NCP INTERNAL STRUCTURE AND DUMP ANALYSIS

REV 1.2

NCP0000

TOPIC OUTLINE

FEP HARDWARE

NCP OVERVIEW

SUPERVISOR

CHANNEL ADAPTER IOS

LINK SCHEDULER

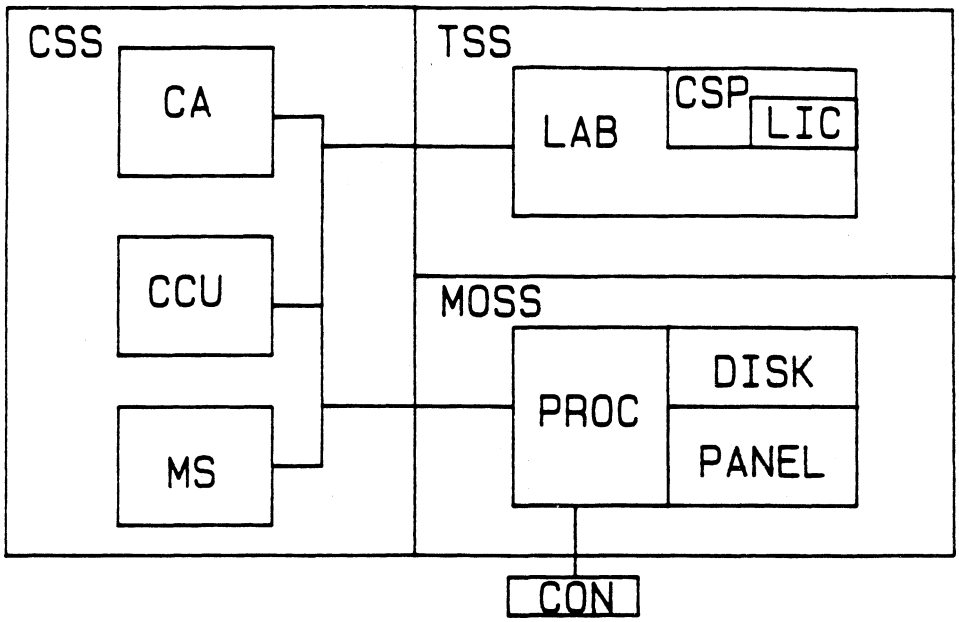
INTERMEDIATE NETWORK NODE

BOUNDARY NODE & PHYSICAL SERVICES

METHODOLOGY

SNA NETWORK INTERCONNECTION

3725 OVERVIEW



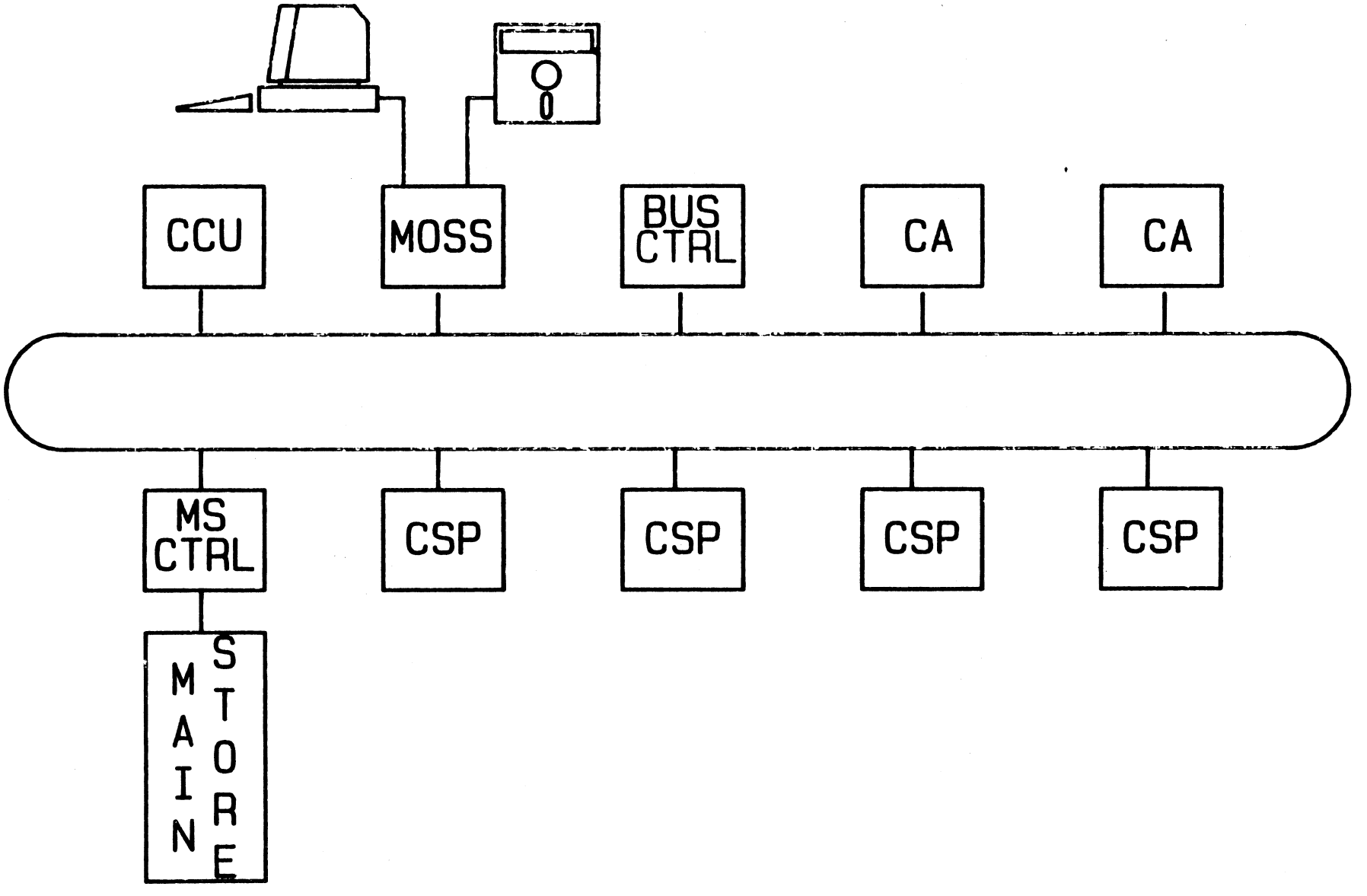
CSS - CONTROL SUBSYSTEM
- CA - CHANNEL ADAPTER
- CCU - CENTRAL CONTROL UNIT
- MS - MAIN STORAGE

