

4853 JCN 14 Sep 70

4853 JCN 14 SEP 70  
ARC BASELINE PLANS ..... 9/9/70 am

Link to search patterns: .  
["\*\*\*"];(patterns:zwn)  
ARC BASELINE PLAN

		1970												2a							
		Sept			Oct			Nov			Dec			Jan		2b					
Feb	Months													2c							
		Week												2d							
4	5	1	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	2e
SERVICE SYSTEM																					
Leader: WKE																					
PDP-10 Hardware !																					
Designs and plan:																					
Link: (english,  Ondw, :xbnpD)																					
Checkpoints																					
Leader: WKE																					
People:																					
	WKE	!																			2e d
	WKE	@																			2e d a
	CHI	!																			2e d 2
	CHI	@																			2e d 2a
	WHP	!																			2e d 3
	WHP	@																			2e d 3a
	DIA	!																			2e d 4
	DIA	@																			2e d 4a
	MSC	!																			2e d 5
	MSC	@																			2e d 5a
	JDR	!																			2e d 6
	JDR	@																			2e d 6a
	HGL	!																			2e d 7
	HGL	@																			2e d 7a
	JTM	!																			2e d 8
	JTM	@																			2e d 8a
	KEV	!																			2e d 9
	KEV	@																			2e d 9a
	RDB	!																			2e d 10
	RDB	@																			2e d 10a
	EKV	!																			2e d 11
	EKV	@																			2e d 11a
PDP-10 Software !																					
Designs and plan:																					
Link: (paxton,  Osft, 2:xbnpD)																					
Checkpoints																					
Leader: WHP																					
People:																					
	WKL	!																			2e2d
	WKL	@																			2e2d a
	CHI	!																			2e2d 2
	CHI	@																			2e2d 2a
	WHP	!																			2e2d 3
	WHP	@																			2e2d 3a

DIA	!	2e2d1
DIA	@	2e2d1a
MSC	!	2e2d5
MSC	@	2e2d5a
JDB	!	2e2d6
JDB	@	2e2d6a
HGL	!	2e2d7
HGL	@	2e2d7a
JTM	!	2e2d8
JTM	@	2e2d8a
KRV	!	2e2d9
KRV	@	2e2d9a
RDB	!	2e2d10
RDB	@	2e2d10a
ERV	!	2e2d11
ERV	@	2e2d11a
File handl	!	2e3
Designs and plan:		
Link: (lehtman,archi,:zxnd)		2e3a
Plan for file space, reliability		2e3a1
Overview of the whole storage problem WSD?		2e3a1a
Plan for the PDP-10		2e3a1b
Remote storage UOSB - on the 940 (2) then the 10 (3)		2e3a2
Checkpoints		2e3b
Leader: WSD		2e3c
People:		2e3d
WSD	!	2e3d1
WSD	@	2e3d1a
HGL	!	2e3d2
HGL	@	2e3d2a
WKE	!	2e3d3
WKE	@	2e3d3a
Remote Displ	!	2e4
Designs and plan:		
Link: (english,rmdsp,:zxnd)		2e4a
Hardware access for remote display		2e4a1
Mouse and keyset on IMLAG		2e4a2
NLS on IMLAG		2e4a3
Checkpoints		2e4b
Leader: WKE		2e4c
People:		2e4d
WKE	!	2e4d1
WKE	@	2e4d1a
Net Access	!	2e5
Designs and plan:		
Link: (english,netac,:zxnd)		2e5a
Access to ARC by Net users		2e5a1

TODAS for Net users		2e5a2
Checkpoints		2e5b
Leader: JTM		2e5c
People:		2e5d
WKE	!	2e5d1
WKE	@	2e5d1a
JTM	!	2e5d2
JTM	@	2e5d2a
Team Facil	!	2e6
Designs and plan:		
Link: (english, team,:zxnd)	created?	2e6a
Projection TV		2e6a1
Switching facility		2e6a2
Software features		2e6a3
Checkpoints		2e6b
Leader: WKE		2e6c
People:		2e6d
WKE	!	2e6d1
WKE	@	2e6d1a
Transcr Facil	!	2e7
Designs and plan:		
Link: (english, trnsc,:zxnd)	created?	2e7a
System design		2e7a1
mag tape-typewriters		2e7a2
Tape input facilities		2e7a3
Checkpoints		2e7b
Leader: WKE		2e7c
People:		2e7d
WKE	!	2e7d1
WKE	@	2e7d1a
DatabasegmtSY	!	2e8
Designs and plan:		
Link: (engelbart,dbms,:zxnd)	created?	2e8a
System design - selection		2e8a1
Access negotiations		2e8a2
Connection and use		2e8a3
Interactive front end		2e8a4
Checkpoints		2e8b
Leader: DCE		2e8c
People:		2e8d
DCE	!	2e8d1
DCE	@	2e8d1a
Measurement	!	2e9
Designs and plan:		
Link: (english, measu,:zxnd)	created?	2e9a
Design of requirements		2e9a1
NLS implementation		2e9a2
TENEX implementation		2e9a3

Checkpoints		2e9b
Leader: WHP		2e9c
People:		2e9d
WHP	!	2e9d
WHP	@	2e9d a
LochardCopyOut	!	2e 0
Designs and plan:		
Link: (english,nocpy,:zxnd) created?		2e 0a
Checkpoints		2e 0b
Leader: WKE		2e 0c
People:		2e 0d
WKE	!	2e 0d
WKE	@	2e 0d a
OutputProc	!	2e 1
Designs and plan:		
Link: (parsley,oplan,:zxnd)		2e 1a
Also in: (journal,2849,:zxnd)		2e 1a
Checkpoints		2e 1b
Pusher: BLP		2e 1c
People:		2e 1d
BLP	!	2e 1d
BLP	@	2e 1d a
Microform	!	2e 2
Designs and plan:		
Link: (english,micro,:zxnd) created?		2e 2a
System design		2e 2a
CDR service		2e 2a2
Output Processor		2e 2a3
Frame-jumping here		2e 2a4
Network use		2e 2a5
Checkpoints		2e 2b
Leader: WKE		2e 2c
People:		2e 2d
WKE	!	2e 2d
WKE	@	2e 2d a
Voice	!	2e 3
Designs and plan:		
Link: (english,voice,:zxnd) created?		2e 3a
Voice blocks in NLS		2e 3a
Communication system to the user		2e 3a2
Checkpoints		2e 3b
Leader: WKE		2e 3c
People:		2e 3d
WKE	!	2e 3d
WKE	@	2e 3d a
NLS Features	!	2e 4
Designs and plan:		
Link: (lroy,nliea,:zxnd) created?		2e 4a

940:		2e 4a
	Collector sorter WSD (Journal,4806,:zxbn) tape?	2e 4a a
	Including TODAS, NLS, Collector jumping commands	2e 4a a
	Calculator compiler VDB	2e 4a b
	TODAS improvements CHI WHP	2e 4a c
	Alter	2e 4a c
	None	2e 4a d
10:		2e 4a2
	Create display with windows	2e 4a2a
	Multiple files	2e 4a2b
	LSS related	2e 4a2c
	Picture package	2e 4a2d
Checkpoints		2e 4b
Leader: CHI		2e 4c
People:		2e 4d
	CHI            1	2e 4d
	CHI            e	2e 4d a
		2e 5

		2e 5a
DSS		
Leader: WSD		2f
DSS	!	2f
Designs and plan:		
Link: (duvall,dss,:zxnd) created?		2f a
Archiving		2f a
Journal		2f a2
Link aids		2f a3
Checkpoints		2f b
Leader: WSD		2f c
People:		2f d
WSD	!	2f d
WSD	@	2f d a
NIC		
Leader: WLB		2g
Overall Design and plan:		
Link: (bass,nicdn,:zxnd)		2g
Cats and indices	!	2g2
Designs and plan:		
Link: (xxx,catin,:zxnd)		2g2a
Checkpoints		2g2b
Leader: xxx		2g2c
People:		2g2d
WLB	!	2g2d
WLB	@	2g2d a
On-Line Services	!	2g3
Designs and plan:		
Link: (xxx,onlin,:zxnd)		2g3a
Checkpoints		2g3b
Leader: xxx		2g3c
People:		2g3d
WLB	!	2g3d
WLB	@	2g3d a
NIC Collection	!	2g4
Designs and plan:		
Link: (xxx,nicol,:zxnd)		2g4a
Checkpoints		2g4b
Leader: xxx		2g4c
People:		2g4d
WLB	!	2g4d
WLB	@	2g4d a
Text Distribution	!	2g5
Designs and plan:		
Link: (xxx,textd,:zxnd)		2g5a
Checkpoints		2g5b
Leader: xxx		2g5c
People:		2g5d

WLB	!	2g5d
WLB	@	2g5d a
Dialog Support	!	2g6
Designs and plan:		
Link: (xxx,dials,:zxnd)		2g6a
Checkpoints		2g6b
Leader: xxx		2g6c
People:		2g6d
WLB	!	2g6d
WLB	@	2g6d a
Liaison Activity	!	2g7
Designs and plan:		
Link: (xxx,liais,:zxnd)		2g7a
Checkpoints		2g7b
Leader: xxx		2g7c
People:		2g7d
WLB	!	2g7d
WLB	@	2g7d a
Microform services:		2g8
Designs and plan:		
Link: (xxx,ufors,:zxnd)		2g8a
Checkpoints		2g8b
Leader: xxx		2g8c
People:		2g8d
WLB	!	2g8d
WLB	@	2g8d a
NIC Operations	!	2g9
Designs and plan:		
Link: (xxx,nicop,:zxnd)		2g9a
Checkpoints		2g9b
Leader: xxx		2g9c
People:		2g9d
WLB	!	2g9d
WLB	@	2g9d a
RINS		
Leader: DOR		2h
InfoNeedsAsses	!	2h
Designs and plan:		
Link: (xxx,infne,:zxnd)		2h a
Checkpoints		2h b
Leader: xxx		2h c
People:		2h d
xxx	!	2h d
xxx	@	2h d a
Info collect	!	2h2
Designs and plan:		
Link: (xxx,info,:zxnd)		2h2a
Checkpoints		2h2b



Leader: xxx		2h2c
People:		2h2d
xxx	!	2h2d
xxx	@	2h2d a
File maint	!	2h3
Designs and plan:		
Link: (xxx,fbain,:zxnD)		2h3a
Checkpoints		2h3b
Leader: xxx		2h3c
People:		2h3d
xxx	!	2h3d
xxx	@	2h3d a
Collect maint	!	2h4
Designs and plan:		
Link: (xxx,cmain,:zxnD)		2h4a
Checkpoints		2h4b
Leader: xxx		2h4c
People:		2h4d
xxx	!	2h4d
xxx	@	2h4d a
Analysis serv	!	2h5
Designs and plan:		
Link: (xxx,analy,:zxnD)		2h5a
Checkpoints		2h5b
Leader: xxx		2h5c
People:		2h5d
xxx	!	2h5d
xxx	@	2h5d a
MANAGEMENT SYSTEM		
Leader: JCN		2i
Record System	!	2i
Designs and plan:		
Link: (norton,recor,:zbxnD)		2i a
Checkpoints		2i b
Leader: JCN		2i c
People:		2i d
JCN	!	2i d
JCN	@	2i d a
Resource coord	!	2i2
Designs and plan:		
Link: (norton,resou,:zbxnD)		2i2a
Checkpoints		2i2b
Leader: JCN		2i2c
People:		2i2d
JCN	!	2i2d
JCN	@	2i2d a
Interfaces	!	2i3
Designs and plan:		

Link: (norton,inter,:zxnd) created?	213a
Need/possibility identification and development with:	213a1
Dialogue Support System	213a2
Output processor	213a3
New system features	213a4
Intelligence system	213a5
User systems	213a6
Network Info Center	213a7
Leader: JCN	213b
Checkpoints	213c
People:	213d
JCN !	213d1
JCN @	213d1a
Organiz/roles !	214
Designs and plan:	
Link: (norton,roles,:zxnd) created?	214a
Leader: JCN	214b
Checkpoints	214c
People:	214d
JCN !	214d1
JCN @	214d1a
USER SYSTEM	
Leader: DCS	2j
Use measur !	2j1
Designs and plan:	2j1a
Link: (xxx,useme,:zxnd)	2j1a1
Measuring the users' use of the system	2j1a2
when, how often, how, operations, difficulties,	
improvement rates, tasks needing help	2j1a2a
Measuring the system performance under various	
conditions and in relation to relevant service level	
standards	2j1a3
Leader: xxx	2j1b
Checkpoints	2j1c
People:	2j1d
xxx !	2j1d1
xxx @	2j1d1a
Measur analy !	2j2
Designs and plan:	
Link: (xxx,usean,:zxnd)	2j2a
Measuring the users' use of the system	2j2a1
when, how often, how, operations, difficulties,	
improvement rates, tasks needing help	2j2a1a
Measuring the system performance under various	
conditions and in relation to relevant service level	
standards	2j2a2
Leader: xxx	2j2b
Checkpoints	2j2c



ARC People (9/9/70) ..... 29 full time only .	2m
(personnel:x2bjnzD)	3
Present: ..... 25	3a
Bass, W.L. link	
(baseline:wind;["&"]OR["WLB"]);	3a1
Bates, R.D. .	
(baseline:wind;["&"]OR["RDB"]);	3a2
Baughman, V.R. .	
(baseline:wind;["&"]OR["VRB"]);	3a3
Caldwell, M.G. . replace	
(baseline:wind;["&"]OR["MGC"]);	3a4
Casseres, D.G. . replace	
(baseline:wind;["&"]OR["DGC"]);	3a5
Church, A.S. .	
(baseline:wind;["&"]OR["MSC"]);	3a6
Davidson, G.E. . Summer	
(baseline:wind;["&"]OR["GED"]);	3a7
Duvall, W.S. .	
(baseline:wind;["&"]OR["WSD"]);	3a8
Engelbart, D.C. .	
(baseline:wind;["&"]OR["DCB"]);	3a9
English, W.K. .	
(baseline:wind;["&"]OR["WKE"]);	3a10
Hardy, M.E. .	
(baseline:wind;["&"]OR["MEB"]);	3a11
Hopper, J.D. .	
(baseline:wind;["&"]OR["JDB"]);	3a12
Irby, C.H. .	
(baseline:wind;["&"]OR["CHI"]);	3a13
Jernigan, M.E. .	
(baseline:wind;["&"]OR["MEJ"]);	3a14
Lehtman, H.G. . December	
(baseline:wind;["&"]OR["HGL"]);	3a15
Melvin, J.T. .	
(baseline:wind;["&"]OR["JTM"]);	3a16
North, J.B. .	
(baseline:wind;["&"]OR["JBN"]);	3a17
Norton, J.C. .	
(baseline:wind;["&"]OR["JCN"]);	3a18
Parsley, S.L. .	
(baseline:wind;["&"]OR["SLP"]);	3a19
Paxton, W.H. .	
(baseline:wind;["&"]OR["WHP"]);	3a20
Ratliff, J. .	
(baseline:wind;["&"]OR["JR"]);	3a21
Row, B.E. .	
(baseline:wind;["&"]OR["BER"]);	3a22

