

TOPS-10 v 7.03

Engineering Seminar

Presented by

LCG Software Engineering

Colorado Springs, Colorado

June 9-13, 1986

TOPS-10 v 7.03

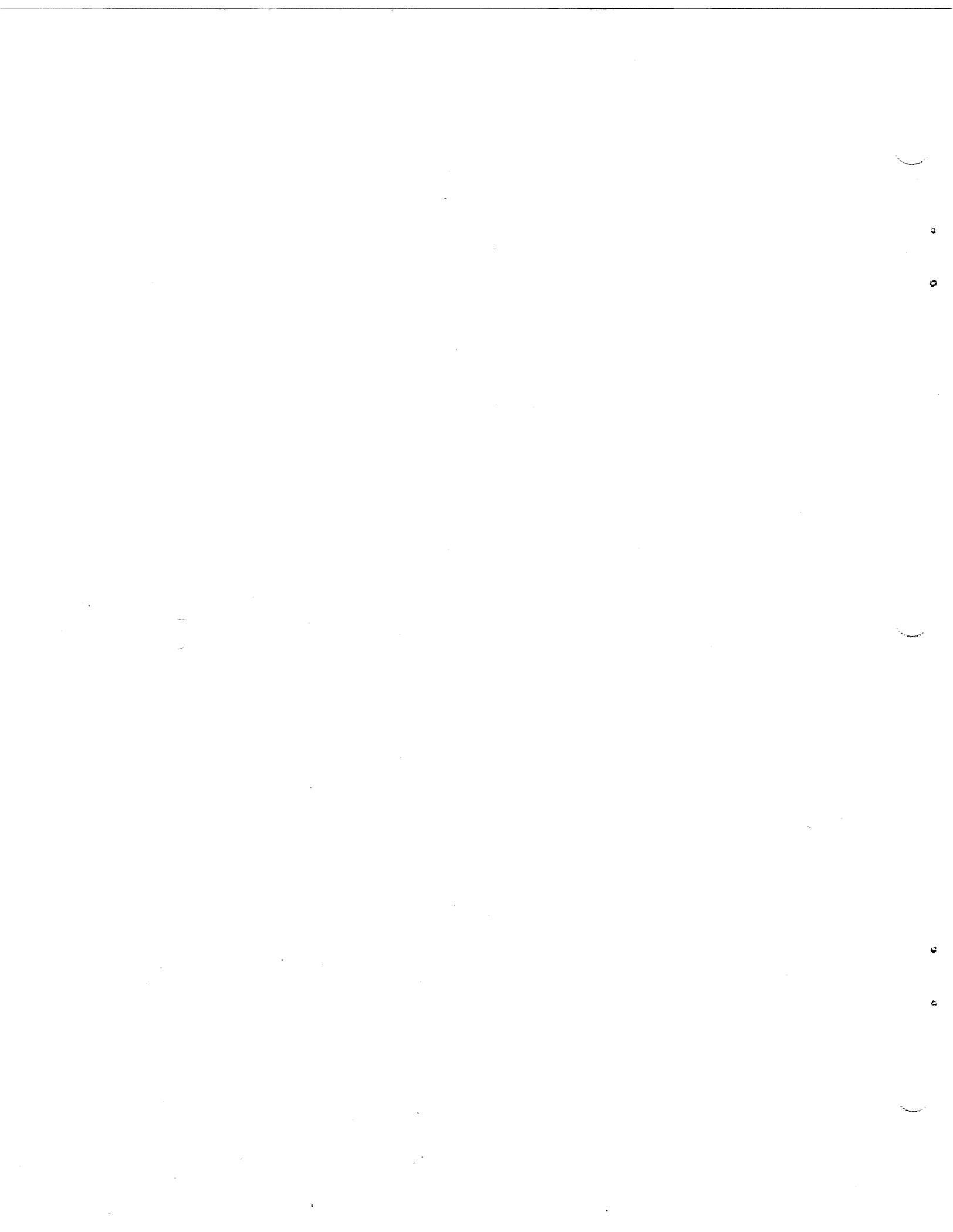
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LIST OF PRESENTERS

(Cast of Characters?)

[Not necessarily in order of appearance]

- o Jim Flemming, project leader
- o Kimo Yap
- o Don Mastrovito
- o Tony Dziedzic
- o Bill Davenport, DECnet project leader
- o Spider Boardman
- o Nick Tamburri
- o Alan Frantz, program manager



Acknowledgements

No project as complicated as TOPS-10 version 7.03 succeeds without the efforts of a very large number of people. The following list is surely incomplete, but attempts to recognize at least the principal contributors to this product.

The TOPS-10 software development team is supervised by Ed Trotter. Jim Flemming was the project leader for 7.03, and Bill Davenport the leader for the DECnet version 4 component of the release. The development staff included Carl Appellof, Dawn Banks, Raun "Spider" Boardman, J. Anthony Dziejcz, Arnetha Haynes, Bob Houk, Barbara Huizenga, Carl Kunkel, Leo Lavin, Timothe Litt, Don Mastrovito, Tarl Neustaedter, Michael Rudenko, Ned Santee, Larry Sendlosky, Nick Tamburri, Stefan Wolfe, and Kimo Yap, each of whom contributed in greater or lesser measure to the 7.03 software. In addition, some of the DECnet code was ported directly from TOPS-20 and the assistance of Wick Nichols, Stu Grossman, Marty Palmieri, and others who worked on TOPS-20 6.1 should be acknowledged. We got a special assist from Paul Young who made LINK version 6 run on TOPS-10. David Eklund approved each SPR answer included in 7.03.

Susan Anderson O'Brien has been the development team's secretary throughout this effort, and thus helped with this book (and numerous plane and hotel reservations).

The software development manager for this project was Tomas Lofgren. The cost center manager, Peter Hurley, and the TOPS-20 manager, David Braithwaite, also supported our efforts indirectly.

The documentation manager for this release was Susan Porada. Mary Marotta was the project leader who deserves special accolades. The writers included Ron Anderson, Ellen McWilliams, and Ernie Morrell. Production work on the documents was done by Helen Spanzella, Rose Guineau, Carol Stanhope, Donna Jacobs, Ann Brodmerkle, and perhaps others.

The CSSE people who worked on the project included John Krzysztof who took over from Russ McManus, and Steve Faust, who inherited Candy Martin's role. Batya Olsen and Darwin Hatheway of CSSE did the product tracking during Field Test. Nancy Mahoney was instrumental in getting the KLAD-10 pack produced.

The release engineering group, managed by Dorothy Clunie, helped get each F/T tape and the final product correctly packaged. Joanne Creely did most of the TOPS-10 work. Jane McGreal did the KLAD work.

The diagnostic engineering work was supervised by Peter Zaleski. Greg Scott was the principal contributor to the new diagnostics for NI and CI, or at least for their conversion to TOPS-10. The microcoders were led by Sean Keenan, with Dick Wagman implementing new KL microcode. Timothe Litt did the KS microcode work.

Field Test Administration of this project was supervised by Mary Lane. Clotelle Atkins and Jane Lombard did most of the FTA work.

Product manager throughout 7.03 has been Diane Lorion. She has enlisted the support of Rich Whitman, Connie Davis, and many others in Large Systems Marketing. Diane also did most of the dealing with the SDC, where our planner was Debbie Stuczynski, who took over from Magee Symonds, who had seemingly done TOPS-10 releases from time immemorial.

The Inhouse Field Service engineer most responsible for keeping KL1026/KL1042 and the other systems running was Paul Marr.

Last, and probably least, the management team that coordinated these efforts was composed of Lawrence Bales, Stephen Faust, Jim Flemming, Alan Frantz, John Krzysztof, Tomas Lofgren, Diane Lorion, Susan Porada, and Ed Trotter.

To each of these people, and any others I may have neglected to mention, thanks are due for a difficult job brought to a successful conclusion.

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A G E N D A

for

Day 1 (Monday 09-Jun-86)

9:00 a.m. Introductions, groundrules, etc. -- Alan
Overview via DECUS slide show -- Jim, Kimo, Bill
10:30 a.m. BREAK
10:45 a.m. New Microcodes -- Jim
RSX20F -- John Andruszkiewicz and Jim
New BOOT -- Don
BOOTM -- Tony
12:00 noon LUNCH
1:00 p.m. General Monitor Reorganization -- Jim
Address Space Reorganization -- Kimo
KS Address Space -- Tony
2:45 p.m. BREAK
3:00 p.m. Contexts, PUSH/POP, etc. -- Don

A G E N D A

for

Day 2 (Tuesday 10-Jun-86)

9:00 a.m. CI hardware, Overview of CI Architecture -- Tony

Overview of MSCP, Monitor module interactions -- Tony

Monitor CI database, FILSER database -- Tony

10:45 a.m. BREAK

11:00 a.m. Alternate CI porting and failover -- Tony

DIAG. and SCS. UUOs, Diagnostics -- Tony

Care and feeding of the HSC50 and RAXX disks -- Tony

CI/HSC Utilities -- Tony

Disk performance [NOT videotaped] -- Tony

12:30 p.m. LUNCH

1:30 p.m. Scheduler changes for 7.03 -- Kimo

User mode extended addressing -- Kimo

3:00 p.m. BREAK

3:15 p.m. Crash Analysis Round-Table -- Kimo, Spider,
and the entire cast

A G E N D A

for

Day 3 (Wednesday 11-Jun-86)

9:00 a.m. DECnet Phase IV -- Bill

Ethernet and network configurations -- Bill

DECnet data base -- Bill

Crash analysis addendum, network data base -- Bill

10:45 a.m. BREAK

11:00 a.m. New networking UOs -- Bill

Network management (NML) -- Bill

Error reporting and diagnostics -- Bill

12:00 noon LUNCH

1:00 p.m. KS10 Decnet -- Bill

MCB, very briefly -- Bill

NFT/FAL enhancement -- Bill

LAT -- Bill

2:45 p.m. BREAK

3:00 p.m. CTERM concept and implementation -- Spider

CTERM to and from VAXen, some problems -- Spider

Network Performance [NOT videotaped] -- Bill

A G E N D A

for

Day 4 (Thursday 12-Jun-86)

9:00 a.m. SCNSER and COMCON changes -- Spider
ANF, briefly -- Spider
Crash analysis addendum, the SCNSER database -- Spider
Miscellaneous new UOs and commands -- Jim
10:45 a.m. BREAK
11:00 The new accounting system -- Spider
REACT, ACTDAE, LOGIN -- Spider
Password encryption -- Spider
12:30 p.m. LUNCH
1:30 p.m. GALAXY 5.1 -- Nick
2:45 p.m. BREAK
3:00 p.m. LPTSPL enhancements -- Nick
Other CUSPs -- Jim
Tools -- Jim
Packaging changes and installation implications -- Jim

A G E N D A

for

Day 5 (Friday 13-Jun-86)

9:00 a.m. Documentation -- Alan

Field Test Experience -- Alan

Monitor Performance [NOT videotaped] -- Jim

Future plans (7.04) -- Don

10:45 a.m. BREAK

11:00 a.m. Question and Answer Roundtable -- entire cast

12:00 noon (approximate) End of Seminar

Afternoon -- flights back to Boston

TOPS-10 V7.03

SOFTWARE PRODUCT DESCRIPTIONS

<u>SPDS</u>	<u>SPD NUMBER</u>	<u>PART NUMBER</u>
TOPS-10 V7.03	7.23.04	AE-BT14E-TB
DECNET-10 V4.0	8.60.07	AE-D040H-TB
KL10 MICROCODE (MODEL B) (QH850)	8.54.08	AE-1015I-TB
IBM COMM		
T-10/T-20 2780/3780/HASP	30.24.03	AE-P337D-TK
T-10/T-20 2780/3780 E/T	30.23.04	AE-P336E-TK
TOPS-10 MPE V7.03	7.09.06	AE-H872G-TB
TOPS-10 PSI GATEWAY	8.63.01	AE-EU62B-TB
TOPS-10 OPTIONAL SOFTWARE CROSS REFERENCE TABLE	7.99.10	AE-P171K-TB
DEC SERVER 100 V1.2	30.47.01	AE-HA24B-TD
ETHERNET TERMINAL SERVER V2.1	30.48.01	AE-HB02A-TM

- 0 GALLEY COPIES OF ALL EIGHT SOFTWARE PRODUCT DESCRIPTIONS HAVE BEEN SUBMITTED TO SDC.
- 0 THE DEC SERVER 100 AND ETHERNET TERMINAL SERVER SPDs HAVE BEEN SUBMITTED TO SPD ADMINISTRATION, AS PER PREVIOUS ARRANGEMENTS.

3.0 PRODUCT CAPABILITIES

3.1 REQUIRED FEATURES

THE FOLLOWING SET OF FEATURES ARE REQUIRED FOR TOPS-10 V7.03:

- 0 SUPPORT FOR KL MODEL B SYSTEMS
- 0 SUPPORT FOR SINGLE, DUAL, AND TRI-PROCESSORS
- 0 SUPPORT FOR KL ACCESS TO HSC50 DISKS (RA60 AND RA81) VIA THE CI
- 0 SUPPORT FOR NIA20 TO DIRECTLY CONNECT THE NI TO THE KL10
- 0 SUPPORT FOR DECNET-10 V4.0 WHICH WILL BE A FULL PHASE IV PRODUCT WITH THE SAME FUNCTIONALITY AS DECNET-20 V4.0 AT THE TIME OF FCS (DECNET-20).

SPECIFIC FEATURES INCLUDE:

PHASE IV ROUTING AND END NODE SUPPORT

DOWNLINE LOADING/UPLINE DUMPING OF REMOTE STATIONS ON THE ETHERNET

DECNET SUPPORT FOR THE NI, ALLOWING TASK TO TASK COMMUNICATION, NETWORK FILE TRANSFER, AND HETEROGENEOUS COMMAND TERMINALS

DECNET-10 SOFTWARE MUST CONFORM TO THE CURRENT DIGITAL NETWORK ARCHITECTURE SPECIFICATIONS

- 0 SUPPORT HETEROGENEOUS COMMAND TERMINALS USING SOME CURRENT PROTOCOL. (THE DESIRED PROTOCOL IS CTERM.)
- 0 SUPPORT FOR BOTH THE NI AND THE TRADITIONAL LSG COMMUNICATION PRODUCTS (RSX20F, IBM COMM, ANF-10, PHASE III MCB) AT THE SAME TIME
- 0 SUPPORT NI AND CI ON THE SAME KL10
- 0 SUPPORT FOR ROUTER AND TERMINAL CONCENTRATOR (LAT)
- 0 MOP PROTOCOL SUPPORT FOR LOOPBACK OVER THE NI
- 0 PASSWORD ENCRYPTION
- 0 NOTHING SHOULD BE DONE DURING THE DEVELOPMENT OF TOPS-10 THAT WILL PRECLUDE ANY PART OF THE MONITOR, OR ANY CUSP, FROM BEING UPDATED WITH AUTOPATCH.

3.2 DESIRABLE FEATURES

THE FOLLOWING ARE DESIRABLE AND REQUIRED FEATURES THAT, IF ENGINEERING BUDGET AND SCHEDULE PERMIT, ARE TO BE CONSIDERED AS CANDIDATES FOR DEVELOPMENT AND RELEASE:

- 0 CUSTOMER SUPPORTED TAPE SHOULD CONTAIN, BUT NOT BE LIMITED TO, SOFTWARE FOR RETIRED HARDWARE. THIS WAS MADE AVAILABLE TO CUSTOMERS WITH RELEASES 7.01 AND 7.02, AND SHOULD BE UPDATED TO INCLUDE NEWLY UNSUPPORTED DEVICES, AND BE MADE AVAILABLE WITH 7.03.
- 0 SUPPORT DECNET OVER THE CI TO OTHER KL SYSTEMS
- 0 SUPPORT FOR TA78 TAPE DRIVES ON HSC50
- 0 SUPPORT FOR ADDITIONAL LN01 CAPABILITIES (I.E. GRAPHICS, ADDITIONAL FONTS)
- 0 SUPPORT FOR PRINT SERVERS
- 0 PC AND PRO SUPPORT VIA THE NI.

3.3 FEATURES NO LONGER SUPPORTED

THE FOLLOWING IS A LIST OF FEATURES THAT WILL NOT BE SUPPORTED IN VERSION 7.03. THIS LIST HAS BEEN APPROVED BY PAC AND WILL APPEAR IN SALES UPDATE AND LARGE SYSTEMS NEWS ARTICLES. THE REQUIREMENT IS TO NOT SUPPORT THESE FEATURES, EVEN THOUGH THESE FEATURES WERE SUPPORTED IN RELEASE 7.02. ALTHOUGH V7.03 WILL NOT SUPPORT THESE FEATURES/DEVICES, NO EFFORT SHALL BE MADE TO REMOVE THE CODE FOR THE FOLLOWING HARDWARE DEVICES:

- o KS10
- o BA10 WITH CR10E OR CR10F CARD READERS
- o BA10 WITH LP10F OR LP10H LINE PRINTERS
- o BA10 WITH XY10 PLOTTERS
- o CD20 AND CP10D CARD PUNCH EQUIPMENT
- o DK10, DX10
- o LA30 AND LA36 TERMINALS
- o MS10 MOS MEMORY
- o PC10
- o RH11 WITH RM03 DISK DRIVES
- o TD10C WITH TU55 OR TU56 TAPE TRANSPORTS
- o TX01, VT05 TERMINALS

7.03 MICROCODES

KL10 microcode 2.0(411)

MCA25 support

OWGBP in section 0

Serious problems with the NIA20 in a SMP environment

More info in AC block 7

KS10 microcode 2.0(130)

No support for KI paging

Support for no CST

Several bug fixes

Other microcodes

CI20 microcode 1(711)

NIA20 microcode 1(167)

HSC50 microcode 250 or greater

RSX20F version 15-50

DATE/TIME

Support for setting KLINIK parameters

EXAMINE EBR/UBR n

Cache off/on

Command Files

CLOCK.CMD

CRAM.CMD

DEX.CMD

DRAM.CMD

EBUS.CMD

FMPAR.CMD

HALT.CMD

KPALV.CMD

LOOP.CMD

TIMEO.CMD

BOOT

- o Callable as a subroutine
- o Configuring
- o Debugging
- o Memory usage
- o Preserved monitor data

Monitor calls BOOT as a subroutine

- o BOOT restart (do not load)
- o Dump
- o Load (read BOOTXT)
- o System sleep dump.
- o Page replacement on parity errors

Configuring BOOT

```
.COMPILE/COMPILE BOOT.MAC  
MACRO:  BTSPRM  
        BOOT  
[Assembling BOOT for a KL10]
```

EXIT

```
.R LINK
```

```
*BTONCE/SAVE = BOOT/LOCALS/SYMSEG:LOW, REL:EDDT /GO
```

EXIT

```
.RUN BTONCE
```

```
Create binary output files [Y/N]: N      ;WRITE BINARY FILES  
Preserve EDDT and symbols [Y/N]: N      ;EDDT.  
Load DX10/TX01 microcode [Y/N]: Y       ;DX10/TX01  
Load DX20/TX02 microcode [Y/N]: Y       ;DX20/TX02  
Load DX20/RP20 microcode [Y/N]: Y       ;DX20/RP20  
Load KLIPA/CI microcode [Y/N]: Y        ;KLIPA/CI  
Load KLNI/NI microcode [Y/N]: N         ;KLNI/NI
```

Memory map	From	To	Size	Version
-----	-----	-----	-----	-----
Bootstrap	700000	707554	007555	3(47)
DX10/TX01 microcode	707555	712302	002526	15
DX20/TX02 microcode	712303	714703	002401	10(71)
DX20/RP20 microcode	714704	717304	002401	3(1)
KLIPA/CI microcode	717305	734560	015254	1(711)
Total size			034561	

EXIT

Memory usage

Symbol	Contents	Address
LOADER	Microcode loader	140
LOADEN	Unused core	
BTSVEC	Entry vector page(s)	
EPT	EPT/UPT/section 0 map	700000
DATA	Impure data	
BOOT	Bootstrap	
EDDT	Exec DDT	
DDTEND	Patch space	
	Symbol table	
	Microcore storage	
	Unused core	777777

Preserved monitor data

- o Active Swapping List
- o System Dump List
- o System Search List
- o Monitor bootstrap filespec

FEATURE TEST SWITCHES REMOVED FROM 7.03

Removed as if turned on

WATC	-	Watch statistics
DAEM	-	DAEMON
VERS	-	VERSION command
EL	-	Error logging
DBAD	-	Disk off-line
DQTA	-	Disk quotas
DSTT	-	Disk statistics
DSUP	-	Super I/O
DALC	-	Optimal allocation algorithms
DMRB	-	Extended ribs
DRDR	-	Rename accross directories
DBBK	-	Maintain bat blocks
GSRC	-	Generic search for device names
CCIN	-	Control C intercept
MODM	-	Modem control
TVP	-	Vertical positioning
DAIL	-	Support for autodialer
TPAG	-	TTY PAGE command
TBLK	-	TTY BLANK command
NUL	-	NUL device
MONL	-	SET MEMORY ON command
MOFF	-	SET MEMORY OFF command
DSIM	-	Simultaneous update
DHIA	-	Disk high availability features
EXE	-	EXE format save files
KLP	-	KL paging

Removed as if turned off

MTER	-	METER UO
RTC	-	DX10 real time clock device
HDPX	-	Half duplex
GPO2	-	Support for the British Post Office GPO2 modem
630H	-	Support single-scanner 630
SCLC	-	Support 680 (no Irma)
2741	-	Support 2741
KI10	-	Support for the KI10 processor
OSAV	-	OSSAVE command
DOTD	-	DPB not RMW

NEW FEATURE TEST SWITCHES IN 7.03

XMON	-	Monitor uses extended addressing
MPFH	-	PFH in the monitor
SCA	-	Support for Systems Communications Architecture
CIDSK	-	Support for disks on the CI
CITAP	-	Support for tapes on the CI
CIDNET	-	Support for DECnet on the CI
ENET	-	Support for the Ethernet
KLPS	-	Support for setting KLINIK parameters from the monitor
SETS	-	Support for disk sets
DTCK	-	Check date/time as entered by the operator

Unsupported devices.

BA10 with CR10x, LP10x, XY10, CP10D
DX10 with TU7x tape transports
TD10C with TU5x tape transports
Front end card readers
KS card readers

Things moved to the customer supported monitor tape.

CD2SER
CDRSER
DCRSER
PLTSER
CDPSER
TX1KON
DTASER
PTRSER
PTPSER

There are a few new things which appeared as a result of 7.03 development.

Unsupported things which appear in monitor sources.

NETPLT
NETDDP

PSECTS

.ABS.
.LOW.
HIGH
SKY

Intrasection communications

SNCALL (name of routine being called, section where it lives)

MONGEN

No TTYGEN
MUNGEN

LINKing

LINK version 6 must be used to LINK the monitor.
DECnet must be LINKed immediately after the COMMON modules and if the system contains the MPE option, CPNSER must be LINKed immediately after DECnet.

DDT, FILDDT

DDT version 44 must be used with this monitor. Patching under 7.02 requires FILDDT version 44. You cannot patch under 7.02 by getting the monitor and typing DDT.

TSKSER and RDXSER are now in NETDEV.

SIX CHARACTER STOPCD NAMES

There are four major changes:

- 1) The code generated by the STOPCD macro is now

```
name::          XCT [
                  PUSHJ P,DIE
                  SIXBIT /name/
                  XWD bits,cont addr
                  EXP typeout address
                ]
```

- 2) DIE handles the above format. DIE also now has an entry point PERISH which handles the above format with a XPCW .CPSPC instead of PUSHJ DIE. This entry point could be used in cases where the stack pointer is suspect.
- 3) %SYSPC (prev. name,,pc) now contains a fullword PC. %SYSCD (new entry .GTSYS) contains the full stopcode name.
- 4) Location CRSWHY is now a fullword stopcode name, and the date/time/name checksum has moved to the right half of CRSCHK in location 26.

.EXE File Address Layout

00..000000	Traditional 'Low Seg' COMxxx data structures Exec page maps Interrupt vectors & code Prototype DDBs Job (JBT) tables
00..075374	
00..075375 00..144777	Initialization Code SYSINI, EDDT, ONCE, etc.
00..133000 00..277777	Void
00..360000	
00..751777	Traditional 'Hi Seg' Pure code UUC calls Device drivers IPCF, ENQ/DEQ, ANF, etc.
00..666000 00..777777	Void
01..000000 01..777777	Void
02..000000 02..254777	Symbol Table
02..250000 02..637777	Void
02..640000 02..703777	'Sky Hi Seg' DECnet pure code
02..704000 02..777777	Void

Note: Specifications subject to change without notice. Addresses shown are for comparison purposes only, actual addresses may be different depending on your specific monitor habitat.

Monitor Code Section(s) Layout

00.,000000	Traditional 'Low Seg' COMxxx data structures Exec page maps Interrupt vectors & code Prototype DDBs Job (JBT) tables
00.,075374	
00.,075375	PTY DDBs, TTY DDBSs Monitor free core
00.,241777	PDBs, Context blocks, etc.
00.,242000	Void
00.,313777	
00.,314000	Job Per-process mapping UPT, Extended-exec-PDL Disk DDBs, TMPCOR Pathological names
00.,353777	.TEMP, .JBPK, etc. map slots
00.,356000	Per-CPU CDB mapping
00.,357777	
00.,360000	Traditional 'Hi Seg' Pure code UUO calls Device drivers
00.,751777	IPCF, ENQ/DEQ, ANF, etc.
00.,752000	KBDs, UDBs
00.,773777	
00.,774000	Void
00.,777777	
01.,000000	Monitor Section One (mapped identically to section zero)
01.,777777	

Note: Specifications subject to change without notice. Addresses shown are for comparison purposes only, actual addresses may be different depending on your specific monitor habitat.

DECnet Code Section Layout

02,,000000 (*)	Traditional 'Low Seg' COMxxx data structures Exec page maps Interrupt vectors & code Prototype DDBs Job (JBT) tables
02,,064777	
02,,065000 (*)	PTY DDBs, TTY DDBSs Monitor free core
02,,230777	PDBs, Context blocks, etc.
02,,231000	Void
02,,233777	
02,,234000 (*)	Job Per-process mapping UPT, Extended-exec-PDL Disk DDBs, TMPCOR Pathological names .TEMP, .JBPK, etc. map slots
02,,273777	
02,,276000 (*)	Per-CPU CDB mapping
02,,277777	
02,,300000 (*)	Traditional 'Hi Seg' Pure code Common subroutines (partial mapping only)
02,,637777	
02,,640000	'Sky Hi Seg'
02,,702777	DECnet code
02,,703000	Void
02,,777777	

(*) = Mapped identically with section zero.

Note: Specifications subject to change without notice. Addresses shown are for comparison purposes only, actual addresses may be different depending on your specific monitor habitat.

Monitor Data Section 3 Layout

03..000000
03..017777

PAGTAB

03..020000
03..037777

PT2TAB

03..040000
03..057777

MEMTAB

03..060000

Disk Cache
DECnet Name-to-Address
Translation Table
G.P. 'Nzs' Free core

03..174777

03..175000
03..277777

Void

03..300000
03..407777

DECnet 'MB' pool

03..410000
03..517777

DECnet free pool

03..520000
03..543777

DECnet Routing Vectors

03..544000
03..547777

KLNI free pool

03..550000
03..553777

LAT free pool

03..554000
03..777777

Void

Note: Specifications subject to change without notice. Addresses shown are for comparison purposes only, actual addresses may be different depending on your specific monitor habitat.