TSS - TRANSMISSION SUBSYSTEM
- LAB - LINE ATTACHMENT BASE
- CSP - COMMUNICATIONS SCANNER
- LIC - LINE INTERFACE COUPLER

MOSS - MAINTENANCE AND OPERATOR SUBSYSTEM
- MOSS PROCESSOR
- DISKETTE
- CONTROL PANEL
- MAINTENANCE CONSOLE

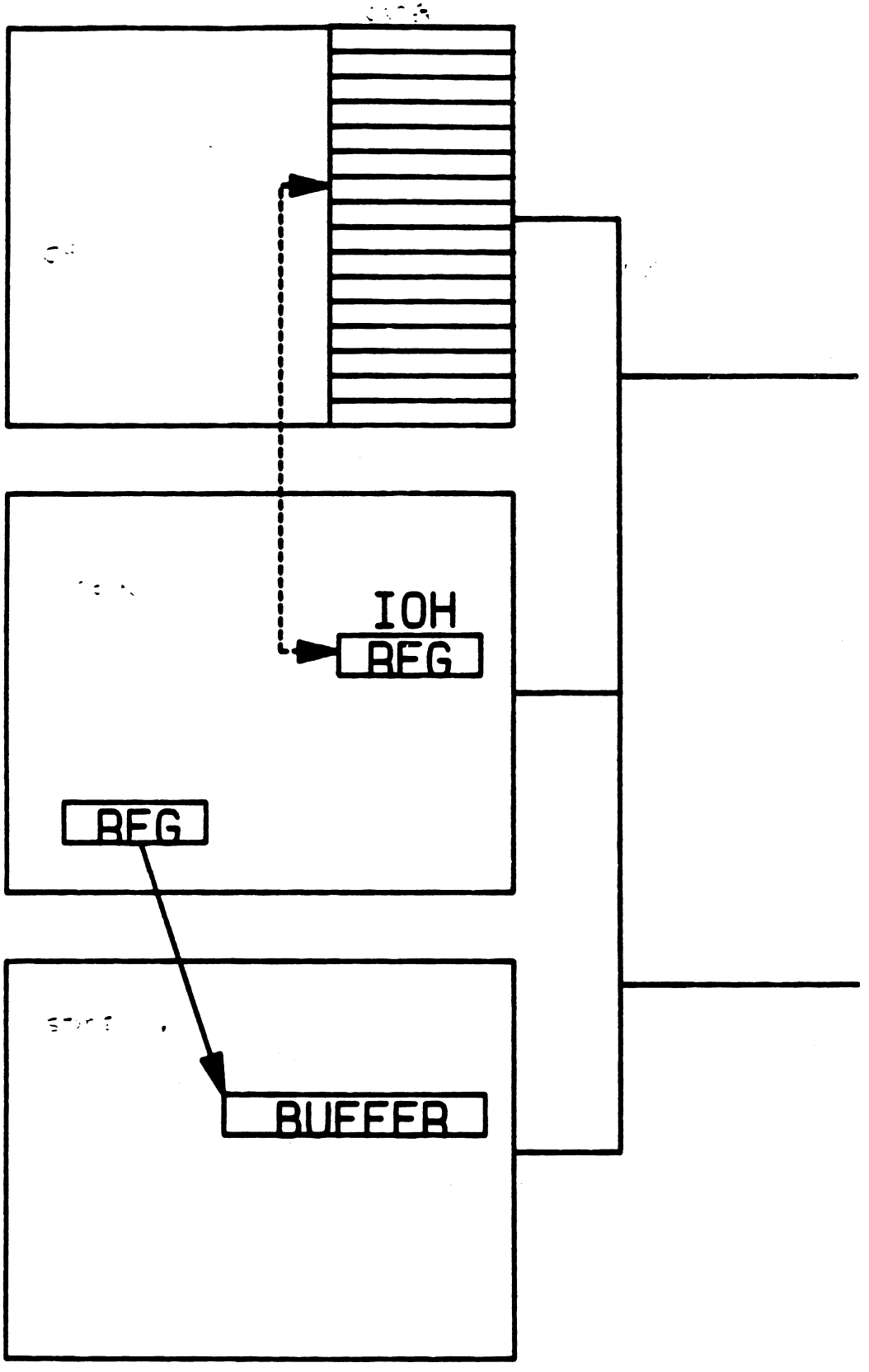
NCP0020

SYSTEM BUS



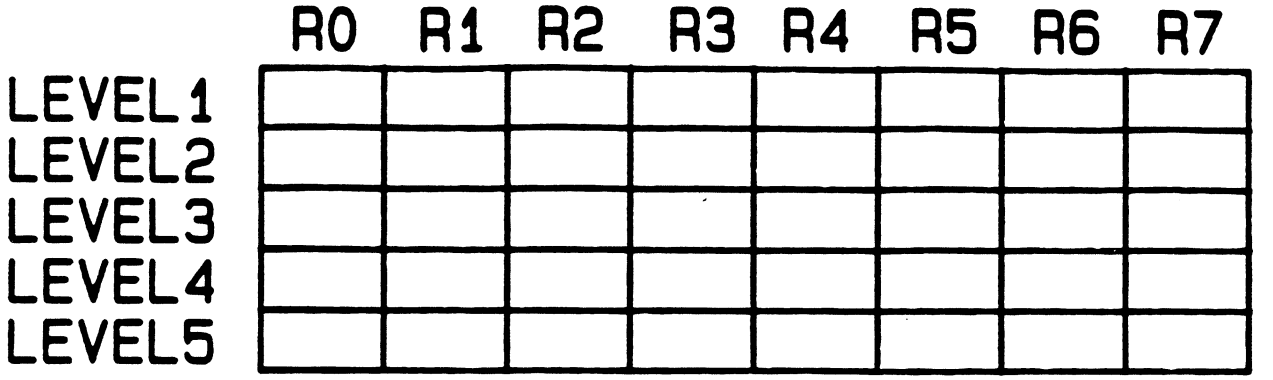
NCP0025

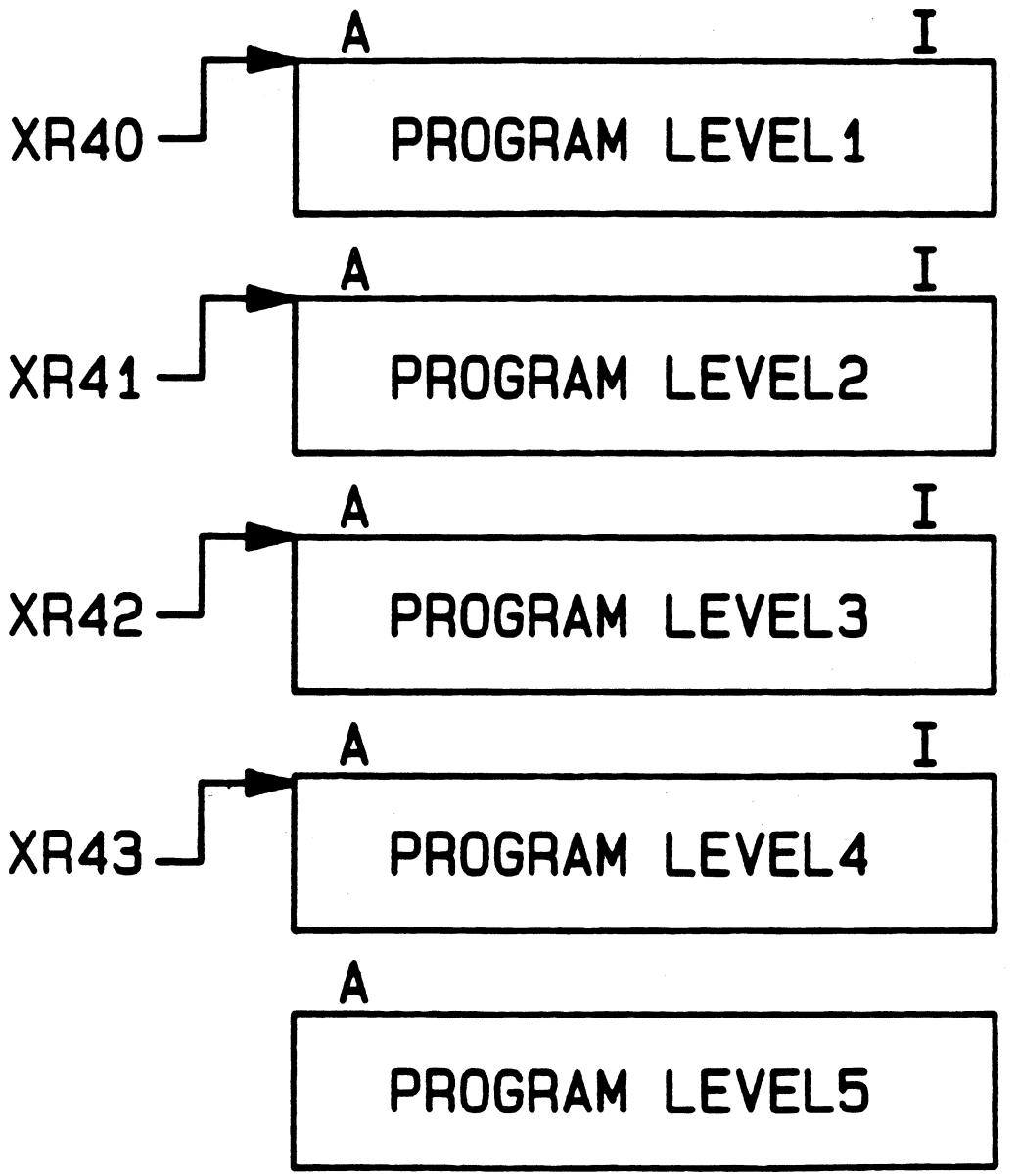
CHANNEL ADAPTER



NCP0030

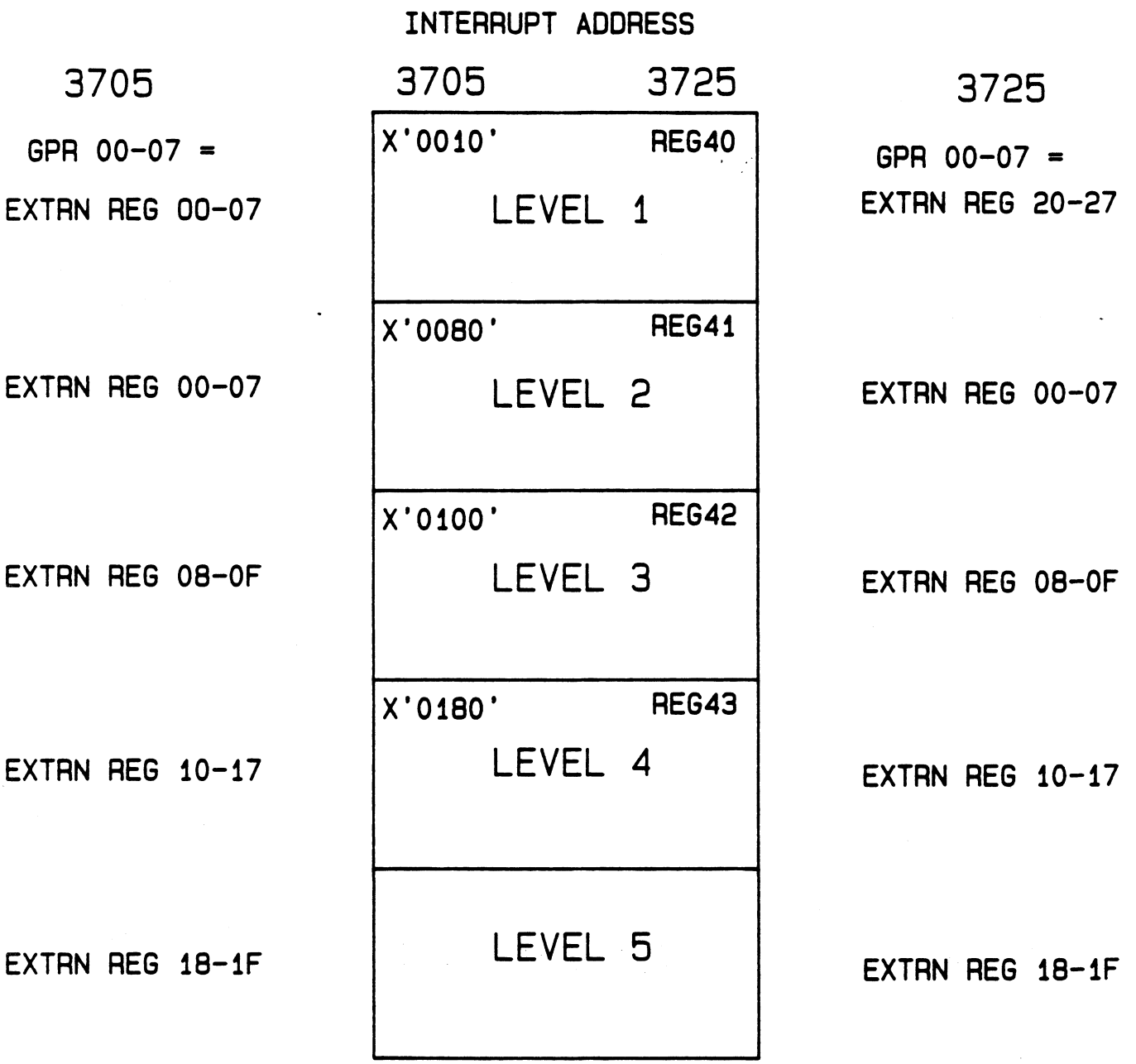