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Trundy, R.E. . replace	
(baseline:wind;/"a"/OR/"MET"/);	3a23
Van De Riet, R.A. .	
(baseline:wind;/"a"/OR/"EKV"/);	3a24
Victor, R.E. .	
(baseline:wind;/"a"/OR/"KEV"/);	3a25
Additions:..... 2	3b
NIC operations .	
(baseline:wind;/"a"/OR/"nnn"/);	3b1
System Operations .	
(baseline:wind;/"a"/OR/"ooo"/);	3b2
Others:..... 2	3c
Andrews, D.I. .	
(baseline:wind;/"a"/OR/"DIA"/);	3c1
Bosch, F.V.D. . to Feb 1971	
(baseline:wind;/"a"/OR/"FVB"/);	3c2
Freeze initials: DIA RDB WER VRE MGC DGC MSC GKD WSD DCE WKE MEH	
JDH CHI MEJ RGL JTM JDN JCN SLP WHP JR BER MET FVB EKV KEV	

Patterns

All links to planning files:	4
(baseline:xobind;/'a/OF/"ink"/;)	5
All tasks and ESTIMATES: link: (2e:xhbind;/"&/OR/"!"/;)	5a
People: ESTIMATES and ACTUAL: (baseline:zx5bni;/"JCN"/AND NOT/" Leader"/;)	5b
People: ESTIMATES	5c
only: (baseline:zx5bni;/"!J"/OR/"WSD"/AND/"!"/;)	5d
People: ACTUAL only:	
(baseline:zx5bni;/"!J"/OR/"WSD"/AND/"@"/;)	5e
Link to people: (personnel:xbbnjD)	5f
All tasks FEATURES: (baseline:zx5bnid;/"&/OR/"Features"/;)	5g
All tasks LEADERS: (baseline:zx5bnid;/"&/OR/"Leader"/;)	5h

'4853', 09/11/70 10:18 MGC : :TASKS, 09/11/70 0958:30 JCN ; Top  
view: (2:zx4bnpD) Summary view link: (baseline:zx4bnpDi;["&"]);  
.DPN=1;.SCR=1;.PGR=0;.PSD="4853 JCN 11SEP70  
ARC BASELINE PLANS ..... 9/9/70 am";  
.SNF=72;.MCH=65;.PGN=0;.DSN=1;.DPR=0;

## General Approach

## Hardware

PDP-10 configuration from DEC  
(see file (|Oacc, :xb) for exact components)

Processing unit

128K core, 1.8 usec

2 mag tapes

2 DECtapes

20 teletype channels

## Paging box

The paging box will be provided by either BB&N or  
Systems Concepts. We have quotes from both:

BB&N quote is \$50,000 for box alone. Installation  
will be from \$5,000 to \$20,000 more.

Systems Concepts bid is \$50,000, complete with  
installation.

It is not clear what the Systems Concepts box would  
be and if they could get design and permission to  
build the BB&N box (BB&N has patented it). Much  
politics too resolve still.

Existing equipment will be connected to the PDP-10 as  
follows:

The Xcore will be installed as addressable memory

This will take care of displays, workstation input,  
line printer, network, and real-time clock.

It will be an independant bank of core, obviously not  
interleaved with any other. Xcore will have to be  
modified to provide higher priority for the port that  
the 10 accesses. The interfacing will be done by  
Cybernex on contract. Fixed price bid is \$13,700



A general purpose box (called I/O control multiplexor) will be built to provide I/O instruction and interrupt control for the devices on Xcore. This too will be built by Cybernex - fixed price bid is \$12,600.

1a3a3

Studies have shown that the Univac drums will be significantly slower than the Bryant drum used by BB&N. We are currently negotiating with DEC, Bryant, and Utah to get one of these drums.

1a3b

The Bryant drum comes complete with controller.

1a3b1

The Bryant disc will be interfaced to the system in one of the following ways:

1a3c

Cybernex will bid on a relatively simple interface to the current controller, providing 24/36 packing.

1a3c1

Systems Concepts will bid on a new controller for the disc which will also have ports for Memorex disc packs. This will probably be much more expensive than the Cybernex interface.

1a3c2

Either of these controllers will interface directly to the PDP-10 memory buss.

1a3c3

Hardware schedule

2

Month	August	Sept	Oct	Nov	Dec	
Week	1 2 3 4 5	1 2 3 4	1 2 3 4	1 2 3 4 5	1 2	2a
3 4						2b
Date of Sunday determines the month						2b1
Net to Xcore	1	x				2c
Sept 7 -- Move network interface to Xcore						2c1
This is just replugging cables. Will be done at 6:00 PM						2c1a
Leader - RDR						2c1b
Software coordination - JTM						2c1c
Netsystem must use Xcore						2c1c1

Power wiring	!	x	2d
Sept 6 to 10 -- Power wiring for PDP-10			2d
Leader - EKV			2d a
Move 940 cons.	!	x	2e
Sept 15 -- Move RADS, 940 console, paper tape, etc.			2e
We should be through with RADS by now. Just unplug and move away.			2e a
Leader - EKV			2e b
Move EK	!	x	2f
Sept 17 -- Move EB, IDC, Display controllers, etc.			2f
Leader - EKV			2f a
Disp in Xcore	!	XXXXXXXXXXXX	2g
now to Sept 18 -- Get displays operating out of Xcore only			2g
Leader - JDN			2g a
2nd disp in xcore	!	xx	2h
Sept 24 -- Get second display coontroller operating in Xcore			2h
Leader - EKV			2h a
Move xcore	!	x	2i
Sept 24 -- Move Xcore, net, line print, etc.			2i
Leader - EKV			2i a
Rewire IDC	!	x	2j
Sept 25 - 26 -- Rewire IDC and checkout			2j
Remove from rack, cleanup wiring and install cables for Xcore. Down at 5:00 PM Friday and back by Saturday night			2j a



Oct 13 to Oct 28 -- Mo4s to KA10 for paging box										2p	
Leader - RDB										2p a	
Paging box arrives	!								x	2q	
Nov 15 -- Due to arrive										2q	
Leader - WKL										2q a	
Paging Box Checkout	!								x	2r	
Nov 16 to Nov 20 -- Checkout the paging box										2r	
Leader - RDB										2r a	
Cybernex debug	!								xxxxxx	2s	
Oct 28 to Nov 20 -- Debug Cybernex interface equipment										2s	
Leader - RDB										2s a	
System operational	!								x	2t	
Nov 20 -- All done										2t	
Month		August		Sept		Oct		Nov		Dec	2u
Week		1 2 3 4 5		1 2 3 4		1 2 3 4		1 2 3 4 5		1 2	2v
3 4											

:4854, 09/14/70 1442:36 RGC ; :ICHDW, 08/08/70 1528:39 WKE ;

.HED="4854 JON 14SEP70

"; .SNF=72;.MCH=65;.PGN=0;.DSN=1;.DPR=0;

Software transfer - general approach

- Finish NLS changes on the 940 including SPL compiler and structure manipulation in new MOL |a
- Convert compilers to produce PDP-10 code on the 940 |b
- Use PDP-10 via the Network to bootstrap compilers |c
- Rewrite NLS in new compiler language |d
- Get version of NLS running on other PDP-10 in Network. This will be a TODAS only - at least enough to compile and modify code |e
- Modify TENEX monitor to operate with our hardware |f
- When our PDP-10 arrives debug monitor and get display NLS running |g

Software schedule

Month	JULY	AUGUST	Sept	Oct	Nov	Dec	
week	2 3 4	2 3 4 5	2 3 4	2 3 4	2 3 4 5	2	2a
3 4							2b
Strmnp	xxx						2c
	Rewrite structure manipulation in new MOL (on 940)						2c1
	no structure manipulation dialect in the new SPL, instead use MOL in a machine independent manner -- result is both more efficient and more readable						2c2
	WHP						2c3
SPL compiler	xxxxxx						2d
	Compiler for SPL on the 940 using the new Tree						2d1
	Leader - DIA						2d2
SPL source	xxxxxxxxxxx						2e
	Modify the SPL source code in NLS to use the new compiler						2e1

the SPL source code will be the same on the PDP-10	2e2
main changes from the old SPL code are:	2e3
reserved words are cap's	2e3a
procedure calls are links	2e3b
CHI MSC MGC	2e4
New NLS           !           xxxx	2f
Get NLS running with new SPL and structure manipulation	2f1
CHI MSC	2f2
Libe 1           !           XXXXXXXXXXXXXXXX	2g
Modify Tree library to produce PDP-10 binaries	2g1
DIA	2g2
Tree 2.5         !           XXXXXXXXXXXXXXXX	2h
Tree running on 940 producing binaries for the 10	2h1
DIA	2h2
L10               !           xxxxxxx           xxxxx	2i
New MOL for NLS written in Tree 2.5	2i1
WHP	2i2
Debug L10        !                           xxxxx	2j
running on 940 producing binaries for PDP-10	2j1
this will involve debugging the new Libe that produces binaries for the PDP-10 as well as finding bugs in the Tree program for Mopsus	2j2
WHP DIA -- mid June to end July?	2j3
L10 on 10        !                           xxxxxxx	2k
some modifications to program (in Tree) to use new libe	2k1

WHP			2k2
Xcore monitor	!	XXXXXXXXXXXXXXXXXX	2l
ARG FVE			2l1
Tree 3	!	XXXXXX	2m
Modify Tree to use new libe			2m1
fewer POP's on the PDP-10 so there will be some changes here			2m2
but not extensive (or tricky)			2m3
DIA -- mid June to mid July			2m4
miniTocas	!	XXXXXX	2n
CHI WHP ASD			2n1
Xcore NLS	!	XX	2o
Modify NLS and get new version running			2o1
CHI -- end May to end June			2o2
SPL-10	!	XXXXXX	2p
Decide on how implement the SPL on PDP-10 -- what POP's etc.			2p1
DIA WHP			2p2
Libe 2	!	XXXXXX	2q
Translate Libe for Tree into version of L10			2q1
this is the Libe that produces PDP-10 binaries running on the 10			2q2
DIA			2q3
Comp10	!	XXXXXX	2r
Get Tree and L10 compilers running on (any) PDP-10			2r1



WHP DIA			2r2
PASS4	!	XXXXXX	2s
Translate PASS4 into Mopsus			2s1
BLP			2s2
Network	!	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	2t
Access to (any) PDP-10: via the network			2t1
JTM -- mio MAY to end MAY with luck			2t2
NLS-10	!	XXXXXXXXXXXXXXXXXXXX	2u
Translate rest of NLS into L10			2u1
create display first so that can have NLS			2u2
perhaps this is one place where should change algorithms			2u2a
see how doing then			2u2b
or perhaps *SB can work on this in conjunction with			2u2c
network access to NLS			2u2c1
use of NLS over phone lines (via LMLAC)			2u2c2
design create display that has one module (device independent) that decides what (absolutely minimal) changes have to be made and another module (device dependent) that actually does the changes to the display buffers			2u2d
then translate other parts like Calc, Vector package, Keyword, etc.			2u3
check out on our PDP-10 when monitor mods and hardware allow			2u4
CHI WBP BEC WSD			2u5
Net-10X	!	XXXXXX	2v
Network access to TENEX			2v1



step 2: make T2.5 to go with LIBE1	3b
accepts syntax required for SL10	3b1
t2(T2.5) => t2.5 which uses libe0 and produces calls to libe1	3b2
step 3: write SL10, an MCL for the 10	3c
SL10 compiled by T2.5 on 940, produces code for the PDP-10	3c1
<t2.5 + libe0>(SL10) => sl10 which uses libe1	3c2
step 4: rewrite LIBE1 in SL10 this is LIBE2	3d
<sl10 + libe1>(LIBE2) => libe2 which is PDP-10 loadable	3d1
step 5: alter T2.5 to T3 to use LIBE2	3e
same syntax as T2.5	3e1
step 6: make SL10 to run on the 10	3f
same syntax as SL10 on the 940	3f1
step 7: put it all together on th PDP-10	3g
<t2.5 + libe0>(T3) => t3 which is 940 loadable	3g1
<t3 + libe1>(T3) => t3' which is PDP-10 loadable	3g2
<t3 + libe1>(SL10) => sl10' which is PDP-10 loadable	3g3
<t3' + libe2> is Tree Meta on the PDP-10	3g4
<sl10' + libe2> is SL10 on the PDP-10	3g5

':4855', 09/10/70 1119:13 MGC ; ':10SFT', 09/10/70 1451:57 WHP ;  
.HED="4855 JCN 14SEP70  
";RES; .SNF=72;.MCH=65;.PGN=0;.DSN=1;.DPR=0;

4856 JCN 14SEP70

## FUNCTIONAL SPECIFICATION FOR PRIMARY TAPE ARCHIVE SYSTEM--

Revised 30 August 1970

2

Note---30 August 1970.

3

This report discusses features of the proposed Archive system which will serve as the first stage in the implementation of a dialogue support system. We envision a separate Journal/Catalogue system which will make use of ARCH.

3a

As of this date most implementation decisions have been made and most of the procedures required have been outlined. Command parsers and program dispatchers for the two major programs of the system (ARCO and ARCE) have been written. We plan to have an operational system by 18 September incorporating most of the system described below.

3b

Link to User implementation file---(archu,:)

3c

Link to File Directory---(fd,:)

3d

Link to user program---(quarc,:)

3e

Link to operator program---(exarc,:)

3f

## Environment

4

The Archive System (ARCH) will consist of two separate programs, a command queuing program (similar to Print) and a command execution program for commands requiring tape handling by an operator. It will place files in a safe repository (the archive) and will be capable of retrieving them on request if the file is not already on the disc in a special archive location capable of immediate access by the user without direct interaction with the archive system.

4a

The Journal/Catalogue System will be a user of ARCH. Users of that system need not be aware of the existence of ARCH; calls on ARCH will be made by the system.

4a1

The queuing and execution programs communicate in much the same manner as the print and printer executer, i.e., through communication files.

4a2

The archive to tape execution program is expected to be run during hours of off-peak system usage. The archive files will be updated when an operator is available.

4b

The software for ARON may permit the implementation of a parallel system to serve as a replacement for KDF and permit direct access to files not in the user's colon space from NLS. Backup would be handled by the tape archive system.

4c

Capabilities:

5

Archiving a File.

5a

This places the file on the storage device, and enters the file and pertinent information in a master archive directory (MAD).

5a1

A user should not be directly involved in the choice of device upon which his file is to be written. Among the information to be entered in the Master Directory will be an estimated activity level.

5a|a

If this level is above a level to be determined (perhaps dynamically) by system capabilities and use, the file will be written on one of the faster devices (e.g., disc.)

5a|a1

The actual activity level, contained in the directory in the aging word, will be checked periodically by the execution program. If the activity is below the level for the device on which the file is stored, it will be rewritten on a slower device and the space on the faster storage device released.

5a|a2

Retrieving a file from storage device:

5b

This retrieves a file from an archive device, given an archive file name.

5b1

A user should not be concerned with which medium his file is on when requesting the retrieval of an archive file.

5b2

After his command has been parsed by ARCQ, the file directory is searched for its listing.

