrupts enabled, to enable maximum output speed when using                   \*\* T.12 \*\*  
Printers faster than 50 cps.

Bug fixed, which could cause a system crash when using TRAnslated           \*\* T.14 \*\*  
characters when the output buffer is full.

Screen Driver (SCR).   \*\* T.14 \*\*

Full dynamic windowing has been added. Each job is allocated a buffer area for its windows. This area is a rectangle which encloses all the windows which are owned by the job, plus all area of the screen which have been previously occupied by windows owned by the job that have been written to. This means that windows that are opened and immediately redefined, as is done by the UT.CON and UT.SCR vectored routines, do not contribute to the buffer space area. Otherwise, buffer area do not shrink, which ensures that top line banners etc remain with the job. The exception to this is SuperBASIC, allowing the use to reduce it from using the entire screen.

The driver only allows buffer areas which are unobscured to be written to, all others being preserved. Attempting to perform a write to such an area will return "not complete" if a finite timeout is specified or wait until unobscured. Areas may be rendered writable by issuing an SD.TOPW (\$3a) i/o trap on any screen or console channel belonging to the job, or moving the flashing cursor to a console window belonging to the job (See the description of CON for enhanced cursor moving). When a window is first opened, the job's buffer area is made writeable: this means that a new job overlapping SuperBASIC's area {normally all of the screen!} will suspend SuperBASIC unless the cursor is specifically moved back; thus, it is sensible to always use EX (manually) rather than EW. Closing all the windows belonging to a job will release its buffer area: this should therefore not be done unless this effect is desired; for example, this may be used when it is desired to "really" move or shrink a window area.

Windowing now can be turned off (for compatibility with a minority       \*\* 4.03 \*\*  
of irregular programs) by setting the byte sv\_nowin (offset \$85) in the system variables; for example:

```
POKE SYS_VARS+133, 255
```

This will only affect jobs opening their first windows with the flag set; to remove a job's (e.g. SuperBASIC's) window buffer, close all of its windows and reopen them.

Thor Notes V 4.03

German keyboard fixed to have one double-s ("beta") and one plus key,   \*\* 4.02 \*\*  
instead of two plusses!

Greek keyboard fixed to get accent key right.                               \*\* 4.02 \*\*

<Sys Req> now changes screen in scheduler loop to prevent clashes.       \*\* 4.02 \*\*

The keyboard definition table pointer, sv\_kbd, has been changed to       \*\* 4.02 \*\*



\$150, to ensure long word alignment (for Thor-20). This should not cause any problems as this was not previously documented. The "raw" keyboard queue is now pointed to by sv\_kbdq (\$154), allowing improved keyboard response to be provided by "greedy" device drivers, such as the floppy, which need to hold off interrupts" for significant periods.

Window changes on <Sys Req> arc now done in the scheduler loop to prevent window mixing. \*\* 4.02 \*\*

Greek keyboard finalised: in greek mode, the <`> key is special: when \*\* 4.03 \*\* it is pressed, nothing is output, but if any of the lower case keys <a>, <e>, <h>, <i>, <o>, <y>, <v> (alpha,epsilon,eta,iota,omicron,upsilon,omega) immediately follow it, they are converted to their accented (dotted) form. <Shift>-<`> produces a double accented upsilon.

PAR. \*\* T.09 \*\*

All options are now recognised:

```
PAR[N|C|R][_bufsize][K]
```

Options:

Newline translation:

N - Newline:           <newline> => CR LF (default).  
C - Carriage return: <newline> => CR.  
R - Raw.

Buffer size = 128 if neither <bufsize> or K present;  
 = <bufsize>, multiplied by 1024 if K present;  
 = 1024, if only K present.

Once a channel has been closed, a further channel may be opened, even if output is still occurring. Therefore to perform background printing from memory, open a channel with a buffer size adequate for the entire output: the output will apparently complete immediately, and further printer output may be initiated. Note that it is the responsibility of the printing job to ensure that memory is not "hogged": a channel occupies about 100 bytes more than the buffer size specified.

Watermark \*\* T.08 \*\*

Installed in Winchester only: currently in second top rom only!

Installed in RAM drive. \*\* T.11 \*\*

Installed in FLP driver. \*\* T.13 \*\*

Now in correct ROM. \*\* 4.00 \*\*

## SUMMARY OF VERSIONS.

T.04:	EX	Bug fix (owner job)	9/9/1986
	WCOPY	Bug fix (non-plain file headers)	

T.05: BIN\$ Bug fix (0 bits). Now accepts value only 10/9/1986

EXTRAS Now ignores Thor ROMs  
HEX\$ Bug fix (0 bits). Now accepts value only.