CENTRAL CONTROL UNIT





NCP0040

INTERRUPT ADDRESSES



NCP0042

DIRECT ADDRESSABLES

BASE ADDRESS

3705	3725
X'0680'	REG44
BYTE (XDB)	
X'0700'	REG45
HALFWORD (XDH)	
X'0780'	REG46
FULLWORD (XDA)	

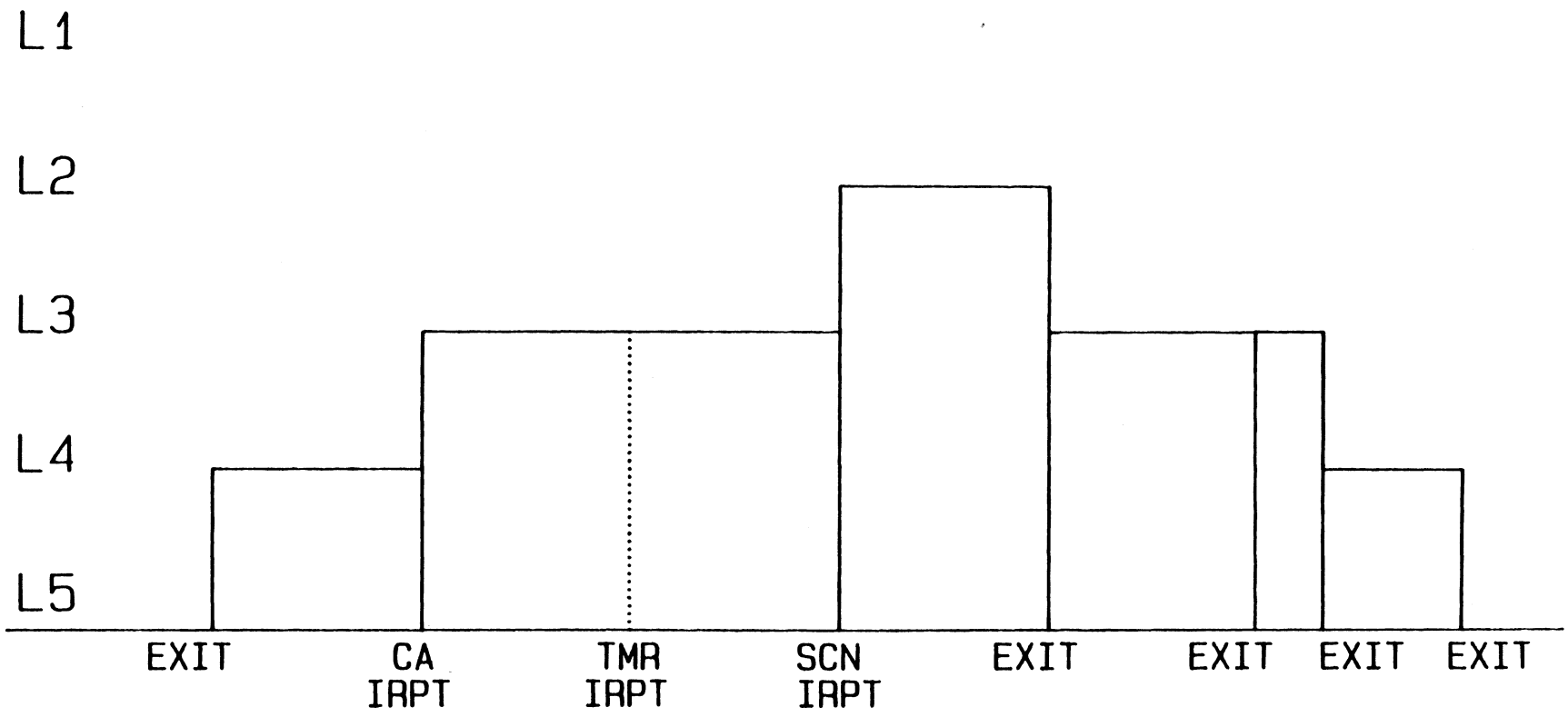
WHEN A BASE REGISTER OF ZERO IS SPECIFIED FOR A LOAD OR STORE TYPE INSTRUCTION THEN THE HARDWARE WILL USE THE VALUES SPECIFIED IN THE ABOVE TABLE INSTEAD OF THE CONTENTS OF REGISTER ZERO.