5b2a

A message is returned informing the user if the file is not in the archive. If the file exists and is on tape, the message informs the user of his position in the queue and an estimated time required for retrieval. If it is on the disc, no retrieval is required; only a location message, (e.g., "File already on disc"), need

be sent to the user who may load the file through the use of its pseudonyms.

5b2b

If the file is on tape, a message is transmitted to the operator to mount the necessary tape.

5b2b1

#### Directory Print and Display.

5c

We would have display commands for entire directory or for individual user's directory. No cataloging here, only location, status words, etc. We would display the most recent listings on the screen first. By pushing any character except rubout the user could continue through the entire directory until a rubout is entered. We may also keep a record of the last archival manipulations. Use of BEFORE and SINCE commands permits selective directory display.

5c1

Information retrieval and comments in J/C.

5c2

#### Linking.

5d

In the archive successive versions of a particular file would be linked together; any could be accessed. Multiple names for the same file could be linked together.

5d1

#### Setting modes for a file.

5e

Accessibility--public, private, password.

5e1

Permanence--removable, not removable.

5e2

#### Deleting a file.

5f

#### Miscellaneous.

5g

At each run of ARCE, data indicating the status of the files manipulated and the outcome of the run is summarized as necessary in the directory space.

5g1

#### Implementation Concepts:

6

#### Operating Environment.

6a

ARCE operates as a separate subsystem which in turn has two parts-- the Archive Executor (AX) and the Retrieval Executor (RX). They are operational only when an operator

is available and logged in. 6a1

The ARCO will operate in essentially the same manner and environment as the current print program. 6a2

The ARCE operates in an environment which is similar to nutility. 6a3

This allows it to use all of the system features available for copying files, verifying files, etc. 6a3a

ARCO, as presently envisioned, also needs many of these features. 6a3b

The ARCO is a simple interactive command parsing program. 6b

It parses commands of the user, can return the user to EXEC, searches, displays, modifies, and maintains backups for the Master Archive Directory (MAD) and maintains flags in the directory to tell the Archive Executor (AX) which files are to be archived to tape. 6b1

It sets up and interropates a communication file-queue and its backups used for passing on commands to the Retrieval Executor (REX) for retrieval of files from tape archive. 6b2

It can display receipts for the archiving procedure in the directory. 6b3

It immediately copies files into a disc archive space. 6b4

This is a set of several user blocks each with permanent groups of small files with names like (ARC1):A1, (ARC2):A2, etc., facillitating a larger amount of disc space for the archive than would otherwise be permitted by the TSS. 6b4a

We thus have the problems of having the user ARCH write into the space of several users and keeping this space read only to other users of the TSS. 6b4a1

If some space is released, the block is rewritten small again. 6b4b

The system must establish and keep track of the relationship between the names of the disc file space and the names used by the users for retrieval purposes.



(Pseudonyms.)

6b4c

There will probably be two major sections of ARCE: the Archive Executor (AX) and the Retrieval Executor (REX). ARCE must be able to parse the commands and interactions of the operator.

6c

The Archive Executor (AX) used for placing files onto tapes.

6c1

When the operator wishes to archive files to tape he will enter ARCE with a command informing the system that he wishes to do so. The ARCE will be closed to users for archiving and retrieval while the process is being carried out. MAD is searched and if a file is to be archived to the tape it will be. If, according to the aging word in the directory entry, a file is to be deleted from disc space because of little use, this will also be done at this time.

6c|a

The last file copied onto the tape at each running of AX is the most recent MAD.

6c|b

The directories will be linked as successive versions of the same file. As such all previous versions of a file will be listed in MAD.

6c|b1

(Is it in fact reasonable to copy directories over and over even if they change little?)

6c|b2

We will not have the problem of overwriting file with the same name on tape because the actual names of files will include the date and time the file was archived.

6c|b3

If no date is included in the name given to the system for a command, the default name (except for delete commands) is the most recent version of the file.

6c|b3a

For a delete command if no date is given, all versions will be deleted. (Is this reasonable?)

6c|b3b

We must check the integrity of the files written on the tapes.

6c|b4

AX updates the directory entries with the location of the file on tape and changes the "File to Be Archived"

flag.

6c|c

The Retrieval Executor (REX) used for retrieving files from tape.

6c2

ARCQ sets up a queue of requests for retrieval and sends this queue to REX through the communication file.

6c2a

The operator mounts the tapes as desired and interacts with REX to tell when tapes are ready.

6c2b

REX tells which tapes to mount on which device and copies the desired file into one of the archive locations on the disc. MAD is updated with the location on disc (pseudonym definition) and an instruction to dismount the tape is given.

6c2b|

If we handle file management through TSS we will do things this way. If we did not have the particular limitations of the system we could get around the necessity for pseudonyms, etc.

6c2b|a

REX is also used as a medium for reloading the system disc space after a serious crash.

6c2c

The communication file contains information concerning the availability of the operator to mount tapes; if he is unavailable for a particular length of time, this information may be transmitted to the users of the system.

6c2d

There are two files used by the system; each has two back-up files to guard against system crashes. In addition there are blocks used by the system to store files on the disc. (The method of storage is tied to the requirements of the existing TSS file management system; changes are desirable, but probably not practical for the 940. We should make the system compatible with any future changes.)

6d

There is a communication file which is used by ARCQ for passing commands to ARCE-REX for retrieval of files from tape.

6d|

The file is random, with the basic physical block size being 256 (this block is programatically subdivided.)

6d|a

The first block is a header, containing pertinent

information. 6d1b

A technique for providing lock is trivial, and consists of simply opening the command queue file for output, since the system allows only one user to have a file open for output at a time. 6d1c

There is a Master Archive Directory. 6d2

This file contains the identification of each archived file, and other pertinent information. 6d2a

Most information in MAD is not directly set by the user. 6d2a1

Directory format ideas. 6d3

MAD description. 6d3a

MAD will consist of control words followed by 256 blocks of 256 words each. 6d3a1

MAD is tree-like with three levels of branching. 6d3a2

(1) The first is the user name level. 6d3a2a

It is made up of a user name table, USERTB, of user blocks, u-blocks. 6d3a2a1

This is a linear array which may be indexed by the TSS user number. Among the elements in this array is a pointer to the file name list for the user. 6d3a2a2

(2) The second is the file name level. 6d3a2b

It is made up of one or more linked 256 word file name tables, NAMETB, made up of name blocks, n-blocks. 6d3a2b1

A NAMETB has a hash table for a user's archived files. The name field of the archive file name is a key into the hash table. The system commands for manipulating hash tables are used (BRS 5,6, and 37). 6d3a2b2

Pointers exist from each name entry in the hash

table to the date table for the file name. Pointers also exist to a linked pseudonym list of names by which a particular file may be accessed. 6d3a2b3

(3) The third is the date level. 6d3a2c

It is made up of linked 256 word date table blocks, DATETS, made up of date blocks, d-blocks. 6d3a2c1

At this level is a linked list of dated versions of a particular filename with the earliest occurring elements in the list the most recent. 6d3a2c2

Each d-block contains pointers to an attribute block, a-block, for a file, to the preceding version of the file, and back to the first name in the pseudonym list. 6d3a2c3

Physical directory layout. 6d3b

Control words. 6d3b1

256 blocks of 256 words each. 6d3b2

Block 0-- Checksums for file. 6d3b3

word 0-- checksum for this block not including word 0. 6d3b3a

Words 1-255-- checksum for each block allocated. 6d3b3b

Blocks 1 through 255 will have in word 0 a block type number:

- 0: Block unused.
- 1: User table block.
- 2: Name table block.
- 3: Date table block.
- 4: Attribute table block.

and in word 1 a link to the next block of the same type in the linked list of blocks. The last block in a particular list has in word 1 an end signal, -1. 6d3b4

User table blocks. 6d3b5

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Block 1 is the first (and probably for a long time  
 the only) USERTB. 6d3b5a

Word 0- Block type. 6d3b5a1

Word 1- Link to next USERTB. 6d3b5a2

Words 2-4- Unused. 6d3b5a3

Words 5-196- 3 word user blocks for 64 users  
 indexed by TSS user number. 6d3b5a4

Words 197-255- Unused at present, space for  
 more u-blocks. 6d3b5a5

u-block format. 6d3b5b

Word 0- Pointer to n-block list for this user. 6d3b5b1

Word 1- 6d3b5b2

Bits 0-11. Number of files in this user's  
 archive. 6d3b5b2a

Bits 12-23. Number of file names deleted  
 from the user's archive since the last  
 garbage collection. 6d3b5b2b

Word 2- 6d3b5b3

Bit 0. Directory in use flag. Locks access  
 to this user's directory to other user's to  
 prevent multiple changes to the file. 6d3b5b3a

Bits 1-23. Unused. 6d3b5b3b

Name table blocks. 6d3b6

Word 0- block type. 6d3b6a

Word 1- Link to next NAMETB for this user. If this  
 word is negative, it is the last in the list and  
 points back to the user block for this user. 6d3b6b

Word 2- 6d3b6c

Bits 0-11. Number of names of files in this

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name block.	6d3b6c1
Bits 12-23. Number of names deleted since last garbage collection.	6d3b6c2
Words 3-5- Three word table for hash commands (see 4-2), p.14-4).	6d3b6d
Word 3- Pointer to hash table start.	6d3b6d1
Word 4- Pointer to hash table end.	6d3b6d2
Word 5- Communication word.	6d3b6d3
Word 6-	6d3b6e
Bits 0-11. Average name length (for string area- hash table area ratio allocation).	6d3b6e1
Bits 12-23. String area end pointer.	6d3b6e2
Words 7- 255- Hash table (from 7 up) and string area (from 255 down).	6d3b6f

The space for the hash table area is initially allocated to be 112 words, enough space for 35 entries. This leaves 144 words for the initial string area (approximately 12 characters per word.) If either becomes full, a computation is made to determine the amount of space unused in the other portion of the block; space is reallocated if it seems desirable. A record of name deletions is kept and garbage collection is made when enough space has been released. 6d3b6f1

Hash table area- Made up of three word entries indexed by BRS hash values. Each entry contains: 6d3b6f2

Entry word 0- 6d3b6f2a

Bits 0-7. Name table block of next name in pseudonym linked list. 6d3b6f2a1

Bits 8-23. String pointer (as required by BRS commands). 6d3b6f2a2

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This word is -1 if the name has been deleted.	6d3b6f2a3
Entry word 1-	6d3b6f2b
Bits 0-7. Entry in block for next pseudonym .	6d3b6f2b1
Bits 8-23. String pointer (as required by BRS commands).	6d3b6f2b2
Entry word 2-	6d3b6f2c
Pointer to d-block for the most recent version of this file.	6d3b6f2c1
This word is a free list pointer if the name has been deleted and the space is made available.	6d3b6f2c2
String area- as required by the BRS commands. From 255 down.	6d3b6f3
Date table blocks.	6d3b7
word 0- block type.	6d3b7a
word 1- link to next DATETB.	6d3b7b
word 2- Free list pointer for this block.	6d3b7c
word 3- Unused.	6d3b7d
words 4- 255- 63 d-block spaces of 4 words each.	6d3b7e
Date blocks-	6d3b7f
Words 0,1- Date in YYYYDD TTTT:TT or free list pointer.	6d3b7f1
Word 2- Pointer to next d-block in date list for this file or, if negative, this is the last d-block in this list and the pointer is a pointer back to the pseudonym list.	6d3b7f2
Word 3- Pointer to a-block for this file.	6d3b7f3

Attribute table blocks. 6d3b8

Word 0- block type. 6d3b8a

Word 1- link to next attribute table block. 6d3b8b

Word 2- free list pointer for this block. 6d3b8c

Words 3-7- Unused. 6d3b8d

Words 8-255- 31 a-blocks of 4 words each. 6d3b8e

Attribute blocks. 6d3b8f

Words 0,1- Aging words (or, initially, estimated activity level). 6d3b8f1

The aging words indicates the number of times that the AA program has been run that a particular file has not been on the disc and the last date written onto the disc. (We resort to the negative because the TSS does not keep track of the number of times a particular file is accessed by users directly; we feel it is valuable to permit the user the freedom of accessing files on disc without entering ARCH.) If it has only recently been written onto the disc and the aging count is small, we keep it on the disc. AARRGGGHHHH!!!!!!

6d3b8f1a

Word 2- Tape (or other remote storage device) location. 6d3b8f2

In the case of tape, the system number and the reel number. 6d3b8f2a

Bits 0-11. Tape system number. (? ? ?) 6d3b8f2a1

Bits 12-23. Tape reel number. 6d3b8f2a2

These are set when the file is archived to the tape. 6d3b8f2a2a

Word 3- 6d3b8f3

Bits 0-1. Location flag. 6d3b8f3a



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=0: Only on tape.	6d3b8f3a1
=1: On disc.	6d3b8f3a2
=3: Retrieval requested.	6d3b8f3a3
(These numbers are used to compute locn in ARCO along with tape number, accessibility flag.)	6d3b8f3a4
bits 2-5. Accessibility.	6d3b8f3b
=0: Owner only.	6d3b8f3b1
=1: General access.	6d3b8f3b2
=2: Password access.	6d3b8f3b3
bits 4-6. Disc user number.	6d3b8f3c
A mapping to the user names ARC1, ARC2, etc. (or similar names) giving the dummy archive user name location on the disc. right at first, but we have bits to permit more.	6d3b8f3c1
bits 7-12. Disc name number.	6d3b8f3d
A mapping to the dummy disc name A1, A2, etc. Number limited by TSS. We take the number to be 64.	6d3b8f3d1
bit 13. File type coarse.	6d3b8f3e
=0: Random.	6d3b8f3e1
=1: Sequential.	6d3b8f3e2
bits 14-16. File type fine.	6d3b8f3f
Core image, binary, dump, etc. Use TSS numbers.	6d3b8f3f1
bit 17. Durability flag.	6d3b8f3g
=0: Removable.	6d3b8f3g1

=1: Not removable.	6d3b8f3g2
bits 18-23. Unused.	6d3b8f3h
Could be used as bit pattern to check validity of MAD.	6d3b8f3h1
word 4- Three character password.	6d3b8f4
word 5- Validity check-- checksum of file.	6d3b8f5
word 6- Size of file.	6d3b8f6
bits 0-7. number of blocks in file.	6d3b8f6a
bits 8-23. Unused.	6d3b8f6b
words 7,8- Unused. (May be used to spread out information in word 3 to permit more device codes, etc.)	6d3b8f7

File Name Conventions. 6e

A file name in the archive system consists of three fields: 6e1

(1) User: This is the TSS user name. 6e1a

(2) Name: The scratch file name. 6e1b

(3) Date: The date and time at which the request to archive the file was made. 6e1c

The user may request a file by name (e.g., :<filename> or (<user>):<filename> if the file was created by another user). The file accessed in the directory will be the most recent version. He may also access a file in the same format followed by a semi-colon (;) and a six (or twelve) figure date (or date and time). The file accessed will be the entry or, if no entry of the requested date exists, the closest preceding entry. 6e2

As usual, a period affirms a filename, anything else aborts the request. 6e2a

Guarding against file loss from system crashes. 6f

The MAD and communication file will both have two back-ups to permit fairly secure directory spaces.