Monitor Data Sections 4,5 Layout

04..000000
04..277777

Void

04..300000
04..345777

SCNSER TTY Chunks

04..346000
04..441777

SCNSER TTY LDBs

04..442000
04..777777

Void

05..000000
05..004777

SCA Free pool

05..005000
05..121777

SCA Datagram buffers

05..122000
05..165777

SCA Message buffers

05..166000
05..166777

SCA Connect ID table

05..170000
05..171777

KLIPA BSDs

05..172000
05..172777

KLIPA BHDs

05..173000
05..176777

LAT 'Extra allocation'

05..177000
05..777777

Void

Note: Specifications subject to change without notice. Addresses shown are for comparison purposes only, actual addresses may be different depending on your specific monitor habitat.

Monitor Data Sections 6,7 Layout

06..000000 06..007500	BOOT
06..007500 06..012250	DX10 (DXMPA) ucode
06..012250 06..014650	DX20 (DXMCA) ucode
06..014650 06..017250	DX20 (DXMCD) ucode
06..017250 06..034530	KLIPA (KLPCOD) ucode
06..034530 06..051777	KLNI (KNICOD) ucode
06..052000 06..777777	Void

07..000000 07..003777	Swapping SATs
07..004000 07..076777	Disk SATs
07..077000 07..122777	SAT free core
07..123000 07..777777	Void

Note: Specifications subject to change without notice. Addresses shown are for comparison purposes only, actual addresses may be different depending on your specific monitor habitat.

Monitor Data Sections 36,37 Layout

36..000000
36..777777

SNOOPY hackerie

37..000000
37..737777

Void

37..740000
37..777777

User section maps

Note: Specifications subject to change without notice. Addresses shown are for comparison purposes only. actual addresses may be different depending on your specific monitor habitat.

Commands

- CONTEXT Create, delete, kill, list, switch
- PUSH Create inferior context
- POP Return to superior context
- SET WATCH CONTEXTS

UUOs

- o CTX. Context service interface
- o CMAND. CM.AUT for auto-save
- o ENQ/DEQ Storage for context number
- o IPCFx. Storage for context number
- o JOBPEK Storage for context number
- o PIJBI. Storage for context number
- o SETUUO .STWCH will set context watch

PDB storage

- .PDSAC Context chain header
- .PDCTC Current block address
- .PDCTQ Block & page quota
- .PDCTU Block & page use counts
- .PDCTX Flags

Job tables

- JBTCX CX resource interlock
- JBTST2 JS.SAC (auto restore on halt)
- JBTWCH JW.WCX (watch contexts)

Funny space

- .USBTS UP.CTX (RUN error recovery)

.GTCTX GETTAB table (CTXTAB)

- o %CTJCQ Default context quota
- o %CTJPQ Default saved page quota
- o %CTSCQ System context quota
- o %CTSPQ System saved page quota
- o %CTSCU System count of contexts in use
- o %CTSPU System count of saved pages
- o %CTTCS Total context saves done
- o %CTACE # ctx quota exceeded (auto)
- o %CTAPE # page quota exceeded (auto)
- o %CTPCÉ # ctx quota exceeded (priv'ed)
- o %CTPPE # page quota exceeded (priv'ed)
- o %CTBDM Byte pointer for directory map

Saved data in a context block

- JBTAD2 Physical page zero address
- JBTDDDB I/O wait DDB address
- JBTCHK Swapped out checksum
- JBTCVL Current virtual & physical limits
- JBTIMI Image-in size
- JBTIMO Image-out size
- JBTNAM Program name
- JBTPC User PC for Control-T
- JBTSG2 High segment section number
- JBTSGN High segment word
- JBTST2 Second job status word
- JBTSTS Job status word
- JBTSWP Swapped out disk address
- JBTVRT Program size for Control-T

Saved data in a context block

- .PDABS Address break conditions
- .PDCMN Pointer to user-defined commands
- .PDDIR Program PPN
- .PDEJB ETHNT, UUO data
- .PDNAM Program file name
- .PDSCS SCS, UUO data
- .PDSCX SAVCTX word
- .PDSFx Program SFDs
- .PDSJB DECnet data base
- .PDSPS SET RUN CPU specification
- .PDSTM Time of last RESET
- .PDSTR Program structure
- .PDTMC Virtual timer trap counter
- .PDTMI Virtual timer trap interval
- .PDUNQ Pointer to UNQTAB for commands
- .PDVRT Page fault rate

Saved data in a context block

- o BIGBUF value (from UUO)
- o ENQ/DEQ queue chain address
- o From SYS bit
- o Funny page use count
- o HIBER and HPQ settings
- o IPCF words
- o Monitor mode bit
- o TTY break mask
- o TTY DDB (selected words only)
- o Patch space
- o PSI word (PIT)

.CTFLG (flags + ctx #)
.CTJCH ('CTX'..job/ctx)
.CTNXT (next)
.CTPRV (previous)
.CTSUP (superior)
.CTLAS (switching from)
.CTNEW (switching to)
Miscellaneous data

PDSAC

.PDCTX

.PDCTQ

.PDCTU

.PDCTX

.USBTS - UP.CTX

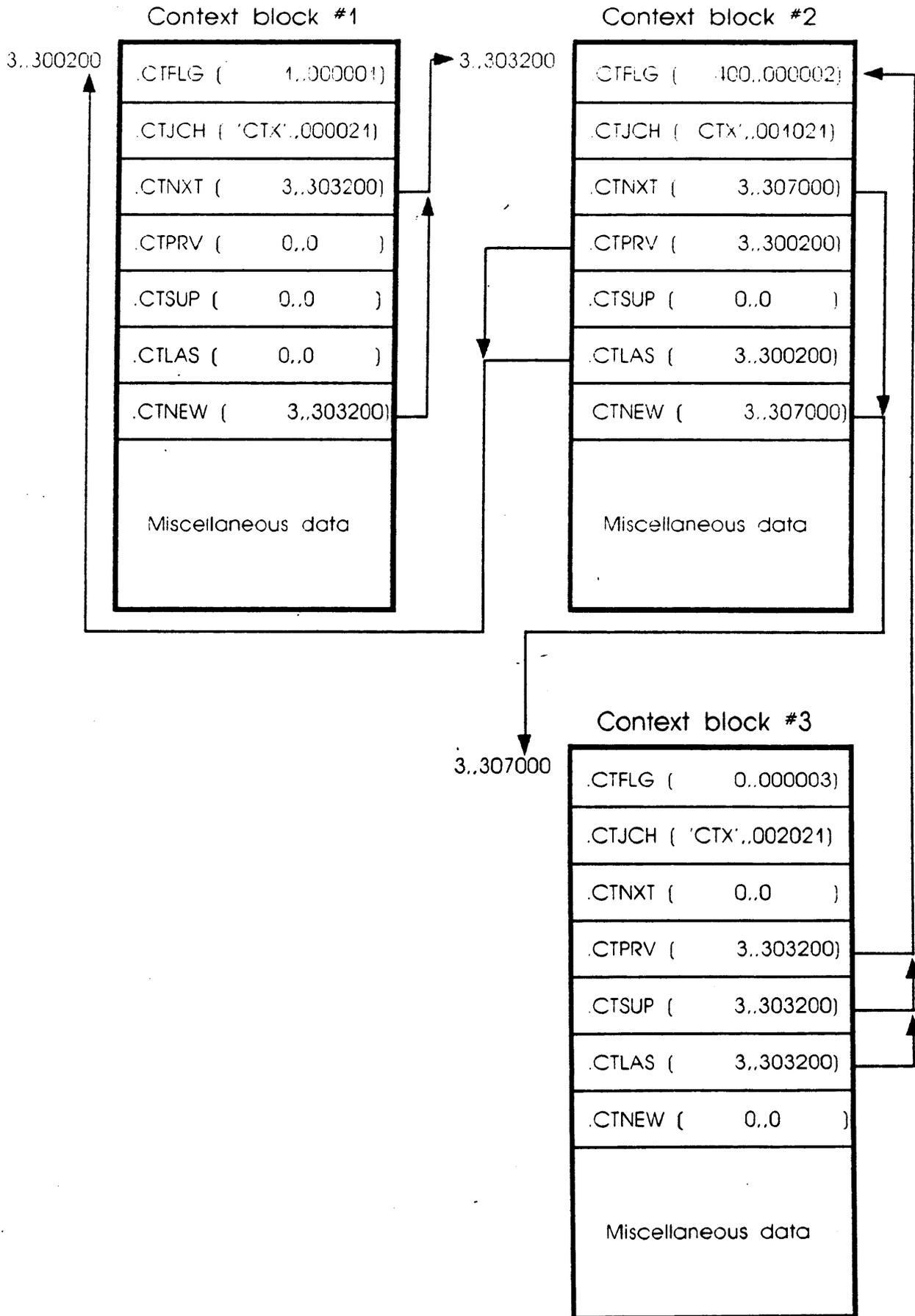
JBTST2 - JS.SAC

JBTWCH - JW.WCH

JBTCX

CTXTAB

UNQTAB - SACFLG APPFLG



Functional Specification

for

TOPS-10 Alternate Context support

D. P. Mastrovito

4-Jun-86

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1.0 Product summary

The implementation of Alternate Contexts under TOPS-10 will provide facilities to save and restore the state of a job. The Alternate Context features will allow a running program to be halted and saved in order to perform some other task which normally destroys the core image. At some later time, the saved context may be restored and the original program continued.

2.0 Environment

2.1 Users

Temporary or permanent Alternate Contexts may be created through the use of monitor commands or monitor calls.

2.2 Hardware

Alternate Contexts will run on any valid DECsystem-10 configuration.

2.3 Software

The Alternate Context features will be available to any program through the use of a monitor call.

2.4 Services

All context features will be serviced directly by the TOPS-10 monitor.

3.0 Software capabilities

3.1 Building the monitor

By default, Alternate Context service (module CTXSER) will always be loaded. The loading of CTXSER is accomplished by the setting the MONGEN parameter M.CTX to 1. If M.CTX is set to zero, CTXSER will not be loaded. Not loading CTXSER will have the following effects:

1. Monitor and user defined commands marked to perform an auto-save will always destroy the user's core image
2. The CONTEXT, PUSH, and POP commands will yield the error message "?Job contexts not supported".
3. The CTX, UUO will always take the non-skip return, leaving the AC unchanged.
4. All UUOs which allow the inclusion of an optional context number in their arguments will fail if the context number is non-zero.

3.2 Saving and restoring the state of a job

Alternate Contexts are implemented by memorizing in a context block, the current state of the job and some terminal parameters. The job's core image is then swapped out to disk, an implicate RESET UUO is performed, and all user core is released. Once on disk, the

context is considered idle. At this point, a user is free to run programs and use any monitor commands normally available to him/her. When restoring the state of a job, an implicit RESET UJO is performed, all user core is released, and the saved parameters in the context block are restored. The next time the job wants to swap in, it will have its original core image in-core again.

All data residing in the per-process area (funny space) will be saved and restored when switching contexts. No attempt is made to selectively save and restore portions of this data. Selected job tables, portions of the job's terminal DDB, and words within the PDB are required to be preserved over changes in contexts. Other items, while not absolutely necessary, do provide a friendlier interface and are desirable. The following is a list of all items saved and restored. Those marked with an asterisk indicate data that is absolutely necessary to preserve the integrity of the monitor and job. All other items are optional.

1. * Program run from physical SYS bit: JBSYS from JBTLM(J)
2. * Monitor mode bit: LDLCOM from LDBDCH(U)
3. * SAVCTX word in the PDB: The right half of PDSCX(W)
4. Break mask words: LDBBKM(U) and LDBBKB(U)
5. PSI data base address: JBTPIA(J)
6. All IPCF-related words in the PDB
7. Enqueue block chain address: PDEQJ(W)
8. * Selected words in the TTY DDB
9. * Job status word: JBTSTS(J)
10. * Swapped out disk address: JBTSWP(J)
11. * Swapped in image size: JBTIMI(J)
12. * Swapped out image size: JBTIMO(J)
13. * High segment number: JBTSGN(J)
14. * Per-process (funny space) page count: JBTPDB(J)
15. * Swapped out checksum: JBTCHK(J)
16. * Program name: JBTNAM(J)
17. User PC: JBTPC(J)
18. I/O wait DDB: JBTDDB(J)
19. Program run: PDNAM(W), PDSTR(W), PDDIR(W), PDSFD(W)
20. Time of last reset: PDSTM(W)
21. * Address to user defined commands: PDCMN(W)
22. * Address to UNQTAB for user defined commands: PDUNQ(W)
23. Address of DECnet session control job block: PDSJB(W)

Additional items can easily be added to the list. The routines to save and restore job and terminal information are completely table driven. Provisions exist for calling subroutines to perform the save and restores where the complexity or amount of data to be moved requires special attention.

3.3 System services

Code has been added to three major system services that enhance their usage in conjunction with Alternate Contexts. The Enq/Deq, IPCF, and PSI facilities have been modified to allow them to work with idle contexts.

The concept of a job/context handle (JCH) was created to uniquely identify a job and one of its contexts. JCH storage requires 18 bits. A JCH with a zero context component is always translated into the JCH for the job's current context. Fortunately the UJO argument blocks for Enq/Deq, IPCF, and PSI had reserved a 18 bits for a job number, even though only 9 bits were ever used. The full 18 bits are now used for JCH storage. Thus, a program may target the UJO at a particular context for a job or leave the context number zero and the current context will be the default.

The result of these changes means idle contexts may hold Enq/Deq locks, have IPCF message queues maintained, and PSI interrupts posted.

3.4 Program interface

All context manipulation is done through the CTX. UUU (CALLI 215). The UUU argument block contains storage for a UUU function code, flags, RUN UUU block address, context name, and a data buffer length and block address. The argument block is never written by the monitor. Hence it may reside in a write protected page or a literal. All data is returned to the calling program in the UUU AC or the data buffer if present. The UUU functions perform a superset of those available at monitor command level. The calling sequence for using the CTX. UUU is

```

XMOVEI AC, addr
CTX. AC
    <error return>
    <normal return>
  
```

The CTX. UUU argument block is:

	Flags + Length	Function
.CTFNC		
.CTDBL	Data Buffer Length	
.CTDBA	Data buffer address	
.CTNAM	SIXBIT context name or octal context number	
.CTRNO	Reserved	RUN UUU offset
.CTRNB	RUN UUU Block Address	
.CTTMN	TMPCOR Length	SIXBIT name
.CTTMB	TMPCOR Buffer Address	

3.4.1 Word .CTFNC

This word is used for UUU flags, block length, and function code. Currently, only one flag is defined. CT.PHY (1B0) is the physical-run bit. Function .CTSVR (save current context and run program) uses this bit to do a physical device search for the device given in the RUN UUU block. Optionally, UU.PHY may be used with the same results. Bits 1-8 are reserved to DEC for future expansion. CT.LEN occupies bits 9-17 and holds the length of the argument block. CT.FNC is the function code, made up of bits 18-35. Negative functions are reserved for customers.

3.4.1.1 Function .CTSVH - Save the current context and halt job. This provides "PUSH" capabilities. The new context is an interior.

3.4.1.2 Function .CTSVR - Save the current context and run a program. This is equivalent to the auto-save/restore facilities available at monitor command level.

3.4.1.3 Function .CTSVT - Save the current context and create a new top level context. This function creates an adjacent context, not associated with the current context or PUSH chain, if one exists.

3.4.1.4 Function .CTSVS - Save the current context and switch to another, already existing context.

3.4.1.5 Function .CTSVD - Save the current context, delete the target context, and switch back again to the original one. The process of deleting a context requires the job to have that context as its current one. Hence the need to save the original.

3.4.1.6 Function .CTRDB - Read the data buffer. This is used by an inferior context to read data passed to it by its superior. This is not a destructive read. It may be done several times.

3.4.1.7 Function .CTWDB - Write the data buffer. This is used by an inferior context to return data to its superior. Once data has been written using this function, any old data originally set by the superior will be lost. An inferior may write the data buffer repeatedly, each write function overwriting any existing data.

3.4.1.8 Function .CTRQT - Read a job's context and saved-page quotas. This function requires the use of the data buffer to pass and return arguments. Word 1 (.CTJOB) specifies the target job number. Words 2 and 3 (.CTCTQ and .CTPGQ) return the context quota and saved-page quota respectively.

3.4.1.9 Function .CTSQT - Set a job's context and saved-page quotas. This function uses the data buffer as function .CTRQT.

3.4.1.10 Function .CTDIR - Return a directory map of all contexts for a job in the data buffer.

3.4.1.11 Function .CTINF - Return information for a context in the data buffer.

3.4.2 Word .CTDBL

This word contains the data buffer length in words. The maximum value may be 510 decimal words. If this word is non-zero, .CTDBA contains the data buffer address.

3.4.3 Word .CTDBA

This word contains the full 30-bit address of the data buffer. The IFIW bit is respected and will cause a section local address reference relative to the section the CTX. UUO is executed in. Zero is a valid data buffer address.

3.4.4 Word .CTNAM

This word is used to specify a context name when creating new contexts, namely functions .CTSVH, .CTSVR, and .CTSVT. For functions which perform some task on or for a particular context, this word may contain either a context name or number.

3.4.5 Word .CTRNO

This word is used to specify the RUN UUO offset if one exists. The offset is stored in the right half of the word. Currently, the left half is reserved.

3.4.6 Word .CTRNB

This word contains the full 30-bit address of a RUN UUO block. The IFIW bit is respected and will cause a section local address reference relative to the section the CTX. UUO is executed in. An address of zero is used to indicate no RUN UUO block is present.

3.4.7 Word .CTTMN

This word is used when a new context is created and one wants to write a TMPCOR file into the new context's per-process space. The left half of the word contains the length of the TMPCOR buffer to write. The right half contains the standard 3-character SIXBIT TMPCOR name. If this word is non-zero, .CTTMB contains the TMPCOR buffer address.

3.4.8 Word .CTTMB

This word contains the full 30-bit address of a TMPCOR buffer. The IFIW bit is respected and will cause a section local address reference relative to the section the CTX. UO is executed in. Zero is a valid TMPCOR buffer address.

3.4.9 CTX. UO AC usage

On any return from the CTX. UO, the AC will contain information pertaining to the status of the data buffer and errors.

Regardless of the success or failure of the UO, if a data buffer was used, CT.DAT (1B0) indicates the existence of data returned in the buffer. CT.DBT (1B1) is returned if the buffer was truncated. CT.ETX (1B2) flags UO error text in the buffer. The CT.RDL (777B27) field is a count of the number of words returned in the buffer.

For UO function .CTSVR, if the implied RUN UO fails, CT.RUN (1B3) indicates the returned error code is a RUN UO error, not a CTX. UO error. RUN errors never return error text in the data buffer.

Finally, the CT.ERR (777B35) field is the CTX. or RUN UO error code. This is always returned on UO errors even when the data buffer contains error text.

3.5 Command interface

Three commands (CONTEXT, PUSH, and POP) which control context creation, deletion, display, naming, and switching. Contexts may also be changed when certain program are run. This is the auto-save/restore facilities. In addition, there is a minor change to the SET WATCH command.

3.5.1 CONTEXT command

This is a multi-function command. It allows a user to display and manipulate contexts within his or her job. The CONTEXT command requires the job to be halted and at monitor level. It always preserves the current core image. Most options of the CONTEXT command takes at least a context name or number. A context name is a string of 1 to 6 alphanumeric characters where the first character must be alphabetic. A context number is a decimal number assigned by the monitor and associated with a given context. A period (".") may be substituted in place of any context name or number to represent the current context for a job.

3.5.1.1 List options - A user may list the status of a single context or the status for all contexts. The simplest form of the command is "CONTEXT" with no arguments. This produces a display showing the status of all contexts.

```
.CONTEXT
```

```
Contexts used/quota = 24, pages used quota = 33,1000
```

Context	Superior	Prog	Idle time
TOPLVL	1	DDT	3.53
*	2	TOPLVL	1

In the above example, the user has used 2 out of 4 contexts allowed for the job and 33 out of 1000 saved-pages. Context #1 is named TOPLVL and was running the DDT program when it was saved. TOPLVL(1) has one inferior, context #2 which is unnamed. Currently, it is not running any program. TOPLVL(1) had been idle for 3.53 seconds before the CONTEXT command was typed. An asterisk indicates the current context. In this case, it is context #2.

An individual context may be listed using the "CONTEXT n LIST" command. "n" is a valid context name or number. The following examples show the use of the LIST option:

```
.CONTEXT TOPLVL/LIST
```

Context	Superior	Prog	Idle time
TOPLVL 1		DDT	3.53

```
.CONTEXT 2 LIST
```

Context	Superior	Prog	Idle time
* 2	TOPLVL 1		

3.5.1.2 Create option - The CONTEXT command may be used to create an adjacent context chain. Context blocks in the new chain are not associated with the current PUSH chain in any way. This facility allows a user to create multiple contexts so that programs which take lots of time to initialize (such as MS) may be started, halted, and 'kept'. Keeping a idle context with an initialized program, allows a user to quickly switch to that context and continue it, thus avoiding the expensive overhead of restarting the program. The syntax to create an adjacent context is:

```
.CONTEXT = :CREATE AN ADJACENT CONTEXT
.MAIL :RUN A PROGRAM
MS> :PROGRAM TYPEOUT
MS>EXIT :EXIT PROGRAM
.CONTEXT :LIST ALL CONTEXTS
```

Contexts used/quota = 2/4, pages used/quota = 33/1000

Context	Superior	Prog	Idle time
TOPLVL 1		DDT	3.53
* 2		MS	

Optionally, preceding the equals sign with a name will associate that name with the newly created context.

3.5.1.3 Delete option - Any single context or a context at the end of a PUSH chain may be deleted from any other context. The command syntax is "CONTEXT n/KILL" where "n" is a valid context name or number.

```
.CONTEXT          :LIST ALL CONTEXTS

Contexts used/quota = 2/4. pages used/quota = 33/1000
  Context      Superior      Prog      Idle time
  TOPLVL      1              DDT       3.53
*             2
```

```
.CONTEXT TOPLVL.KILL      :DELETE TOPLVL(1)
.CONTEXT          :LIST ALL CONTEXTS
```

```
Contexts used/quota = 1/4. pages used/quota = 0/1000
  Context      Superior      Prog      Idle time
*             2
```

3.5.1.4 Naming option - The CONTEXT command may be used to associate an alphanumeric name with any context owned by the job. The command format is "CONTEXT new=old" where "new" is the new name to assign to context "old". As with other CONTEXT command options, "old" must be any valid context name or number.

```
.CONTEXT          :LIST ALL CONTEXTS

Contexts used/quota = 2/4. pages used/quota = 33/1000
  Context      Superior      Prog      Idle time
  TOPLVL      1              DDT       3.53
*             2

.CONTEXT FOO=2      :ASSIGN "FOO" TO CONTEXT 2
.CONTEXT          :LIST ALL CONTEXTS

Contexts used/quota = 2/4. pages used/quota = 33/1000
  Context      Superior      Prog      Idle time
  TOPLVL      1              DDT       4.12
* FOO         2
```

Additionally, a context may be named when it is created via the CONTEXT command. See the section on the create option.

3.5.1.5 Switch option - Once two or more adjacent contexts have been established, the user may switch from one context to the other using the "CONTEXT n" command. "n" may be any valid context name or number. Here, as in the delete option, the same restrictions apply: a user may switch between the current context and any single adjacent context or one at the end of a PUSH chain.

```
.CONTEXT          :LIST ALL CONTEXTS  
  
Contexts used/quota = 2/4, pages used/quota = 102/1000  
  Context      Superior   Prog   Idle time  
* TOPLVL      1          DDT  
  MAIL        2          MS      10:02
```

```
.CONTEXT MAIL      :SWITCH TO MAIL(2)  
.CONTEXT          :LIST ALL CONTEXTS
```

```
Contexts used/quota = 2/4, pages used/quota = 33/1000  
  Context      Superior   Prog   Idle time  
  TOPLVL      1          DDT      3.53  
* MAIL        2          MS
```

3.5.2 PUSH command

This command allows a user to create an inferior context. The following sequence of commands would demonstrate the PUSH command.

```
.R DDT            :RUN A PROGRAM  
DDT              :PROGRAM TYPEOUT  
Z               :EXIT PROGRAM  
.PUSH           :CREATE AN INFERIOR CONTEXT  
.CONTEXT        :LIST CONTEXTS
```

```
Contexts used/quota = 2/4, pages used/quota = 33/1000  
  Context      Superior   Prog   Idle time  
  TOPLVL      1          DDT      3.53  
*             2  TOPLVL  1
```

The display shows context #2 is an inferior to context TOPLVL(1). Note the action of the PUSH command caused an additional context to be charged to the user. In the case of DDT, 33 additional pages has been counted against the user's saved-page quota. Note also the context with the DDT core image had been idle for 3.53 seconds before the CONTEXT command was typed. The functionality available in the PUSH command is identical to that provided by the .CTSVH function to the CTX. UOO.

3.5.3 POP command

This command provides the only means to return to a superior context. It's purpose is to undo what the PUSH command did. That is, destroy itself and restore its superior context. The following sequence of commands demonstrates the use of the POP command.

```
.POP             :RETURN TO SUPERIOR CONTEXT  
.CONTEXT        :LIST CONTEXTS
```

```
Contexts used/quota = 1/4, pages used/quota = 0/1000  
  Context      Superior   Prog   Idle time  
* TOPLVL      1          DDT
```

```
.CONTINUE       :RETURN TO THE SAVED PROGRAM  
<>            :PROGRAM TYPEOUT
```

POPping a context causes a free context to be returned to the number available to the user. In this case of the DDT program, 33 pages is no longer counted against the total saved-pages allowed to the user.

3.5.4 Auto-save/restore

Normally, when a command is given that runs a program, the user's core image will be destroyed. The system administrator has the option of marking certain commands as auto-save commands. When the user types a command that runs one of these programs, the monitor will automatically save the user's current context, and then run the specified program. Whenever the job attempts to return to monitor level (EXIT UUO, C, HALT, or fatal error in job), the monitor performs an automatic restore of the saved context for the user. The net result is the user's core image is still intact. Additionally, user defined commands maybe flagged as auto-save commands.

This sequence of auto-save, running a program, and auto-restore is identical to the user typing PUSH, RUN, and POP commands with one exception. A user's context and saved-page quotas are never checked when an auto-save is in progress. This is done to allow the system administrator to set a user's context quota to 1 and still allow the use of normal monitor commands that might invoke the auto-save/restore sequence. System context and saved-page quotas are always checked under all circumstances.

3.5.5 SET WATCH command

An additional keyword has been added to the SET WATCH command. The "CONTEXTS" keyword is now accepted by the SET WATCH command. When this feature is enabled, context information will be displayed each time the current context changes. For example:

```
.CONTEXT          :LIST CONTEXTS

Contexts used/quota = 1/4, pages used/quota = 33/1000
  Context      Superior   Prog   Idle time
* TOPLVL      1          DDT

.SET WATCH CONTEXTS  :ENABLE CONTEXT WATCH
.R DDT              :RUN A PROGRAM
DDT                 :PROGRAM TYPEOUT
Z                   :EXIT PROGRAM
.PUSH               :CREATE AN INFERIOR CONTEXT
[Context 2]         :WATCH CONTEXT TYPEOUT
.POP                :RETURN TO SUPERIOR CONTEXT
[Context TOPLVL(1)] :WATCH CONTEXT TYPEOUT
```

3.6 Conservation of system resources

Anytime JOBKL to kill a job is called and the job has contexts, the contexts are deleted, freeing up monitor free core and swapping space. This is accomplished by CTXSER ordering the job's entire list of context blocks into one PUSH chain, positioning the current context to the end of the chain. A POP command is simulated which propagates back to the highest superior context. Then the final context block is deleted and the job is allowed to logout.

