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SOFTWARE RELEASE GUIDE

TERAK-85/RT-11, VERSION 3B, OPERATING SYSTEM

for the

TERAK 8510/a BLACK & WHITE GRAPHICS COMPUTER SYSTEM

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4. SYSTEM CHARACTERISTICS

Before you can begin building a working disk you must determine the system characteristics best suited to your application. This section provides the background information you need to build your working system. Included are discussions of the monitor capabilities, device handlers, and screen console characteristics available with your RT-11 software. In addition, file and monitor naming conventions are reviewed.

4.1 MONITOR CHARACTERISTICS

The monitor you choose provides the core around which you will build your working system.

There are three primary types of monitor provided with your RT-11 software: the Base-line Single Job Monitor, the Standard Single-Job Monitor and the Foreground/Background Monitor.

The Base-line Single Job Monitor is a special version of the single job monitor. It has the smallest memory requirement of the monitors provided and is intended for use in applications where the greatest amount of memory possible must be made available for the user's program.

The base-line monitor can perform all of the system commands and run most of the utilities. For highly interactive applications the standard single job monitor should be used. The more complete device support and error processing of the single-job monitor will provide a more flexible and easy to use system.

The Single Job Monitor is the smallest standard RT-11 monitor. It will run all the system utilities and support all hardware devices.

The single job monitor has the fastest response times, at interrupt and keyboard level, of the standard monitors provided. If your application involves continuous execution of a single user program; interactive program development; or maximum throughput, realtime data aquisition; the single job monitor will be the best choice.

The Foreground/Background Monitor is the RT-11 monitor that supports

multi-programming. The foreground/background monitor lets you operate an independent foreground job, at a higher software priority level than the background, while you use the remaining system facilities to support the background job. The foreground job is not intended for use as a two user time sharing system or for interactive program development. Rather it bests supports a stable, event-driven I/O or realtime job, that can execute with a minimum of user interaction while the background deals with the balance of the system requirements.

If you have a real-time, software priority application which you need to run concurrently with normal system development and data-processing applications, the foreground/background monitor is the proper choice. If you do not require concurrent execution, use of the single job monitor will conserve system resources.

4.2 CONSOLE DISPLAY CHARACTERISTICS

The console display is provided through a software terminal emulator. Software (the Emulator) controls all console functions, including motions of the cursor, character panning or echo, and scrolling of the screen. The emulator code is resident within the operating system and may be activated by all the standard system terminal procedure calls. The screen may also be driven by user program I/O routines which expect to drive a serial interface at the standard console addresses. The emulators released in this kit are a glass teletype (GT) and the Terak emulator (TK). Other terminals can be emulated but are not provided with this software kit.

The emulator accepts characters from the hardware emulator data buffer and places them into the page buffer in a manner similar to a hardware data terminal. The characters are placed into the hardware emulator data buffer by the TT handler which is built into the RT-11 V3B monitors. RT-11, and other code, which drives a serial interface, will operate without modification, provided that the code runs at processor level 0 (all interrupts enabled). Note that MICRO-ODT does not meet this requirement.

The GT emulator is used most often when memory space precludes use of the TK emulator or, the simple terminal is all that is required for a particular application.

4.3 DEVICE HANDLERS

The Terak RT-11 monitors are generated with the standard DEC RT-11 device handlers, plus system (QX and QB), console (TT), and Null (NL) device handlers. Three (or five) free I/O slots are included for additional devices in the single job and foreground/background monitors. The base-line monitor contains neither a null device handler or free handler slots.

The user may add additional device handlers using the INSTALL command as described in RT-11 V3B System User's Guide.

Summary of Monitor Characteristics

	BL	SJ	FB
Memory Support Required	8-28k-words	8-28k-words	16-28k-words
Support FG Job	no	no	yes
Timer Facilites	no	yes	yes
BATCH Support	no	optional	optional
Graphics Terminal Support	yes	yes	yes
Devices Supported	QB,QX,GT No free I/O slots	QB,QX,GT,NL,TK 3 free I/O slots	QB,QX,GT,NL,TK 5 free I/O slots

4.4 TERAK MONITOR CONFIGURATIONS

Terak monitors are shipped with either a Terak emulator or a Glass Teletype emulator resident within the monitor. The monitor/emulator combinations shipped are:

Base-line/Glass Teletype

Single-Job/Glass Teletype
Single-Job/Terak

Foreground/background/Glass Teletype
Foregroung/background/Terak

Each of the monitors also have bootstraps for specific device handlers embedded within the monitor. The device handler specified within the bootstrap may be QX single drive, QX multidrive or QB multidrive. The QB single drive option is resident as a set utility within the QB multidrive monitor.