6f1

Whenever one of these files is to be modified it will modify the contents of the most recently written back-up (which should be itself) and copy it into the other back-up. In the event of a crash, if one of the files is bad one of the back-ups is likely to be good. One would lose a minimum of information. In the event of a truly serious crash, the system may be reloaded from tape. (Perhaps we could get away with only one back-up.)

6f2

Disc files will be written in space permanently assigned to the archive system in small blocks which are written over when needed and made small again when released.

6f3

Needs of various user commands (from ARGO).

6g

Finished--

6g1

Just get back to EXRC.

6g1a

Eliminate name--

Set parameters for file--

Activity

General access

Owner access

General access

Password access

Removable name

Permanent name

6g2

Require directory access, modification.

6g2a

Print directory

Display directory

Location--

6g3

Require selective (or complete) directory display or print after search.

6g3a

Order--

6g4

Requires communication file search for location in queue.

6g4a

@@@Receipt display--

6g5

Must examine file directory to see location.	6g5a
Archive--	6g6
Must set up directory entry--modify directory.	6g6a
Must copy into disc space--either permanent or temporary depending on activity level. Must keep track of pseudonyms.	6g6b
Retrieve--	6g7
Must search NAL for entry; deliver message on location.	6g7a
If on tape and retrieval desired, must set up communication file-- place in queue, modify MAD (retrieval already requested flag.) Must be able to keep track of pseudonyms-- access files in disc space.	6g7b
Needs of various operator commands (from ARGE).	6h
Must check MAD and then copy files to tape, then reset MAD with location in AX. In NAL must get file off tape into disc archive space and reset MAD with proper location--set up pseudonym.	6h1
Operator sign-in--	6h2
Must let communication file know retrieval may be carried out.	6h2a
Operator log-out--	6h3
Let system know when return expected to permit user to receive estimated retrieval time.	6h3a
Crash restart--	6h4
Must give commands to operator to mount proper tapes to permit reloading of archive system. Reload directory from tape, initialize archive space and then copy required files into blocks.	6h4a
Ready--	6h5
Must be aware that command has been completed and then	

do what's right.	6h5a
Commands to operator--	6h6
Must tell operator to mount tapes, etc.	6h6a
Commands and System Responses.	7
User commands.	7a
Entering the Archive System.	7a1
One would enter ARCH from EXEC by typing @ARCH .	7a1a
(The underlined characters are typed by the user.) The system responds with a # in the command feedback line indicating that it is ready for the next user command. This procedure is followed after all user commands.	7a1b
Archiving a file.	7a2
Once in ARCH one could enter a file in the archive with the command #Archive file--- <filename> ( ./, )	7a2a
If a period is typed the activity level will be assumed to be 0, the file will have private access, and the durability will be removable. If a comma is typed instead one may set parameters for the file to be entered as if the Set Parameters directive had been typed. Each additional mode may be terminated with either a period (end of entry for this file) or a comma (more modes to be set).	7a2b
The activity level is used to determine whether or not the file in question will be copied on disc archive as well as on tape. If the estimated number is less than one the number 0 should be entered. An actual activity level will be contained in the aging word; it will be consulted periodically to see if some tape archive files should be copied onto the disk and if some disk archive files should be deleted.	7a2c
Set Parameters.	7a3
One sets parameters either when a file is to be archived	

by typing a comma rather than a period at the end of the Archive command (i.e., after the file name) or by typing the command

#Set parameters for file <filename>.

7a3a

As long as a user is in the set parameters mode, two asterisks will be typed in the command feedback line indicating that a parameter may be set. After each parameter selection has been made, if a comma is typed one stays in the set parameters mode, if a period is typed one leaves that mode and a # is typed indicating that ARCH is prepared to accept another command.

7a3a1

If more than one of the same parameter set commands is entered for a file the most recent is the one which is entered into the current Master File Directory. A rubout in a parameter set mode deletes the most recent parameter set in the current mode.

7a3a2

If not explicitly set, the default parameters are Activity level=0, private access, removable name, no password.

7a3a3

Activity level.

7a3a4

One sets the estimated activity level in the set parameters mode by typing

\*\*Activity: <number from 0 to ?> (./.)

where the number is an estimate of the number of times a week the file is to be retrieved. It will be placed on only tape if the number is below a limit determined by the availability of colon space for the archive system.

7a3a4a

Setting accessibility.

7a3a5

Public or private access may be set with the commands in set parameters mode

\*\*general access (./,)

\*\*owner access (./,)

7a3a5a

Password access.

7a3a5b

One enters a three character password which is required for access to these files.

7a3a5b1

Setting durability.

7a3a6

The durability of an archive file refers to whether or not it can be deleted. A file is deleted from the system by having its name removed from the archive directory.

\*\*removable name (./,)  
\*\*not removable name (./,)

7a3a6a

The default is "removable". If a name is deleted from the most recent file directory, it still exists in earlier directories and the file still exists on the tape. Only if the tape is recopied will the file be truly deleted.

7a3a6b

It provides two things.

- (1) Keeps directory small.
- (2) keeps back-up copy. We may want to make it explicit that when a file is deleted it is merely removed from active directory and backup is available. Delete may want to respond with receipt telling which was the last recover directory.

7a3a6b1

Deleting a file.

7a4

A file can be deleted if it is not permanent by using the command

#Eliminate name--- <filename> .

7a4a

If the file is permanent the system responds with the message

Elimination forbidden.

7a4b

We may run into trouble if system crashes and we reload the system from an old directory on tape in which the file has not been deleted. We will have backup flags and files to protect us as much as possible. The file still exists on tape unless we clean up the tapes periodically.

7a4c

Directory print and display.

7a5

The information displayed includes the name of the file, the date of creation, accessibility, deletability, perhaps information about size, use, etc.

7a5a

There are several display possibilities for the directories. 7a5b

Display of complete directory. 7a5b1

The following command will create a display of MFD entries for all users. 7a5b1a

#Display Directory Complete. 7a5b1a1

The most recent 20 directory entries appear on the screen following a header giving the effective date of the directory being displayed. Files in the directory will be arranged in the order of entry. 7a5b1b

If the user wishes to go further back in the directory any character other than a rub-out typed on the keyboard would feed the next set of items. 7a5b1b1

A rub-out would abort the catalogue display. 7a5b1b2

Directory display for another user. 7a5b2

Displays 20 most recent files of named user. Continue and Abort commands same as above. 7a5b2a

#Display directory for user <username> . 7a5b2a1

Directory display for current user. 7a5b3

Same as above but for present user. 7a5b3a

#Display directory . 7a5b3a1

The directory may be printed out with the same options as above using the word "Print" instead of "Display". 7a5c

Print possibilities will be deferred indefinitely. 7a5c1

Some filtering will be possible; if instead of a period an "s" is typed, the word "since" will appear. (The letter "b" indicates BEFORE.) Then if a date in the form YY/MM/DD tt:tt is typed in, the first file entries displayed will be those generated on the date closest to or later than that entered (earlier than in the case of



BEFORE). ( This is to be consistent with conventions in  
the content analysis feature.)

7a5d

Retrieving a file.

7a6

To retrieve a file from an archive storage device one  
types the command

#Retrieve file---<filename> .

7a6a

After searching MAD, the system responds with a line of  
information dealing with the accessibility of the file  
to the current user. If the file is not entered in the  
directory the system responds

File not in directory.

and the system awaits the user's next command.

7a6b

If the file is not available to the present user, the  
following message is entered:

file accessibility denied.

7a6c

If the file is in the directory and accessibility is  
permitted to the current user the following message is  
entered:

File on <device name (i.e., disk, tape number,  
etc.).

Estimated retrieval time <time estimate> .

Retrieval---

7a6d

At this point the user may decide whether or not he  
wishes to have the file retrieved by entering a "D" for  
"desired" or an "N" for "not desired".

7a6e

If the file is to be retrieved, the request will be  
entered in the queue and queue information will be typed  
out. The file will be brought into a read only colon  
space when the queue position of the request had been  
reached. The file is actually in one of several blocks  
assigned to ARCH under the names ARC1, ARC2, ARC3, etc.  
MAD contains pointers to these blocks. (A user could  
access files through the "pseudonym"

(<username>):<filename>:<date-time>. The date-time is  
optional.)

7a6f

At logout the file remains in ARCH colon space until  
activity levels are checked; it may then be deleted  
from colon space, or may remain there if space  
permits.

7a6f1

- If it is in the disc archive retrieval space already,  
the file is immediately available. 7a6f2
- If it is in the tape archive only (or on some other  
as yet undefined external devices), the request is  
entered into the queue and when the request is  
reached a message is sent to the operator asking for  
the proper tape to be mounted (or device set up). 7a6f3
- The user may leave ARCH and do other things while the  
file is being retrieved. From ARCH using a command  
#order in queue.  
he could obtain information concerning his position in  
the queue. 7a6g
- The command  
#location of file <filename>.  
would tell whether the file had been written into colon  
space or not. 7a6h
- If the file is in use or it has already been requested  
and is already or will soon be in colon space under the  
username ARCHIVE, a message will be typed:  
File use requested previously. 7a6i
- Returning control to EXEC. 7a7
- One may leave ARCH by typing the command  
#finished . 7a7a
- Operator commands. 7b
- When an operator wishes to enter the system to show his  
availability to mount tapes, he enters the command  
#operator <initials> . 7b1
- Only recognized initials will be accepted. 7b2
- When the operator leaves he may inform the system that he  
will return at a particular time with the command  
#Logout. will return (<time in minutes>/ no) . 7b3
- The operator responds with "no" if he does not anticipate  
returning in a reasonable length of time. 7b4
- The time is used to inform users of the estimated

retrieval time.

7b4a

The system will request a tape to be mounted with the command

Mount tape <tape no.> on device <no.> .

7b5

The operator responds to this request by either mounting the desired tape and typing

#Ready.

or by entering the message

#Tape not mounted--(. / <reason>.)

The text of the reason will be made available to the user requesting the tape.

7b6

The system requests a tape to be removed with the command  
Dismount tape from <device>.

7b7

The operator responds with the message

#Ready.

7b8

If a system crash requires reloading of ARCH from tape a message will be delivered

System crash--reload disc archive.

Mount most recent tape.

The system would then load the most recent extant directory and proceed through the directory entries loading necessary files (on the basis of their activity levels) onto the disc by requesting that the operator mount the necessary tapes.

7b9

Archiving files onto tapes.

7b10

Once a day (or whenever necessary) an operator will archive the backlog of files onto tape by entering the ARCH subsystem in the AX mode. The current archive tape number is entered into the system.

7b10a

The system informs the operator when a new tape must be mounted. As files are written onto a tape the directory is updated with information concerning the tape location of each file. The final file to be archived at each tape archival is the most recent, updated MAD. (We should recall that the copy routine puts some sort of tape directory at the start of each tape----)

7b10b

Additional ideas not yet incorporated.

8

When retrieving from disc we should be able to check the

integrity of a file. If it is bad a message should be sent to the user, the file deleted from disc, and a new copy brought in from tape.

8a

This may be accomplished with a new command  
#Bad disc copy--<filename>.

8a1

Upon entering this command, the file disc space will be deleted (i.e., written small using the appropriate BRS command), a retrieval from tape command entered, and MAD appropriately up-dated.

8a2

We may want the option of keeping only one version (the most recent) of a file in MAD. We could use an additional variation of the Archive command to accomplish this.

8b

We may want the option of deleting all but the most recent file from MAD.

8c

'4856', 09/14/70 113R:16 MGC : :ARCHI, 08/31/70 1001:37 HAL ; .SINCE  
(70/08/26 00:00); .SCB=2; .HED="4856 JCM 14SEP70  
"; .SNF=72;.MCH=65;.PCN=0;.DSN=1;.OPR=0;

This document describes the current plans for the remote site experiment in occidental. |

## Terminals |

The Imlac display on order will be used initially by Bill Duvall. 2a

Delivery is expected by 10 August. An interface for the mouse and keyset is being constructed and the system should be ready for use by mid September. 2a |

A second display terminal of some kind will be obtained for Don Andrews. There are several possibilities: 2b

A second Imlac system could be used. 2b |

The obvious advantage is that we already know how to use it and have the software to drive it. Disadvantages are delay in getting it and the cost (about \$17,000). 2b | a

A more simple display terminal could be bought or leased. Many of these are on the market, most with upper case characters only. We will have to survey the possibilities again. Two are: 2b2

Executera 2 -- This is a high-quality display with upper and lower case and a reasonable keyboard. It is not available on a rental plan and must be leased for one year at a price of approximately \$340 per month. Purchase price is approximately \$3500. It has local display storage with simple single-character local editing and a stepping-type cursor. 2b2a

Textronix Storage Tube -- This is similar to the ARDS terminal. It has storage on the display tube with no local editing. Lease prices are not yet announced but will probably be on the order of \$300 per month with no month-to-month rental option. Purchase price is approximately \$10,000. 2b2b

## Communications |

Communications will be over a private, 4-wire circuit (full duplex) with terminations at both remote sites. This line is scheduled for installation by 24 August 1970. 3

3a

Data to the displays will be transmitted on Bell system type 201A modems operating at 2000 baud. Three of these will be required, one here and one at each location in Occidental. Data will be transmitted to both locations simultaneously with a control code to indicate which display is being addressed.

3b

Details of this control scheme have not yet been worked out.

3b1

Return data will be transmitted on Rixon type FM300 modems operating at 300 baud. Four of these will be used, one at each remote location and two here. These modems will operate in pairs on two different frequencies providing two independent 300 baud channels.

3c

#### Interfacing

4

The modems will be interfaced to the 940 as follows:

4a

The Rixon modems will connect directly to two of the teletype GTE channels and operate as a 30 cps teletype inputs.

4a1

The 201A modem will interface to XCORE via the dataset interface that was constructed for communication with UC Berkeley some time ago.

4a2

The modem interface is included in the Imlac display and will probably be available in whatever other display is used.

4b

#### Voice communications

5

An off-premise local will be installed at Bill Duvall's house, giving him access to our phones through the SRI exchange. This too is scheduled for installation by 24 August.

5a

The phone company will not install an extension on this local at Don Andrew's house since that is in a different exchange area. There are several possibilities for getting Don on this circuit.

5b

We could order a private line from Bill's house to Don's house and "bootleg" a connection to the local at Bill's house.

5b1

We could modify the arrangement to a private line instead of an off-premise local -- this the phone company will do.

It would give us one or two separate phones here for communications over a single circuit to both remote locations but they would have no access to the SRI or local exchanges.

5b2

The phone company recommends that to avoid a long delay we do not make any changes until the currently ordered service is installed.

5c

#### Costs

6

Communications and modem costs are as follows:

6a

Off-premise local to Bill's house	327.40 per month	6a1
Full duplex data line to both locations with channel terminations	366.25 per month	6a2
201A modems (3 at \$70)	210.00 per month	6a3
Total monthly	903.65	6a4
		6a5
Rixon modems (purchased)	1685.00	6a6
Phone equipment installation	380.00	6a7
Total one time	2065.00	6a8



' :4857', 09/14/70 1208:32 MGC : :RMDSP, 07/31/70 1122:19 WKE ;  
.HED="4857 JCN 14SEP70  
"; .SNF=72;.MCH=65;.PGM=0;.DSN=1;.DPR=0;

Network access to system

Three users at a time

Limit due to buffer space - could be increased if really needed

User directory will include one name for each site (site name)

The special version of KDF for network users (NDF) will be implemented. This NDF system will have the following features:

It will be a regular subsystem, meaning that after entering NDF, users will not be able to continue any other subsystem they might have been using. This will eliminate the bug that causes crashes on rubbing out of KDF.