4.0 Dependencies

4.1 Projects on which this component depends

Alternate Contexts are not dependant on any other products.

4.2 Projects which depend on this project

No products are dependent on Alternate Context features.

5.0 Publications

The implementation of Alternate Contexts will require five publications to be updated.

5.1 TOPS-10 Monitor Calls

The Monitor Calls manual Volume I will require additional information to be added in the section entitled "Controlling the Job". The MACRO programmer should be made aware of the job parameters that will be saved and restored when manipulating contexts. An overview of the UWO level facilities should also be included.

Monitor Calls manual Volume II will require the addition of the specific calling sequences of the CTX, UWO, argument block formats, and error codes.

5.2 TOPS-10 Monitor Calls Quick Reference Guide

This document should contain a one or two line description of the CTX, UWO and a brief description of the function codes, argument blocks, and error returns.

5.3 TOPS-10 Operating Systems Commands Manual

This document will require descriptions of the CONTEXT, PUSH, and POP commands. Under the description of the USESTA (T) command, a sentence should be added to reflect the context information now included in the display. The description of the SET WATCH command will need to be enhanced, as switching contexts will cause additional typeout to occur if WATCH CONTEXTS is turned on.

5.4 TOPS-10 Commands Quick Reference Guide

This document should contain an abbreviated version of the information available in the Commands Manual.

5.5 TOPS-10 Software Installation Guide

The section on setting up accounting files should inform the system administrator on how to set "context" and "saved page" quotas.

6.0 Packaging

Alternate Context support will be made available with the TOPS-10 7.03 monitor as part of the standard "bundled" product.

7.0 Installation

The standard monitor installation will automatically make Alternate Contexts available to a customer. The system administrator should refer to the TOPS-10 Software Installation Guide if non-standard default 'context' and 'saved page' quotas are desired. Also, swapping space may need to be increased depending on the amount of the amount of existing swapping space and the expected increased load created by saving contexts. Again, the Installation Guide will provide guidelines for the allocation of swapping space.

8.0 Ease of use

Alternate Contexts will be extremely easy to understand and use from both command and UUO level.

9.0 Performance

Using Alternate Contexts will increase the swapping load on a system. The amount of increase can vary greatly depending on the size of the jobs being saved and restored. For systems currently using the recommended amount of swapping space, it is strongly suggested that the amount of swapping space be increased to compensate for the additional core images being saved.

10.0 Reliability

The Alternate Context features must be extremely reliable. It should be as reliable as the TOPS-10 swapping algorithms.

11.0 Maintainability

Maintenance will be done through the normal TOPS-10 maintenance procedures.

12.0 Compatibility

12.1 Product compatibility

The TOPS-10 Alternate Context facility is a new feature of the monitor, and as such, no existing programs know how to use it. Therefore, there are no compatibility problems between existing programs and the TOPS-10 monitor.

12.2 Standards conformance

Alternate Contexts will conform to TOPS-10 standards.

12.3 Internationalization

Alternate Contexts are nationality independent.

1.0 Evolution

The monitor may easily be modified to change which job parameters get saved and restored on context switches.

14.0 Costs

It will take about three months to code and test the Alternate Context features.

15.0 Timeliness

The Alternate Context features will be available for in-house use as soon as the 7.03 monitor is run on a permanent basis. It will go to field test with the monitor about October 1984.

16.0 Constraints and trade-offs

There are no constraints and trade-offs in supporting Alternate Contexts in the monitor.

17.0 outstanding issues

There are no outstanding issues.

Appendix A

Glossary

ADJACENT CONTEXT

A context not associated with, or linked in any way to the current context or PUSH chain if one exists.

AUTO-SAVE

A monitor or user defined command which, prior to running a given program will automatically save the job's current context.

AUTO-RESTORE

When a program for which an auto-save had been done or a program invoked by a CTX. UWO function .CTSVR attempts to return to monitor level, an automatic restore of the previous or superior context will be performed. Note that this action will be done regardless of how the program returns to monitor level (EXIT UWO, C, HALT, or fatal error in job).

CONTEXT BLOCK

A block of non-zero section free core in which the monitor saves job and terminal parameters for a context. All context blocks for a job must be addressable at all times by the monitor so a user can switch between contexts at any time. The blocks are forward and backward linked to each other. .PDSAC(W) contains the address of the first context block. .PDCTC(W) contains the address of the current context block. Additional link words are used to provide backchain pointers to superior context blocks, next context block to switching to, and previous context block to switching from. A block will also retain information during CTX. UWO and implied RUN UWO processing, as well as error recovery data.

CURRENT CONTEXT

The context containing a job's currently addressable core image.

DATA BUFFER

An arbitrary block of data, up to 510 decimal words in length used to pass data to an inferior context. If a data buffer is specified in a CTX. UWO, an inferior context may read and write the buffer using functions .CTRDB and .CTWDB. When control is returned to the superior context, data written by the inferior context will be copied into the user's address space pointed to by the CTX. UWO argument block. There are no restrictions on

the contents and format of the data residing in the data buffer, with one exception. If the CTX. UVO fails prior to creating the Alternate Context, then monitor will return ASCIZ error text in the buffer. This text is what would normally be typed on the user's terminal if the equivalent command had been given. This feature allows programs return meaningful error information without the need to code a table of ASCIZ strings indexed by the UVO error code.

IDLE CONTEXT

A saved context. Saved contexts are said to be idle because the core image is not addressable (it's on disk) and hence, cannot be executed.

IMPLIED RUN UVO

The action performed by the CTX. UVO when a save and run function (.CTSVR) is being processed.

INFERIOR CONTEXT

A context created as a result of CTX. UVO functions (.CTSVH or .CTSVR, a PUSH command, or a monitor or user defined command which does an auto-save prior to running a program.

JOB/CONTEXT HANDLE

A job/context handle (JCH) is an 18 bit quantity that uniquely identifies a job and one of its contexts. It is comprised of two fields. The job number occupies the right most 9 bits and the context number resides in the left most 9 bits. A JCH with a context component of zero always translates into the current context for the job in question.

PUSH CHAIN

A chain of inferior contexts.

SYSTEM CONTEXT QUOTA

The total number of contexts allowed in the system at any one time. This is set to the default number of contexts per job (M.CTXC) times the number of jobs the monitor was built for (M.JOB).

SYSTEM SAVED-PAGE QUOTA

The total number of pages of swapping space allowed for all contexts on the system at any one time. This is set to the default number of saved-pages per job (M.CTXP) times the number of jobs the monitor was built for (M.JOB).

USER CONTEXT QUOTA

A limit on the number of contexts a job may have at any one time. This number is set up by the system administrator in the accounting profile for a user. The LOGIN CUSP sets the quota in the monitor when a user logs in. In addition, a privileged user ([1,2] or JACCT) may set a job's context quota using the .CTSQT function of the CTX. UVO. A default context quota specified by the MONGEN parameter M.CTXC is set for those jobs which are logged in on FRCLIN or by programs that do not use CTX. function .CTSQT. This limit is desirable because a block of non-zero section free

core is required to maintain each context in use at any time. If this quota is set to zero, a user may allocate contexts until free core is exhausted.

USER SAVED-PAGE QUOTA

A limit on the number of core image pages that may be saved by a job at any one time. This number is set up by the system administrator in the accounting profile for a user. The LOGIN CUSP sets the saved-page quota in the monitor when a user logs in. In addition, a privileged user (1,2] or JACCT) may set a job's saved-page quota using the .CTSQT function of the CTX. UUC. A default saved-page quota specified by the MONGEN parameter M.CTXP is set for those jobs which are logged in on FRCLIN or by programs that do not use CTX. function .CTSQT. This limit is desirable because each saved core image occupies as much swapping space as would be required to normally swap out a job. If this quota is set to zero, a user could possibly exhaust all available swapping space.

Appendix B

CTX. UO definitions

.CTFNC==0 :FUNCTION CODE WORD
CT.PHY==1B0 :PHYSICAL ONLY RUN UO
CT.LEN==777B17 :LENGTH OF BLOCK INCLUDING THIS WORD
CT.FNC==777777B35 :FUNCTION CODE
.CTSVH==00 :SAVE CONTEXT. HALT JOB
.CTSVR==01 :SAVE CONTEXT. RUN PROGRAM
.CTSVT==02 :SAVE CONTEXT. CREATE TOPLEVEL
.CTSVS==03 :SAVE CONTEXT. SWITCH TO ANOTHER
.CTSVD==04 :SAVE CONTEXT. RUN PROGRAM
.CTRDB==05 :READ DATA BUFFER
.CTWDB==06 :WRITE DATA BUFFER
.CTRQT==07 :READ QUOTAS INTO DATA BUFFER
.CTSQT==10 :SET QUOTAS IN DATA BUFFER
.CTDIR==11 :RETURN A DIRECTORY MAP OF ALL CONTEXTS
.CTINF==12 :RETURN INFORMATION ABOUT A CONTEXT
.CTDBL==1 :DATA BUFFER LENGTH
.CTDBA==2 :DATA BUFFER ADDRESS
.CTNAM==3 :SIXBIT CONTEXT NAME
.CTRNO==4 :RUN UO OFFSET (LH RESERVED)
.CTRNB==5 :RUN UO BLOCK ADDRESS
.CTTMN==6 :TMPCOR LENGTH..SIXBIT NAME
.CTTMB==7 :TMPCOR BUFFER ADDRESS
.CTMAX==10 :LENGTH OF ARGUMENT BLOCK
: DATA BUFFER OFFSETS FOR FUNCTIONS .CTRQT AND .CTSQT
.CTJOB==0 :JOB NUMBER
.CTCTQ==1 :CONTEXT QUOTA
.CTPGQ==2 :SAVED PAGES QUOTA
: DATA BUFFER OFFSETS FOR FUNCTION .CTDIR
.CTJOB==0 :JOB NUMBER
.CTWCT==1 :RETURNED WORD COUNT OF BYTE-STREAM DATA
.CTFDW==2 :FIRST DATA WORD OF DIRECTORY BYTE-STREAM
: DATA BUFFER OFFSETS FOR FUNCTION .CTINF
.CTJOB==0 :JOB NUMBER
.CTCNO==1 :THIS CONTEXT'S NUMBER
.CTCNM==2 :THIS CONTEXT'S NAME
.CTSNO==3 :SUPERIOR'S CONTEXT NUMBER
.CTSNM==4 :SUPERIOR'S CONTEXT NAME
.CTPGM==5 :PROGRAM NAME
.CTITM==6 :IDLE TIME IN TICKS
: ON ANY RETURN. THE AC WILL CONTAIN THE FOLLOWING
CT.DAT==1B0 :DATA WORDS RETURNED

CT.DBT==1B1	:DATA BUFFER TRUNCATED
CT.ETX==1B2	:UWO ERROR TEXT IN DATA BUFFER
CT.RUN==1B3	:RUN UWO ERROR
CT.RDL==777B27	:WORDS IN DATA BUFFER
CT.ERR==777B35	:ERROR CODE

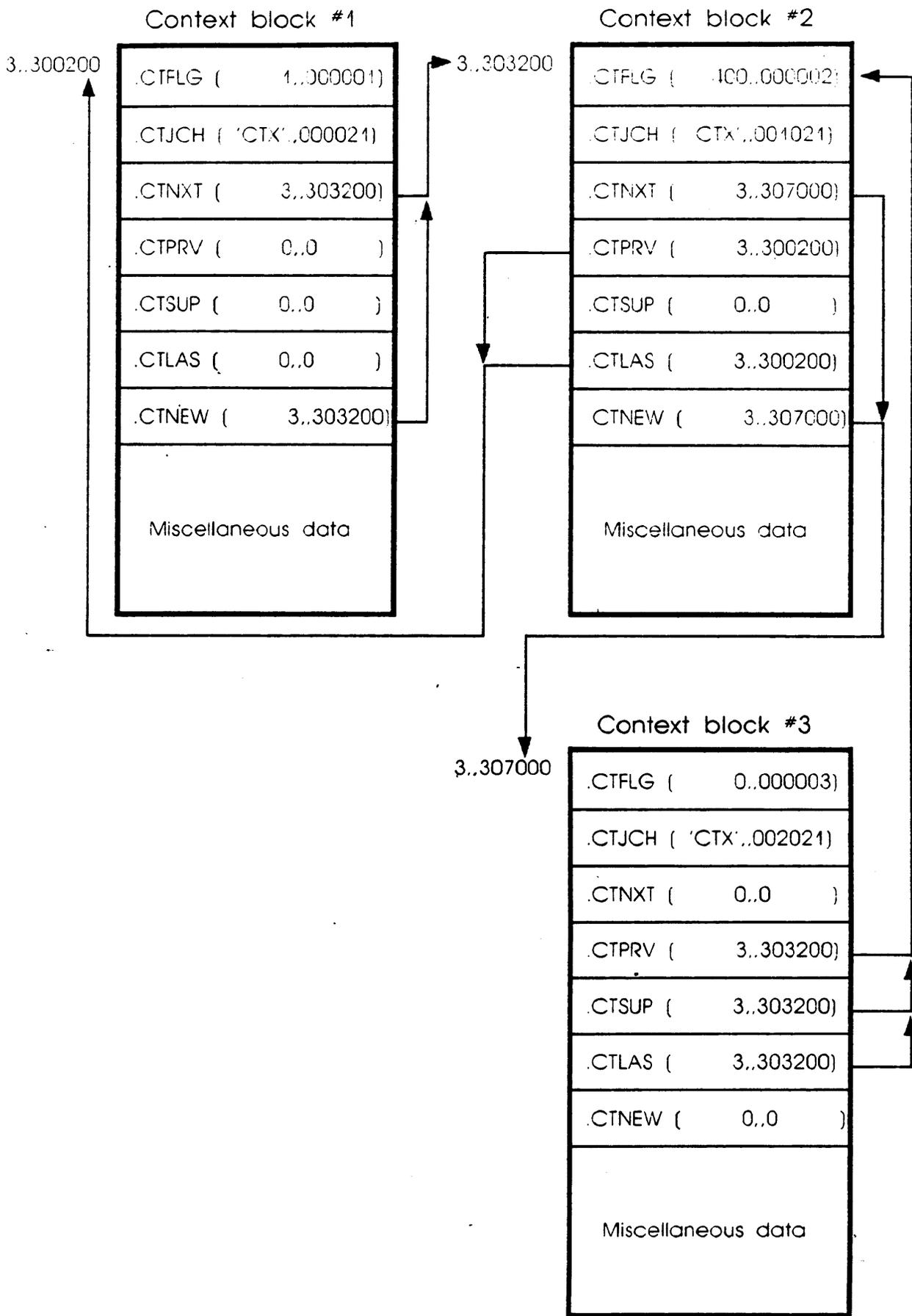
: CTX. UWO ERROR CODES

CXIFC%==00	:ILLEGAL FUNCTION CODE
CXACR%==01	:ADDRESS CHECK READING ARGUMENTS
CXACS%==02	:ADDRESS CHECK STORING ANSWERS
CXNEA%==03	:NOT ENOUGH ARGUMENTS
CXNLI%==04	:NOT LOGGED IN
CXLOK%==05	:LOCKED IN CORE
CXDET%==06	:DETACHED
CXSCE%==07	:SYSTEM CONTEXT QUOTA EXCEEDED
CXSPE%==10	:SYSTEM PAGE QUOTA EXCEEDED
CXJCE%==11	:JOB CONTEXT QUOTA EXCEEDED
CXJPE%==12	:JOB PAGE QUOTA EXCEEDED
CXNCS%==13	:NOT ENOUGH CORE TO SAVE CONTEXT
CXNCD%==14	:NOT ENOUGH CORE TO RETURN DATA BLOCK
CXICN%==15	:ILLEGAL CONTEXT NUMBER
CXNSC%==16	:NO SUPERIOR CONTEXT
CXNPV%==17	:NO PRIVILEGES TO SET QUOTAS
CXIJN%==20	:ILLEGAL JOB NUMBER
CXCSI%==21	:CANNOT SWITCH TO INTERMEDIATE CONTEXT
CXCDI%==22	:CANNOT DELETE AN INTERMEDIATE
CONTEXT	
CXCDC%==23	:CANNOT DELETE THE CURRENT CONTEXT
CXCNP%==24	:CONTEXT NOT PRIVILEGED
CXNDA%==25	:NO DATA BLOCK AVAILABLE

Appendix C

Context block linkages

The following figures illustrate typical context block linkages. These represent a job having three context blocks: the one allocated when the job was created, one interior, and one adjacent context block.



END OF DAY 1

Outline for Presentation

on

TOPS-10 Implementation of CI Disk Architecture

Tony Dziedzic

10 June 1986

1. CI hardware

- o HSC50 - Hierarchical Storage Controller
 - Performs all optimization
 - Selectable buffering for 512- or 576-byte sector disks
 - Usable by VMS when set to 576-byte sector buffering (Heterogeneous CI)
 - Supports both 16- and 18-bit disk drives
- o RA60 - Removable media disk drive
 - Uses RA60P (16-bit) or RA60PE (18-bit) disk pack (RA60PE pack can be reformatted for 512-byte sectors)
 - 362064 blocks in 576-byte sector format with RA60PE
- o RA81 - Non-removable media disk drive
 - 803712 blocks in 576-byte sector format
- o TA78 - TU78-style tape drive
 - Tape drives on the CI are not supported by TOPS-10
- o CI20 - Computer Interconnect Interface
 - Installs in KL10 backplane (RH20 slots 6 AND 7)
 - Requires wiring changes to KL10 backplane
 - After backplane is modified RH20 slots 6 and 7 are not usable for RH20s
 - Loadable microstore (microcode in BOOT)
- o SC008/SC016 - Star Coupler
 - Electrically passive (transformers)
- o Redundancy (dual paths)
 - Two transmit and two receive cables per CI node
 - Subsystem still usable if one path fails

2. Overview of CI architecture

- o Layering
 - SYSAP - System Applications
 - SCS - System Communication Services
 - PPD - Port/Port Driver
 - PI - Physical Interconnect
- o Functions of each layer

3. Overview of MSCP

- o Protocol used to control mass storage peripherals

4. Monitor module interactions

- o SYSAPs
 - MSCP (RAXKON, MSCCOM, MSCPAR)
 - SCS. UO (SCSUO)
- o SCS (SCASER, SCAPRM)
- o PPD (KLPSER, KLPPRM)

5. Monitor CI database

- o PCB - Port Control Block
- o PB - Path Block
- o SB - System Block
- o CB - Connection Block

6. FILSER database

- o KDB and UDB changes
 - KONCAM/UNICAM versus KOYCPU
(UNICAM changes in first 7.03 Autopatch tape)
 - KONMX (multiple transfers)
 - UNIALT
- o DRB - Disk I/O Request Block
- o FLHTID entry to FILIO

7. Alternate porting and failover

- o Dual port feature is standard on all drives
 - Only one port actually usable at any time
 - One port is selected at ONCE time
- o Automatic failover upon hardware failure

8. DIAG. UO

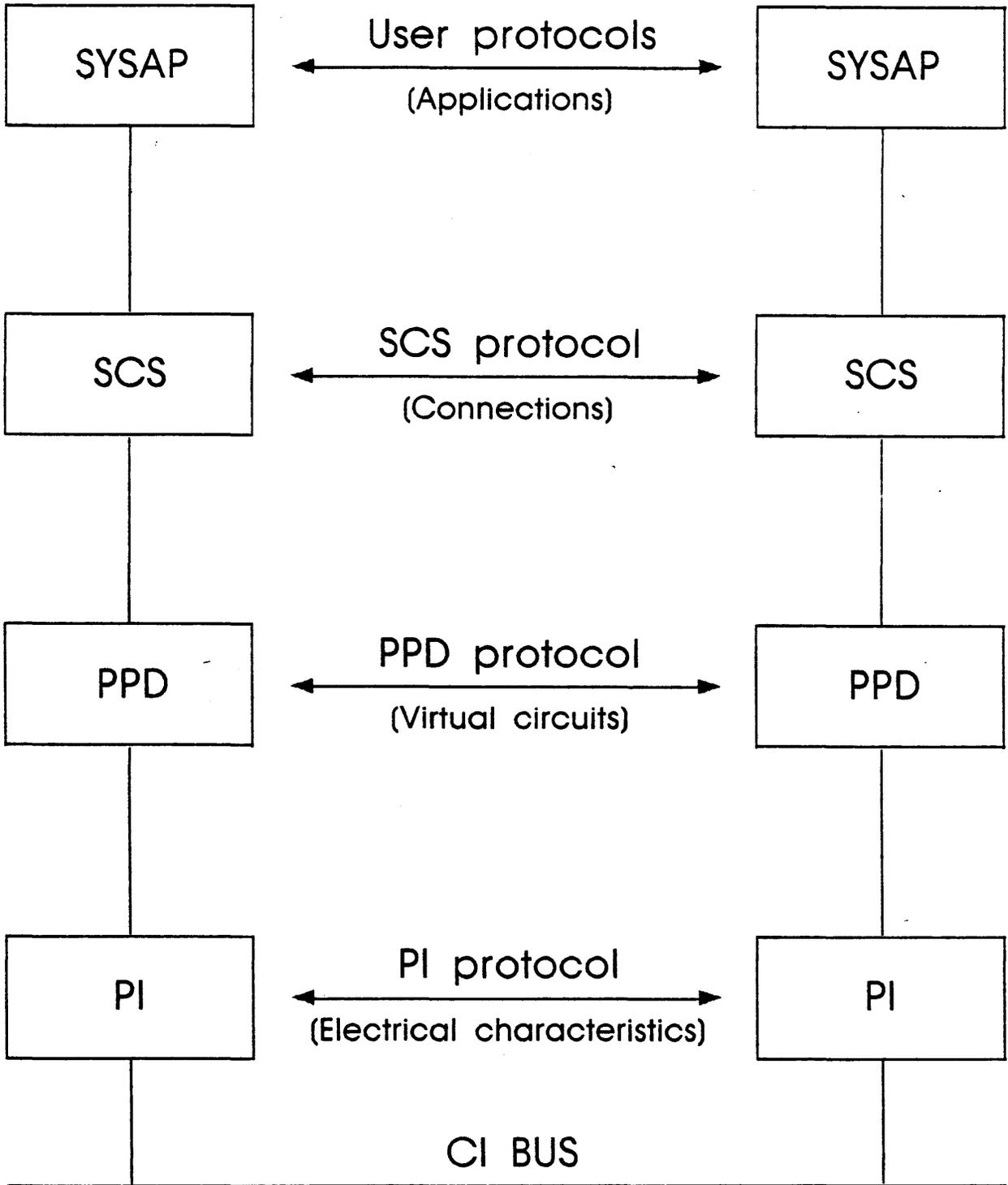
- o Additions
 - Enable/disable CI20 microcode loading
 - Load CI20 microcode
 - Enable/disable CI20 maintenance mode
 - Manipulate CI20 port counters

9. SCS. UO

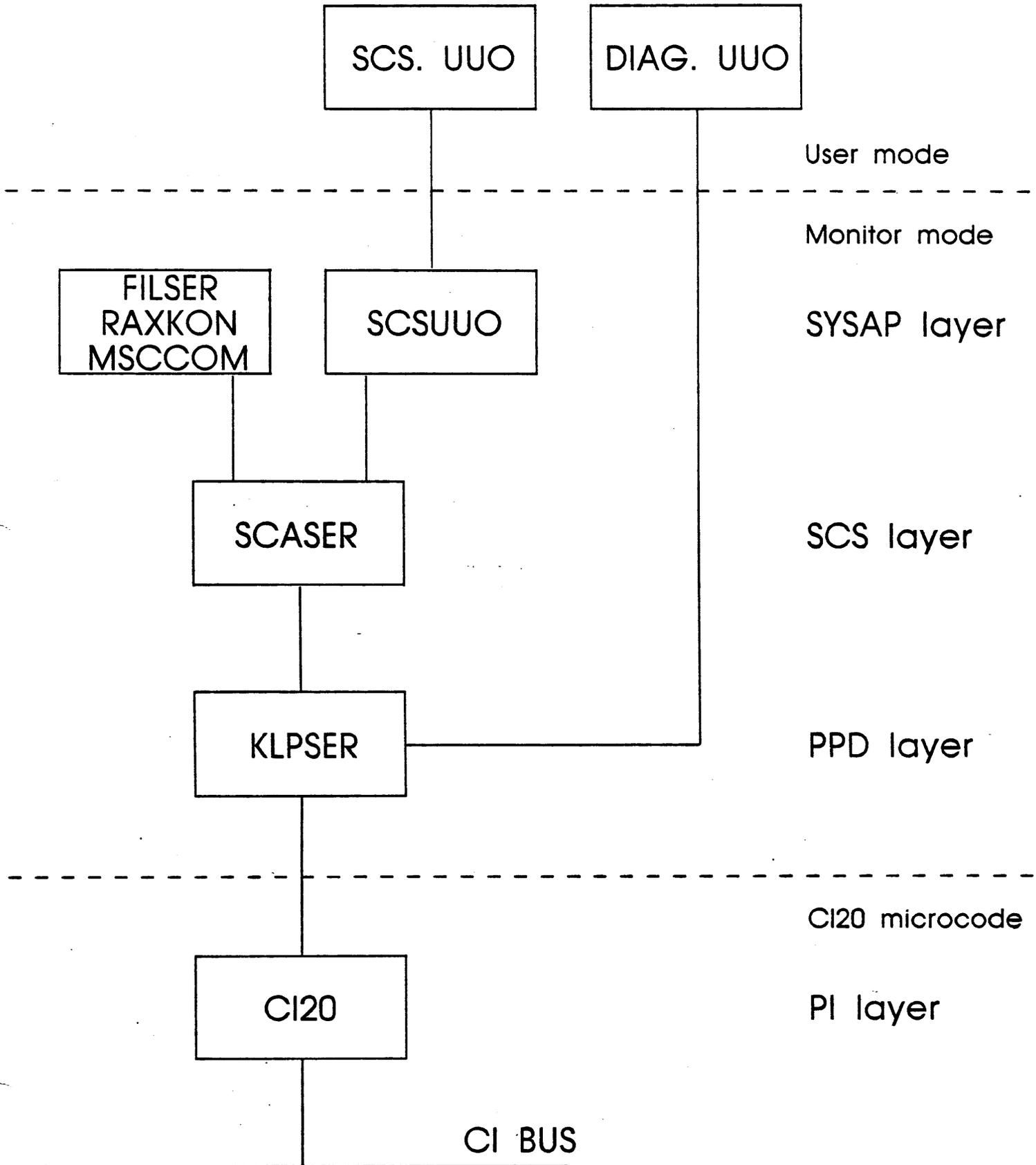
- o Used by user mode diagnostics (DFPTA, DFCIA, DFCIB, DFCIC)
- o Some functions used by SYSDPY and user mode utilities
- o Not intended for general communications

10. Error reporting
 - o System Error Blocks
11. Diagnostics
12. Care and feeding of the HSC50 and RAXx disks
 - o Configuration
 - HSC50 node number
 - HSC50 buffer size
 - o Fault light and fault codes
 - o Disk port selection
13. Utilities
 - o 10-based
 - CICTRS
 - SYSDPY
 - CISTS
 - o HSC50-based
 - SETSHO
 - FORMAT
 - VTDPY
 - DIRECT
14. Performance (off tape/transcription)
 - o Our experience
 - o Comparisons against RP06