4.5 MONITOR AND HANDLER FILE EXTENSIONS

The RT-11 monitor and handler file extensions follow a standard naming convention. This convention is important to the system at bootstrap time

when the system bootstrap uses a file name search to determine which monitor file to boot and which handler files (and therefore which devices) are present on the system. RT-11 monitor file names are always of the following format:

xx MNyy.SYS

Identifies this file as the system monitor.

Identifies the the system device handler

Identifies the monitor type

The first two letters (xx) are a two character device code which identifies this monitors system device. The Terak system device will be either QB for the QB series device handler or QX - for the QX series handler.

The last two letters (yy), identify the type of monitor resident in the file BL for base-line, SJ for single-job and FB for foreground/background.

The middle two letters of any monitor file name are always MN and the file type of the system monitor file is always, .SYS. Therefore,

QBMNSJ.SYS

indicates that this file is the system monitor file, that it is a single job monitor and the system device is a QB handler. NOTE that you can identify the monitor code extension, which appears as part of operating system logo, when you boot the system or by checking the disk directory to see which of the monitors present has the .SYS extension.

4.6 MONITOR AND HANDLER NAMING CONVENTIONS

When you load a monitor into memory and boot the system, the monitor will return by printing an identifying message on the screen:

RT-11 V03B-00D-Axxx

This indicates that the system is RT-11, the version is 3B, any revisions (00D-A) and the monitor code extension (xxx).

The monitor code extension tells you which monitor is currently resident within your operating system.

All Terak MONITOR CODE EXTENSIONS follow a standard naming convention. The first letter indicates the type of monitor base-line (B), single-job (SJ) or foreground/background (F). The middle letter identifies the emulator characteristics resident within the monitor; glass teletype (G) or Terak (T). The final letter indicates whether the monitor is intended for use on a single drive (S) or a multidrive system (M).

The Terak monitors, their code extensions and characteristics are:

Number of terminals	M or S
Type of Job	B, S, F
Emulator	G or T

Monitor Characteristics

Code Extension	Size in blocks	Handler	User Space (bytes)
BTM	63	3	25.8
BGM	60	3	26.3
STM	64	3	25.5
SGM	62	3	25.9
FTM	73	5	23.6
FGM	71	5	24.1
BGS	64	3	25.8
BTS	63	3	26.3
STS	64	3	25.5
SGS	62	3	25.9
FTS	73	5	23.6
FGS	71	5	24.1

4.7 CHARACTER SETS

Your RT-11 software contains several character sets. In addition to the standard English character set; foreign language character sets for Greek, Arabic and Russian are available. Several special function sets for science, mathmatics and form generation are also included.

Character sets have the file extension .CHR and must be initilized by the system software. The character set is fetched from a system file, CHRSET.SYS. If the system has been turned off, the system file, CHRSET.SYS, must be present on the disk used to boot the system. You may select any character set by renaming it, CHRSET.SYS.

A character set file contains a packed image of either 96 or 192 character templates. Each template is a 10 byte field representing a character of 10 rows of eight pixel, top row first, and left most pixel corresponding to the least significant bit of the byte. The two half character sets are packed arrays of 96 character templates, covering character codes 40 (octal) thru 177, or codes 240 thru 377. In a character set file, the second half character set starts on a logical block boundry. Thus, it is possible to split a character set in half by file surgery using DUP or PIP. Character set files are either two or four blocks long. The default extension for a character set file is .CHR.

During bootstrap the character set file is loaded into the writeable character generator of the Terak 8510/a. If CHRSET.SYS contains half a character set; the upper half set will be generated from the video reverse of the lower half set. A half character set, 96 characters only, is indicted by a file of only two blocks size. If CHRSET.SYS does not contain

half a character set, the entire 192 character set will be load from the contents of the full four block file.

If CHRSET.SYS is absent when the system is booted, the bootstrap will proceed. If the power has not been cycled since the last character set load, the previous character set will still be present. If the disk does not have a character set file, no CHRSET.SYS, and the power has been cycled; the system will function normally but random character fonts will be displayed. In this case the utility CSLOAD is available for reloading a character set file.

5.7 THE LIBRARIAN (LIBR)

The librarian utility lets you create, update, modify, list, and maintain object library files. You can also create MACRO library files for use with the MACRO assembler.