All file space available to NDF will be under a single fictitious name. This name will be transparent to the actual user of NDF.

This means that all network users will store files in a single KDF space. In the documentation distributed to network TODAS users, we will urge users to attach passwords to files stored in NDF. At least, passwords should identify the individual sites in the network allowing us or other network users to see who in the network is taking up all of the space in NDF.

In the documentation we will explain the nature and purpose of the system and warn people that it is experimental and file security is not guaranteed, show one in particular that files without passwords may be deleted at any time.

Special features will be provided to protect our files and limit subsystem use

A flag will identify users as logging in over the Network (independent of user name).

This flag will be used to:

Limit subsystem access (what systems yet to be decided)

|

|a

|a|

|b

|c

|c|

|c2

|c2a

|c2b

|d

|d|

|d2

|d2a

Possibly prohibit permanant files (we may just discourage these)

1d2b

Prohibit tape files.

1d2c

A password feature will be provided so that users logging in over the Network can use only Network names unless they have the local "group" password.

1d3

This should be as automatic as possible so that all local users need not give the password whenever they login

1d3a

If this is too much work forget it - we can put up with some password requirements for 5 months

1d3a1

Would be nice if a prefix" to the password could be provided by the exec whenever login is local. Users could then add their own individual part of the password.

1d3b

Needs

2

Finish Network operating system

2a

Modify system for protection features described above and NDF

2b

Provide space for 3 more teletypes (or let the Network system attach some of the 20 that we have).

2c

Attaching current teletype channels may be very inconvenient since specific locations will be attached.

2c1

Be sure suitable documentation is available

2d

1:4858', 09/14/70 12:31 MGC ; :NETAC, 07/10/70 12:17 WKE ;

.HED="4858 JON 1488P70

"; .SNF=72;.NGH=65;.RGN=0;.DSN=1;.DPR=0;

Background

From the RADC proposal ESU 69-100:

|  
|a

APRPL ADF dump from Feb 1970?

|a|

From the RADC final report 1970:

|b

II-C-2-d. Conference Augmentation

|b|

There is great potential value in direct augmentation of conferences and meetings.....

|b|a

On the basis of recent experience, we plan to provide better facilities for groups of people working together at consoles.....

|b|b

The facility will consist of a meeting room equipped with projection TV, several appropriately designed consoles, and furniture designed so that three or four people may work at the consoles with ten or so less active participants.

|b|b|

First phase design

2

Development of the ARC Augmented Conferencing Facility

2a

We are now proceeding with development of the on-line conference facility outlined in our proposal for project ESU 8457 (RADC).

2a|

The facility is planned to include the following design features:

2a|a

The location will be: Room J-2077

2a|b

Lighting:

2a|c

We plan four plug-in lighting strips mounted in the ceiling, with several fixtures that may plug in anywhere on the strips. The strips will be controlled independently from wall switches.

2a|c|

This arrangement will provide controlled lighting under a wide variety of use conditions, including:

2a|c2

Individuals working alone, pairs working as teams, and larger ARC groups working in an augmented conference mode.

2a|c2a

Frequent formal and informal demonstrations of the on-line system for outside groups of up to about 20 people.

2a|c2b

Attention will be given to such factors as "performer" lighting, reflected glare, whole room lighting.

2a|c2c

Room-size rug:

2a|d

To make the room a more presentable place for on-line demonstrations to an increasing number of outside visitors.

2a|d1

To decrease distracting noise levels with larger groups of visitors and ARC staff during demonstrations and collaborative working sessions.

2a|d2

To decrease noise levels when TTY's and other noise producing devices are used in addition to the consoles.

2a|d3

To decrease noise when we are recording discussions. Background noise has proven a serious handicap in the past when we have recorded group discussions.

2a|d4

Painting:

2a|e

The walls will be repainted with an appropriate background color, after minor patching repairs are made.

2a|e1

Off-line display facilities:

2a|f

We plan to use free-standing chalkboards or pad-holders as needed. We have one such to start with.

2a|f1

Slide and movie projectors and screens will be used when needed, and are not expected to be built-in.

2a|f2

Consoles:

2a|g

We have provided three connections for display consoles in the room. The cables have been wrapped to make them less conspicuous.

2a|g|

Newly redesigned consoles are ready for use in the room when other arrangements are completed..

2a|g2

Projection TV:

2a|h

We are now reinvestigating the availability of projection TV equipment as contemplated in our proposal to RADC. This will permit much more effective presentations and on-line conferencing. In the past, large groups could not see the displayed material well, primarily because of limited screen size and their distance from it.

2a|h|

Table and chairs:

2a|i

We ordering a round table and several chairs for use with chairs brought in from adjoining areas depending on group sizes.

2a|i|

Special console chairs may be needed, but we have not yet reached a decision on this.

2a|i2

Funding for this facility is planned as follows:

2a2

On project:

2a2a

Consoles and associated cabling

2a2a|

Console switching equipment

2a2a2

Projection TV and associated equipment

2a2a3

On overhead:

2a2b

Liant switching work

2a2b|

Painting and minor patching work

2a2b2

On capital:

2a2c

Tables and chairs

2a2c|

Room-size rug

2a2c2

1859 JCN 14SEP70

Lighting equipment

2a2c3

Second phase design

3

WKE to extend see proposal and other sources?

3a



'4859', 09/11/70 1225:26 MCO ; :TEAM, 09/11/70 0926:33 JCN ;.HED="4859  
JCN 14SEP70  
"; .SNF=72;.MCH=65;.PGN=0;.DSM=1;.DPR=0;

4860 JCN 14SEP70  
New NLS features

Chuck: examples are in (maxton,10sft,:zxbnd)	1
Designs in process	2
940:	2a
Collector sorter SSD	2a1
Including commands to transfer among TODAS, NLS, Collector	2a1a
Link to detailed design: (journal,4806,:zxbn) tape?	2a1b
Calculator compiler VBE	2a2
Link to detailed design: (bosca,xxx,:zxbn)	2a2a
TODAS improvements GUI WEP	2a3
Alter additions	2a3a
Fast print commands	2a3b
ged device--makes alter exactly like QED modify	2a3c
Other possibilities (as time permits)	2a4
output quickprint, output device printer default name	2a4a
output quickprint header improvements	2a4b
output quickprint statement number location (left or right)	2a4c
passk directive initialization from viewspecs	2a4d
delimited scan in conan	2a4e
conan scans that ignore case of alphabets	2a4f
allow for larger (1k) conan programs	2a4g
10:	2b
Create display with windows	2b1

4860 JCN 1458F70  
New NLS features

Link to detailed design: (iroy,ncdsply,:zxbn) etc	2b1a
Multiple files--cross file editing	2b2
Link to preliminary design: (iroy,ifedt,:zxbn) etc	2b2a
DSS related	2b3
back links and commenting, improved mail and journal from nls	2b3a
Link to preliminary design: (irby,blink,:zxbn) etc	2b3a1
Improved vector package	2b4
Improved conan/reformatting language	2b5
also new pointer scheme (interstice)	2b5a
Traveling during the specification of a command	2b6
Screen changes	2b7
selection of branches by means of conan, selection of specific structural locations	2b7a
Literal display of selected text editing entities	2b8
SID's in files (wsc may have done this already)	2b9
and associated viewspecs, etc	2b9a
Select location or entity	2b10
and new insert link	2b10a
Allow editing of literal before insertion into the file	2b11
Other possibilities	2b12
EAC link	2b12a
display start psid and viewspecs saved with output checkpoint	2b12b
jump file return link	2b12c
jump to word (jump to content but insures that hits are	

words)	2b 2d
context (limit scope of operations to a group within the file)	2b 2e
relative indenting for branch and plex only	2b 2f
indent literal feedback for statement insertion	2b 2g
centerdot to continue commands (like insert statement now)	2b 2h
command to reset viewspecs, viewchange parameters	2b 2i
invisible text	2b 2j
variable text size within a statement	2b 2k
stack of ground states	2b 2l

NLS features schedule many dates are guesses, highly changeable 3

Month	Sept	Oct	Nov	Dec	Jan	
Feb						3a
Week	2 3 4	2 3 4	2 3 4 5	2 3 4	2 3 4	3b
5						

Collector sorter !<xxx 3c

Permits easy searches through a number of file with or without reformatting, outputting to an open-ended series of collection files. Also provides new user specified sorting features.

3c|

Calculator compiler:<x xxx 3d

Allows for general programs within the context of the calculator. The language provides special mechanisms that allow for interaction of the program with the user. The language will eventually be extended to be able to produce graphs and line drawings.

3d|

TODAS improvements i xx 3e

Addition of control characters (r and y--as in QED) to alter command, addition of fast print commands (/ , † ,

linefeed--as in QED), and the definition of a QED device which will have alter control characters defined as in QED.	3e
Conan improvements :	XX 3f
Delimited scans, larger conan/reformatter programs (up to 1k), and scans that ignore the case of alphabets.	3f
Quickprint improve :	XX 3g
Improved page header (filename, initials, date, l-viewspec, t-viewspec, page number), default name for both quickprint and output device printer, and the ability to have the statement numbers typed to the right of the first line of each statement with quickprint.	3g
CDSPLY with windows:	?> 3h
Multiple view areas on the users screen, with different viewspecs for each area, and the ability to edit across areas. This will include the use of different files in different areas (with cross-file editing) when 'multiple files' is implemented.	3h
Multiple files :	?> 3i
The ability for the user to edit more than one file at a time.	3i
DSS related :	?> 3j
The implementation of back links and commenting capabilities, improved journal and mail facilities which are operable from NLS/TODAS.	3j
Picture package :	?> 3k
Allows the user to edit the text in line drawings as he now edits the normal text of a statement.	3k
New reformatter :	?> 3l
An improved language for scanning and reformatting one's files.	3l
Traveling :	?> 3m
The ability to jump around within a file in the midst of	

specifying a command.			3m1
Seegen changes	!	?>	3n
The ability to select branches with the conan, and to limit selection to specific structural locations (e.g. specific levels and specific sublist positions).			3n1
Entity display	!	?>	3o
The specific textual entities which the user has selected to be moved or copied will be displayed in the literal area and the user will be given the opportunity to backspace or add to the entity before it is actually re-inserted into the file.			3o1
SID's in files	!	?>	3p
Statement identifiers will be permanently associated with statements, with the ability for the user to display and use them as he now uses statement names and numbers.			3p1
Select loc/entity	!	?>	3q
Allows the user to save a desired location in a file (i.e. the username, filename, and sid will be saved), to later be used with the insert link command. Also, the user will be able to save specific textual entities which can later be used in editing commands.			3q1
Literal editing	!	?>	3r
Allows the user to edit the literal which he is typing and then to continue typing the literal.			3r1
Other features	!	?>	3s
EAC link			3s1
The code for the Analyzer Compiler will be obtained from the target of the link.			3s1a
Display start psid and viewspecs saved with output checkpoint			3s2
Allows the user to do a jump to Return after loading his checkpoint to get back to his previous state.			3s2a

Jump file return link	3s3
A special link that will execute a Jump File Return.	3s3a
Jump to word	3s4
Jump to content out insures that hits are words.	3s4a
Context	3s5
Limit scope of operations to a group within the file.	3s5a
Relative indenting for branch and plex only	3s6
Left justify the statements which are displayed, under viewspec or viewchange control.	3s6a
Indent literal feedback for statement insertion	3s7
Indent the literal being entered for insertion or replacement of a structural entity to the appropriate column.	3s7a
Centerdot to continue commands	3s8
More general use of centerdot to continue commands, with updated destination, as is now done with insert statement.	3s8a
Command to reset viewspecs, viewchange parameters	3s9
Resets them to normal state.	3s9a
Invisible text	3s10
Allow the user to set portions of a statement invisible, under viewspec control.	3s10a
Variable text size within a statement	3s11
With the new create display, one will be able to change the character size within a line on the screen.	3s11a
Stack of ground states	3s12
The user will be able to build up a stack of ground states and will be able to easily move around in the stack and thereby easily move from one frequently used	

4860 JCN 10SEP70  
New NLS features

command to another.

3s|2a

Leader: CHI

4

People:

5

CHI           !

5a

CHI           @

5a|



' :4860', 09/11/70 1235:29 MCO ; :NLFEA, 09/11/70 0956:57 CHI  
;.HED="4860 JCN 1RSEP70  
New NLS features";.PGM=0;.DPM=1;  
.SNF=72;.MCH=65;.PGM=0;.DSN=1;.DPR=0;

Excerpts from base inicdn 9/11/70 am	1
STAGE 1 DESIGN FOR LIASON ACTIVITY	2
Liason and Dialog Facilitation Elements at each site	2a
Reference and Communication Agent	2a1
Attributes	2a1a
Reliability (work hours, location, execution of requests by NIC and site personnel)	2a1a1
Proficiency in typing.	2a1a2
Ability to grasp technical and operational aspects of NIC tasks.	2a1a3
Duties	2a1b
help setup the R&C station.	2a1b1
Maintain day-to-day liason between NIC and site staff on non-technical NIC and Network matters.	2a1b2
Accept items for submittal to the NIC, and transmit them to us.	2a1b3
Distribute documents and messages to site staff upon request of NIC or another site.	2a1b4
Maintain R&C Station (terminal and local collection).	2a1b5
Site Reference and Communication Station	2a2
Elements	2a2a
Shelf space for local hardcopy collection.	2a2a1
Teletype-functioning computer terminal with (initially) access to voice-grade phone line for data communication and (eventually) full hookup to the network.	2a2a2
"Pegging room" space for browsing of local collection.	2a2a3

	All-hours ringable telephone for voice communication.	2a2a4
Location		2a2b
	Near to normal working space of R&C Agent.	2a2b1
	Convenient to most Network users.	2a2b2
	Enough space to permit pleasant use of the R&C Terminal, browsable access to hardcopy collection with space for eventual incorporation of micro-form devices.	2a2b3
Liason Agent		2a3
Attributes		2a3a
	Member of technical staff knowledgeable about site's current and planned contributions to Network resources and about current Network status.	2a3a1
Duties		2a3b
	To maintain general technical liason with other sites' technical personnel.	2a3b1
	To aid the R&C Agent in development of technical skills.	2a3b2
Initial NET Dialog Facilitation Services		2b
Training of R&C Agents		2b1
	Each R&C Agent will receive material describing the purpose and functions of the R&C net, desired characteristics for the physical R&C Station layout, procedures for submitting material to NIC for cataloging and distribution, information on how to fire up the data communication links to NIC and other R&C Stations, and initial information on the use of our TSS and TODAS.	2b1a
	This material will constitute a "R&C Agent's Handbook" which will be kept up to date by the Agent at our direction.	2b1b
Distribution of Basic Contact Information (R&C and Liason Agents)		2b2

We will supply each R&C and Liason Agent with current lists of all site Agents. This will be done as soon as some "critical mass" of sites have designated their Agents, and will be a precursor of the "Network Directory" which we will subsequently compile with the assistance of the R&C Agents.