CI Architecture Layers



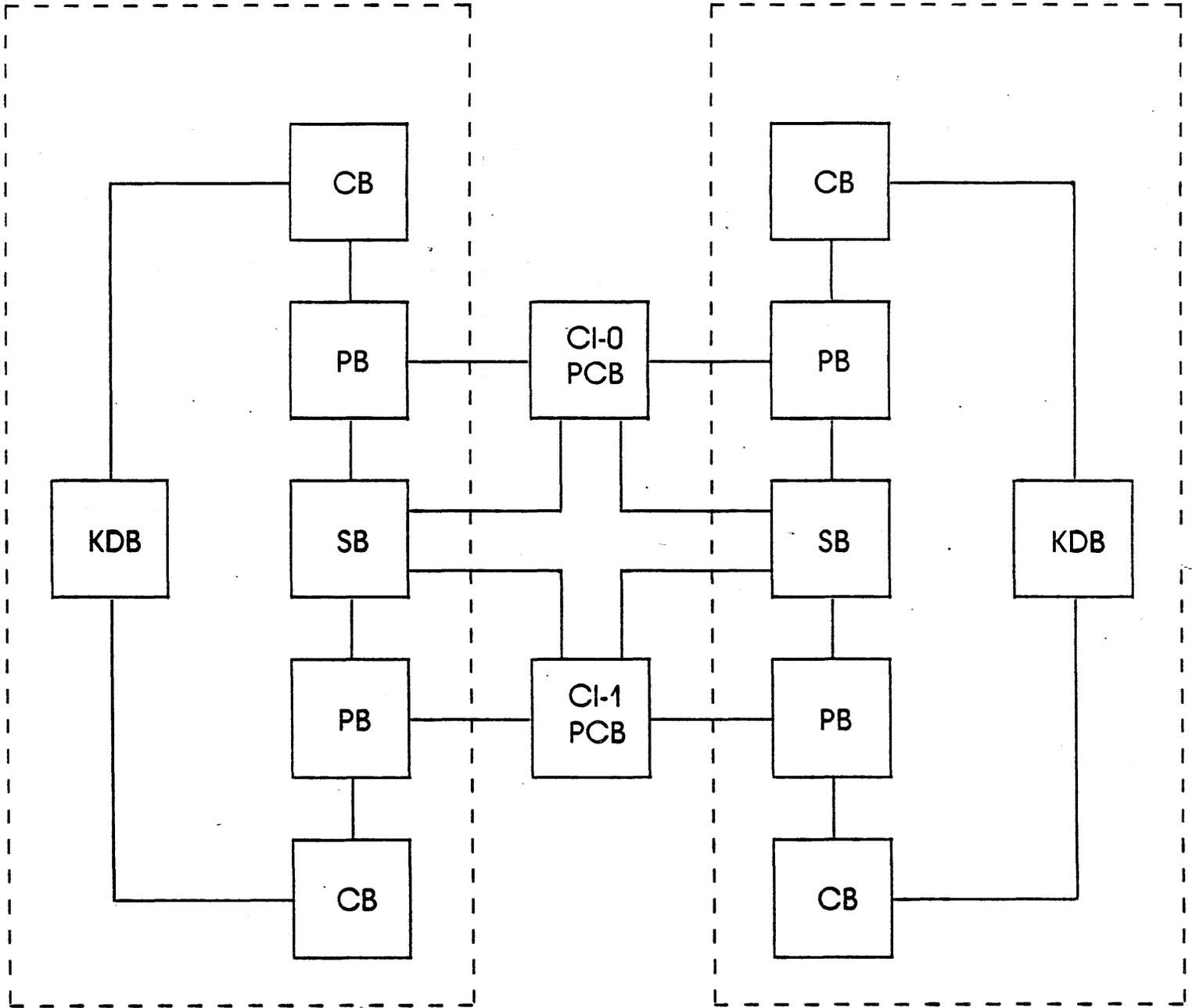
CI Module Interaction



CI Data Structures

HSC50 'A'

HSC50 'B'



WMU Scheduler Enhancements

1. Dormant segment retention times
2. Free core goals - If BIGHOL is less than the "minimum" goal AND CORTAL is less than the "maximum" goal, the swapper is activated.
3. New SCHED. UVO functions accessible via SCDSET.
 1. .SC{R|S|FG via {READ|SET} FREE CORE LIMITS
 2. .SC{R|S|RT via {READ|SET} HI SEG IN CORE TIME
4. Specific DA/AU wakeups
5. Minor tweaks to the frustration code.

NOTE

YOUR MILEAGE MAY VARY

Swapper and VM Modifications

1. Goal of insignificant degradation for non-extended cases; reasonable efficiency for extended images.
 1. Layout on the swap space
 1. User section 0
 2. Funny space
 3. Non-zero section maps
 4. User non-zero sections
 5. User section 0 map (directly accessible through JBYMAP)
 6. UPT (directly accessible through JBTSWP)
 2. Two phases for non-extended images (as in pre-7.03), three for extended.
 1. UPT and section 0 map
 2. Section 0 and funny space
 3. Non-zero sections
 3. VPN value or table pointed to by .USLPS to eliminate having to figure out at what virtual page a transfer starts at.
 4. Working set bit table for non-zero sections in funny space page at .WSBNZ (allocated when user goes "extended").

NOTE

A user is not considered extended if all his non-zero sections are mapped to section 0.

2. New table PT2TAB to allow fast relinking of PAGTAB chains (list is now doubly-linked).
3. CORE UUOs translated to equivalent PAGE. functions.
4. Access to all user section maps through executive section 37.

New & Different Job Related Information

1. **JBTIMI**
Old IMGIN field (formerly part of JBTSWP). Also contains information about the number of non-zero section maps job has wants.
2. **JBTIMO**
Old IMGOUT field (formerly part of JBTSWP)
3. **JBTSWP**
Disk address of UPT or first page of high segment: or pointer to fragment table for latter.
4. **JBTJIL**
New header JBTHSQ for jobs who are waiting for high seg swapping I/O to complete.
5. **JBTADR. .USREL. .USMEM**
Concern section 0 only
6. **.USSCT**
9-bit byte table indexed by section number listing number of pages in each non-zero section.
7. **JBTS2**
Section number high segment is in.

Miscellaneous

1. *User limits*
Using the new REACT, these may be set to the new maxima of 16384P instead of 512P.
2. *Swapping space*
The absolute maximum swapping space available on a single unit is now 262143 pages (18 bits worth).

Access to Non-Zero Sections - Command level

1. *USE:n*
Switch to be used on RUN, GET, or MERGE commands to put the specified program in section n.
2. *E & D commands*
Utilize 30-bit addresses

NOTE

30-bit addresses may be expressed as "large" octal integers or in half-word format (a..b).

3. *START & CSTART*
Utilize 30-bit addresses
4. *SET BREAK*
Utilizes 30-bit address
5. *CORE command*
Although the CORE command does not allow modification of extended section (except to destroy them), the CORE command does now print a memory map for the user:

```
.r pip
*^C
.DDT
VMDDT
^C
.core
Page number          Page statusData on page

0-1                  RD WR EX          Private page(s)
400-411              RD EX SH          DSKA:PIP.EXE[1.4]
700-712              RD WR EX          Private page(s)

Total of 27 pages
```

Access to Non-Zero Section - Program Level

1. PAGE. UUO
 1. Utilizes 14-bit page numbers in page oriented functions (.PAGCD, .PAGIO, .PAGSP, .PAGAL, .PAGAA, .PAGCA, .PAGEM, .PAGCB)
 2. Function to create sections or map them together (via indirect pointers) (.PAGSC)
 3. Functions which return bit-maps can return large bit maps if required (.PAGWS, .PAGGA, .PAGBM)
2. IPCFS. and IPCFR.
Page mode IPCFS. and IPCFR. can send/read from into non-zero section pages.
3. CORE UUO
The CORE UUO is section relative for the section the CORE UUO is executed in.
4. RUN. MERGE., SAVE., and GETSEG UUOs
The core word (word 5) of the argument block may now optionally contain XWD -n..addr where addr will contain information about sections.
5. FILOP. functions .FOFXI and .FOFXO
Allow dump mode using "bi-word" format IOWD lists:

n>0	:Transfer n words
30-bit address	:from specified global address
or	
0	:GOTO address
30-bit address	
or	
0	:End of IOWD list
0	
6. *Additionally, the FILOP. UUO must be used to specify that buffer rings be set up in a non-zero section (new arguments .FOBSA and .FOBSZ).*
7. JOBPEK UUO
JOBPEK has a second format which allows reading and writing 30-bit addresses.

NOTE

Although PAGE. allows explicit control over sections, section maps are automatically created if required. It can, however, be more efficient in certain unusual cases to create section maps explicitly rather than allowing on the automatic mechanism. In the case of PAGE., section maps can also automatically be destroyed.

Trapping

Only PSISER and UTRP. handle interrupting out of non-zero sections. If other traps are used and the interrupt condition occurs in a non-zero section, the job will be stopped.

1. UTRP. must be used in order to use LUUOs in a non-zero section (trap number zero).
2. In order to use PSISER, the new bit PS.IEA must be set in the PIINI, flags field. Given that this is done, the "old PC" stored by the monitor will be a 30-bit global PC, and the "new PC" word will be interpreted as a 30-bit global PC. If the user wishes to obtain or change the flags for this PC, he must use the new PIFLG. UWO.
 1. If PS.IEA was not set and an interrupt occurs in a non-zero section, the job will be stopped; otherwise the arguments and values in the interrupt block are interpreted as 18-bit values.
 2. Additionally, PS.UCS may be set in the PIINI, flag word to indicate a global interrupt vector address.

UUO Rules

1. UUOs which were designed for 30-bit arguments will take 30-bit arguments.
2. UUOs which take page numbers may be given 14-bit page numbers.
3. Except as noted previously, other pre-existing UUOs use "PCS" (Previous Context Section), i.e., the section the UUO was executed in becomes the "default" section for all 18-bit arguments.

END OF DAY 2

DECnet-10 v4.0 Overview

DECnet Phase IV Implementation

Ethernet Support

LAT Protocol Support

CTERM Protocol Support

Multi-Threaded FAL Support

DECnet-10 v4.0

DECnet Phase IV Overview

Multiple Area Support

Level 1 Routing Support

Ethernet Endnode Support

Ethernet Upline Dump & Downline Load

DECnet-10 v4.0 Supported Configurations

KL10 System

Minimum: 1 DN20/MCB
 or 1 NIA20
Maximum: 3 DN20/MCBs per cpu
 and 1 NIA20 per cpu