T.06:	BOOT	Device added	10/9/1986
T.07:	WIN	Various enhancements	12/9/1986
T.08:	WIN	Watermark added (winchester only)	19/9/1986
T.09:	PAR	First complete version.	15/9/1986
T.10:	CON	Multi-language keyboard support	19/9/1986
T.11:	RAM	Relinked to include watermark	19/9/1986
T.12:	NFS	Linked in.	22/9/1986
	PAR	Performance improved with fast printers.	
	WIN	Not installed if Pal absent.	
T.13:	CON	French, German keyboards added; Danish Improved.	22/9/1986
	FLP	Now includes watermark. Rearrangement of roms.	
T.14:	CON	Greek (HELLAS), Swedish keyboards added	10/10/1986
	CON	<Sys Req> response improved.	
	PAR	TRA bug fixed.	
	SCR	Full windowing version.	
4.00:	Thor	First full release version.	12/10/1986.
	BOOT	Screen clears reduced.	
	CLOCK	(procedure) New window for windowing software.	
	CON	Further <Sys Req> and <Scroll Lock> improvements.	
	EX	Enhanced option string input.	
	FSDs	Watermark moved to correct rom.	
	WCOPY	New entries added; improved messages; large buffers.	
	WDEL	Improved messages.	
4.01:	CLOCK	(device) Error handling improved.	28/10/1986.
	CON	Greek keyboard enhanced; improved system interface.	
	CON	Job stacking improved.	
	EX	Various bug fixes.	
4.02	CON	Greek & German kbds fixed; Sys_req improved.	16/11/1986.
		SYS_VARS function added.	
	WCOPY	"TO" replaced by "=>".	
4.03:	CON	Greek (HELLAS) keyboard changed again.	18/11/1986.
	SCR	System variable to disable windowing.	

OS "QDOS/Thor"

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EPROM base \$F0000 upwards  
Hardware Interfacing

1. RAM: 640K  
System stack at HIMEM-1K
2. Floppy: (FLP1\_, FLP2\_)

Qdisc based system from Qjump/Tony Tebby  
Adapted for Thor hardware.  
"EXTRAS" included in Thor system.

3. Winchester (WIN1\_)  
Based on CST SCSI system, related to Qdisc: interrupt  
Driven. Hierarchical directories: FS.MKDIR (SB); Date  
Stamping; Backup/access/modified dates: FS.DATE
4. Clock  
SET\_CLOCK command, gets QL clock - copies to Battery  
Backed clock.  
Read at powerup, copied to 'QL' clock.
5. Printer port  
Device name 'PAR' = 'PARN'-Newline-> <CR><LF> } <FF> at  
              'PARC' = Newline -> <CR> } end of file  
              'PARR' = Raw (untranslated)  
              'PAR\_5' = 5K buffer etc.  
Supports TRA command except when RAW mode.
6. Mouse Port  
6821 port: interrupt driven  
No OS support yet: currently only ICE
7. Keyboard  
6850 port: Interrupt driven: interaction with floppy?  
Keyrow problem  
Function keys & numeric pad  
LEDs  
Languages (error messages in MG ROMs): loadable  
Print screen - QDUMP.
8. Network driver.  
Toolkit II: Qjump/Tony Tebby design

#### SOFTWARE OS FEATURES

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1. RAM DRIVE                'RAM1\_' to 'RAM8\_'  
CST design: fastest screen load around  
Buffering rewrite for 4.10: COPY now twice as fast.
  2. Windowing  
Automatic "swapping" between jobs.  
SYS REQ key  
SD.TOPW call  
Flag in System Variables to turn off (V4.03): SV.NOWIN
  3. Watermark  
FS.WATER call  
Fields are currently "Thor", serial number (binary)  
Stored "shadowed" under hardware
  4. BOOT  
Loads floppy or winchester boot file  
Could be modified

## SUPERBASIC

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1. EX, EW  
Ownership of jobs fixed.  
Numeric parameters: EX XCHANGE;100
2. SYS\_VARS  
Returns address of system variables  
Allows portability to Thor-20...
3. CLOCK  
Only one CLOCK job  
Channel owned by calling job; active when BASIC is.
4. WCOPY  
Faster  
WCOPY\_O/\_F  
'=>' instead of 'TO' (4.02)
5. HEX\$, BIN\$  
Length now optional: HEX\$(256) = '100'  
HEX\$(-1) = 'FFFFFFFF'

## APPLICATIONS

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### XCHANGE 3.84

1. Tasks
2. Quill: Mail Merge  
Glossaries
3. Archive: Bug fixes etc.
4. Easel: 3D bars; Plotters
5. Abacus: Goal seek
6. XCHANGE IM/EXPORT
7. TSL
8. Installation and configuration

### ICE

1. Rewritten in part
2. Gradually incorporating low level functions in OS.
3. Mouse/cursor keys
4. User visible changes needed:  
Calculator numeric input  
Hierarchical directory support

O/S driven mouse

QDUMP

1. Rewritten for Thor
2. Default directories etc.
3. File structure

PMU

FILED

DISCED

BACKUP

CONVERT

HIP / GLASS PENDULUM