2b2a

#### Compilation of Comprehensive Contact Information

2b3

Prepared forms will be distributed to R&C Agents for filling in info on all site personnel (and maybe others) who are involved or interested in the Network. (See (bass,net contacts,))

2b3a

Information from the returned forms will be compiled into an "ARPA Network Directory" which will be distributed to all sites. The directory will be maintained in standard catalog format to facilitate the development of special indices.

2b3b

#### Creation and Distribution of General and Specialized Mailing Lists and Labels

2b4

From the master file for the Directory, we will extract special contact lists (e.g., for all principal investigators or network software people, etc.). These lists can be in the form of special-purpose directories, mailing lists, or mailing labels. Initially, we will prepare several sample lists for general distribution and advertise that we can easily create them for any given purpose. After we have sufficient experience with this system, we can distribute instructions to the R&C Agents which will permit them to assemble contact lists for any special needs of their own site (if there seems to be sufficient demand for this kind of service).

2b4a

#### Replication and Distribution of Hardcopy Documents on Request

2b5

We will be prepared to reproduce from hardcopy or microform any document which a site wishes to have distributed to any subset of the other sites. Documents submitted will be assigned an acquisition number, entered into the Catalog, replicated in the appropriate quantity, and mailed to the specified recipients.

2b5a

We should be prepared to provide 24-hour response time

for short hardcopy documents and as rapid as possible service for large docs and docs submitted in microform.

2b5b

Entry into Collection (by Cataloging) of Documents on Request

2b6

We will be prepared to accept into the NIC Collection any "object" which any site wishes to have cataloged. Initially we will not attempt to censor acquisitions, deferring a decision on this until a good case arises (if ever). The only condition being that the submitter must provide means for obtaining hardcopy access, either by submitting hardcopy itself or by giving access information (e.g., "order from defense documentation supply, number ... , cost ... ).

2b6a

Assignment of Accession Numbers to any Catalogable Entity Upon Request

2b7

In addition to accepting existing objects into the NIC collection, we will assign, on request, accession numbers to be used on documents in preparation. At the time of assignment, a catalog entry will be created for the document with a descriptor indicating that it is preparation and enquiries should be addressed to ... .

2b7a

Editing, Publication, and Distribution of the NICletter

2b8

We will advertise the existence of a NICletter Service which will serve as a vehicle for general Network news, brief notices from any sites, announcement of NIC developments, discussion of "survey" results, and general, low-priority Network dialog (i.e., not sufficiently important to justify distribution independently).

2b8a

The NICletter will be published:

2b8b

Whenever NIC feels that there is enough timely material to justify immediate distribution.

2b8b1

Upon request by any Network person (for "good cause").

2b8b2

At least once every month.

2b8b3

The NICletter will be distributed to the widest possible Network audience and thus will be an easy vehicle for

reaching a lot of people. We will attempt to discourage extensive distributions of individual documents, pushing for inclusion of such in the NICletter and supporting this by guaranteeing that the "next" issue of the NICletter is always ready for publication on very short notice.

2b8c

':486|', 09/11/70 1335:25 MGC ; ':NICEX', 09/11/70 1805:18 JCN ;  
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4862 JCN 14SEP70  
ARC Record system development

Record system development |

General approach |a

The aim of the ARC record system is to provide a framework within which relevant and necessary operational dialogue and documentation may occur and be organized in useful ways. |a|

A related ARC system is the Research Intelligence System (RINS). The record system is thought to be included in the overall RINS system. |a|a

For the time being, the distinction between these systems will be primarily on the basis of the record system being more directly ARC operations-oriented than the RINS. |a|b

ARC's system building endeavour requires many tasks within various general activity areas to be in progress or awaiting activity at any one time. |a2

As the system evolves, some tasks are completed, others added, and still others redirected through new phases. |a2a

The interrelatedness of the tasks and activities is an important factor in the design of specific features and the timing of their implementation. The record system should provide communication of developments, status, etc between the activities, tasks, and the people involved in them. |a2b

The coordination of ARC resources must be carefully related to the overall ARC goals, the goals of the specific tasks, and to the goal of the most effective balance between their application. |a2c

The record system, therefore, will provide a medium within which designing, planning, resource coordination, task status, system feature and use documentation can take place most effectively. |a3

The approach will be to maintain one "central" file which will list all activities and significant tasks within the ARC. This will contain links to individual task each of which will be the responsibility of one task leader. |a4



The "central" file will also contain collected checkpoints and people scheduling data for analysis of the combined effects of task plans and schedules. Collections of such data will be automated as far as useful and possible, and will occur periodically as the need to see the combined picture arises.

|a4a

Execute merge, executable text, analyzer/compiler features will be used at first. Collector/sorter features will be used when available.

|a4a1

A related resource coordination system will be implemented to record actual application of resources to tasks. The data produced from that system will be entered into the branches collected people scheduling data for summary and analysis.

|a4a2

The individual task planning files will contain these elements:

|a4b

Current designs

|a4b1

Implementation plans

|a4b2

Checkpoints (if pertinent)

|a4b3

People needed and when ---- as best we can estimate.

|a4b4

Status comments, updated periodically --- weekly?

|a4b5

The task files will use a common checkpoint/schedule format as well as common people scheduling formats for ease in analysis of the combined data.

|a4c

These formats will be easily obtained by the task leaders by use of merge operations from a common source file.

|a4c1

The whole set of task files together with selected views of the central file will be entered into the Journal periodically ---- monthly? bi-weekly? weekly?

|a4d

There will be hard copies of these Journal file in the main Journal Access set.

|a4d1

In addition, there will be a set of copies of the

current task plan files arranged in useful sub-groupings in hard copy,	a4d2
The groupings may be:	a4d2a
Baseline designs	a4d2b
Status comments	a4d2c
People schedules and checkpoints	a4d2d
Descriptions of current system features and their use	a4d2e
Other designs under consideration	a4d2f
Design This section needs much work, some is already above, etc.	b
Link to present central planning file: (norton,tasks,:%XEND)	b1
Elements:	b2
Operational records	b2a
baseline: description of facilities/system features or changes decided upon that are in the process of design or implementation	b2a1
Description of ARC facilities/system features at present	b2a2
Status of tasks	b2a3
Comments and alternatives to baseline	b2a4
Successive versions of Baseline and other records with ways to identify each	b2a5
Reference material	b2b
This will be described and handled through RIMS system planning	b2b1
Journal vs. operational records	b3
Procedures for initial creation and maintenance	b4

Implementation	lc
Decisions regarding what is on the Baseline now	lc1
planning meetings ?	lc1a
Collection of existing documents	lc2
Producing others as needed	lc3
Organization of records on shelves	lc4
Organization as possible on-line	lc5
Evaluation	ld

'4862', 09/12/70 1310:04 HGO : :RECOR, 09/11/70 1028:23 JON ;  
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4863 JCN 14 SEP 70  
ARC Resource Coordination

## RESOURCE Coordination

### General Approach

The goal of the ARC resource coordination system is to provide a medium, coordinated with the overall ARC record system, in which ARC and other related resources --- primarily people and system power --- can be utilized most effectively toward ARC goals.

The general approach will be to record and make use of frequent estimates of resources needed by the ARC tasks.

A "timesheet" like system for recording how people's time was actually spent --- as accurately as reasonable --- will be implemented.

Needs work

Tools and techniques for analysis of these data will be developed.

These will include graphic representations of estimates vs actual, models for trial of various estimates, etc.

### Design of task management-resource co-ordination framework

Needs much work

Stage 1:

Off-line data collection by meetings and/or MET "surveys"

Complete review of ARC plans each month

On-line recording of estimates and actuals

Stage 2:

Improved formats and conventions

On-line data collection

On-line recording of estimates and actuals

On-line analysis of successive estimates

Main elements

Description of tasks with links to working files

Significant milestones

Relationship with other activities

interdependency

and result expected -report-program-hardware?

Date of estimated start and finish

People involved

Level of effort

Status commentary

### Implementation of system to stage 1:

Get agreement of ARC through participation in the development and in implementation with as little effort as possible

Try initial steps, ready to modify after first try

### Evaluation of usefulness and modification as necessary

Gather meaningful comments from the users ARC, DCE etc

|  
|a

|a1

|a2

|a3

|a3a

|a4

|a4a

|b

|b1

|b2

|b2a

|b2a1

|b2b

|b3

|b3a

|b3b

|b3c

|b3d

|b4

|b4a

|b4a1

|b4a2

|b4a3

|b4a4

|b4b

|b4c

|b4d

|b4e

|c

|c1

|c2

|d

|d1

'4863', 09/14/70 1351:02 MGC ; :RES00, 09/10/70 0947:58 JCN  
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4864 jcn 16sep70

(roles) A&O role development	
Notes after DGB JCN talk 6/9/70 on	a
	a
Configuration - facet interaction	a a
pusher for each activity project task subtask, etc, etc.	a2
(Implementation coord) Implementation coordinator	a2a
Supervision	a2a
(Resource coordinator) Resource coordinator	a2b
(User features) user features coordinator	a2c
(Hardware) hardware coordinator	a2d
(Software) software coordinator	a2e
(Servicesystem arch) Servicesystem designer	a2f
Coordination of resource use to produce Aug service	a2f
(Overall designer) Overall designer	a2g
Strategy	a2g
Promotion	a2g2
Goals	a2g3
Investments gambles	a2g4

Notes from JAF JGN talk 8/24/70 am

Visibility of ARC roles is needed to effectively fulfill critical ones

Roles identify points of view

User	produces needs	b2a
Architect	produces designs	b2b
Pusher	accepts contracts and produces products	b2c
Coordinators	integrate product building for effective progress	b2d
Implementation		b2d1
Hardware		b2d2
Software		b2d3
User Feature		b2d4
Resource		b2d5
Implementer	builds products	b2e
User	uses products	b2f
Where is manager	if not above in pieces ??	b2g

ARC task plans are now becoming more clear. This makes the need for role responsibility more apparent.

Why we need to change what we do

Many of our roles are not well identified or understood.

Many of us do not know how to perform specific roles.

Some of us are unwilling to take on certain roles.

Some of us are unwilling to perform after we agree to take on certain roles.



Many of us are inconsistent in the way we do perform the roles.

|b4e

Notes from DOE WKE JCN talk 6/26/70 am

|c

Roles identify points of view

|c|

User: helps produce needs

|c|a

Pusher: makes contracts and produces products

|c|b

Architect: produces designs

|c|b|

Implementer: builds products

|c|b2

Coordinators: integrate product building for effective progress

|c|c

Hardware

|c|c|

Software

|c|c2

User Feature

|c|c3

Resource

|c|c4

(dception) WKE's planning and MS considerations from:  
(engelbart, p3not, |:zaxnd)

|d

Develop ARC working framework

|d|

Define objectives, resources, constraints, policies, principles of strategy and tactics, etc.

|d|a

Define kickoff state and vector for ARC as a whole.

|d|b

Get service facility into position where we can expand the service relatively easily (i.e. by adding or replacing commercial hardware with mainly money).

|d|b|

Dimensions along which we seek such openness are:

|d|b|a

Program space, for freely developing large programs,

|d|b|a|

User space, capacity for supporting more users.

|d|b|a2

Transaction-scheduling space, for developing

and operating scheduling algorithms aimed at maximizing the value of the service-system's operation to its user community. |d|b|a3

Assuming several important dimensions to the transactions to be serviced: |d|b|a3a

The resource requirements -- on transfer channels, storage devices, processors. |d|b|a3a|

xxxx for allowing more users to be supported |d|b|a3b

Assuming a spectrum of services with a demand distribution whose probabilities will vary dynamically, and whose service requirements are dynamically distributed over a spectrum from high-priority high-demand real-time to mixed-priority batched background. |d|b|a3c

Assuming a spectrum of services with a demand distribution whose probabilities will vary dynamically, and whose service requirements are dynamically distributed over a spectrum from high-priority high-demand real-time to mixed-priority batched background. |d|b|a3d

Usage-measurement space, for developing and operating measurement processes on user and system dynamics. |d|b|a4

Develop framework of Activities, Projects, Roles for pursuing objectives under current situation. |d|c

NSA, |d|c|

HHS, |d|c2

USA |d|c3

SS, |d|c4

NIC, |d|c5

--- Development projects --- |d|c6

DSS, |d|c7

DGS, Display Generation System	ldlc8
Formulate role framework for DGE (ARG Pusher, Manager, Director, AUG Architect),	ldld
Organize each major ACTIVITY and PROJECT	
Push development of working framework for each top-level Activity and Project (kickoff and vector), which includes framework for setting up subordinate projects and tasks.	ld2
Develop necessary formulations to support the above.	ld3
Candidate topics for attention:	ld3a
CGS Design	ld3a1
dialogue system, Design Kickoff	ld3a2
rel-user features, Formulate framework for setting up	ld3a3
user-feature role, Set up	ld3a4
DGE roles, Analyze	ld3a5
Publisc NIOLETTEPI	ld3a6
PIO plan, formulate framework	ld3a7
NBI-DBMS issue, formulate framework	ld3a8
RINS, formulate framework	ld3a9
Pusher	ld3a9a
Early plan (framework for)	ld3a9b
---	ld4
Future meetings: set up Monday 6/29 cancelled 6/30 meeting	le
Tuesday 6/30:	lel
WSD	lela
WHP	lelb
CHI	lelc

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RRV

leld

WKB

lele

DCB

lelf

JCN

lelg

JAB

lelh

## Concept of role hierarchies

2

It appears that a basic relationship between several critical roles exists for each ARO endeavor, whether at the "overall ARO" level or at the smallest sub-project level, some of these roles are formally designated at times. At other times they more or less automatically filled out of habit or reflexive action based on internal structure and task level.

2a

The usual task development sequence goes like this:

2a1

Identification of needs and possibilities (requiring tasks to meet)

2a1a

Decision on which tasks to undertake

2a1b

Selection of a pusher

2a1c

Development of a plan

2a1c1

Selection of an designer

2a1d

Development of a design

2a1d1

Selection of builder(s)

2a1e

Implementation of a design

2a1e1

Testing and debugging

2a1f

Acceptance of the task as completed

2a1g

Introduction into use

2a1h

## Role scopes:

2b

Overall ARO

2b1

Activity

2b2

Project

2b2a

Task

2b2a1

Subtask

2b2a2

Cross ARO roles

2b3

Role definitions:	3
General:	3a
Pusher: makes contracts and produces products	3a1
Designer: produces designs	3a2
builder: builds products	3a3
Coordinators: integrate product building for effective progress	3a4
Hardware	3a4a
Software	3a4b
User Feature	3a4c
Resource	3a4d
Specific: Discussion of pusher, since it appears to be the key role, present in each of the other sub-roles	3b
Responsibilities:	3b1
A pusher operates under an AGREEMENT or contract with another pusher for whom the particular product is being developed.	3b1a
The pusher supplies the NEEDED ENERGY to get the task done, with continuing RE-EVALUATION of design, timing, resource costs, and relationships to other ARC developments.	3b1b
He see that needed information is DOCUMENTED for his own and others future use. This includes documenting plans, designs, and final details of use or construction.	3b1c
When appropriate, his plans include strategic ALTERNATIVE COURSES or stopping points to effectively react to unforeseen changes in the situation as time progresses.	3b1d
ARC evolves through the combined effect of a NETWORK OF pusher ROLES continually being created and fulfilled, each with as much reference to all other pusher roles as	

appropriate and necessary.