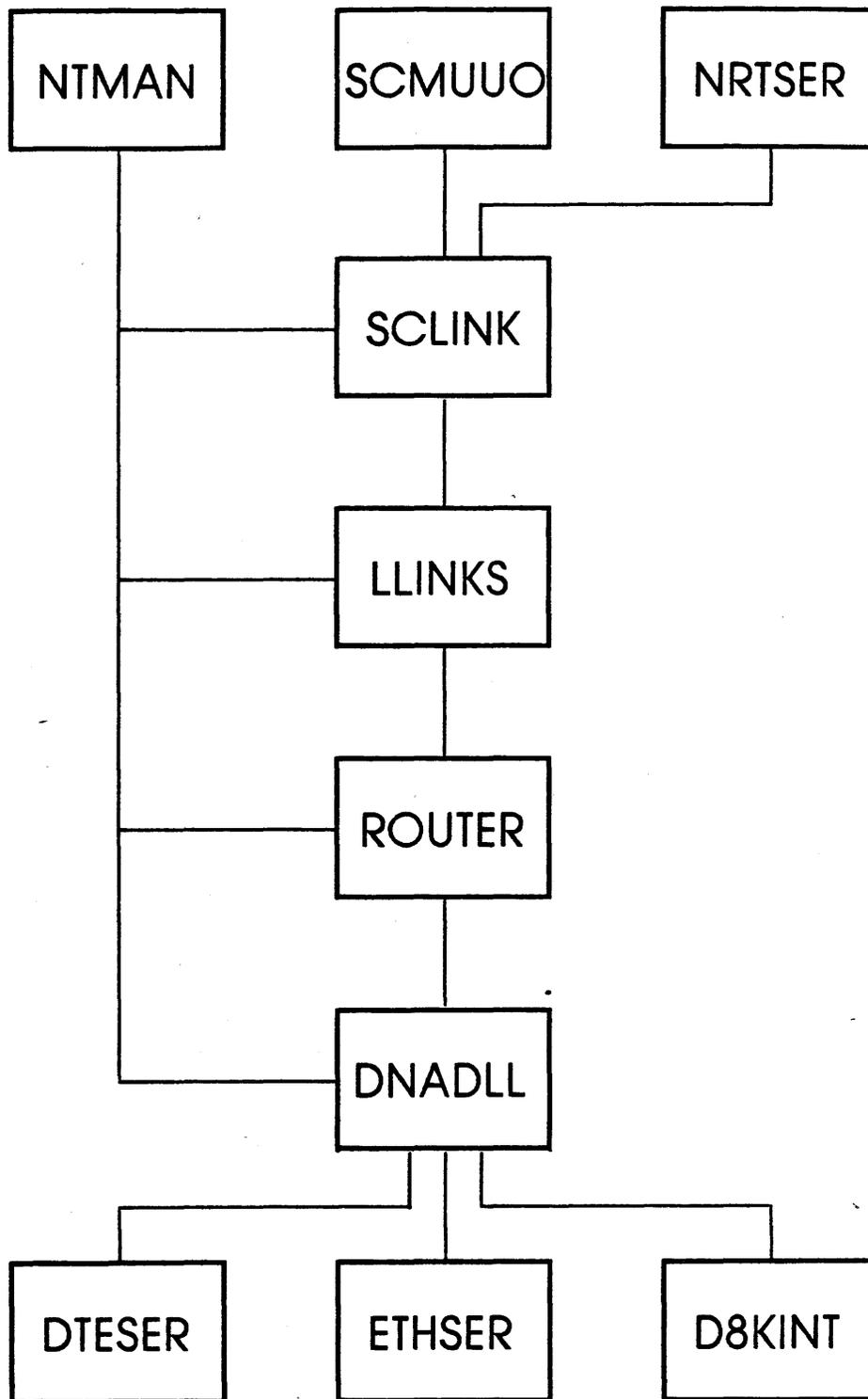
KS10 System

Minimum: 1 KDP
Maximum: 2 KDPs

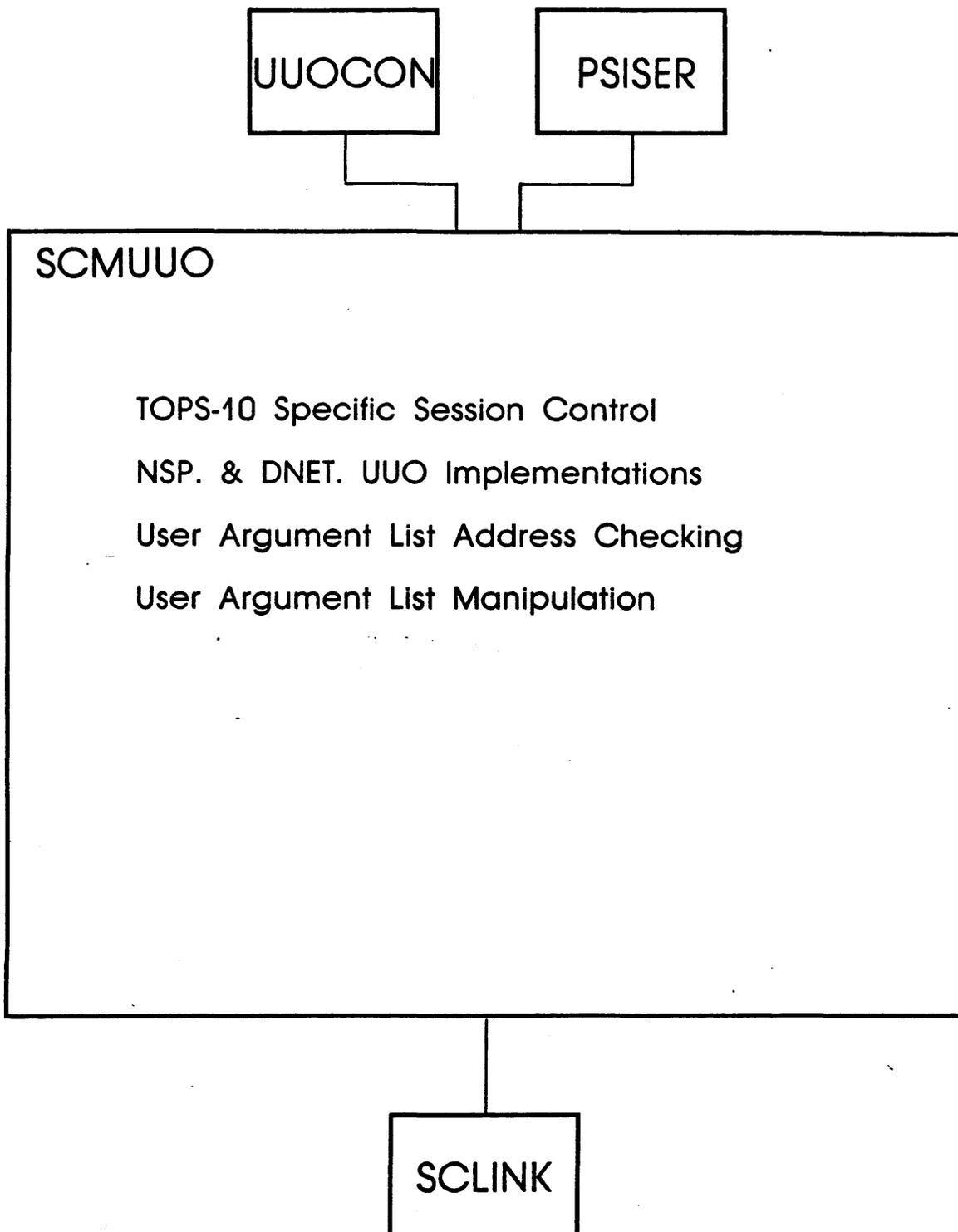
DN20/MCB Front End

Minimum: 1 KDP
 or 1 DMC
 or 1 DMR
Maximum: Refer to SPD

DECnet-10 v4.0 Module Overview

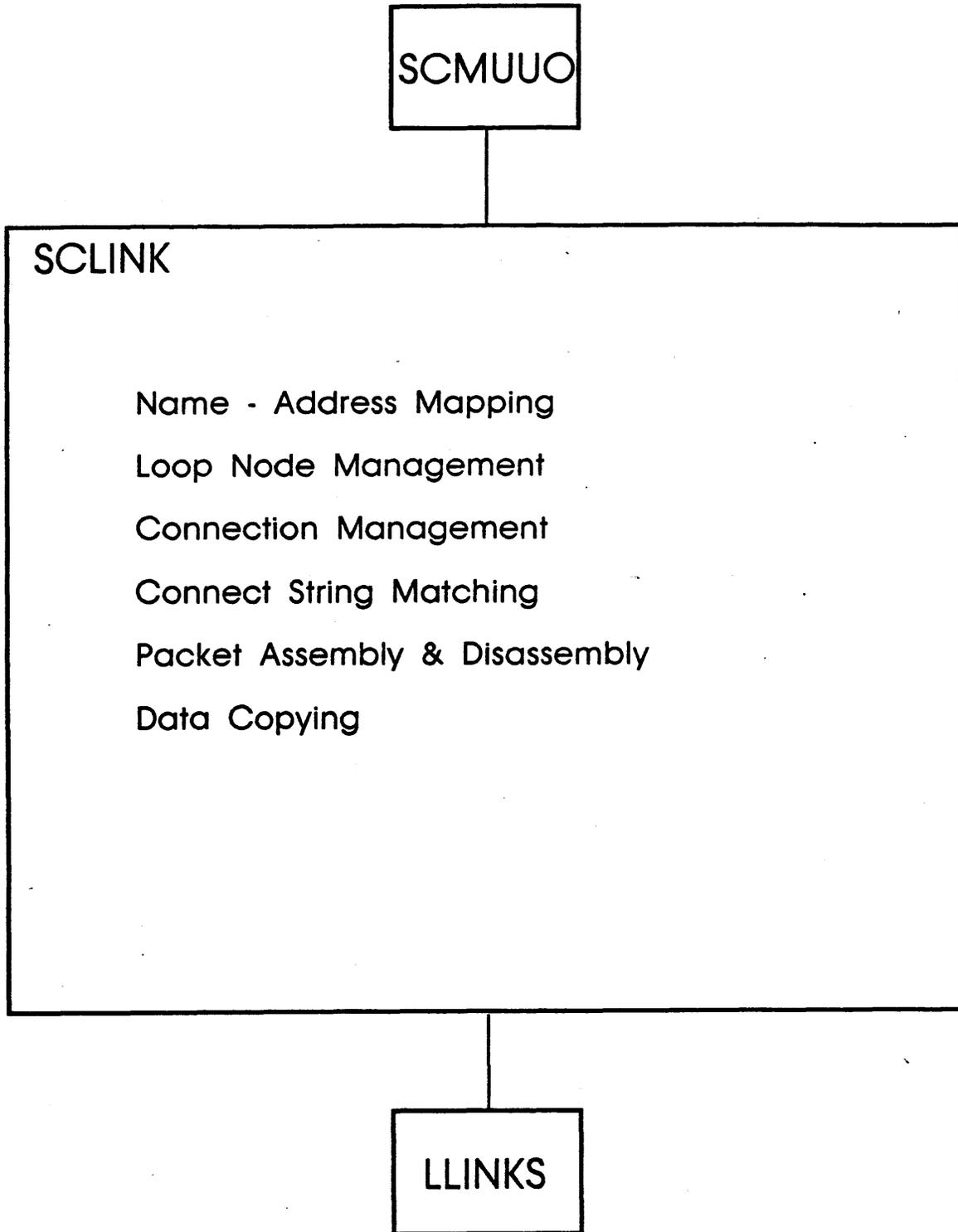


DECnet-10 v4.0
SCMUUO Module Overview

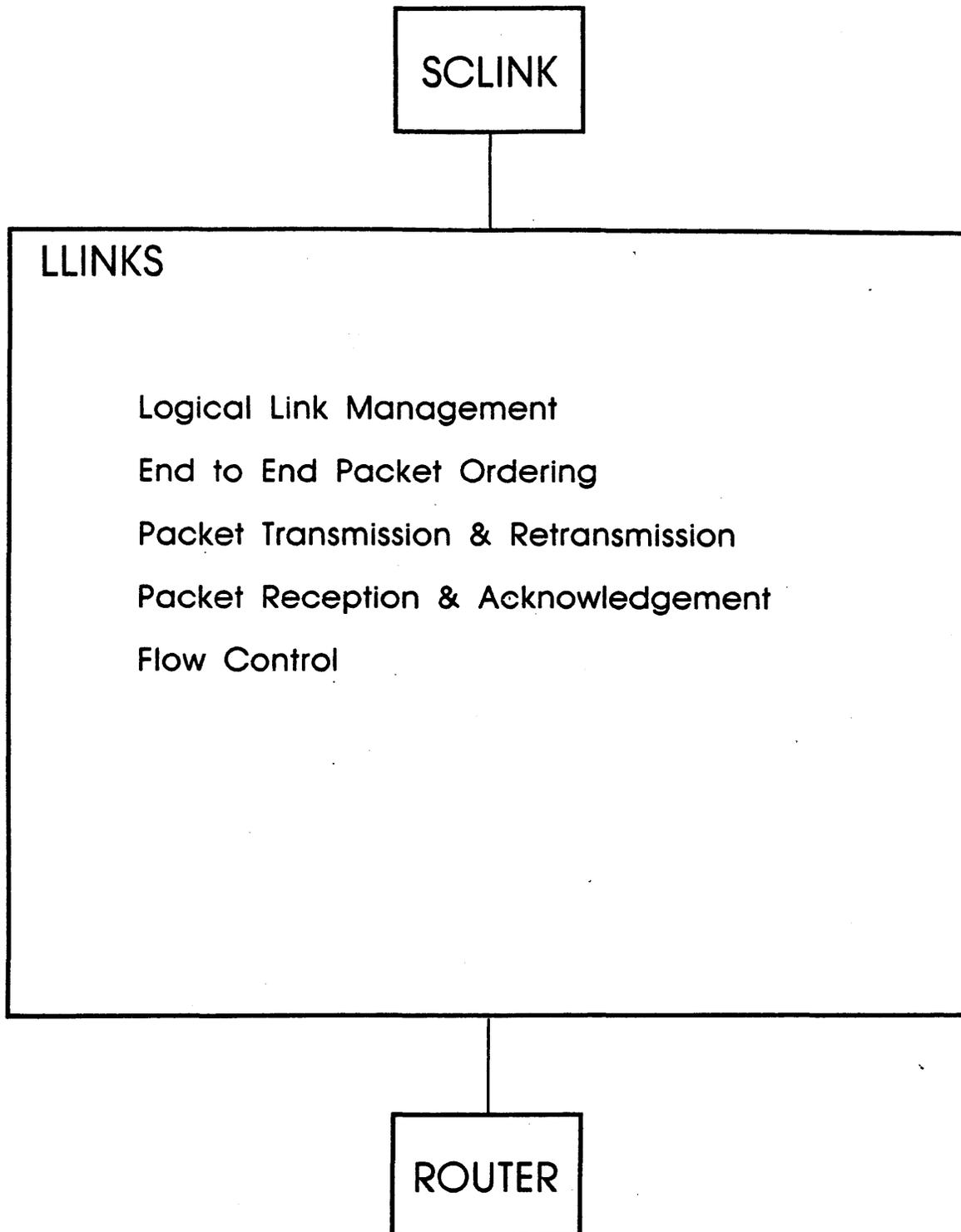


DECnet-10 v4.0

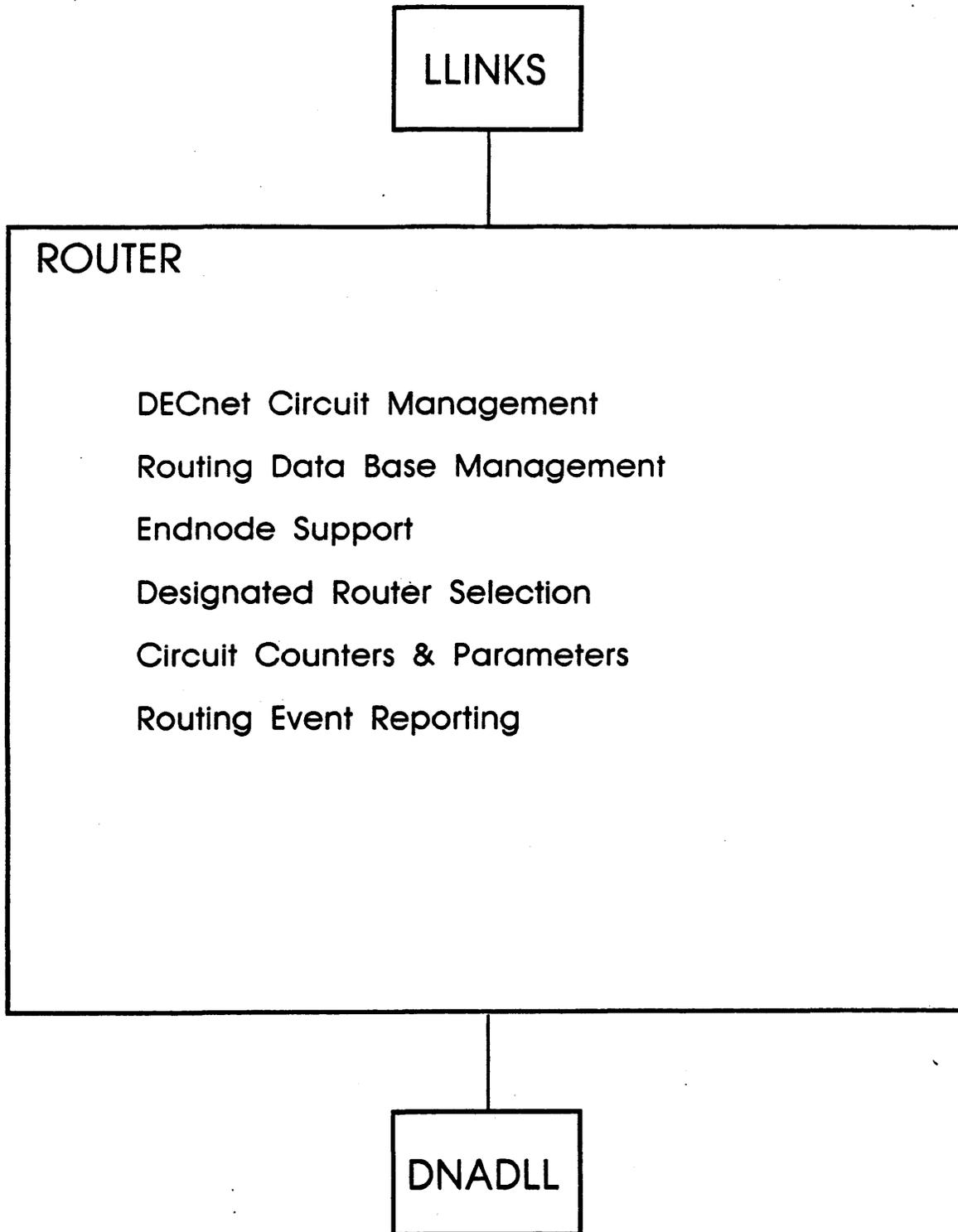
SCLINK Module Overview



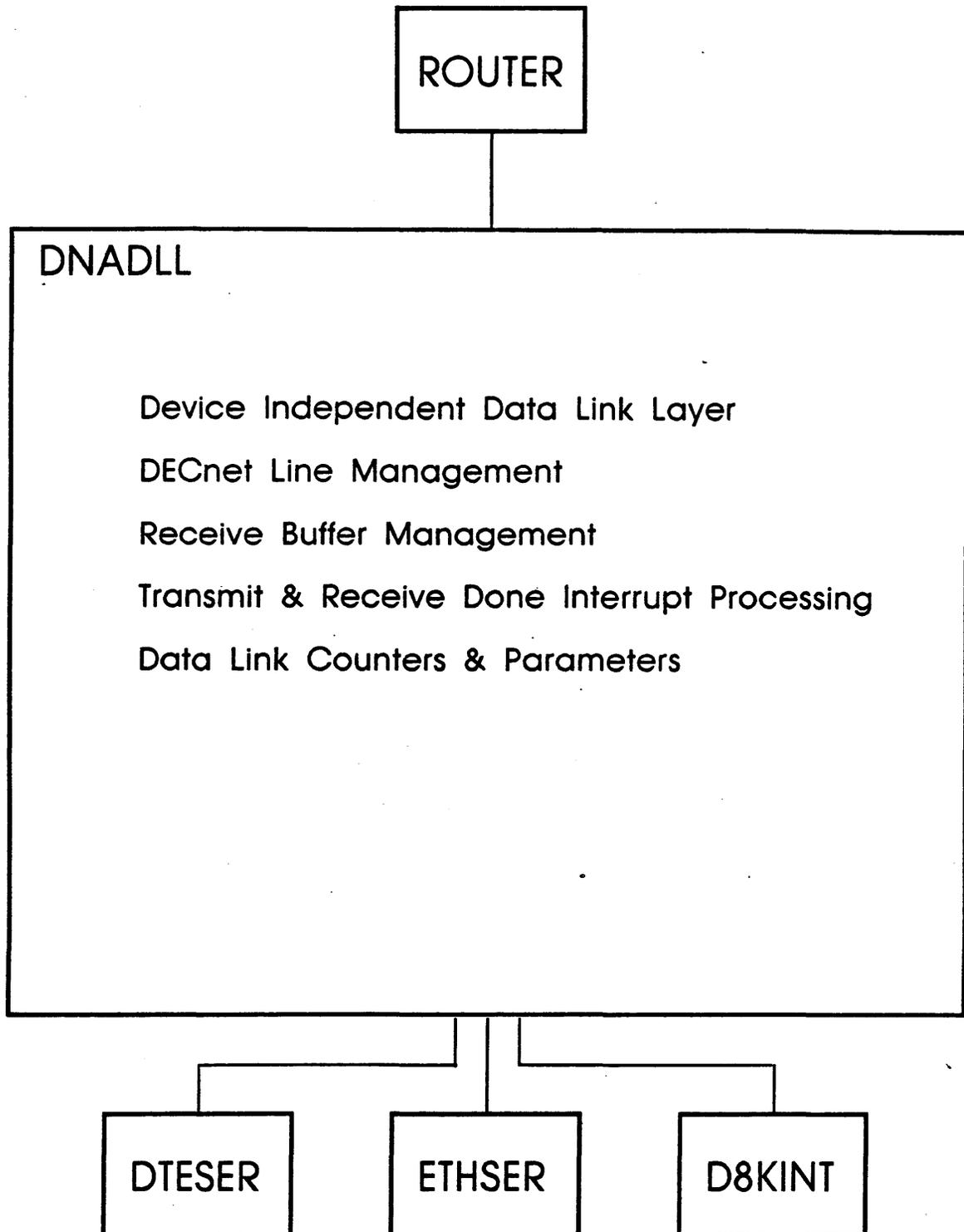
DECnet-10 v4.0 LLINKS Module Overview



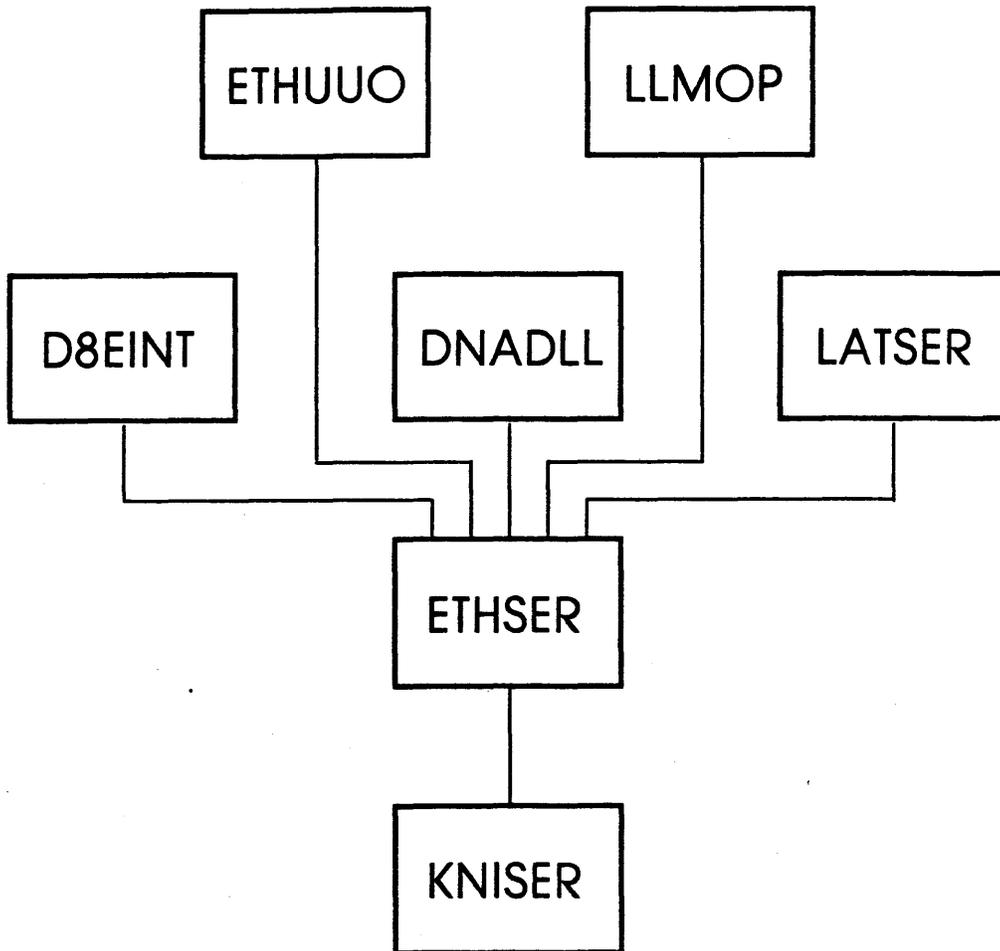
DECnet-10 v4.0 ROUTER Module Overview



DECnet-10 v4.0 DNADLL Module Overview



Ethernet Module Overview



Ethernet Tools SYSDPY E Display

Ethernet Status of RN301A DEC10 Development 27-May-86 10:34:07 UP:01:06:00

Chan/Kont	State	E-Net Address	DgmXmt	DgmRcv
ETH-0	Online	AA-00-04-00-6E-1C	34141	104887
NI-0	Online	AA-00-03-03-00-87	34141	104888
NI-1	Online	AA-00-03-03-00-13	0	0

Protocol	State	Kont	User	DgmXmt	DgmRcv	FQE
60-16	Online	NI-0	System	60	0	0
60-03 DECnet	Online	NI-0	System	5868	64202	0
60-04 LAT	Online	NI-0	System	28211	39363	5
90-00 Loopback	Online	NI-0	System	0	0	0
60-02 RmtCon	Online	NI-0	System	6	1329	0
-Inf-	Online		Job 55 Ctx 1	0	0	0
-Inf-	Online		Job 19 Ctx 1	0	0	0
60-01 DNA/MOP	Online	NI-1	Job 19 Ctx 1	0	0	0
-Inf-	Online		Job 30 Ctx 2	0	0	0

LAT Tools

SYSDPY Z Display

LAT Status on RN301A DEC10 Development 27-May-86 10:35:13 UP:01:07:06

Server	Received	Xmitted	Re-Xmitted	Seq error	Ill msg	Ill slot
*LAT54(MR01-2 H13)	97	107	0	0	0	0
*LAT20(MR01-2 P8)	526	547	0	12	0	0
*LAT21(MR01-2 P8)	416	440	0	17	0	0
*LAT97(MR01-2 M14)	2423	2545	0	71	0	0
*36-BITS-FOREVER(MR01-2/L5)	2499	2702	0	0	0	0
*\$HORSE_FEATHERS(MR01-2/Pole L2)	9051	10098	0	2	0	0

CTERM

Command Terminal Protocol

CTERM

- o What is it?
- o Implementation
- o Support Issues
- o Known Bugs
- o Futures

What is CTERM?

- o Corporate protocol standard
- o Allows for efficient use of network resources
- o Implementation guided by the protocol specifications
- o Location of the specs:
 - ELUDOM::USRDS:[TSA]FOUND.MEM
 - ELUDOM::USRDS:[TSA]CTERM.MEM

CTERM Implementation

- o Monitor - Host service
 - NRTSER
 - SCNSER

- o User agent - 'pad'
 - SET HOST command
 - CTHNRT program

CTERM Host Service

- o NRTSER
 - Add support for multiple objects and protocols

- o SCNSER
 - Change ISRREM calling sequence to handle features needed by NRTSER

CTERM User Agent

- o SET HOST now runs CTHNRT
- o CTHNRT accepts three switches on the SET HOST command line:
 - /CTERM - don't try NRT protocol
 - /NRT - bypass CTERM protocol
 - /OLD - same as /NRT (for VMS users)

Support Issues

- o Performance is less than desirable
- o Quick implementation with as few special cases as possible
- o Those few special cases were to cover bugs in remote implementations
- o ^C and ^O don't make it through high volumes of output
- o CTHBCM events still occur since not all remotes have fixed even their configuration messages
- o Character echoing is often wrong for reasons beyond our control

Known Bugs

TOPS20:

- o Always echoes terminators
- o Blanks out the line when given a backspace to type

ULTRIX-32:

- o Drops the link for no apparent reason
- o Doesn't always give us a complete break mask

VMS:

- o Implemented a different protocol

Futures

- o Performance improvements
- o Possible evolution of the protocol

CHAPTER 1

VMS CTERM

1.1 GOALS OF THIS DOCUMENT

The purpose of this document is to record the details of the VMS CTERM implementation. It includes the exceptions and additions to the standard CTERM specification. An attempt to make objective comments and criticisms of the architecture will also be made.

It is assumed that the reader is familiar with the CTERM and FOUND specs, and that s/he has a copy to refer to when reading this document.

1.2 HISTORY

Remote terminal implementations have always been done via ad-hoc methods which resulted in heterogeneous protocols. The result of this was that each operating system within the company had to know how to communicate with every other system explicitly. For VMS, the SET HOST software understood protocols for VMS, RSX, RSTS and TOPS-20. Setting host to a system other than VMS was not supported. CTERM (command terminal protocol) is the first homogeneous protocol within the company. Engineers from the operating systems and architects spent a period of over a year coming up with a protocol that all systems could support.

1.3 WHAT CTERM IS

CTERM is a protocol for implementing remote command terminals across DECnet circuits. The Digital Terminal Software Architecture (TSA) defines the syntax and semantics of CTERM. The protocol includes messages that create bindings, start reads from the terminal, send write data to the terminal, manage characteristics, and so forth.

1.4 WHAT CTERM IS NOT

Many people within the company have expected CTERM to be more than it can be. CTERM is not a great panacea that will cause all of

Digital's cross system compatibility problems to go away. Certain basic philosophical differences that exist between operating systems will almost certainly always prevent complete cross system supportability of every terminal feature available.

Another problem is one of dynamics. The CTERM protocol captured a fairly good set of terminal driver functions at the time it was written, but implementation of features has continued. One example of this is the line editing functions that will be available in VMS V4.0. This feature has been conceived since the CTERM spec was written. It obsoletes (as far as VMS is concerned) any definition in the CTERM spec of what line editing is.

Because of these problems, CTERM does not make a good protocol for terminal servers. As an operating system changes, the terminal server (and the protocol) must keep pace. If it doesn't, the user directly connected to a VAX system will have more features available than a user connected through a terminal server. It is certainly not impossible to implement a server that completely mimics the host, just very difficult. The only case where this is easily implemented and compatible is where the server is the same system as the host (in other words, they are running the exact same terminal driver).

These problems are not minor and should not be ignored or glossed over. However, CTERM is still a very viable architecture and will solve a lot of the problems of the past. VMS is planning to drop its own operating system specific protocol in favor of CTERM and VMS specific extensions. The extendability of CTERM is one of its strongest features and will allow very flexible and extensive modifications. Another advantage is that the protocol allows very efficient use of the DECnet circuit being used.

1.5 BASICS

In order that the VMS terminology is understood, I will first describe the overall VMS implementation. There are two distinct pieces to the CTERM support, namely SERVER and HOST. The server software consists entirely of the RTPAD image (aka SET HOST) and the standard terminal driver interface. The host software consists of two pieces, REMACP and CTDRIVER. REMACP simply answers requests for object type 42 and handles creation and deletion of remote terminal I/O database objects. CTDRIVER maps QIO requests into CTERM protocol and sends them to the server via DECnet. Figure 1 illustrates this.

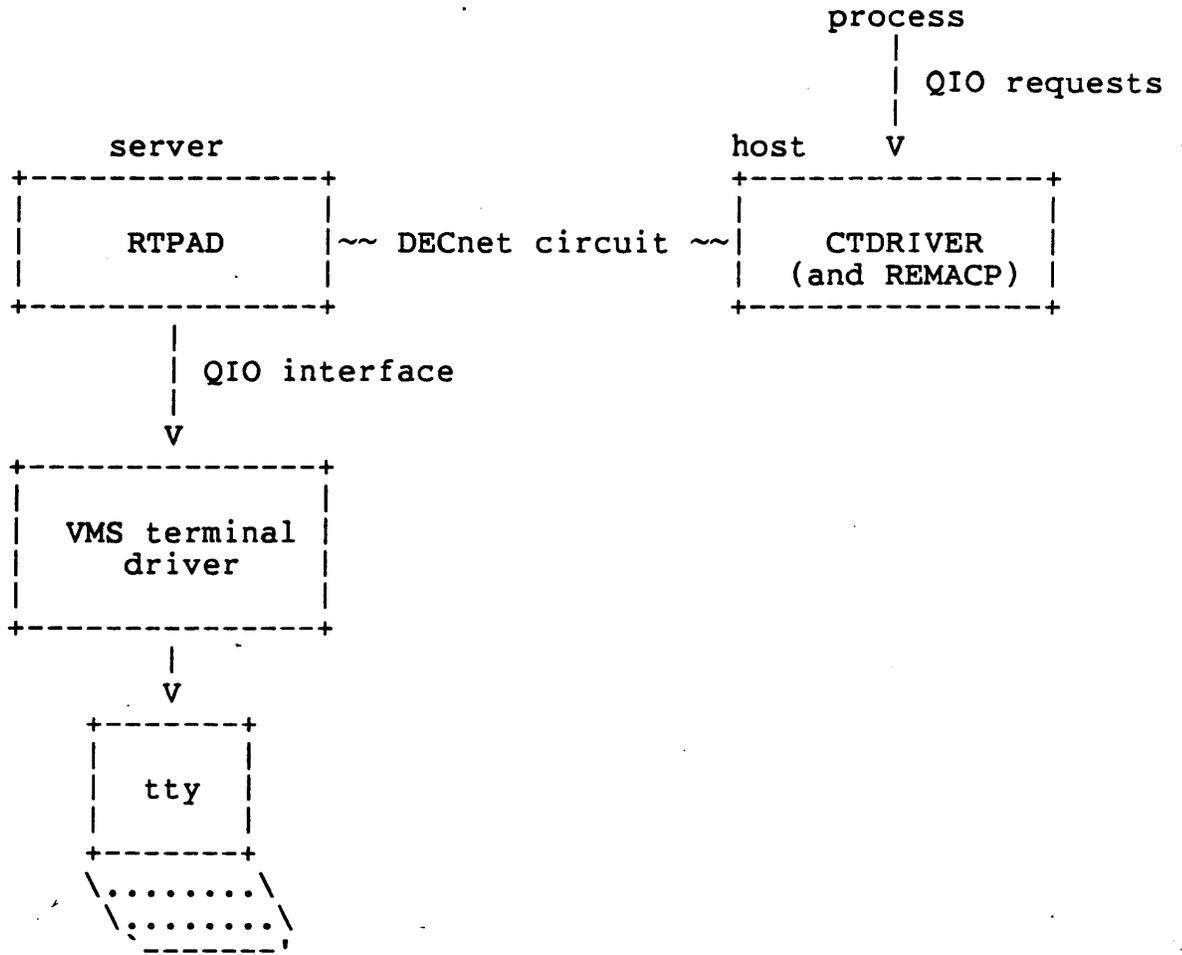


Figure 1. VMS pieces of CTERM support.

CHAPTER 2

DIFFERENCES BETWEEN THE TSA SPEC AND THE VMS IMPLEMENTATION

2.1 REASONS FOR DIFFERENCES

There are several reasons that an implementation of CTERM might not be completely in keeping with the specification. The major reason for these differences is that the lower levels of terminal support (i.e. the terminal driver) may not support a needed feature. There are many reasons why it may not be possible to add this feature to the terminal support. These reasons include:

1. Feasibility -- Due to a restriction in memory or architecture, it may not be feasible to implement a given feature.
2. Supportability -- Any feature included in the lower levels would have to be supportable for use by customers. In some cases, this may not be practical.
3. Philosophy -- Low level terminal services are radically different from system to system within the company. These differences are due to varying philosophies regarding terminal services. Without radical changes, it would be impossible to provide certain features.

VMS has looked at each feature from a viewpoint of "is this a valuable function in general?". If the answer to this was no, we opted to leave out the feature. We are not saying that VMS will never implement the things that have been left out, only that the features will not be in VMS V4.0. If CTERM becomes highly usable and viable for connections with RSX and TOPS-20, additional work would be in order to make usability even better.

2.2 CHARACTERISTICS SUPPORT

The first aspect of the VMS implementation will deal with characteristics. As terminal characteristics determine the "feel" of a terminal interface, it is probably a good place to start.

2.2.1 CTERM Characteristics

Also called handler maintained characteristics, these have been broken out as characteristics which are unique to command mode interaction. Whether this is strictly true will not be debated here.

1. IGNORE-INPUT -- the closest thing VMS has to this characteristic is NOTYPAHD (no type ahead). This results in data being discarded only when a read is not active. This is what we map for this characteristic.
2. CHARACTER-ATTRIBUTES -- specifies the characteristics of a character. This is probably the most difficult, most ambiguous characteristic in all of the architecture. I suspect that this characteristic and the way it is handled will cause most of the cross-system inconsistencies.
 - Out-of-Band Handling - VMS does not handle anything other than control characters as out-of-band characters. This is not in keeping with the spec's definition of immediate hello (type 3) out-of-bands which include the full 8 bit character set. It is felt that the cost in terms of non-paged pool (i.e. physical memory in VMS) would be too high to implement this. Also, deferred clear out-of-bands (type 2) are treated as immediate clear (type 1) by the server. A VMS host will never request deferred clear.
 - Include Flag - full support. Enabled by IO\$M_INCLUDE function modifier.
 - Discard Flag - full support in server. Only requested on immediate clear requests from host.
 - Control Character Echoing - not supported. With VMS V4.0, control characters either have a function (e.g. delete word) or they are a nop. The reason for this is to prevent fumbled fingered typists from terminating a read before they really wanted. What sense does it make to insert a form feed (for instance) into a DCL command?

The CTERM spec only allows echoing of control characters when they are input characters. Echoing of out-of-bands is not addressed clearly. For VMS, there are two types of out-of-bands. The first type is the standard ^C or ^Y (cancel and interrupt) which echo when typed. The second is the normal out-of-band (like ^T) which does not echo the character. It is therefore possible to enable a ^C out-of-band that echos (through IO\$_SETMODE!IO\$M_CTRLCAST) or one that doesn't echo (through IO\$_SETMODE!IO\$M_OUTBAND). The way in which this information is preserved is by setting the "echo in standard form" for standard ^C and ^Y in the protocol message.

Another difference is the way in which VMS V4.0 will echo

^C, ^Y, ^O and ^Z. The following table lists the echo strings.

1. ^C - Cancel
2. ^Y - Interrupt
3. ^Z - Exit
4. ^O - Output Off (or) Output On

- Enable/Disable special characters - not supported. All special characters are always enabled.

3. CONTROL-O-PASS-THROUGH -- not supported in server. Host will never request. Treated as always false.
4. RAISE-INPUT -- full support. VMS ties this to its UPPERCASE characteristic. This means that output is upcased as well as input. The original reason for this characteristic was to support uppercase only terminals. These terminals are rare these days, but we still support them.
5. NORMAL-ECHO -- full support. Mapped to NOECHO in VMS.
6. INPUT-ESCAPE-SEQUENCE-ENABLE and OUTPUT-ESCAPE-SEQUENCE-ENABLE -- full support, except that host always requests both and setting one implies the other in the server. This is because VMS only has an ESCAPE characteristic which applies to both input and output streams.
7. INPUT-COUNT-STATE -- full support for DO-NOT-SEND and NO-READ-SEND. NO-READ-SEND is always requested from VMS host. Unable to implement SEND. Does RSX or TOPS need this?
8. AUTO-PROMPT -- full support. This characteristic, known as script mode in VMS, is unsupported and undocumented. It is used for doing load testing within performance groups in the company. The CTERM spec says that the control A should be inserted before the prompt. I believe this is an error, and that the control A should be sent as the last character of the prompt.
9. ERROR-PROCESSING -- no support in Field Test 1, although it is possible to implement a close parallel to this in our server.

2.2.2 LOGICAL Characteristics

Although both logical and physical characteristics are defined in the Foundation Services Specification, they are all handled more or less the same in the VMS implementation. Because of this, it is logical for the description of these characteristics to be in this document.

1. MODE-WRITING-ALLOWED -- Ignored.
2. TERMINAL-ATTRIBUTES -- full support.
3. TERMINAL-TYPE -- full support for terminals listed in VMS SPD.
4. OUTPUT-FLOW-CONTROL -- full support. Mapped to TTSYNC characteristic.
5. OUTPUT-PAGE-STOP -- ignored.
6. FLOW-CHARACTER-PASS-THROUGH -- ignored. Always false.
7. INPUT-FLOW-CONTROL -- mapped to HOSTSYNC.
8. LOSS-NOTIFICATION -- BELL only when INPUT-FLOW-CONTROL is false. This is because VMS implements HOSTSYNC as "send XOFF" when true and "send BELL" when false.
9. LINE-WIDTH -- full support.
10. PAGE-LENGTH -- full support.
11. STOP-LENGTH -- ignored.
12. CR-FILL -- full support.
13. LF-FILL -- full support.
14. WRAP -- values supported as follows:
 1. 1 - mapped to NO WRAP on server.
 2. 2 - data only discard when NO WRAP and HARDCOPY.
 3. 3 - no support in VMS. Hardware wrapping is not supported.
 4. 4 - mapped to WRAP in VMS.
15. HORIZONTAL-TAB -- full support. Mapped to MECHTAB in server.
16. VERTICAL-TAB -- no support. VMS outputs VT as four line feeds.
17. FORM-FEED -- full support. Mapped to MECHFORM in server.

2.2.3 PHYSICAL Characteristics

1. INPUT-SPEED -- full support.
2. OUTPUT-SPEED -- full support.

3. CHARACTER-SIZE -- full support. (FT1?)
4. PARITY-ENABLE -- full support. (FT1?)
5. PARITY-TYPE -- full support. (FT1?)
6. MODEM-PRESENT -- full support. Mapped to MODEM characteristic.
7. AUTOBAUD-DETECT -- full support.
8. MANAGEMENT-GUARANTEED -- ignored.
9. SWITCH-CHARACTER-1 -- ignored.
10. SWITCH-CHARACTER-2 -- ignored.

2.3 INITIATE

The Initiate message is fully supported. Values sent are in table 1.

selector value -----	value sent by VMS server -----	value sent by VMS host -----
1	?	?
2	?	?
3	?	?
4 (VMS private)	?	?

2.4 START READ

Read processing is complete except in one respect. Functions included to implement distributed input editing have not been included in the server. A VMS host will never request these features. The specifics are listed below.

2.4.1 READ FLAGS

The following flags are not handled because they are intended for the distributed editing case. They are always ignored by the server, and never requested by the host.

1. UNDERFLOW-HANDLING

2. TERMINATE ON VERITCAL CHANGE

3. CONTINUATION READ

The following flags are at least partially supported.