INTERRUPT TYPES BY LEVEL (3725)

LEVEL 1 HARDWARE & PROGRAM CHECKS ADDRESS COMPARE INTERRUPT IPL INTERRUPT
LEVEL 2 COMMS SCANNER DATA SERVICE PROGRAM CONTROLLED INTERRUPT MOSS DIAGNOSTIC INTERRUPT
LEVEL 3 CHANNEL ADAPTER INTERRUPTS INTERVAL TIMER (10 TIMES A SECOND) PROGRAM CONTROLLED INTERRUPT MOSS OPERATOR FUNCTION (INTERRUPT BUTTON) MOSS DIAGNOSTIC INTERRUPT
LEVEL 4 PROGRAM CONTROLLED INTERRUPT SUPERVISOR CALL (LEVEL 5 EXIT INSTRUCTION) MOSS LEVEL 4 SERVICE INTERRUPT
LEVEL 5

NCP0046

3725 PROGRAMMING LEVEL EXECUTION



NCP0050

REGISTER AND STORAGE ADDRESSING

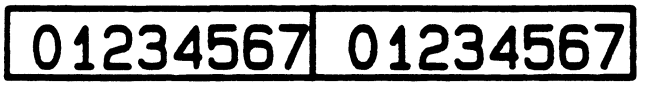
- GENERAL REGISTERS

- REGISTER 0 IS KNOWN AS IAR

- EXTERNAL REGISTER

- INPUT INSTRUCTION
  - EXTERNAL TO GENERAL REGISTER

- OUTPUT INSTRUCTION
  - GENERAL TO EXTERNAL REGISTER



3725 REGISTER ASSIGNMENTS

00-27 GENERAL REGISTERS
- 00-07 LEVEL2
- 08-0F LEVEL3
- 10-17 LEVEL4
- 18-1F LEVEL5
- 20-27 LEVEL1

40-43 INTERRUPT START ADDRESS

44 BYTE OPERATION BASE

45 HALFWORD OPERATION BASE

46 FULLWORD OPERATION BASE

47 RESERVED

48 IOH ADDRESS SUBSTITUTION

49-4F INVALID

50-5F PROGRAMMABLE

60-6F INVALID

70-7F CCU CONTROL

INITIAL PROGRAM LOAD

* PERFORMED WHEN:
  - -POWER ON
  - -LOAD ISSUED FROM MOSS CONSOLE
  - -OUTPUT XR'79' WITH X'2000'
  - -WRITE IPL CCW

* PHASE 0
  - -LOAD THE MOSS FROM DISKETTE
  - -ONLY DURING POWER ON

* PHASE 1
  - -GENERAL RESET OF 3725
  - -TEST CCU INTERNAL BUS
  - -TEST SCANNERS

* PHASE 2
  - -LOAD CLDP
  - -ENABLE CHANNEL ADAPTERS