3b1e

Relationships:

3b2

The pusher usually needs the services of a designer and one or more builders to carry out his role. The designers and builders also operate in the pusher role in conduct of their tasks, and may also make agreements with others for help.

3b2a

The design and resource cost of the task must be compatible with those of other tasks. This is facilitated by interaction with those who have the role of coordinator for various aspects of the ARC operation.

3b2b

Such as: Hardware, Software, User Features, Resources, DSS, RINS, Overall ARC coordinators

3b2b1

The pusher may carry out several of the roles relating to his task. This can make his overall job more difficult due to the need for him to look at all situations from more than one viewpoint.

3b2c

Techniques:

3b3

UNDERSTAND ROLE as related to the specific task

3b3a

When appropriate, make a PLAN for conduct of the task and have it VISIBLE for others to see.

3b3b

Determine significant POINTS expected to occur during the task and make a plan for reviewing progress at each point.

3b3c

Get agreement with appropriate DESIGNERS

3b3d

Goals and other parts of the agreement should be made clear, so that designs are started pointing toward the goals originally set out

3b3d1

REVIEW DESIGN during development and when completed.

3b3e

Arrange with BUILDER(S) to begin implementation of the design

3b3f

INTERACT with builders as their work proceeds.

3b3g

Continually REVIEW STATUS of the task and evaluate in light of other developments at ARC

3b3h

COMMUNICATE status of work and other details to rest of ARC through appropriate media.

3b3i

MAINTAIN AWARENESS of other ARC developments through attention to baseline configurations and other details of existing and planned developments in ARC.

3b3j

ACCEPT final result of task work when considered complete and coordinate with others directly concerned with the end result of the task.

3b3k



	3b31
Glossary of terms	4
Baseline	4a
The approved and defined point of departure for control of future changes in system or equipment performance or design. A baseline is documented by a specification and other documents and is technically defined by formal approval of the specification.	4a1
Activity	4b
Project	4c
Development or task	4d
Client	4e
Pusher	4f
Contract or agreement	4g
Pusher hierarchy	4h
Notes on the game	5
What if a contract is refused?	5a
No contract must be accepted by any potential pusher.	5a1
Grounds for refusing:	5a1a
Agreement not clear	5a1a1
Scope not appropriate for specific pusher	5a1a2
Not enough time of pusher still uncommitted	5a1a3
However, the refusing pusher needs to note that rejecting a contract that appears to fall naturally to him may result in some other developments that he should weigh before rejecting the proposal.	5a2
This would include missing opportunities for other contracts that he may really wish to undertake.	5a2a
It might also include withdrawal of all future proposed	

contracts by the pusher offering this one or by the whole or APC if the situation is critical enough.

5a2b

What if a contract is broken?

5b

If a contract is broken i.e. .. stopped before completion or changed in nature without agreement with the client, there may well be aftereffects.

5b1

It might include withdrawal of future proposed contracts by the pusher offering this one or by the whole or APC if the situation is critical enough.

5b1a

It might result in third party intervention to help make a new agreement about what to do next.

5b1b

Who documents contracts or agreements?

5c

Appears that mutual agreement will decide this ... either can

5c1

Sometimes one party or the other may ask that a proposed agreement be recorded even if being refused .

5c2

No contract need be accepted until both parties feel agreement is complete and/or recorded to the satisfaction of each.

5c3

DCE: Role notes 6/26/70 pr

5d

In the nested roles,, e.g. designer,, pushers,

5d1

if role x wants to interact with designer of task y, does he have to start at top of designer hierarchy?

5d1a

No. Seems best to go down to lowest appropriate level

5d1a1

The approached designer sends him up if it seems appropriate

5d1a2

and, the approached designer automatically keeps record of significant NP's.

5d1a3

MSR "BASELINE AND ROLES" meeting planned:

6

Who: WSD WHE GHI BRV WKE DCE JAF JCN (facilitator)

6a

When: Tues 7/7 am?

6b

Where: ARC Conference room ...set up with available console 6c

Agenda: 6d

DCE: Set the stage of why the meeting, recognizing agenda briefly 6d1

JCN: 6d2

1. Baseline as it now is developing 6d2a

2. Pusher defined as key role 6d2b

3. Network or pushers concept 6d2c

4. Other roles and concepts as they relate to the previous items 6d2d

5. How do the particular people in meeting relate to all of this? 6d2e

6. Discussion 6d2f

DCE: 6d3

Review foregoing and value to ARC in meeting future needs. 6d3a

Notes: 6e

Preparations: 6e1

Agenda in advance 6e1a

Baseline example two levels? 6e1b

Poles: Pusher defined and some comments in advance? 6e1c

Recording of ideas during meeting 6e2

On-line ARC? 6e2a

Tape record? 6e2b

Pencil notes 6e2c

:486h, 09/17/70 1146:54 HEG ; ' :BOLES', 09/15/70 1650:57 JCN ;  
.HED="486h jcn 1650:57"; .SUF=72;.MCH=65;.PGN=0;.DSN=1;.DPR=0;

Mail File

JCN \$4865.1 MGC 09/17/70 1200:59 (NORTON):ROLES IS  
(JOURNAL):4864\$

DCE \$4865.2 MGC 09/17/70 1201:48 (ENGELBART)JRNLA IS NOW  
(JOURNAL):4866\$

WSD \$4865.3 MGC 09/17/70 1328:59 (DUV):JRNLP4846 NOW  
(JOURNAL):4846 -- (DUV):JRNLI NOW (JO):4867 DID YOU EVER USE  
NUMBER 4848? \$

MGC \$4865.4 WSD 09/17/70 1333:06 I DON'T KNOW ABOUT 4848...I  
CON'T REMEMBER TAKING IT..\$

WSD \$4865.5 MGC 09/17/70 1406:25 JCN RESERVED 4848 FOR YOU TO  
USE AS NEXT MAIL FILE NUMBER QUITE SOME TIME AGO (SEE STATEMENT  
IA IN (JO):NUMB) AND IT HAS NOT YET APPEARED FOR PROCESSING, SO I  
ASSUME IT IS STILL AVAILABLE FOR YOUR USE\$

WSD \$4865.6 MSC 09/17/70 1608:41 SDBMNP AND DATA NEED TO BE  
COMPILED BEFORE LOAD -- SORRY, BUT KEN NEEDED TO DO KDF DUMP. IF  
YOU WORK TONIGHT COULD YOU CALL CHUCK AT 968-8526 AND TELL HIM  
WHAT STATE THINGS ARE IN.\$

WSD \$4865.7 MSC 09/17/70 1629:26 IGNORE PREVIOUS TELEGRAM;  
BOTH COMPILED, NUT (BUT) LET CHI KNOW HOW THINGS TURN OUT, OF YOU  
LOAD\$

ARG BER BLP CHI DOC DIA DCE DGC EKV HAL JMY JBN JCN JDH JMH  
JNL JTM JRX KEV LSL MGC MEH MEJ MET MSC NDM VRB VDB WHP WKE WLB  
WSD \$4865.8 KEV 09/17/70 2011:49 THE FOLLOWING FILES ARE PROBABLY  
NOT IN GOOD SHAPE ON THE KDF DUMP MADE LAELBART)RINS  
(N|FILES)CLNUP (N2FILES)TDATA (T3FILES)TXTED (MOL)TMR  
(MOL)MOL (NLS)PROCL (USR)AFD (USR)676  
(T|FILES)BAD (T|FILES)CALC (ERICKSON)NFCH4 (P4DOC)ARGH  
(PARSLEY)LINE (PAXTON)BAD2 (PAXTON)RL10 (CATALOG)NFCH5  
(GEOFFRION)- ALL FILES? (DIALOGUE)671 (DIALOGUE)-663 -  
662 -661 -, 6510 - 965 (PRINCE)NLSXR \$

WHP UTPUT SEQ LOWER/UPPR WORKS IN EXPERIMENTAL SYSTEM;  
ANYTHING BEN WNTS FILE NAME. (ALSO IN TODAS) INSERT SEQ STILL HAS  
PROBLEMS\$

WSD JTM \$4865.10 WHP 09/19/70 1032:50 MOL FOR IMLAC SYMBOLICS  
ARE UNDER MELVIN'S KDF AS IMMOL \$

WSD \$4865.11 WHP 09/19/70 1530:21 HELP!!! I'VE TRIED TO FIND

Mail File

OUT WHY CONTINUE PUTS DISPLAY BACK TO ORIGIN BUT HAVE BECOME LOST  
IN THE MIDDLE OF THE SUPERPROCESSOR STUFF. WILL YOU PLEASE GET IT  
WORKING SO THAT WHEN CONTINUE THE DISPLAY IS AT THE SAME PLACE.  
THANKS \$

WSD \$4865.12 WHP 09/19/70 1532:45 OH ALSO, HOW DOES ONE USE  
THE ANALYZER COMPILER THESE DAYS. I GOT A PROGRAM COMPILED AND  
CALLED BY THE SEQUENCE GENERATOR, BUT THE TEXT WAS NOT BEING  
CHANGED??? IS THERE SOME MAGIC FLAG THAT IS NOT SET PROPERLY??? \$

CHI WHP WSD BLP \$4865.13 MSC 09/20/70 0202:32 TWO NEW  
NUTILITY'S -- BOTH KNOW ABOUT COLON FILES VS SLASH; BOTH USE  
TODAS ENER SEQUENCE FOR SUPER-PROCS RADNU AND NUTIL (BOTH IN MOL  
KDF) CURRENTLY THESAME; SHOULD BE USED WITH RAD SYSTEM. NNUTI IN  
MOL KDF FOR UNUVAC SYSTEM. THE TWO VERSIONS ARE THE SAME EXCEPT  
FOR LOADING PROCESS.\$

BLP \$4865.14 MSC 09/20/70 0206:03 PATCH FOR USING TODAS IN  
PASS4 -- IN UNIVAC SYTEM, LOC 2532 CONTAINS "/O↑" CHANGE THIS TO  
"/I↑". IN RAD SYSTEM LOC 2505 -- SAME CHANGE. (/)/NUTILITY IS  
THE PLACE FILE. AFTER YOU PARCH, SAVE CORE FROM 0 TO 17777  
SA=200364. (PS. I HAVEN'T TESTED THIS PATCH.)\$

WSD \$4865.15 JCN 09/20/70 2215:54 EXECUTE COLSORT NOT UP? I  
GET NOT ON DRUM MESSAGE TONITE ANYWAY, I'VE MADE A THING THAT  
CHEWS OFF "PAST" WEEKS SO AS TO UPDATE ESIMATES AND OTHER THINGS  
ON A TIME BASIS WITH SOME EASE. Q: IT TAKES OFF, SYA FOUR  
CHARACTERS EACH TIME IT IS APPLIED TO A FILE. DO I REALLY HAVE TO  
OUTPUT IT TO HAVE IT TAKE OFF MORE FORM THE SAME FILE BY  
REPRINTING IT WITH VIO%, ETC? OR IS /R THE THING TO DO?? I'M  
CONFUSED. BYES\$

WSD \$4865.16 JCN 09/20/70 2218:32 ANYWAY UPDATE EASE  
APPLIED TAKE ETC\$

WSD \$4865.17 JCN 09/21/70 1124:43 COLSORT SEEMS OK NOW ..  
WHAT IS THE PRESENT LIMIT ON NUMBER OF FILES I CAN FEED TO THE  
COLSORT? I MAY WANT TO FEED IT 30 OR 40 SOON? \$

WHP \$4865.18 WSD 09/21/70 1215:04 SYMBOLICS FIXED SO THAT  
CONTINUE WILL WORK RIGHT. CAN'T PATCH RUNNING SYSTEM BECAUSE THE  
SLASH KEY DOESN'T WORK ON THIS TERMINET. SO RELOAD OR CALL ME  
AND I WILL TELL YOU WHAT PATCH IS\$

WSD \$4865.19 MSC 09/21/70 1722:25 NEW SYSEM LOADED/SAVED IN  
NOBJECTS\$

BLP \$4865.20 MSC 09/21/70 1727:34 PATCHES FOR SEETTING TODAS

## Mail File

FLAGIN PASS4 LOAD. (/NUTILITY IS PLACE FILE. (NOTE SA --  
 NORMALLY 200364) IN NUTILITY THAT RUNS UNDER RADS, LOC 2505  
 CONTAINS "/0†". THIS SHOULD BR "/1†" FO TODAS. IN NUTILITY THAT  
 RUNS UDER RADS, LOCN 2532 SHOULD BE CHANGED AS ABOVE. THE  
 PATCHED FILES SHOULD THEN BE SAVED , EITHER AS YOUR OWN FILE OR  
 UNDER SYSTEM SPABE. (PLEASE DONT CHANGE KDF VERSIONS OF FILES  
 WITHOUT TALKING TO ME FIRST.) PS I HAVENT TESTED THIS, BUT IT  
 SHOULD WORK.\$

20

WSD \$4865.21 MSC 09/21/70 1732:40 ARE YOU LOOKING INTO WHY  
 INSET QED DOENT WORK? MARY C YOURE THE MAN CAN DO ITS

21

ARG BER BLP CHI DOC DIA DCE DGC EKV HAL JMY JBN JCN JDH JMH JNL  
 JTM JRX KEV LSL MGC MEH MEJ MET MSC NDM VRB VDB WHP WKE WLB WSD  
 \$4865.22 KEV 09/21/70 2025:37 THE FOLLOWING FILES ARE PROBABLY IN  
 BAD SHAPE ON THE KDF DUMP TAPES MADE LAST NIGHT(9/21/70):  
 LAMPSON-TAUG ENGELBART-RINS, NFNET LICHTENBERGER-MOVIE  
 N|FILES-CLNUP T3FILES-TXTED PASS4-OPLAN NLS-PROCL USR-AFD, 676  
 T|FILES-BAD, CALC ERICKSON-NFCH4 P4DOC-ARGH PAXTON-BAD2  
 CATALOG-NFCH5,|USR DIALOG-671, 663, 662, 661,965, 65|0  
 PRINCE-NLSXR TRUNDY-MEMOES

22

WSD \$4865.23 JCN 09/21/70 2248:23 WHEN ARE YOU COMMING DOWN?  
 JBN,WLB AND I ARE ABOUT TO BUILD A CATALOG FOR THE NIC... TO MAKE  
 A SMALL CAT FOR SENDING TO THE NODE AGENTS..GIRLS, THAT IS. I'D  
 LIKE TO TRY THE COLSORT ON A SERIES OF "DESCRIPTOR-OUTFITTED"  
 FILES. YOU COULD HELP US KEEP OUT OF MORASSES OR SUCH.\$