1. CLEAR TYPE-AHEAD -- full support via IO\$M_PURGE modifier.
2. FORMATTING FLAG -- Essentially, this is the free line feed logic in the VMS terminal driver. This is always on in VMS. I doubt anyone will ever notice that value 0 (no special action) is not supported in the VMS server.
3. RAISE INPUT -- values 0 and 2 are mapped by IO\$M_CVTLOW. Value 1 (no upcase conversion for this read only) handled as is 0 were requested.
4. DISABLE CONTROL -- values supported as follows:
 1. 0 - full support.
 2. 1 - disable ^U and ^R - this is a distributed editing hook, not supported.
 3. 2 - full support mapped by IO\$M_NOFILTR.
 4. 3 - full support mapped by IO\$M_TTYREADPALL.
5. NOECHO -- full support mapped by IO\$M_NOECHO.
6. TERMINATOR ECHO -- full support mapped by IO\$M_TRMNOECHO.
7. TIME-OUT FLAG -- full support mapped by IO\$M_TIMED.
8. NON-DEFAULT TERMINATOR SET -- full support. Definition of default terminators is new with VMS version 4.0. Only CR or an escape sequence terminates a read.
9. RECOGNIZE INPUT ESCAPE SEQUENCE - full support for 0 and 2 mapped by IO\$M_ESCAPE. Value 1 (do not recognize for this read only) handled as if zero were requested.

2.4.2 READ PARAMETERS

1. MAX-LENGTH -- full support.
2. END-OF-DATA -- full support.
3. TIMEOUT -- full support.
4. END-OF-PROMPT -- full support.

5. START-OF-DISPLAY -- full support.
6. LOW-WATER -- ignored. This is another distributed editing hook.
- 7.

2.5 READ DATA

1. Flag indicating "more type-ahead data" is never set.
2. LOW-WATER is never set.
3. VERTICAL-CHANGE is used to return the cursor position for the end of the line. In other words, if a user types three left arrows before typing <CR>, this field is returned as three.

2.6 OUT-OF-BAND

Full support for control character set.

2.7 UNREAD

Full support. VMS host only requests unconditional unread.

2.8 CLEAR INPUT

Full support in server. Not requested by VMS host.

2.9 WRITE

Full support except:

1. lock handling: VMS does not handle unlock (type 0). VMS terminal services are implicitly locked when doing output.
2. Write completion not requested by VMS host. It is very easy to patch host software to request write completion on every write though.

3. undefined bit 2 (between D.UU) is used for VMS function "newline". Writing a CR with this flag causes CR and LF to be written with the internal "skip the next line feed" flag to be set. This is used in applications that read "terminator no echo" and wish to output a CR exactly as if it had been echoed by the read terminating.

2.10 WRITE COMPLETION

Full support in server. Note that the horizontal and vertical position information that is included in the spec is most likely for VMS. Note also that we are considering removing support for this return data. Any buffering of output requires that this information can not be returned.

2.11 DISCARD STATE

Full support.

2.12 READ CHARACTERISTICS AND CHARACTERISTICS

Full support of messages, see previous text for handling of individual characteristics.

2.13 CHECK INPUT

Requested by host. Maps IO\$_SETMODE!IO\$_TYPEAHCNT QIO request.

2.14 INPUT COUNT

Full support in server. Note that VMS requires the first character in typeahead as well on this function. This is handled by sending a 5 byte message instead of a 4 byte message. The VMS host software uses the length of the message to know whether the character as been included.

2.15 INPUT STATE

Zero to non-zero transitions are sent. Count became zero is not supported.

CHAPTER 3

VMS EXTENSIONS TO CTERM

3.1 REASONS FOR EXTENSIONS

Why is it necessary to extend CTERM for VMS to VMS connections? The CTERM protocol allowed expressing most command terminal functions at the time it was written. However, the base CTERM specification does not cover all of the VMS characteristics, or new functions like read verify.

It was known in the later stages of the CTERM specification that these were real problems. Because of this, hooks were placed in the protocol to make these extensions easy to add and "consistent" with the remainder of the protocol. The most important of these decisions was defining a "base CTERM" and allowing other messages to be added at will and arbitrated during the initial binding.

3.2 CHANGES TO EXISTING PROTOCOL

This section includes changes to existing messages in the CTERM protocol. These include adding new parameters and adding new flags.

3.2.1 The INIT Message

The initiate message includes a new parameter type. We use value 4 for this new parameter. It is only sent from a VMS server to a VMS host. The parameter includes the characteristics of the server terminal and is used for the initial characteristics of the newly created remote terminal.

The format of the message is as follows:

```
PARMTYPE(1) :      4
CHAR(I-255) :      VMS initial characteristics
```

3.2.2 The WRITE Message

One additional flag is used in the write message. The first free bit in the write message (the "." in "D.UU") is used for the VMS IO\$M_NEWLINE function. It is always set when this function is requested, regardless of the server system type.

The semantics of this flag are as follows: At the end of a write, output a line feed and set the internal "skip line feed" flag, so that if the first character in the next write is a line feed, double spacing is avoided. The reason this has been implemented is so that an application that does read with terminators not echoing can output a "CR" which echos as a "CR,LF" in the same manner as does the read processing.

3.2.3 The Read Message

Two additional flags are defined when talking VMS to VMS. These flags are modifiers added for the read editing enhancements done in V4. Bitwise, they are placed next to the escape modifier flags. In "..EE", they appear as "ROEE" where:

O = turn off enhanced editing functions
 0: Do regular read editing
 1: Do V3.0 flavor editing,
 DELETE, ^U, ^R only.

R = Turn off recall
 0: allow last command recall by driver
 1: pass recall back to caller to
 allow him to process recall request
 (Used by DCL to support the last 20
 commands recall feature)

3.3 NEW MESSAGES

VMS has added 3 new message to the CTERM protocol. They are for VMS private characteristics, an upline broadcast message, and extended reads (also known as read verify). These messages use message type codes 15, 16 and 17 and are specified in the INIT message mask.

3.3.1 VMS Characteristics (H <---> S)

The format of the VMS characteristics message host to server and server to host is basically a protocol version of the VMS QIO parameters. It has been done this way so that any VMS QIO can be represented in this single message. The format of this message is so VMS specific that it is meaningless to any other system, and it will not be specified here. This message uses message type code 15.

3.3.2 Upline Broadcast (H <--- S)

The upline broadcast is used in the following case. A VMS to VMS remote terminal session is in progress. The application on the remote terminal as set up a broadcast mailbox and enabled it. Any broadcast to either the remote terminal or the server terminal will result in the message being delivered to the mailbox in the host system. This means that RTPAD (the VMS server) will get a mailbox message, send it up the wire to the VMS host, and the host is responsible for writing the message to the application mailbox.

The format of the message is as follows:

```

MSGTYPE (1)      : C = 16
FLAGS   (2)      : C = 0
                        No flags defined.
MSGCODE (2)      : C = MSG$_TRMBRDCST (53 hex)
                        VMS mailbox message code.
UNITNUM (2)      : device unit number
DEVNAME (16)     : counted string of device name
MSGLEN  (2)      : byte count of message that follows
MSGTXT  (n)      : character string of text

```

3.3.3 Extended READ (H ---> S)

The extended read handles all of the additional parameters in the read verify QIO request. These reads are used by FMS and TDMS to allow efficient processing of field validated data. The format was kept as compatible with the current START READ message so that common code can be used to parse a good portion of both of these messages.

The format is the same up to the point of the terminator mask. At this point, 4 additional words are added to describe the additional strings that follow. So at the point where the terminator in the START READ is specified, the START EXTENDED READ message continues as follows:

```

ALT ECHO SIZE (2)      : alternate echo size
PIC STR SIZE  (2)      : picture string size
EXTENDED FLAGS (2)     : additional flags
BM = ..... ..RA

```

R = Right justify
0: Do normal justification
1: Do right justification

A = autotab
0: Don't do autotab
1: Do autotab

FILLCHAR (2) : Fill characters
first byte - fill character
second byte - clear character

TERMINATION-SET (I-32) : same as normal START READ

strings that follow:

PROMPT STRING

INITIAL STRING

PICTURE STRING

ALTERNATE ECHO STRING

*** I need to get a description here with the actions and semantics of extended read processing *** Voyager needs this asap.

CHAPTER 4

VMS V4.0 COMMAND LINE EDITING

4.1 OVERVIEW

The purpose of this chapter is to give an overview of the functions of the VMS V4.0 command line editing that the terminal driver offers. The command line editor is much more sophisticated than anything previously offered in a Digital operating system. The editor has two modes: insert (like EDT) or overstrike (recommended by human factors for novice users). The default mode is settable as a characteristic which is set at the beginning of each read. The mode can then be toggled by use of ^A. Table 4.1 shows the functions and the keys used to implement them.

function	key	notes
-----	-----	-----
DELETE CHAR	DELETE	
DELETE WORD	LINE FEED (^J)	does not conform to TSA
DELETE LINE	^U	deletes from cursor to BOL
MOVE LEFT	^D or left arrow	
MOVE RIGHT	^F or right arrow	
MOVE TO BOL	^H	BOL = beginning of line
MOVE TO EOL	^E	EOL = end of line
TOGGLE INS/OVER	^A	
RECALL	^B	recall last command
QUOTE	^V	allows escape sequence to be quoted as well

Table 4.1 - Read Editing Keys

In addition to the control character, VMS has made the following assignments to the LK201 keyboard. These are the key assignments VMS has made currently. Note this may not be final. Note that dead keys are reserved for future use by VMS.

key	function	same as
---	-----	-----
F6	cancel	^C
F7	dead key	
F8	dead key	
F9	Recall	^B

F10	Exit	^Z
F11	dead key	
F12	BOL	^H
F13	DelWord	^J
F14	Ins/Over	^A

Table 4.2 - LK201 keyboard definitions

Changes to COMCON and SCNSER

in TOPS-10 V 7.03

COMCON Changes

- o Command Dispatch
- o Security
- o MONGEN'ed Commands
- o DECLAR - User-defined commands

Command Dispatch

- o Customer tables separated from DEC tables
- o Rearranged table formats to make room for more bits
- o Uniqueness made more specific
- o Dispatching in section 1
- o Some commands run in section 1

Security

- o M.RCMP - MONGEN symbol
- o NORCMP - Dispatch bit to make a command ignore M.RCMP
- o Forced commands (e.g., USESTAT) require NORCMP
- o M.RCMP stops only remote lines, not local lines

MONGEN'ed Commands

- o Bit combinations on customer commands may now require angle-bracketed expressions
- o NORCMP can override M.RCMP for customer commands
- o APPFLG requests auto-push/pop on customer commands

DECLAR-ed commands

- o Auto-push available on user-defined commands
- o Uniqueness mask fully specifiable

SCNSER Changes

- o Reorganization
- o Character editing
- o Driver changes
- o New features

Reorganization

- o Code to section 1
- o Data to section 4
- o Chunks to 12-bit bytes

Character Editing

- o Fixed rubout, ^W, ^U, and ^R to correctly display changes IF:
 - In deferred echo
 - No line wrap
 - No. interference from unsolicited output

Driver Changes

- o U always has global address of LDB
- o byte pointers won't work from ACs
- o ISRREM calls now use IRR??? (defined in S.MAC)
- o XMTCHR never returns parity (maybe 8-bit characters)

New features

- o 8-bit ASCII (DEC MCS) support
- o CHTRN. UUO (for 8-bit to 7-bit fallback conversions)
- o PSI on arbitrary character
- o PSI on input available
- o Expansion of user break mask feature

NETOP. UO (CALLI 226)

XMOVEI *ac, addr*
NETOP. *ac,*
error return
normal return

addr:

length,,function
<i>connection type</i>
device, udx, or channel
<i>DEVCHR</i>
<i>DEVTYP</i>
string block for node name
string block for port name

string block:

<i>chars,,words</i>
block <words>
<i>ASCII-8</i>

Miscellaneous new monitor calls

- SEBLK. Used by DAEMON to retrieve error blocks created as a result of CI20/NIA20/HSC50 errors.
- IPCFM. Allows communications with [SYSTEM]IPCC and various flavor INFOs without requiring IPCF.
- ENTVC. Allows LINK to create entry vectors and DDT to read the contents of entry vectors. (See also the /START switch below).

Also, PIFLG. and NETOP. described elsewhere.

Miscellaneous new commands or command extensions

- PASSWORD Allows a user to change his/her password. Runs LOGIN.
- REATA Replaces the REATA program. Runs LOGIN.
- /START:n Allows a 30 bit start address to be specified on GET/RUN/SAVE. Starts the program at n on a RUN. Writes an entry vector specifying n as the start address on a SAVE.
- File Spec The file spec on GET/RUN/MERGE/SAVE commands can have the following the file structure. E.g., SAVE DSKB:[10,675]FOO

```

!-----!
.RBTYP !D!R!M!C!S! Future flags ! CRY ! DTY ! DTO ! DCC !
+-----+
.RBBSZ ! BSZ ! FSZ ! HSZ ! RFM ! RFO !
+-----+
.RBRSZ ! RSZ ! BLS !
+-----+
.RBFFB ! FFB ! ACW !
!-----!

```

```

.RBTYP==22 ;FILE TYPE AND FLAGS WORD (NON-DIRECTORY FILES ONLY)
RB.DEC==1B0 ;DEC FORMATTED FILE (THESE FOUR WORDS VALID)
RB.RMS==1B1 ;RMS-10 FORMATTED FILE
RB.MCY==1B2 ;MACY11 FORMATTED FILE
RB.CTG==1B3 ;FILE IS CONTIGUOUS ALLOCATION
RB.NSB==1B4 ;RECORDS DO NOT SPAN PHYSICAL BLOCKS
;B5-B14 RESERVED FOR FUTURE
RB.CRY==7B17 ;FILE IS ENCRYPTED (VALUE IS ALGORITHM 'TYPE')
RB.DTY==77B23 ;FILE DATA TYPE
.RBDUN==0 ;UNDEFINED DATA TYPE (I.E., NONE SPECIFIED)
.RBDAS==1 ;ASCII CHARACTER DATA
.RBDBI==2 ;BINARY (OR "IMAGE") DATA
;60-77 RESERVED FOR CUSTOMERS
RB.DTO==77B29 ;DATA "OTS" TYPE
.RBOUN==0 ;UNDEFINED (NO) LANGUAGE-SPECIFIC FORMATTING
.RBOCO==1 ;COBOL
.RBOFO==2 ;FORTRAN
.RBOMS==3 ;MAIL ("MS")
;60-77 RESERVED FOR CUSTOMERS
RB.DCC==77B35 ;DATA "CARRIAGE CONTROL" FORMATTING
.RBCUN==0 ;UNDEFINED CARRIAGE CONTROL
.RBCFO==1 ;FORTRAN CARRIAGE CONTROL
.RBCAS==2 ;ANSI "SPACE" CARRIAGE CONTROL
;60-77 RESERVED FOR CUSTOMERS
.RBBSZ==23 ;BYTE/ETC. SIZES (NON-DIRECTORY FILES ONLY)
RB.BSZ==377B7 ;LOGICAL DATA BYTE SIZE
RB.FSZ==377B15 ;PHYSICAL DATA FRAME SIZE
RB.HSZ==377B23 ;FIXED-HEADER SIZE (FOR VARIABLE-LENGTH RECORDS)
RB.RFM==77B29 ;RECORD FORMAT
.RBRUN==0 ;UNDEFINED RECORD FORMAT (NO RECORD STRUCTURE)
.RBRFX==1 ;FIXED LENGTH RECORDS
.RBRVR==2 ;VARIABLE LENGTH RECORDS
.RBRVF==3 ;VARIABLE LENGTH RECORDS WITH FIXED HEADER
.RBRSP==4 ;SPANNED (ANSI LABELED TAPES) RECORDS
;60-77 RESERVED FOR CUSTOMERS
RB.RFO==77B35 ;RECORD ORGANIZATION
.RBRSQ==0 ;SEQUENTIAL RECORD STRUCTURE
.RBRRL==1 ;RELATIVE RECORD STRUCTURE
.RBRID==2 ;INDEXED RECORD STRUCTURE
.RBRHS==3 ;HASHED RECORD STRUCTURE
;60-77 RESERVED FOR CUSTOMERS
.RBRSZ==24 ;RECORD AND BLOCK SIZES (NON-DIRECTORY FILES ONLY)
RB.RSZ==777777B17 ;RECORD SIZE (BYTES)
RB.BLS==777777B35 ;BLOCK SIZE (BYTES)
.RBFFB==25 ;FFB, ACW FIELDS (NON-DIRECTORY FILES ONLY)
RB.FFB==777777B17 ;FIRST FREE BYTE WITHIN LAST BLOCK
RB.ACW==777777B35 ;APPLICATION-SPECIFIC FIELD

```

TOPS-10 Accounting System

7.03 Project

ACCOUNTING (General)

- o Revamping for 7.03/Galaxy 5.1
- o Ease of operation
- o Greater flexibility
- o Security enhancements
- o Improved general-user interface

Accounting Components

- o ACTDAE.SYS
- o ACTDAE
- o REACT
- o LOGIN
- o NEWACT
- o (QUOTA)

ACTDAE.SYS

- o Central repository of user profile information
- o RMS indexed file (keys are PPN and username)
- o Combines old ACCT.SYS and AUXACC.SYS, plus many new features
- o Format is easily extended

ACTDAE

- o Sole modifier of ACTDAE.SYS (in normal operation)
- o QUEUE. and IPCF interface allowing anyone to request changes
- o Only one program needs to handle privilege checking
- o Only one set of routines to modify when changing formats
- o Trivial to tailor for customer profile entries, and which profile fields require privileges to change

REACT

- o Complete rewrite/replacement
- o GLXLIB/OPRPAR command interface
- o Table-driven for easy addition of customer profile entries
- o Friendly names for fields (LOGIN times allowed, privilege bits, etc.)
- o Can verify the system accounting file against a separately stored master file or snapshot file
- o Wildcards and selection criteria available for CHANGE, LIST and SHOW
- o Insertion of multiple profiles (e.g., a new semester's class)
- o Default profiles

LOGIN

- o Cleaned up internally to be more easily maintainable
- o Uses the QUEUE. interface to ACTDAE
- o Enforces the security restrictions from the profile
- o LOGIN by username or PPN
- o ATTACH by username, PPN, or job number
- o REATTACH command
- o PASSWORD command
- o LOGIN displays the last password validation information

Security Features

- o Last password validation date-time
- o Last password validation success/fail flag
- o FAILUR.LOG to keep track of all unsuccessful password validations
- o Encrypted passwords only are stored in profile
- o Use a provided one-way password encryption algorithm or provide your own
- o Maximum password length extended to 39 characters
- o Passwords can be required to be at least a specified length

Security Features (continued)

- o Changing of passwords can be required:
 - At a set time
 - At the next LOGIN
 - Every n days
- o User-requested password changes can be prohibited or allowed on a per-user basis
- o A new encryption algorithm can be added without invalidating old passwords

User Profiles

- o 8-bit usernames (up to 39 ASCIZ-8 characters)
- o PPN
- o Encrypted password
- o MAIL forwarding address (MAIL)
- o Distribution location (GALAXY)
- o Personal name (GALAXY/MAIL)
- o Structure quotas (old AUXACC)
- o Access types (including FAL and Files-only)

User Profiles (continued)

- o Minimum password length
- o Password change interval
- o Change of password deadline
- o Expiration date
- o Program-to-run
- o Context quotas
- o IPCF quotas
- o etc.

NEWACT

- o Merges ACCT.SYS, AUXACC.SYS, and an optional USERS.TXT
- o Creates ACTDAE.SYS
- o Table-driven so can easily extend to handle customer profile words
- o Can optionally demand password changes upon first LOGIN with the new accounting system
- o Assembly parameters can deal with having some form of password encryption already in use
- o Customization instructions are present in the source
- o Uses DSK: (rather than SYS:) to allow for human intervention upon its actions

GALAXY V 5.1

for TOPS-10 V 7.03

GALAXY components

- o **GLXLIB** - Common library
- o **QUASAR** - Queue manager
- o **CATLOG** - System disk and tape librarian
- o **PULSAR** - Labelled tape handler
- o **OPR** - Operator interface
- o **ORION** - OPR message router
- o **PLEASE** - User to OPR interface
- o **QUEUE** - User interface
- o **MOUNT** - MOUNT/SHOW command processor

GALAXY Spoolers

- o BATCON - Batch controller
- o CDRIVE - Card reader controller
- o SPRINT - Card job to batch job converter
- o LPTSPL - Printer spooler

Programs no longer supported

- o QMANGR - Queue entry converter
- o SPROUT - Output spooler

Requirements

- o FTFLBK variable must be set
 - TOPS-10 7.02 (FTFLBK on)
 - TOPS-10 7.03 (FTFLBK off)

- o New accounting system

Incompatibilities

- o GALGEN dialog
 - FTFLBK question
 - Application table defaults and internal status
 - LPTSPL printer drivers
 - Memory defaults
 - User specified symbols

- o Master queue file entries different

New GALAXY Features:

- o GLXLIB efficiency improvements
- o Enhanced QUASAR functionality and support
- o Enhanced OPR program
- o Time of day TAKE files
- o New system catalog handler
- o LPTSPL LN01 laser printer support
- o QUEUE rewritten
- o Control of FAL from OPR program

GLXLIB Enhancements

- o GLXKBD
 - Breakmask usage in keyboard handler
 - 8-bit support

- o GLXSCN
 - More efficient command scanner routines for TOPS10 specific keywords
 - Subcommand handling

- o GLXFIL - Can access file attribute bits

- o GLXIPC - Uses IPCFM. for lower overhead

- o New GLXFUN module to interface with other OTS

New QUASAR Functionality

- o MDA deadlock avoidance support
- o [SYSTEM]INFO functionality
- o Event queue
 - Automatic closure of:
 1. OPR log files
 2. USAGE files
 3. Billing period files
 - Requires ORION co-operation
 - Failsofts KSYS events

New QUASAR Functionality (Cont)

- o Supports unit types
- o Remote printer attributes made sticky
- o Controls FAL
- o Uses new account system for:
 - Distribution location
 - Personal name
 - Physical card reader access

OPR/ORION Enhancements

- o More application tables
 - Selectable at LINK time via GALGEN dialogue.
 - Internal
 - External

- o Time of day TAKE file processing

- o OPSER privileged commands

- o PUSH command to the monitor

- o MOUNT command includes /OVERRIDE-SET-NUMBER f
disks

Internal Applications

o CONFIG

- Takes over functions of CONFIG program.
- KLINIK line control
- Loading microcodes
- Adding and removing CIs and NIs

o LCP

- Controls Local Area Transport (LAT) access

External Applications

- o NCP - Controls DECnet network (NML)
- o CATALOG - Interfaces to system cataloger (CATLOG)
- o QUOTA - Controls QUOTA processor (PULSAR)

The CATLOG Program

- o Only needed in an MDA environment
- o Maintains resource library for QUASAR
- o Replaces REACT STRLST functions.
- o Three types of devices handled:
 - Disks (STRLST.SYS)
 - Magtapes (MTALST.SYS)
 - DECtapes (DTALST.SYS)

The QUOTA Processor

- o Handled by PULSAR
- o System administration privileges required
- o QUOTA.SYS manager (taken over from old REACT)
- o ACTDAE interface (for AUXACC modifications and comparisons)

OPSER Privileged Commands

- o Time of day TAKE files
- o EVENT processing
- o Privileged commands such as:
 - SET SYSTEM
 - BATMIN
 - BATMAX
 - LOGMAX
 - CORMAX
 - CORMIN
 - SET KSYS
 - [UN]RESTRICT

KSYS Mechanism

- o Failsofted
- o Can be set at intervals, relative and absolute time
- o Requires BATCON cooperation
 - Logs out all jobs
 - Uses batch deletion algorithm for quotas
 - Generates a log for the user

QUEUE rewritten

- o Does direct send to QUASAR
- o QMANGR
 - No new development
 - Distributed for compatibility
 - Put into maintenance

New FAL

- o Multi-threaded
- o Control from OPR program
- o DECnet and ANF-10 streams

LPTSPL for

GALAXY V 5.1

Internal Organization

- o Increased modularization
 - LPTMAC - Universal file
 - LPTSPL - Main module
 - Printer specific driver modules

- o New build procedure
 - Drivers specified via GALGEN
 - Drivers loadable at LINK time

Universal File

LPTMAC - Contains all global symbols

- o Revision history
- o Version information
- o Device driver entry vector definitions
- o Form symbols
- o Per stream status flags
- o Scheduler macros and flags
- o Per stream data page definitions

Main module

LPTSPL - Scheduler and common routines

- o Start up routines
- o Stream scheduler routines
- o Operator dialogue handlers
 - BACKSPACE/FORWARDSPACE
 - FORMS/ALIGNMENT

Main module (Cont)

- o Interrupt handlers
- o IPCF communications handler
- o Input/Output routines
- o Global variables
- o Job accounting
- o Miscellaneous library routines
- o Handles file attributes bits

Supported driver modules

- o Old functionality
 - LPTLP5 - Standard line printer
 - LPTMTA - Magtape
 - LPTD60 - DN60 (IBMCOM)

- o New functionality
 - LPTL01 - LN01 laser printer

Unsupported modules

- o DQS - Distributed Queue System
 - LPTDQS - LPTSPL interface to DQSLIB
 - DQSLIB - DECnet communications routines

- o LPTLAX - Asynchronous terminal driver

REQUIRED 7.03 UTILITIES

BOOT	V3	- Replaces MONBTS, contains various microcodes.
DAEMON	V22	- Supports error reporting for the CI and NI.
DDT	V44	- Required for multi-section monitor patching.
FILDAE	V4	- Required to support PUSH/POP messages.
KNILDR	V1	- Required to load the NIA20 microprocessor on a KL10.
LINK	V6	- Required to build the multi-section monitor.
MACRO	V53B	- Required to assemble the multi-section monitor.
MONGEN	V57	- Required to create configuration files.
SPEAR BASIC	V2	- Required for hardware and software report generation.
UUOSYM	V17	- Updated with 7.03 monitor symbols.

TOOLS

Interesting new or changed stuff on the tools tape

CICTRS

CISTS

DTECO

LPTDQS

 DQS.REL

LPTLAX

QSRCVT

KLEPTO

RMTCOM

STOPCD

WHO

All flavors of snoop programs.