5.8 THE LINKER (LINK)

The Linker converts object modules produced by the language translator to a format suitable for loading and execution.

5.9 THE MACRO-11 PROGRAM ASSEMBLER (MACRO)

The MACRO-11 assembler program lets you assemble MACRO programs under the RT-11 operating system, provided those programs have been written using the rules listed in the PDP-11 MACRO-11 Language Reference Manual.

5.10 ON-LINE DEBUGGING TECHNIQUE (ODT)

ODT is the RT-11 on-line debugging utility which aids in debugging programs.

5.11 PASCAL/RT-11 FILE CONVERSION UTILITY (PAS2RT)

PAS2RT will display the directory of a Pascal structured disk and will transfer files to a RT-11 structured disk.

Data may be transferred in either binary or text form. Text files; those that will be accessed by the Editor, or will be used as source code for a compilation or assembly, should be copied in TEXT mode. This is necessary because of the source file format. Other types of files should be transferred in BINARY mode.

PAS2RT has a command structure compatable with the corresponding utility RT2PAS which transfers RT-11 structured files to Pascal structure. These two utilities provide transportability between RT-11 and Pascal systems.

With the RT-11 system disk in drive 0 and the Pascal disk in drive one, call PAS2RT by typing:

R PAS2RT

Type:	The system will return:
(1) R PAS2RT	Display Directory?
(2) Y	Enter Source file title
(3) Enter Pascal file to be transferred.	Enter target file title
(4) Enter RT-11 file name you wish the	Transfer mode: B)inary or #T)ext

file to be called

(5) Enter B or T

PAS2RT will complete the file transfer.

5.12 PATCH

The PATCH utility program lets you make code modifications to any RT-11 file. You can use PATCH to interrogate and then to change words or bytes in a file.

5.13 SOURCE COMPARE (SRCCOM)

SRCCOM compares two ASCII files and lists the differences between them. SRCCOM can print the results or store them in a file.

5.14 TECO

TECO is a text editing program that runs under your RT-11 Operating System. TECO can be used to edit ASCII test including program listings, manuscripts, correspondence or other routine editing jobs. TECO is a character editor rather than a line editor and does not have line numbers associated with it. A single character can be changed without further modifying the line it resides in.

Because of its versatility, TECO contains a sophisticated series of commands. The user should review the TECO User's Guide before attempting operation.

5.15 TEXT EDITOR (EDIT)

EDIT is a text editor utility used to create or modify ASCII source files for use as input to other system programs. Files may be input to the MACRO-11 assembler or the FORTRAN or BASIC compilers. EDIT can read ASCII files from any input device, modify them, and write to any output device.

In addition to the utilities listed in this section, the following special purpose utilities are available:

CROSS REFERENCE OPTION
DUMP
HELP
OBJECT MODULE PATCH UTILITY

Refer to the RT-11 User's Guide for a complete discussion of their funciton.

		hang option). If no error, hang option has effect.
LOGICAL SENSE OF ERROR BIT	o Default = Bit 15 On -> Error Set SP Logic Set SP No Logic	o Allows sense of error Bit to be reversed in case the signal is actually' clear to send' or data set ready in place of error.

SOFTWARE FORM FEED OPTION	o Default = Hardware Form Feeds Set SP SOFTFF Set SP No SOFTFF	o If Soft form feed, the function is simulated by sending line feeds to fill out the page. If no SOFTFF, hardware form feed is assumed. If the handler is freshly loaded, it will assume that the printer is at top of form. To avoid forgetting the actual paper position between print jobs, command KMON to LOAD SP.
HEIGHT (for Software)	o Default = 66 Set SP Height = xxx	o The height set is used for soft form feeds to calculate the lines remaining on a page.
FILL CHARACTER	o Default = Zero Fills Set SP Fill = xxx	o Set SP to send xxx fill characters after every line feed character is sent.

To change SP to drive a SLU other that Unit #1, or to change to drive a line printer controller, patch the following three locations.

NAME	LOCN	OLD VALUE	FUNCTION
SPS	1046	177524	Status Reg Address
SPB	1204	177526	Data Reg Address
SPSTRT	1000	124	Transmitter Vector

For example, to change to Drive SLU # 7.

```
R PATCH

FILENAME --- SP.SYS <return>
*1046/177524 176574 <return>
*1204/177526 176576 <return>
*1000/124 354 <return>
*E
```