23

JTM JDH KEV \$4865.24 WKE 09/22/70 1041:35 I discussed today  
 with Ted Strollo the protection of the TENEX system. They do not  
 want people (particularly DEC) to have access to the system yet  
 and requested that we do not leave it on the disc on the AI  
 machine. If this presents a serious problem please let me know  
 and we will try to make some arrangements.\$

24

WHP JTM \$4865.25 WKE 09/22/70 1044:51 Ted Strollo (of BB&N)  
 informed me today that they are still slipping on getting their  
 PDP-10 on the network and it will be at lease the middle of  
 November before they are up.\$

25

JCN \$4865.26 WSD 09/24/70 0843:41 WAS COMING DOWN TDAY (WEDS),  
 BUT CAR I S IN SHOP, SO WON'T MAKE IT UNTIL FRIDAYS\$

26

MSC CHI \$4865.27 WSD 09/24/70 0846:13 I GUES WE FORGOT TO  
 DE-NOP MAIL IN NLS. WE MAYBE NEED TO PPUT A FLAG (EXP) TEST IN  
 SO WE DON'T HAVE THE PROBLEMS

27

MSC \$4865.28 WSD 09/24/70 0848:03 WON'T BE ABLE TO DO INSERT

## Mail File

QED THING UNTIL NEXT WEEK PROBABLY\$ 28

MSC \$4865.29 MGC 09/24/70 1642:21 PLEASE PLEASE PLEASE PUT  
INSERT QED BRANCH BACK\$ 29

JCN \$4865.30 MEJ 09/24/70 0958:57 (NOR):JRNL| is now JOURNAL  
4876\$ 30

MEJ \$4865.31 MEJ 09/24/70 0959:43 :(JE):JRNL| is now JOURNAL  
4875\$ 31

MGC \$4865.32 MSC 09/24/70 1035:50 BILL DUVAL IS WORKING  
ONWON'T BE AVAILABLE UNTIL NEXT WEEK...SORRY\$ 32

JCN \$4865.33 MGC 09/24/70 1344:22 (NIIONS IN PROPOSED MASTER  
CATALOG FORMAT\$ 33

CHI JTM WKE WHP DIA WSD KEV VDB JDH EKV MSC  
(-)-\$4865.34 JDH 09/25/70 1710:28 \$ 34

CHI JTM WKE WHP DIA \$4865.35 JDH 09/25/70 1714:51  
SYSDEBUG HAS BEEN CHANGED (WITH THE 9-21 TSS) TO USE NEW DDT AND  
NOT TO GIVE MONITOR RELABELING. TO GET MONITOR RELABELING, HAVE  
EXECUTIVITY -1 AND TERMINATE THE SYSDEBUG CALL WITH AN  
EXCLAMATION POINT INSTEAD OF A PERIOD. \$ 35

WSD \$4865.36 MGC 09/25/70 2024:41 WHP SAID MSC IS WORKING ON  
INSERT QED BRANCH. MSC SAYS YOU ARE WORKING ON INSERT QED BRANCH.  
YOU TOLD ME (I THINK) THAT WHP IS WORKING ON QED INSERT QED  
BRACNCH. I HAVE ABOUT TEN FILES THAT I HAVE BEEN TRYING TO GET  
FROM SEQUENTIAL TO RANDOM FILES. I HAVE BEEN TRYING FOR 3 WEEKS  
TO DO THIS. I AM LEAVING ONE WEEK FROM TOMORROW. WHO DO I SEE  
ABOUT GETTING INSERT QED BRANCH PUT BACK IN THE SYSTEM AND IN  
WORKING ORDER? \$ 36

WSD \$4865.37 MGC 09/25/70 2034:30 CHI SAYS WHP IS WORKING ON  
QED BRANCH, IE. "INSERT QED BRANCH" NOT "INSERT SEQUENTIAL"--  
WHP SAYS MSC IS WORKING ON IT AND MSC SAYS YOU ARE WORKING ON IT.  
EACH OF THESE PEOPLE IN TURN HAS AT ONE TIME IN THE PAST MONTH  
SAID HE WOULD GET "INSERT QED BRANCH" BACK IN THE SYSTEM. I AM  
TRYING TO USE IT. I NOW HAVE A BACKLOG OF ABOUT TEN FILES TO USE  
IT ON BEFORE ONE WEEK FROM TOMORROW. CONSIDERING HOW DIFFICULT  
IT IS TO FIND A TIME WHEN I CAN USE THE SYSTEM AT ALL IT IS VERY  
FRUSTRATING TO FIND THE PART OF THE SYSTEM I AM SUPPOSED TO BE  
USING IS MISSING WHEN I DO FINALLY GET SOME TIME ON THE SYSTEM.  
CAN YOU TELL ME IF INSERT QED BRANCH WILL BE READY IN TIME FOR ME  
TO FIND TIME DURNG OFF HOURS WHEN NOT MANY OTHER PEOPLE WOULD BE  
INCON- VENIENCED BY MY USING IT WITHIN A WEEK.??\$ 37



## Mail File

WSD \$4865.38 WSD 09/25/70 2036:15 P.S. I HAVE BEEN TRING FOR  
OVER A MONTH TO DO THE TASKS THAT REQUIRE INSERT QED.\$

38

WLB \$4865.39 MEJ 09/25/70 0901:20 (BASS):JRNL| is now 4877\$

39

MGC \$4865.40 WSD 09/25/70 1006:26 INSERT QED WORKS NOW. IN  
GENERAL, I AM NOT THE ONE TO COME TO FOR SYSTEM MAINTENANCE,  
EXCEPT FOR NEW FEATURES I AM WORKING ON\$

40

CHI \$4865.41 WLB 09/25/70 1238:43 EXECUTE RESET LEAVES THE  
DEFAULT FILENAME FOR OUTPUT FILE SET TO THE NAME OF THE LAST FILE  
OUTPUT BEFORE RESETTING, THUS INVITIE- ING DISASTER IF ONE'S  
HANDS ARE QUICKER THAN HIS EYES. THIS IS A MINOR MINOR POINT, OF  
COURSE; I JUST FELT LIKE IT WAS ABOUT TIME FOR ME TO START  
SENDING YOU MORE MAIL. START SENDING YOU MORE MAIL.\$

41

'4865', 09/28/70 1021:09 MEJ ; 'MAIL', 09/25/70 1355:56 WSD ; .HED="4865 WSD 25SEP70 Mail File"; .SNF=72;.MCH=65;.PGN=0;.DSN=1;.DPR=0;

## Bryant Pro

- Costs less (see cost discussion below) |a
- Allows easier change over to the 10 from the 940 |b
- can leave the univac drums on the 940 while getting the  
bryants going on the 10 otherwise would have to be able  
to switch the univac between 940 and 10 |b1
- Easier to setup commands |c
- single drum rather than multiple moving independently |c1
- Can use IOX monitor routines for Bryant |d
- instead of writing new for univac |d1
- Faster transfer rate (potentially) |e
- can transfer up to 10 pages in 34 milliseconds while the  
univac's can do only about 13 in the same time |e1
- however the percentage of possible transfers which are  
actually used depends on the length of the drum queue and  
the distribution of requests |e2
- studies show that for about 20 items in the queue with a  
uniform distribution over pages of the drum the bryant is  
able to use about two thirds of its possible transfer rate |e3
- the univac is able to give a higher actual transfer rate  
than the bryant for queue lengths less than 20. this is  
because of the much lower latency of the univacs |e4

## Bryant Con

- Slower access - may not be significant with large number of  
users and large memory |2
- BBN (Tomlinson + Hurony) said that with 64K and about 20  
jobs IOX was waiting for the drum about 30% of the time.  
but with 128K expect to be able to have a sufficient number  
of working sets in core that will eliminate almost all  
waiting for the drum |2a1

Reliability - bad experience of AIG 2b

Bryant unable to replace a bad drum could be down for several months 2b1

Univac however would be able to replace a bad unit in very short order 2b2

Capacity 2c

Bryant is fixed 2c1

would not be able to expand the drum capacity This will be a problem when have more than 40 users 2c1a

Each user needs about 20K on the drum for writable pages 2c1b

also about 150K for programs such as NLS, EXEC, etc. 2c1c

The Bryant is fixed at about 1 million words 2c1d

Univac capacity can be enlarged to about twice that of the Bryant 2c2

Transfer rate versus slow memory 2d

The higher transfer rate of the Bryant means that it will require extra buffering if it is to be used with the slow (1.8 mic) memory - contact Ted Stollo for more details 2d1

the univac controller does enough buffering that this would not be a problem with them 2d2

Costs 3

The following costs are for the current contract period. A major factor in favor of the Bryant is that costs for a subsequent contract period will be only maintenance of \$700 per month for the Bryant but the full lease cost of \$6,000 per month for Univac. 3a

Bryant \$94,700 6 man weeks 3b

Purchase cost 90,000 3b1

Buffer additions to interface 500 1 man weeks 3b2

Bryant drum will not operate with the MD 10 memory with

the buffering provided by Bryant. If we are getting these memories we will have to modify the controller by adding two words of buffering. Cost estimates as follows:

			3b2a
Material	\$500		3b2a1
Labor			3b2a2
RDE	2 weeks		3b2a2a
Technician	2 weeks		3b2a2b
Down time	3 days		3b2a3
Maintenance contract	4,200 ??		3b3
Estimated cost about \$200 per month beginning in Dec 1970 and \$700 per month beginning in Dec 1971 *****THIS MUST BE CHECKED WITH BRYANT*****			
			3b3a
Replanning		2 man weeks	3b4
Computer room layout			3b4a
Renovation with Cybernex			3b4b
Negotiations with Utah, Univac and ARPA			3b4c
Univac	\$75,657	3 man weeks	3c
Lease	55,657		3c1
6,746 per month starting in June 1971 (maintenance and use tax included) 6,746 x 8.25 months			
			3c1a
This is the cost for keeping Univac. Lease through May 1970 must be paid in either case.			
			3c1a1
Interface	20,000		3c2
Software		3 man weeks	3c3
Programming effort necessary modify IOX system for the Univac cruss			
			3c3a

' : 4866', 09/16/70 1023:55 JGC ; ' : DRUNS', 09/15/70 1303:05 WKE ;  
 .HED="4866 DCB 1858P70  
 " ; .SNF=72 ; .MCH=65 ; .PCH=0 ; .DSN=1 ; .DPR=0 ;

4867 WSD 17SEP70

Notes, Guesses, and Speculations as to the nature of the TENEX file system Based on a conversation with Ted Strollo

The overall appearance of the TENEX file system seems to be similar to that of the PAO. |

Files are created and referenced by names, and the file directory is organized by user number (I think). |a

A name may additionally have an extension as in IO/50 system, and all files have version numbers. |b

There are no scratch files. |c

There are no drum files. |d

The updating of files is done in a different manner. |e

As I understand, only the parts of a file being accessed are kept in swapping storage...drum and core. |e1

There is a background job which continually trickles pages of the file which have been changed from the swapping storage to the permanent copy on disk. |e2

This raises a few questions: |e2a

How vulnerable is a user program to crashes, and what does this do to programs which demand a high degree of safety in files (e.g. when communicating with another program via a file). |e2a1

T. Strollo says they have had some trouble in this area, and are working on it. |e2a|a

I wonder if there will be a command which allows the user to force currency of a file |e2a|b

Backup |f

There is an extended dump/load facility for use with TENEX. |f|

There are two types of dumps: full dumps or incremental dumps, each only writes out those (portions?) files which have changed. |f|a

Files, directories, or the entire directory may be rebuilt from dumps. |f|b

4867 WSD 17SEP70

Notes, Guesses, and speculations as to the nature of the TENEX file system  
Based on a conversation with Ted Strollo

The incremental dump is initiated manually, as is the full dump.

|f|c

I think that for our purposes, we want to think about making the incremental

|f|c|

dump automatic. T. Strollo did not think that this would be unreasonable.

|f|c2

There is a background job which runs around and checks the validity of files, directories, etc on the disk, and fixes anything which may be amiss.

|f|d

Presumably fix means either rebuild or delete, depending on what is wrong.

|f|d|

Archive.

|g

The archive system has not yet been specified, and probably won't be for a while.

|g|

A few points, however:

|g|a

The archive system will probably be an offshoot of the backup system

|g|a|

There will be no automatic archival or retrieval of files.

|g|a2

There is a version number system which is in effect for all files which works as follows:

|g|a3

Each time a file is written, it is assigned a new version number (ordinal number, 1-N).

|g|a3a

All old copies of the file are accessible unless the user has deleted them.

|g|a3b

This causes a problem in gobbling up disk space.

|g|a3c

I think that this will be extremely severe in our environment.

|g|a3c|

A file name may be followed by a '; followed by a version number:

|g|a3d



## Notes, Guesses, and speculations as to the nature of the TENEX file system based on a conversation with Ted Strollo

fname;-2 means something special (T. Strollo didn't remember exactly what) |g|a3d1

fname;-1 means oldest version of file |g|a3d2

fname;0 means newest version of file |g|a3d3

fname;N where N is positive means the Nth version of the file. |g|a3d4

BBN are thinking about the disk space problem, but I think that we will probably need an override for the version thing. |g|a3e

Garbage collection/Cleanup |h

Spaces which have been released in a file are dynamically garbage collected. |h1

Space used by deleted files is released by a manually(?) run job. |h2

When a file is deleted, a bit is simply set in the file directory |h2a

entry for that file. |h2b

Then, when the manual cleanup routine is run, the space is released. |h2b1

One nice feature of this is that an 'undelete' command is available. |h2c

940-TENEX file conversion. |i

BBN has a program which reads and writes 940 format tapes. |i1

The only restriction is that it is limited to sequential files. |i2

If we make the archive system's tape files sequential, which is being considered (it avoids some 940 bugs) then all of our archive tapes should be directly convertible to be 940, except that the NLS file format may change |i3

Brief opinions and comments. 2

4867 WSD 17SEP70

Notes, Guesses, and speculations as to the nature of the TENEX file system Based on a conversation with Ted Strollo

I don't think that the TENEX system is going to do everything we want it to.

2a

I am afraid that some of the nice features (e.g. versions) are going to be too expensive for us to use in their current forms.

2b

I think that file conversion can be done by using the archive system in the following manner:

2c

Have the retrieval part check the nls version number in the file header, and if it is a 940 file, convert it on input to TENEX format. This would

2c1

not be the most efficient way of handling conversion, but it could include all 940 files that were archived (which could be all that are to be transferred), and it would avoid the management problems involved in a mass conversion run.

2c2

This clearly needs some more thought.

2c3

We ought to think about version numbers in the archive system and the TENEX with a thought towards making them compatible.

2d

It is a question as to whether the date/time or a number is more appropriate.

2d1

When we talk about this, maybe we should think about the eventual format of catalogue numbers too.

2d2

'1:4867', 09/17/70 1321:36 MGC ; :FILENOTE, 09/15/70 1438:53 WSD ; TO  
DCE FROM WSD .HED="4867 WSD 17SEP70  
Notes, Guesses, and speculations as to the nature of the TENEX file  
system Based on a conversation with Ted Strollo";  
.SNF=72;.MCH=65;.PGN=0;.DSN=1;.DPR=0;