Should be there but isn't

FSCOPY

MEDIA THAT SHIPPED

DECtapes (3)
Floppies (3)
RSX20F Tools Tape
RSX20F Source Pack*

KL microcode Source Tape*

KL Bootable Tape
KS Bootable Tape

DECnet Tape*
DECnet Source Tape (2 magtapes)*

Distribution Tape (Monitor and ANF10)
CUSP Tape (2 magtapes)
Tools Tape
Customer Supported Tape
MPE Tape (CPNSER)*

KLAD Tapes (5 magtapes)

*Unbundled

DISTRIBUTION TAPE

2 Save Sets

1. Monitor Save Set -- DSKB:[10,7,703MON,*]

Where * = CTLS, KL, KS

- Monitor Sources found in DSKB:[10,7,703MON]

- MONTAB.MEM[10,7,703MON]

- STOPCD.MEM[10,7,703MON]

2. ANF10 Save Set -- DSKB:[10,7,703ANF]

MPE TAPE

DSKB:[10,7,MPE]

CUSP TAPE

- 1 Save Set, 2 Magtapes - DSKB:[10,7,cusp,component].
- Changes (Read CUSP.BWR[10,7] and GALAXY.BWR[10,7,GALAXY]).
- GALAXY Components found in DSKB:[10,7,GALAXY,component].
- ACTDAE and REACT found in DSKB:[10,7,ACCT].
- [10,7,SYSTEM] contains *.RAM (previously shipped on Distribution tape).
- DIRECT (previously shipped as DIR on Customer Supported Tape).
- Special note for LINK V6, MACRO V53B.
- Copyrights of all CUSPs changed.
- New CUSPS
 - CATLOG
 - LCP
 - KNILDR
 - SWIL (previously shipped on Customer Supported tape)
- Deleted CUSP -- CONFIG
- CUSPS moved to Customer Supported tape
 - BOOTDX
 - SYSINF
 - SPROUT
 - QMANGR
 - NRT
- IBMCOM as shipped must be rebuilt with D60JSY

DECNET TAPE

3 SAVE SETS

1. Monitor Save Set -- DSKB:[10,7,703MON,*]
 - Similar to Distribution Tape

2. MCB Save Set -- DSKB:[10,7,DCNMCB]
 - Includes latest MCB, NIPGEN, NETGEN, TKB36, and VNP36
 - NETGEN combined X25GEN and NETGEN
 - All are built from sources

3. DECNET CUSPs Save Set -- DSKB:[10,7,DCNCSP]
 - CTHNRT - replaces NRT
 - NFT
 - FAL - now separate from NFT
 - NML
 - NML702.EXE

OTHER MICROCODES

DX20/TX02	V10(71)	IN	BOOT.EXB
DX20/RP20	V3(1)	IN	BOOT.EXB
DX10	V15(0)	IN	BOOT.EXB
NI	V1(167)		
CI	V1(711)	IN	BOOT.EXB

Found on CUSP tape -- DSKB:[10,7,BOOT]

KS MICROCODE (KL-Paging) V2(130)

Found on KS Bootable Tape with a new SMFILE

FRONT END MEDIA

KL MICROCODE	V2.411
RSX20F	V15-50
COMMAND FILES	
BOOT.EXB	
BOOTM.EXB	

TOOLS TAPE

- 1 SAVE SET -- DSKB:[10,7,tool,component]

CUSTOMER SUPPORTED TAPE

- INTERCHANGE MODE
- 2 SAVE SETS
 1. CUSPS SAVE SET
Updated SOS
 2. MONITOR SAVE SET

TOPS-10 VERSION 7.03 DOCUMENTATION

<u>Manual Title</u>	<u>SDC Order Number</u>	<u>To Print</u>	
TOPS-10 Monitor Calls			Manuals Shipped
Volume 1	AA-0974F-TB	4/1	With 7.03
Volume 2	AA-K039B-TB	4/1	
TOPS-10 Operating System Commands Manual	AA-0916E-TB	4/1	
TOPS-10 Operator's Command Language Reference Manual	AA-H599B-TB	3/31	
TOPS-10 Operator's Guide	AA-H383B-TB	3/17	
TOPS-10 DECnet and PSI System Manager's and Operator's Guide	AA-L413B-TB	3/29	
TOPS-10 DECnet and PSI Installation Guide	AA-P379B-TB	4/1	
TOPS-10 Software Installation Guide	AA-P512B-TB	4/1	
TOPS-10 Crash Analysis Guide	AA-H206C-TB	4/1	
TOPS-10 LINK Reference Manual (Update)	AD-0988D-TB	3/18	
TOPS-10 DDT Manual	AA-BH82B-TB	3/24	
TOPS-10 Notebooks Update 96	QHN04-WZ	4/1	
TOPS-10/20 RSX-20F System Reference Manual	AD-BS94A-T1	4/2	

TOPS-10 User Utilities Manual	AA-0998B-TB	6/3	Manuals Shipped
			After 7.03
TOPS-10 Monitor Calls Quick Reference Guide	AV-0978F-TB	6/5	
TOPS-10 Commands Quick Reference Guide	AV-K729C-TB	6/5	
TOPS-10 Notebooks Update 97	QHN05-WZ	7/28	
TOPS-10 Monitor Tables	N/A	7/28	
TOPS-10 Stopcodes	N/A	7/28	

TOPS-10 VERSION 7.03 FIELD TEST DOCUMENTATION

<u>Manual Title</u>	<u>SDC Order Number</u>	<u>Date Sent To Field Test</u>	<u>Total No. of QARs</u>
TOPS-10 Monitor Calls Volume 1	AA-0974F-TB	11/25	1
Volume 2	AA-K039B-TB	6/85	6
TOPS-10 Operating System Commands Manual	AA-0916E-TB	6/85	5
TOPS-10 Operator's Command Language Reference Manual	AA-H599B-TB	6/85	0
TOPS-10 Operator's Guide	AA-H383B-TB	6/85	1
TOPS-10 DECnet and PSI System Manager's and Operator's Guide	AA-L413B-TB	6/85	1
TOPS-10 DECnet and PSI Installation Guide	AA-P379B-TB	10/85	1
TOPS-10 Software Installation Guide	AA-P512B-TB	10/85	0
TOPS-10 Crash Analysis Guide	AA-H206C-TB	6/85	3
TOPS-10/20 RSX-20F System Reference Manual	AD-BS934A-T1	11/25	1
TOPS-10 User Utilities Manual	AA-0998B-TB	6/85	0
TOPS-10 Monitor Tables	N/A	6/85	7
TOPS-10 Stopcodes	N/A	6/85	0
Total number of documentation QARs:		26	

FINAL FIELD TEST SUMMARY REPORT

for

TOPS-10 Version 7.03

Alan Frantz, Project Leader

William Kellicker, CSSE/PTG Manager

Submitted: April 23, 1985
By Batya Olsen, CSSE/PTM

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APPENDIX A TOPS-10 7.03 QARS DEFERRED TO AUTOPATCH

APPENDIX B TOPS-10 V7.03 OPEN QAR SUMMARIES

1.0 TOPS-10 V7.03 INFORMATION

TOPS-10 Version 7.03 is a major release of the TOPS-10 Operating System including both new development and maintenance improvements.

The TOPS-10 7.03 introduces new software to support the hardware for the CI20, Star Coupler, HSC50, RA81 and RA60.

In V7.03, new required functionality included:

- DECnet Phase IV,
- CI20 support,
- HSC-50 disk support (RA81 and RA60)
- NIA20 support,
- LAT
- CTERM
- MOP Protocol support for loopback over the NI,
- password encryption,
- a customer-supported tape of software for unsupported hardware.
- MCA25 support, and
- MG20 support

Additional new features of this release are:

- Multi-threaded FAL
- Microcode plus
- reorganization of the address space
- User Mode Extended Addressing
- PFH in the Monitor
- alternate contexts
- six character STOPCDs
- new SCHED. functions

- GALAXY 5.1
- SCNSER enhancements

The scope of the field test specifically includes

- o the TOPS-10 7.03 Monitor, including CI and NI support,
- o CUSPS,
- o DECnet-10 4.0,
- o GALAXY 5.1,
- o RSX02F, and
- o KL microcode.

The purpose of this document is to summarize how well these objectives were met from the customer's point of view.

Tracking provided information relevant to product serviceability, readiness for general release, and customer satisfaction with a new release of a software product.

2.0 FIELD TEST SUMMARY

The information presented here is the result of Product Tracking efforts during nearly thirteen months of testing in the field. Alpha testing at customer sites began in mid-March of 1985. TOPS-10 7.03 official Field Testing began in the third week of October and ended Field Test on 16-April-86.

There were ten customer sites in the U.S., one in Europe plus five internal sites in England, France, Marlboro (2), and Colorado Springs at which 7.03 was tracked. This includes customer sites that were added rather late to the Field Test and were included in the tracking effort.

2.1 FIELD TEST SITE INFORMATION

CUSTOMER SITES

ABBOTT LABS, RESEARCH COMPUTING
Abbott Park, Bldg AP9
North Chicago, IL 60664
Customer Code: ABBO
Customer Contacts: Don weber, Wade Missimer
Site Configuration:

System:1321, Type:1090 ABBOT (KL-SMP)
 System:4228, Type:2020 REACT
 Testing: NI, CTERM, LAT, RA81, RA60, RP20, RPO6, RPO7

QAR Activity:

ABBO	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open		7	3	10	10					
Closed	19	66	41	126	108		2	8	2	6
TOTAL	19	73	44	136	118		2	8	2	6

CH2M Hill Inc.
 2300 N.W. Walnut
 Corvallis, Oregon 97330
 Customer Code: CH2M_
 Customer Contacts: Kirk Topits, Mike White
 Site Configuration:
 System:1226, Type:1090 A (TRI-SMP)
 System:1348, Type:1090 B
 System:1449, Type:1090 CVO
 Testing: NI, DECnet

QAR Activity:

CH2M__	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open	1	1	7	9	8					1
Closed	9	22	14	45	42			1	1	1
TOTAL	10	23	21	54	50			1	1	2

FOKKER BV, Schipholdijk 231, 1117 AB Schiphol Oost,
 NETHERLANDS
 Customer Code: FOKKR
 Customer Contacts: Abram J. De Vuyst and Wildrick Burema
 Site Configuration:
 System:2493, Type:1095
 System:3112, Type:2065
 System:2158, Type:2065
 System:4163, Type:2020
 Testing: NIA20, DECnet, LAT

QAR Activity:

FOKKR	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open	1	4	1	6	5				1	
Closed	8	31	13	52	47		1		2	2
TOTAL	9	35	14	58	52		1		3	2

JOHNSON _JOHNSON

MIC Route 202

Raritan NJ 08869

Customer Code: JHNSN

Customer Contacts: Ralph, Bradshaw, Tom Martin

Site Configuration:

System: , Type:1095

Testing: NI, DECnet

QAR Activity:

JHNSN	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open		3	1	4	4					
Closed	4	13	13	30	27			1		2
TOTAL	4	16	14	34	31			1		2

MARTIN MARIETTA ENERGY SYSTEMS

Bethel Valley Road, PO Box X, Bldg 4500-S, Rm T-2

Oak Ridge, TN 37830

Customer Code: MTNMR

Customer Contacts: Duane Winkler, Larry Sendlosky

Site Configuration:

System:3533, Type:1095

System:3118, Type:1099 (QUINT)

Testing: SW only

QAR Activity:

MTNMR	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open		2		2	2					
Closed	4	18	2	24	19		2			3
TOTAL	4	20	2	26	21		2			3

DEPARTMENT OF ENERGY
 Office of Scientific and Technical Information,
 Oak Ridge, Tennessee 37831
 Customer Code: OSTI_
 Customer Contact: Al Craig, Gerard Newman at SAI
 Site Configuration:
 System:1365, Type:1090
 System:1367, Type:1090
 Testing: NI, CI, LAT, RA81, RA60

QAR Activity:

OSTI__	low	nrml	hi	TOTAL	--	sw	hdw	perf	doc	sugg	othr
Open				0							
Closed	9	14	13	36		32				1	3
TOTAL	9	14	13	36		32				1	3

STEVENS INSTITUTE OF TECHNOLOGY
 Computer Center
 Castle Point Station
 Hoboken, New Jersey 07030
 Customer Code: STVNS
 Customer Contact: Robert McQueen
 Site Configuration:
 System:30515, Type:1091
 System:1282, Type:1090
 System:4566, Type:1090
 System: , Type:2020
 Testing: DECnet, NI, LAT, CTERM

QAR Activity:

STVNS	low	nrml	hi	TOTAL	--	sw	hdw	perf	doc	sugg	othr
Open	1	8	3	12		11		1			
Closed	52	117	39	208		176			8	15	9
TOTAL	53	125	42	220		187			8	15	9

SOUTHWEST TEXAS STATE UNIVERSITY
 Computer Services, J.C.Kellam Bldg.
 San Marcos, TX 78666
 Customer Code: SWTX
 Customer Contact: R. R. Rodriquez
 Site Configuration:
 System:2403, Type:1095 MARS::
 System:2908, Type:1095 SATURN::
 205

Testing: NI, LAT, DECNET

QAR Activity:

SWTX	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open	1	11	1	13	17					
Closed		32	17	49	48					1
TOTAL	1	43	18	62	61					1

UNIVERSITY OF TEXAS

Medical Computing Resource Center
 4600 Harry Hines,
 Dallas, TX 75235

Customer Code: TEXAS

Customer Contact: Victor Summerour

Site Configuration:

System:1040, Type:1090 (KL-SMP)

System:1302, Type:1090

Testing: CI, no NI, LAT, CTERM, RA81

QAR Activity:

TEXAS	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open		6		6	3					3
Closed	23	65	9	97	82			4	1	10
TOTAL	23	71	9	103	85			4	1	13

VANDERBILT UNIVERSITY

Computer Center, P.O Box 1577, Station B,
 Nashville, Tennessee 37235

Customer Code: VBILT

Customer Contacts: Charles Bradshaw, Denson Burnum, Esfandiar Zafar

Site Configuration:

System:1209, Type:1090 (TRI-SMP)

System:1210, Type:1090

System:2232, Type:2060

Testing: NI, GALAXY 5.1

QAR Activity:

VBILT	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open		5	4	9	7			1		1
Closed	14	30	36	80	67		2	4	3	4
TOTAL	14	35	40	89	74		2	5	3	5

WESTERN MICHIGAN UNIVERSITY
 Rood Hall Computer Center, Rm. 3325,
 Oakland Stadium Dr., Kalamazoo, MI 49008
 Customer Code: WMIC
 Customer Contacts: Norman Grant, Ron Schubot
 Site Configuration:
 System:1190, Type:1099 (KL-SMP)
 System:1235, Type:1099
 Testing: NI, DECnet, CTERM, LAT, RA81, RA60

QAR Activity:

WMIC	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open	1	4	8	13	13					
Closed	3	43	72	118	109			6	3	
TOTAL	4	47	80	131	122			6	3	

INTERNAL SITES

CUSTOMER SERVICES SUPPORT CENTER, UK Region, DEC, Ltd.,
 Jay's Close, Basingstoke, Hampshire, RG21 4BS ENGLAND
 Site Code: BSTOK
 Site Contact: Paul Kelsey
 Site Configuration:
 System:3160, Type:2065
 System: , Type:2020
 Testing: DECnet

QAR Activity:

BSTOK	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open			2	2	2					
Closed			1	1	1					
TOTAL			3	3	3					

(COLORADO SPRINGS) CUSTOMER SUPPORT CENTER
 KS02/KSO, 4405 No. Chestnut St.
 Colorado Springs, CO 80907-3812
 Site Code: CSLCG
 Site Contact: Clyde Smith
 Site Configuration:
 System:1135, Type:1090
 Testing: NI, CI, DECnet

QAR Activity:

CSLCG	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open				0						
Closed	3	8	1	12	11	1				
TOTAL	3	8	1	12	11	1				

DIGITAL EQUIPMENT CORPORATION
 200 Forest Street, MR01-1/S35, Marlboro, Massachusetts 01752
 Site Code: DEC
 Site Contact: John Jrzyszto
 Site Configuration:
 System:2241, Type:2060 MRCSSSE::
 System:1322, Type:2065 MRSMEG::
 Testing:

QAR Activity:

DEC	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open				0						
Closed	2	4	5	11	9		1	1		
TOTAL	2	4	5	11	9		1	1		

DECnet Certification - DIGITAL EQUIPMENT CORPORATION
 200 Forest St, Box 1001, MRO1-2/S43
 Marlboro, MA 01752
 Site Code: DCERT
 Site Contact: Barbara Huizenga
 Site Configuration:
 System:1026, Type:1099
 System:4097, Type:2020
 Testing: DECnet

QAR Activity:

DCERT	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open		2	1	3	3					
Closed	1	18	12	31	30			1		
TOTAL	1	20	13	34	33			1		

INTERNAL SOFTWARE SERVICES
 67 Forest Street, IND-3, Marlboro, Massachusetts 01752
 Site Code: ISWS
 Site Contact: John Francini
 Site Configuration:
 System:1122, Type:1091 TWINKY::
 System:4149, Type:2020 MREAST::
 System:2197, Type:2060
 Testing: NI, LAT-11, DECnet, CTERM, GLALXY 5.1

QAR Activity:

ISWS	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open	1		1	2	2					
Closed		18	17	35	33		1			1
TOTAL	1	18	18	37	35		1			1

EUROPEAN TECHNICAL CENTER, S.A.R.L., B.P. 29 Sophia Antipolis
 F-06652 Valbonne Cedex, France
 Site Code: TSCVB
 Site Contact: Ake Blomberg
 Site Configuration:
 System:2931, Type:2065
 System: , Type:2020
 Testing: DECnet

QAR Activity:

TSCVB	low	nrml	hi	TOTAL	sw	hdw	perf	doc	sugg	othr
Open				0						
Closed				0						
TOTAL				0						

3.0 QAR REPORT

As of the Phase III Review, 16-April-1985, 1055 Quality Assurance Reports had been entered for TOPS-10 V7.03 during the Field Test via the MOTHER Data Base Network of which 14 were entered after 11-Apr-86, the date specified in Field Test Administration's Field Test Termination Letter as the end of field test. As of the Phase III Review, 957 of these QARs are closed. Of the closed QARs, 37 were answered as being deferred to Autopatch 14 or a future release. In addition, 8 QARs were answered with patches and a commitment to having the sources appear in the next autopatch tape. A list of these 45 QARs is given in Appendix A. 82 QARs were closed as not being a problem, that is either an intended implementation or an error by the user. 8 QARs were rejected suggestions. 5 QARs were accepted suggestions. 8 QARs were closed as deferred suggestions. 139 QARs were closed with requests for more information from the sites. 52 QARs were closed as being known problems, that is, either problems already reported in other QARs or restrictions in the software. 25 QARs were closed as documentation errors. CSSE and Engineering reviewed each of the 98 open QARs and agreed that none of them would prevent TOPS-10 V7.03 from completing the Field Test. Each of these reported problems will be resolved either in the next Autopatch Tape (number 14) or in V7.04. These QARs are summarized in Appendix B.

3.1 TOPS-10 V7.03 QAR TOTALS CHART

Totals by PRIORITY

Totals by PROBLEM TYPE

```

.....
+-----+-----+-----+-----+-----+-----+
TOTALS | low | nrm | hi | TOTAL | -- | sw | hdw | perf | doc | sugg | othr |
+-----+-----+-----+-----+-----+-----+
Open | 8 | 56 | 34 | 98 | | 89 | | 1 | 1 | 1 | 6 |
+-----+-----+-----+-----+-----+-----+
Closed | 151 | 501 | 305 | 957 | | 843 | 1 | 9 | 35 | 27 | 42 |
+-----+-----+-----+-----+-----+-----+
TOTAL | 159 | 557 | 339 | 1055 | | 932 | 1 | 10 | 36 | 28 | 48 |
.....
    
```

4.0 RESPONSE SUMMARY TO FINAL POLLING OF FIELD TEST SITES

DO YOU THINK THAT 7.03 (257) IS READY TO BE SHIPPED?

External sites

```

ABBO:                Yes.

CH2M:                Yes.

FOKKR:              unable to contact.

JHNSN:              Yes.

MTNMR:              unable to contact.

OSTI:                No.

STVNS:              Yes.

SWTX:                Yes.

TEXAS:              Yes.

VBILT:              No.
    
```

WMIC: Yes.

Internal Sites

CSLCG: Yes.

ISWS: Yes.

TSCVB: Yes.

5.0 COMPLIANCE TO EXIT CRITERIA FOR TOPS-10 V7.03

The following criteria were used by the Management Team to decide whether the product was ready to exit Field Test:

1. There are no unresolved file integrity problems.

Met.

2. There are no unresolved high priority QARs or recurring system crash scenarios.

Met, none of the remaining user-define high priority QARs are on Development's gating problem list.

3. The incoming QAR rate has declined to a level consistent with a stable, reliable product. This is a quantitative determination by the Management Team since customers may submit trivial QARs near the end of field test.

Met.

4. The total backlog of unanswered QARs averages fewer than 5 per Field Test Site.

There are an average of 5.6 open QARs per each of the 16 active field test sites (internal and external).

5. At least 1200 aggregate hours of runtime have been accumulated and logged at each participating site averaged over the complete set of formal field test sites.

This translates to 7 weeks of continuous runtime per system.

At least 600 hours of this must be prime time.

Met.

6. Testing of layered products has been successfully completed and a report is available.

Completed. The report to be available at the Phase III Review.

7. TOPS-10 Monitor Performance has been completed and the results show no area of significant degradation of performance relative to the previous release (TOPS-10 7.02). Performance degradation should be no greater than 10%.

Completed. The report to be available at the Phase III Review.

8. During the Field Test, system effectiveness and availability data will be collected from the sites and compared to data from the same sites for TOPS-10 7.02. This information will be used by the Management Team to determine the quality and stability of 7.03 relative to 7.02 and also to 7.03 itself as the field test progresses.

Done.

9. DECnet Certification and performance measurements have been completed and the reports available.

Completed. The report to be available at the Phase III Review.

10. All fixes necessary for this release have been incorporated into the sources (no patches). There will be no source edits made to the TOPS-10 7.03 or DECnet-10 products during the last two weeks of field test prior to start of final packaging, unless approved by the Management Team.

Met.

11. Fixes that have not been incorporated into the final product have been identified and appropriate action taken place to ensure that the field and the customers have access to the corrections (e.g BWR file).

Met.

12. The BWR, DOC, and HLP files are complete and have been reviewed by SWE, Product Management, DSME/CSSE, and documentation.

Met.

13. All documentation has been reviewed and is in final production.

Met.

14. Each TOPS-10 configuration has been built from the final field test tapes, and has run for a short period of time. Testing results are documented in the SER. The report will include the time required for the installations.

Completed. The report to be available at the Phase III Review.

15. The final tape (sanity tape) has run for two weeks in-house and one week at, at least, two sites.

Met.

16. Serviceability of TOPS-10 7.03 and DECnet 4.0 have been verified as outlined in the respective STPs.

Met.

17. All diagnostics are fully functional and operating correctly.

The diagnostics include the CI20, NIA20, KL10 CPU, memory, peripheral subsystem and device, and communication option diagnostics.

CSSE will ensure that the diagnostics are tested.

Met.

18. Verification of the KLAD build.

CSSE will verify the KLAD build process and ensure testing of the KLAD packs.

Met.

19. The SPDs have been approved and the software conforms to them.

Met.

20. There should be consensus among the Field Test sites that the products are ready to ship based on both the technical and non-technical polling.

Met.

21. There should be agreement among the Management Team that the product is ready for release.

Met.

6.0 EVALUATION OF TOPS-10 V7.03 FIELD TEST

The TOPS-10 V7.03 Field Test Sites were chosen to test a variety of system configurations, network options, network configurations and applications.

The major purposes of this field test in testing CI20 Support and HSC50 disk support as well as CTERM, DECnet Phase IV, LAT support, and NIA-20 Support were achieved. The new features listed above in section 1.0 were tested by most sites.

In general the field test sites selected were cooperative and provided much important feedback. The University of Texas Health Science Center, Abbott Laboratories, Southwest Texas State College and Johnson and Johnson were among those who were able to bring up new software most promptly. Stevens Institute provided much testing of the documentation as well as the software. Other sites tended to find bugs early due to their extraordinary configurations and/or work load. Some of the other sites were somewhat less effective as test sites due to hardware problems, lack of on-site expertise, lead-time required to receive tapes, or the conservative nature of their user groups.

APPENDIX A

TOPS-10 7.03 QARS DEFERRED TO AUTOPATCH

TOPS-10 V7.03 QARS that were addressed but with resolutions still forthcoming via AUTOPATCH:

QAR:868033, LO:10, TSC: , TP:1, ST:CLOSED, PR:HIGH, CD:ABBO , ENGR:BAH
FILE MAY BE GARBAGED AT EOT

QAR:868115, LO:16, TSC: , TP:0, ST:CLOSED, PR:NORMAL, CD:WMIC , ENGR:ETT
ANFRDT STOPCD FOR LPTSPL ON REMOTE PRINTERS

QAR:868143, LO:20, TSC: , TP:0, ST:CLOSED, PR:HIGH, CD:WMIC , ENGR:ETT
LPTSPL HUNG IN IO WAIT WHEN USING NEWLY INSTALLED CFE-LP27

QAR:868184, LO:8, TSC: , TP:1, ST:CLOSED, PR:NORMAL, CD:VBILT, ENGR:ETT
ASS TTY 6 COMMAND FAILS IF IT FOLLOWS A ^C FROM SETSRC PROGRAM

QAR:868305, LO:15, TSC: , TP:2, ST:CLOSED, PR:NORMAL, CD:FOKKR, ENGR:ETT
JOBS DON'T GET DETACHED WHEN CARRIER IS DROPPED

QAR:868308, LO:20, TSC: , TP:3, ST:CLOSED, PR:NORMAL, CD:FOKKR, ENGR:ETT
SYSTEM DEADLOCK

QAR:868328, LO:7140, TSC: , TP:1, ST:CLOSED, PR:HIGH, CD:DCERT, ENGR:ETT
DTS WILL HANG DOING A DATA TEST

QAR:868341, LO:94, TSC: , TP:3, ST:CLOSED, PR:HIGH, CD:STVNS, ENGR:ETT
OPR REPRINTING OF A PARTIALLY ENTERED COMMAND DOESN'T WORK

QAR:868382, LO:275, TSC: , TP:4, ST:CLOSED, PR:NORMAL, CD:ISWS , ENGR:ETT
SYSTEM NOT DEFENSIVE ENOUGH IF A SWAPPING PACK IS REMOVED WITHOUT TELLING I

QAR:868437, LO:29, TSC: , TP:233, ST:CLOSED, PR:HIGH, CD:VBILT, ENGR:ETT
EUE STOPCODE

QAR:868442, LO:129, TSC: , TP:4, ST:CLOSED, PR:NORMAL, CD:STVNS, ENGR:ETT
IME STOPCODE IN SEGCON AT PTHFIL+2

QAR:868448, LO:4, TSC: , TP:4, ST:CLOSED, PR:NORMAL, CD:SWTX , ENGR:ETT
JUNK IN FAILURE LOG

QAR:868465, LO:75, TSC: , TP:3, ST:CLOSED, PR:LOW, CD:TEXAS, ENGR:ETT
EUE DURING HIBER UUU -- GALAXY COMPONENTS

QAR:868507, LO:50, TSC: , TP:3, ST:CLOSED, PR:NORMAL, CD:WMIC , ENGR:ETT
ERROR COPYING FILE WITH RECORD ATTRIBUTES: FORTRAN CARRIAGE CONTROL

QAR:868512, LO:5, TSC: , TP:4, ST:CLOSED, PR:HIG, CD:ABBO , ENGR:ETT
NETWORK DATA BASE GETTING CLOBBERED

QAR:868546, LO:14, TSC: , TP:4, ST:CLOSED, PR:NORMAL, CD:SWTX , ENGR:ETT
IME WHE RUNS NML

QAR:868560, LO:85, TSC: , TP:4, ST:CLOSED, PR:NORMAL, CD:TEXAS, ENGR:ETT
CONTINUATIONS OF QAR 868559 RENAME PROBLEM

QAR:868570, LO:7, TSC: , TP:4, ST:CLOSED, PR:NORMAL, CD:ABBO , ENGR:ETT
IME STOPCODES -- STACK CONTAINS ALL ZERO'S

QAR:868578, LO:157, TSC: , TP:4, ST:CLOSED, PR:HIG, CD:STVNS, ENGR:ETT
JOB STUCK IN PQ1.

QAR:868592, LO:163, TSC:|, TP:4, ST:CLOSED, PR:HIG, CD:STVNS, ENGR:WXD
MORE INFO ON QAR #868588

QAR:868618, LO:35, TSC: , TP:233, ST:CLOSED, PR:NORMAL, CD:FOKKR, ENGR:DPM
SEVERAL FIELDS NOT COPIED FROM DEFAULT ENTRY

QAR:868622, LO:171, TSC: , TP:5, ST:CLOSED, PR:NORMAL, CD:STVNS, ENGR:DPM
RMS-10 VERSION NUMBERS SEEM TO BE SKEWED.