  - -MONITOR IPL PORTS

* PHASE 3
  - -LOAD COMMUNICATION SCANNERS

* PHASE 4
  - -LOAD/INITIALIZE CONTROL PROGRAM

INSTRUCTION SET

RR - REGISTER TO REGISTER

RS - REGISTER TO STORAGE

RSA - REGISTER TO STORAGE
WITH ADDITIONAL OPERATION

RT - BRANCH

RA - REGISTER TO IMMEDIATE
ADDRESS

RI - REGISTER TO IMMEDIATE
OPERAND

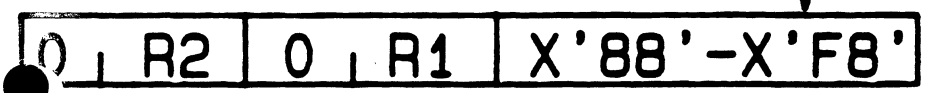
RE - REGISTER TO EXTERNAL
REGISTER

EXIT

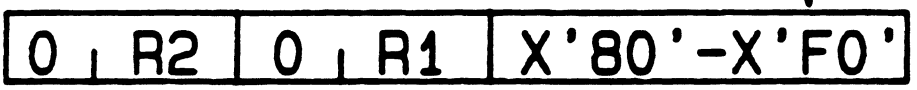
IOH/IOHI

REGISTER TO REGISTER

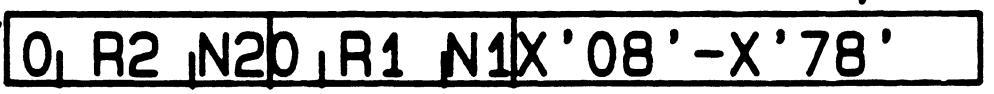
LR	LHR	LCR
AR	AHR	ACR
SR	SHR	SCR
CR	CHR	CCR
XR	XHR	XCR
OR	OHR	OCR
NR	NHR	NCR
LOR	LHOR	LCOR



R1, R2



R1, R2



R1 (N1), R2 (N2)

BALR

R1, R2

NCP0100

REGISTER TO STORAGE

IC R (N) , D (B)

STC R (N) , D (B)

LH R, D (B)

STH R, D (B)

L R, D (B)

ST R, D (B)

* = 0 FOR IC, LH, L
= 1 FOR STC, STH, ST

IF BASE REG = 0
IC, STC - BASE = XR'44'
LH, STH - BASE = XR'45'
L, ST - BASE = XR'46'

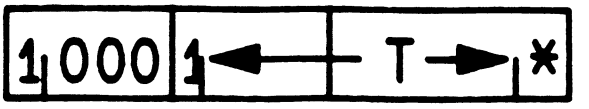
REGISTER TO STORAGE WITH ADDITIONAL OPERATION

ICT R(N),B

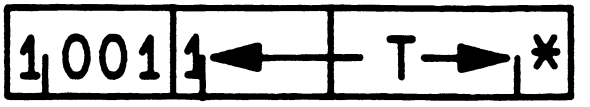
STCT R(N),B

BRANCH

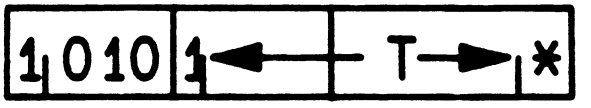
BZL T



BCL T



B T



* BIT 15 = 0 IS +DISPLACEMENT
BIT 15 = 1 IS -DISPLACEMENT

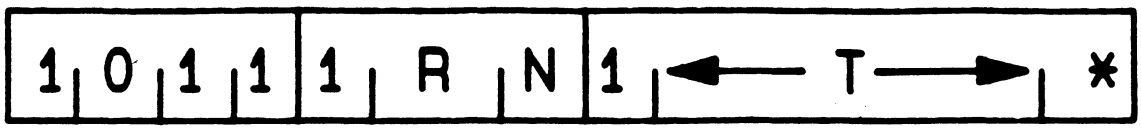
- MAX T = 1023 (IN HALFWORDS)
- DISPLACEMENT FROM NEXT INSTRUCTION
- LATCH SETTING

C	Z
<	=
≠0	=0
<0	=0

NCP0130

BRANCH

BCT R(N), T



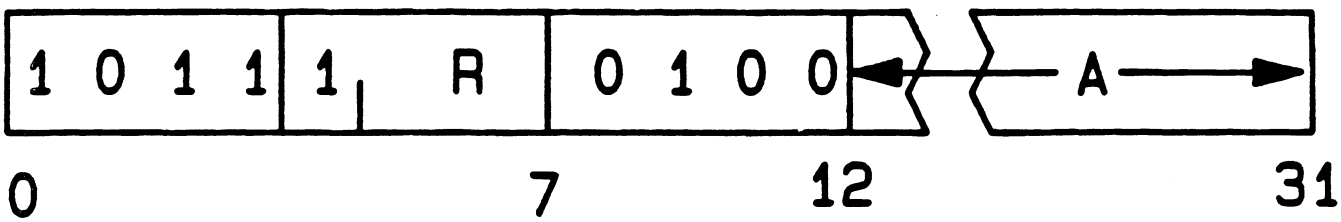
N = 0 USE BYTE 0 OF REG
N = 1 USE BYTE 0 & 1 OF REG