QAR:868627, LO:43, TSC: , TP:245, ST:CLOSED, PR:LOW, CD:VBILT, ENGR:WXD
KNIHLT STOPCODES WHILE ANOTHER STOPCODE IS BEING PROCESSED

QAR:868633, LO:92, TSC: , TP:5, ST:CLOSED, PR:LOW, CD:TEXAS, ENGR:DPM
REACT WILL NOT LET CHANGE OWN PASSWORD

QAR:868732, LO:24, TSC: , TP:5, ST:CLOSED, PR:NORMAL, CD:CH2M_, ENGR:KBY
.PAGGA FUNCTION OF PAGE. UUU DOES NOT RETURN ENTIRE BIT MAP

QAR:868740, LO:68569, TSC: , TP:5, ST:CLOSED, PR:LOW, CD:JHNSN, ENGR:RCB
TERM NO LC ACTS FUNNY

QAR:868747, LO:75, TSC: , TP:5, ST:CLOSED, PR:HIG, CD:WMIC , ENGR:DPM
BAC FROM LOGOUT/LOGOUT UUU

QAR:868754, LO:28, TSC: , TP:5, ST:CLOSED, PR:HIG, CD:CH2M_, ENGR:KBY
JOBS HUNG IN RN STATE AFTER SWAPPING MIGRATION

QAR:868761, LO:51, TSC: , TP:5, ST:CLOSED, PR:NORMAL, CD:ABBO , ENGR:KBY
INCONSISTENCY IN SEGMENT TABLE

QAR:868772, LO:29, TSC: , TP:5, ST:CLOSED, PR:LOW, CD:CH2M_, ENGR:DRB
FILCOM /1L BROKEN

QAR:868774, LO:31, TSC: , TP:5, ST:CLOSED, PR:LOW, CD:CH2M_, ENGR:DRB

COMPIL 22F (576) FAILS TO ACCEPT AN INDIRECT FILE

QAR:868783, LO:8863, TSC: , TP:254, ST:OPEN, PR:LOW, CD:ISWS , ENGR:DRUEK
SPEAR DISK ERROR REPORTS DON'T

QAR:868808, LO:38, TSC: , TP:5, ST:CLOSED, PR:HIGH, CD:CH2M_ , ENGR:KBY
IME @ PFHTM4

QAR:868810, LO:40, TSC: , TP:5, ST:CLOSED, PR:NORMAL, CD:CH2M_ , ENGR:KBY
DORMANT SEGMENTS NOT PRESERVED

QAR:868827, LO:39, TSC: , TP:6, ST:CLOSED, PR:NORMAL, CD:SWTX , ENGR:DPM
PFL STOPCODE FOLLOWED BY A CMU

QAR:868842, LO:87, TSC: , TP:5, ST:CLOSED, PR:HIGH, CD:WMIC , ENGR:JAD
CANT REMOUNT RA60 AFTER DISMOUNT

QAR:868859, LO:7140, TSC: , TP:5, ST:CLOSED, PR:NORMAL, CD:DCERT, ENGR:RDH
NFT AND FAL DON'T KNOW ABOUT PC/DOS

QAR:868860, LO:49, TSC: , TP:6, ST:CLOSED, PR:NORMAL, CD:SWTX , ENGR:RDH
DIFFICULTY USING VT2XX OVER ANF LINES

QAR:868867, LO:5, TSC: , TP:5, ST:CLOSED, PR:HIGH, CD:CH2M_ , ENGR:KBY
SBZ AND KAF STOPCODES DOING JOBPEK, POSSIBLE NXM'S

QAR:868909, LO:107, TSC: , TP:6, ST:CLOSED, PR:LOW, CD:TEXAS, ENGR:RDH
NFT IGNORES /BUFFER AND /BUFFERSIZE SWITCHES

QAR:868923, LO:210, TSC: , TP:6, ST:CLOSED, PR:NORMAL, CD:STVNS, ENGR:RDH
ERROR IN PARSING RECEIVED NAME MESSAGE WHEN TAKING A DIRECTORY OF 11M OR PO

QAR:868943, LO:49, TSC: , TP:6, ST:CLOSED, PR:HIGH, CD:CH2M_ , ENGR:DPM
BAC OR IME STOPCODES DURING LOGOUT

QAR:868976, LO:860318, TSC: , TP:255, ST:CLOSED, PR:NORMAL, CD:CSLCG, ENGR:KBY
UNJ STOPCODES ASSOCIATED WITH CORE COMMAND

QAR:868977, LO:215, TSC: , TP:6, ST:CLOSED, PR:HIGH, CD:STVNS, ENGR:JMF
DPN STOPCODES WHEN DOING A SAVE TO MTAP:

QAR:868992, LO:82, TSC: , TP:6, ST:CLOSED, PR:LOW, CD:VBILT, ENGR:DRB
FAL IN TO STATE

APPENDIX B

TOPS-10 V7.03 OPEN QAR SUMMARIES

Abbreviations used in the following list (exclusive of the problem statements):

- CODE - indicates which site made the report.
- DOC - reports about the documentation.
- DOC_ERROR - a response that the issue reported will be corrected in the documentation.
- H or HI - high priority
- HDW - reports about hardware
- KNOWN PROB - a response that the issue reported has already been addressed.
- L - low priority
- N or NRML - normal priority
- NOT_A_PROB - a response that the issue reported is not a problem with this product.
- OPN/CLSD - open or closed status of the QAR.
- OTHE or OTHR - "other" class of report.
- PERF - reports about product performance.
- PRI - priority assigned to the report by the customer or by DEC.
- SUGG - reports which are suggestions.
- SW_E or SW - reports about software

Tops-10 7.03 Open QARs sorted by Customer-Defined Priority
(with secondary sort by date of entry.)

Open QARs Summaries:

QAR CODE	Number	DEV Name	Problem Statement	DEC Date	Current QAR Status	Date LAST Accessed	Opn/Clsd Status
PRI	PRI	Clas	Recieved				

ABBO	868594	WORLE	MORE ON QAR 868593				
H	-	SW E	12-Dec-85	Assigned	14-Jan-86	--OPEN--	
VBILT	868662	JMF	RE QAR OF 868651				

H - Othe 14-Jan-86 Assigned 15-Jan-86 --OPEN--
 WMIC 868668 CJA ANOTHER IME IN NEWCKS RE:868378
 H - SW E 15-Jan-86 Assigned 3-Mar-86 --OPEN--
 WMIC 868685 SPIDE EUE LOGING OUT A JOB
 H - SW E 16-Jan-86 Assigned 17-Jan-86 --OPEN--
 DCERT 868705 CJA TOPS-10 TO RT-11 DOESN'T WORK
 H - SW E 20-Jan-86 Assigned 21-Jan-86 --OPEN--
 STVNS 868752 DPM MORE INFO ON END-OF-TAPE PROBLEM WITH BACKUP AND L
 H - SW E 28-Jan-86 Assigned 30-Jan-86 --OPEN--
 CH2M_ 868802 SPIDE JOBS STUCK IN COMMAND WAIT, RE QAR 868754
 H - SW E 6-Feb-86 Assigned 7-Feb-86 --OPEN--
 CH2M_ 868805 SPIDE IME AT IPCFQ4
 H - SW E 6-Feb-86 Assigned 7-Feb-86 --OPEN--
 ABBO 868821 SPIDE GUARANTEED SYSTEM KILLER
 H - SW E 9-Feb-86 Assigned 10-Feb-86 --OPEN--
 FOKKR 868855 SPIDE JOBS HUNG IN TI STATE
 H - SW E 17-Feb-86 Assigned 17-Feb-86 --OPEN--
 STVNS 868921 SPIDE RSX-11M 4.2/DECNET-11M 4.2 CAN NOT SET HOST TO A T
 H - SW E 4-Mar-86 Assigned 6-Mar-86 --OPEN--
 CH2M_ 868941 KBY NXMS AND KAFS DOING JOBPEK
 H - SW E 6-Mar-86 Assigned 7-Mar-86 --OPEN--
 CH2M_ 868944 JAD RELOAD IME ON HUNG DISK
 H - SW E 6-Mar-86 Assigned 7-Mar-86 --OPEN--
 CH2M_ 868945 JMF AAO STOPCODES.
 H - SW E 6-Mar-86 Assigned 7-Mar-86 --OPEN--
 CH2M_ 868947 JMF PFNO10 STOPCODES
 H - SW E 6-Mar-86 Assigned 7-Mar-86 --OPEN--
 WMIC 868978 NT PART OF LPTSPL TRAILER PRINTS A FEW PAGES EARLY.
 H - SW E 19-Mar-86 Assigned 20-Mar-86 --OPEN--
 VBILT 868982 KBY PEZ STOPCODE
 H - SW E 19-Mar-86 Assigned 20-Mar-86 --OPEN--
 WMIC 868983 KBY JOB STUCK IN RN SW.
 H - SW E 19-Mar-86 Assigned 20-Mar-86 --OPEN--
 VBILT 868984 KBY IME STOPCODE
 H - SW E 19-Mar-86 Assigned 20-Mar-86 --OPEN--
 VBILT 868995 FRANT RSX2OF TAPE IS NEEDED
 H - DOC 24-Mar-86 Assigned 24-Mar-86 --OPEN--
 ISWS 869016 SPIDE "IO TO UNASS. CHANNEL" IF DEFAULT LOG FILE FIELD N
 H - SW E 2-Apr-86 Assigned 3-Apr-86 --OPEN--
 ABBO 869022 NT ERROR CODE 6 RETURNED FROM ORION TO QUEUE UO
 H - SW E 7-Apr-86 Assigned 8-Apr-86 --OPEN--
 WMIC 869028 NT MORE ON QAR:868978 MIXED OUTPUT ON LPT:
 H - SW E 8-Apr-86 Assigned 9-Apr-86 --OPEN--
 WMIC 869029 DPM LPTSPL HANGING IN IO UPDATE RE:868294
 H - SW E 8-Apr-86 Assigned 9-Apr-86 --OPEN--
 WMIC 869030 JMF AAO FROM R BACKUP:/DIR BACKUP:
 H - SW E 8-Apr-86 Assigned 9-Apr-86 --OPEN--
 SWTX 869031 SPIDE STILL GETTING NRTBPM STOPCD'S WITH 257
 H - SW E 8-Apr-86 Assigned 14-Apr-86 --OPEN--
 WMIC 869037 KBY BAC'S ON LOGOUT, SOME MORE INFORMATION.
 H - SW E 10-Apr-86 Assigned 11-Apr-86 --OPEN--
 JHNSN 869047 RDH QAR 869032 REVISITED
 H - SW E 15-Apr-86 Assigned 16-Apr-86 --OPEN--
 ISWS 869048 DPM CATLOG DIES WITH ILL UO @ 0 IF BATCH JOB MOUNTS N
 H - SW E 15-Apr-86 Assigned 16-Apr-86 --OPEN--

ISWS 868783 DRUEK SPEAR DISK ERROR REPORTS DON'T
 L - SW E 31-Jan-86 Assigned 3-Mar-86 --OPEN--

SWTX 868852 SPIDE VT220 INCORRECTLY DISPLAY THE DECSYSTEM-10 NOT RUN
 L - SW E 13-Feb-86 Assigned 13-Feb-86 --OPEN--

FOKKR 868889 RUDEN AFTER SYSTEM POWER OFF THE MICROCODE CANNOT BE FOU
 L - SW E 25-Feb-86 Assigned 25-Feb-86 --OPEN--

CH2M_ 868906 SPIDE TOPS10.FIL CONTAINS UNSUPPORTED MODULES
 L - Othe 1-Mar-86 Assigned 3-Mar-86 --OPEN--

WMIC 868987 WXD TATTLE CANT LOAD SYMBOLS (NOT ENOUGH ROOM BELOW HI
 L - SW E 19-Mar-86 Assigned 20-Mar-86 --OPEN--

STVNS 868998 NT QSRCVT WASN'T UPDATED ON THE TOOLS TAPE FOR GALAXY
 L - SW E 25-Mar-86 Assigned 25-Mar-86 --OPEN--

WMIC 869050 PIP RENAME/COPY LOOSE RIB INFORMATION
 L - SW E 15-Apr-86 Received --OPEN--

TEXAS 869051 RDH NFT NETWORK COMMAND FOR LOCAL NODE NO LONGER WORK
 L - SW E 15-Apr-86 Assigned 16-Apr-86 --OPEN--

STVNS 868579 DPM MOUNT REQUEST NOT SATISFIED, BUT SHOULD HAVE BEEN.
 N - SW E 4-Dec-85 Assigned 5-Dec-85 --OPEN--

STVNS 868586 JMF KAF STOPCODE BECAUSE P GOT SMASHED - LOOPING TRYIN
 N - SW E 10-Dec-85 Assigned 11-Dec-85 --OPEN--

STVNS 868661 RDH RE: 868625 - REMOTE PRINTER GOES OFF LINE AND NEVE
 N - SW E 14-Jan-86 Assigned 15-Jan-86 --OPEN--

VBILT 868714 SPIDE NDP STOPCODE RIGHT AFTER AN EXFCHK STOPCODE
 N - SW E 21-Jan-86 Assigned 28-Jan-86 --OPEN--

VBILT 868715 SPIDE SEVERAL EXFCHK STOPCODES RELOADING MONITOR
 N - SW E 21-Jan-86 Assigned 23-Jan-86 --OPEN--

VBILT 868717 KBY GNA STOPCODES
 N - SW E 21-Jan-86 Assigned 28-Jan-86 --OPEN--

ABBO 868745 CJA IME IN NEWCKS (SIMILAR TO 868668)
 N - SW E 27-Jan-86 Assigned 3-Mar-86 --OPEN--

WMIC 868749 WXD DECNET ROUTER RELOAD FAILS WHEN -10 IS ON SAME DEL
 N - SW E 27-Jan-86 Assigned 28-Jan-86 --OPEN--

ABBO 868753 SPIDE .SET TTY COMMANDS MAY NOT WORK
 N - SW E 28-Jan-86 Assigned 30-Jan-86 --OPEN--

SWTX 868759 SPIDE OPSER SENDS CONTROL-A'S TO THE WRONG SUBJOB
 N - SW E 28-Jan-86 Assigned 30-Jan-86 --OPEN--

WMIC 868764 SPIDE ANOTHER TMDLI STOPCD
 N - SW E 29-Jan-86 Assigned 30-Jan-86 --OPEN--

CH2M_ 868806 SPIDE TMDLI STOPCODES
 N - SW E 6-Feb-86 Assigned 7-Feb-86 --OPEN--

JHNSN 868818 SPIDE PRO-350'S CAUSE CTHBCM EVENT
 N - SW E 7-Feb-86 Assigned 7-Feb-86 --OPEN--

JHNSN 868831 SPIDE CAN'T SEEM TO SET-UP SYSTEM DEFAULT ACCOUNT
 N - SW E 11-Feb-86 Assigned 11-Feb-86 --OPEN--

SWTX 868846 SPIDE NO ENTRIES CHANGED ON A REQUESTED WILDCARD CHANGE
 N - SW E 12-Feb-86 Assigned 13-Feb-86 --OPEN--

FOKKR 868853 SPIDE NPJ & IME STOPCODES
 N - SW E 17-Feb-86 Assigned 17-Feb-86 --OPEN--

JHNSN 868877 DRB EUE AND ANU STOP CODES
 N - SW E 19-Feb-86 Assigned 20-Feb-86 --OPEN--

ABBO 868879 SPIDE IME INSIDE COMCHK
 N - SW E 19-Feb-86 Assigned 20-Feb-86 --OPEN--

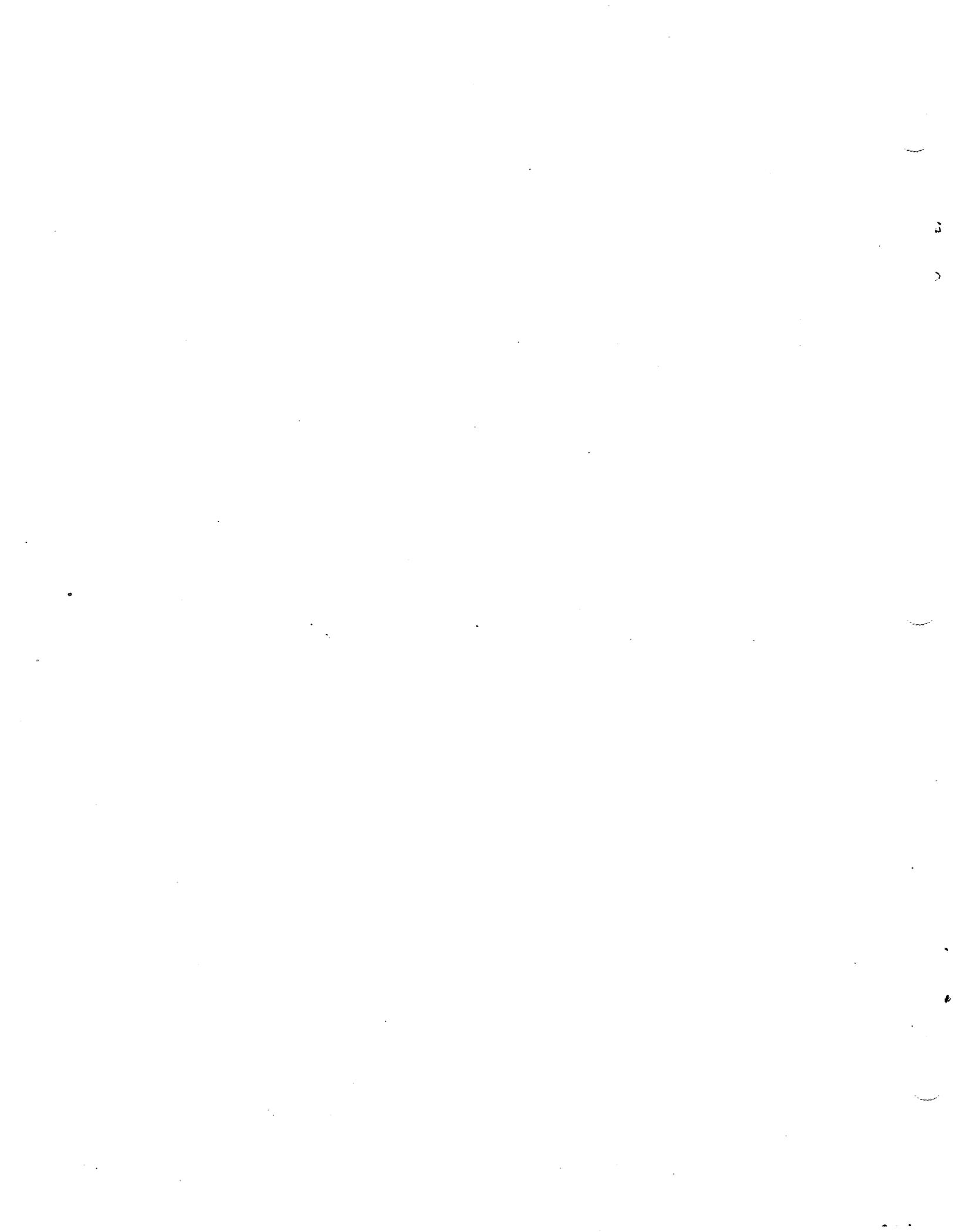
STVNS 868884 JAD RE: 868870 WTP STOPCODE WHEN AN RP DRIVE WENT SOUT
 N - SW E 20-Feb-86 Assigned 21-Feb-86 --OPEN--

TEXAS 868910 DPM MOUNT OR ALLOC OF CERTAIN STRUCTURES CAUSES ERROR

	N	-	Othe	3-Mar-86	Assigned	4-Mar-86	--OPEN--
DCERT	868917	SPIDE	SPURIOUS ^Y LEFT IN INPUT BUFFER WHEN HOSTED TO A				
	N	-	SW E	4-Mar-86	Assigned	6-Mar-86	--OPEN--
WMIC	868920	NT	GLXLIB STOPCD ILM TYPING "NEXT PRI O/NODE:12<ESC>"				
	N	-	SW E	4-Mar-86	Assigned	6-Mar-86	--OPEN--
ABBO	868929	SPIDE	RCC AND SIC CRASHES ON KS				
	N	-	SW E	5-Mar-86	Assigned	6-Mar-86	--OPEN--
SWTX	868930	KBY	CMU STOPCD WITH POPJ AT CHKTAL+1 JFCL'ED (FTMP=0)				
	N	-	SW E	5-Mar-86	Assigned	6-Mar-86	--OPEN--
SWTX	868932	DPM	IEZ STOPCD'S				
	N	-	SW E	5-Mar-86	Assigned	6-Mar-86	--OPEN--
SWTX	868935	SPIDE	VERY POOR CHARACTER ECHO RESPONSE WHEN CTHNRT'ED T				
	N	-	SW E	5-Mar-86	Assigned	6-Mar-86	--OPEN--
DCERT	868937	WXD	DOING A LOOP TESTS FROM RSTS TO 10 FAILS				
	N	-	SW E	6-Mar-86	Assigned	6-Mar-86	--OPEN--
SWTX	868939	DPM	MORE ON THE EVER DECREASING LOGNUM				
	N	-	SW E	6-Mar-86	Assigned	10-Mar-86	--OPEN--
SWTX	868940	RDH	BAC STOPCD				
	N	-	SW E	6-Mar-86	Assigned	10-Mar-86	--OPEN--
SWTX	868950	RDH	IME STOPCD				
	N	-	SW E	7-Mar-86	Assigned	7-Mar-86	--OPEN--
FOKKR	868951	DPM	ORION BPN STOPCODES				
	N	-	SW E	7-Mar-86	Assigned	7-Mar-86	--OPEN--
SWTX	868955	SPIDE	NRTBPM STOPCD				
	N	-	SW E	10-Mar-86	Assigned	10-Mar-86	--OPEN--
STVNS	868965	JMF	IME FROM E COMMAND.				
	N	-	SW E	17-Mar-86	Assigned	17-Mar-86	--OPEN--
STVNS	868966	SPIDE	NPJ STOPCODE				
	N	-	SW E	17-Mar-86	Assigned	17-Mar-86	--OPEN--
STVNS	868968	NT	IME IN COMCON AT FNDAB2				
	N	-	SW E	17-Mar-86	Assigned	17-Mar-86	--OPEN--
MTNMR	868975	KBY	IME				
	N	-	SW E	18-Mar-86	Assigned	18-Mar-86	--OPEN--
WMIC	868980	JMF	VERY HIGH OVERHEAD ON POLICY CPU (OVER 70%)				
	N	-	SW E	19-Mar-86	Assigned	20-Mar-86	--OPEN--
VBILT	868988	SPIDE	CAN NOT SET HOST TO VAX IF USER NAME IS LONGER THA				
	N	-	SW E	19-Mar-86	Assigned	20-Mar-86	--OPEN--
VBILT	868991	JMF	ASSIGNMENT PROBLEM WITH FORTRAN VERSION 6-RE QAR O				
	N	-	SW E	20-Mar-86	Assigned	20-Mar-86	--OPEN--
TEXAS	868993	RUDEN	KL CLOCK STOP ERROR CRAM DIFFERENCES KLI VERIF				
	N	-	Othe	20-Mar-86	Assigned	20-Mar-86	--OPEN--
STVNS	868996	JMF	SYSTAT P GIVE INCORRECT INFORMATION				
	N	-	SW E	25-Mar-86	Assigned	25-Mar-86	--OPEN--
ABBO	869000	SPIDE	IME AT NEWCKS (AGAIN)				
	N	-	SW E	26-Mar-86	Assigned	27-Mar-86	--OPEN--
ABBO	869001	JAD	DOUBLE KAF -- BEGINS IN PWQLP8				
	N	-	SW E	27-Mar-86	Assigned	27-Mar-86	--OPEN--
MTNMR	869003	KBY	EUE STOPCODES				
	N	-	SW E	27-Mar-86	Assigned	27-Mar-86	--OPEN--
ABBO	869019	SPIDE	CTHNRT V5(315) STILL CANNOT CONVERSE WITH RSX NODE				
	N	-	SW E	4-Apr-86	Assigned	7-Apr-86	--OPEN--
TEXAS	869023	SPIDE	WILD CARD PROBLEMS WITH REACT				
	N	-	SW E	7-Apr-86	Assigned	8-Apr-86	--OPEN--
TEXAS	869026	KBY	RJZ STOPCODE. JOB NUMBER CLOBBERED.				
	N	-	SW E	8-Apr-86	Assigned	8-Apr-86	--OPEN--

TEXAS 869034 WXD MCB DMR11 CIRCUIT TO VMS GOES TO THE OFF STATE WHE
 N - SW E 10-Apr-86 Assigned 11-Apr-86 --OPEN--
 TEXAS 869035 NT LPTSPL TRAILER MIXED WITH OUTPUT TEXT
 N - Othe 10-Apr-86 Assigned 11-Apr-86 --OPEN--
 FOKKR 869044 SPIDE NO ADMINITRATIVE PRIVS COULD CAUSE PROBLEMS.
 N - Sugg 14-Apr-86 Assigned 14-Apr-86 --OPEN--
 FOKKR 869046 SPIDE CANNOT SET HOST TO A VAX WITH "/" IN USERNAME
 N - SW E 15-Apr-86 Assigned 15-Apr-86 --OPEN--
 WMIC 869049 KBY IME AT SEJLA2+6
 N - SW E 15-Apr-86 Assigned 16-Apr-86 --OPEN--
 CH2M_ 869052 DPM QUASAR ILMS
 N - SW E 16-Apr-86 Assigned 16-Apr-86 --OPEN--
 CH2M_ 869053 SPIDE AE.LOK SET IN ACTDAE.SYS PROFILE
 N - SW E 16-Apr-86 Assigned 16-Apr-86 --OPEN--
 CH2M_ 869054 DRUEK MISCELLANEOUS SPEAR PROBLEMS
 N - SW E 16-Apr-86 Assigned 16-Apr-86 --OPEN--
 CH2M_ 869055 DPM PROBLEMS WITH GALAXY 5 UNDER 7.02
 N - Othe 16-Apr-86 Assigned 16-Apr-86 --OPEN--
 BSTOK 868936 WXD AS QAR#868887 SUGGESTED FIX HAS NO EFFECT
 URG - SW E 6-Mar-86 Assigned 6-Mar-86 --OPEN--
 BSTOK 868948 WXD MORE ON QAR#868887 AND #868936
 URG - SW E 7-Mar-86 Assigned 7-Mar-86 --OPEN--
 CH2M_ 869043 KBY BAC/SYSTEM HUNG WITH DELBLK DIAGNOSTIC PATCH INSTA
 URG - SW E 13-Apr-86 Assigned 14-Apr-86 --OPEN--
 STVNS 869045 SPIDE TERMINAL I/O ON DN200 WHEN CONNECTED TO 2020 LOSES
 URG - Perf 14-Apr-86 Assigned 15-Apr-86 --OPEN--
 CH2M_ 869056 KBY STOPCODE SBW ON DUMP MODE I/O WHILE VIRTUAL
 URG - SW E 16-Apr-86 Assigned 16-Apr-86 --OPEN--

Total Entries: 98



7.03 PERFORMANCE OVERVIEW

Site Input

- Ten QARs
- WMU results
- Overhead
- Throughput/Responsiveness
- Size

CI Results

- Single Transfer
- Average Transfer
- Real Life
- Loaded System
- Multiple Drives
- SMP

Performance Focus

- Routing Overhead
- Virtual Memory
 - Paging Queues
 - PFH in the Monitor
 - Dispatch Time
 - Dump Mode I/O Breakup
- SAVE/GET

SCHED.

TOPS-10 Future/7.04

- Reliability
- Maintainability
- Performance
- New features