BB R(N, M), T

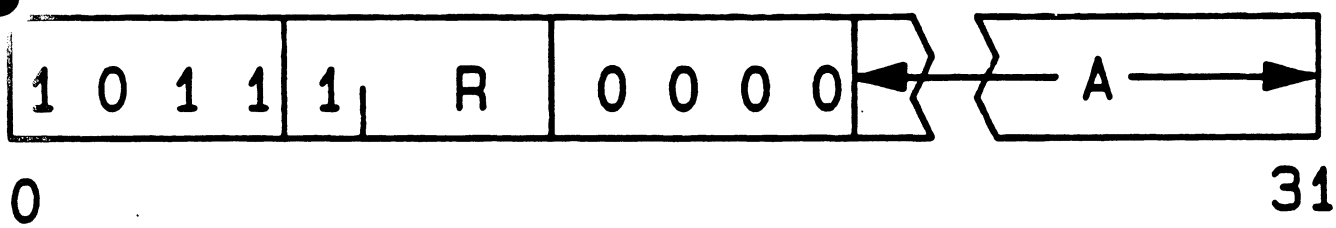
MAX T = 63 (IN HALFWORDS)

REGISTER TO IMMEDIATE ADDRESS

BAL R, A



LA R, A



REGISTER TO IMMEDIATE OPERAND

LRI

ARI

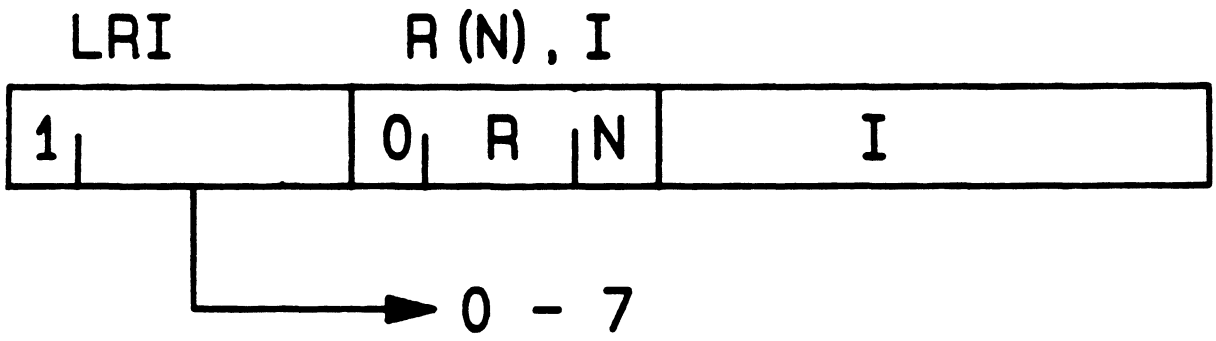
CRI

XRI

ORI

NRI

TRM



NCP0160

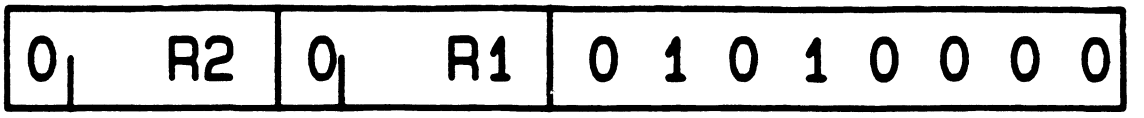
REGISTER TO EXTERNAL REGISTER

INPUT R, E

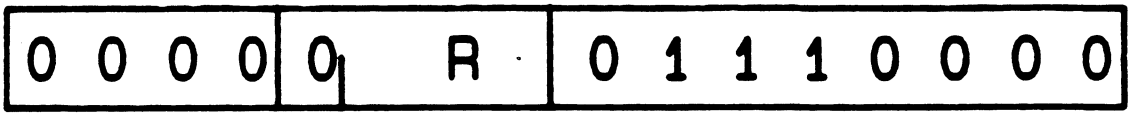
OUTPUT R, E

IOH IOHI

IOH R1, R2



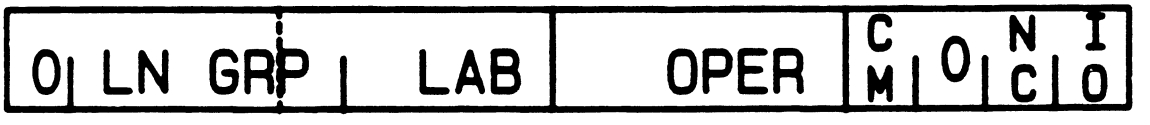
IOHI R, A



R2 OR SECOND HALFWORD VALUES

CHANNEL ADAPTER

COMMUNICATIONS SCANNER



NCP0180

STORAGE PROTECTION

* EACH 2K ASSIGNED A 3-BIT KEY
  - KEY OF 7 IS UNPROTECTED
  - NCP BUFFER POOL IS KEY 7

* EACH USER IS ASSIGNED A 3-BIT KEY
  - TO EXECUTE AN INSTRUCTION
    USER KEY = STORAGE KEY
  - TO STORE OR ACCESS DATA
    USER KEY = STORAGE KEY
    EXCEPTIONS:
      STORAGE KEY = 7
      USER KEY = 0

* READ ONLY PROTECTION
  - NO STORE ALLOWED

* EXTERNAL REG 73 USED TO SET KEYS

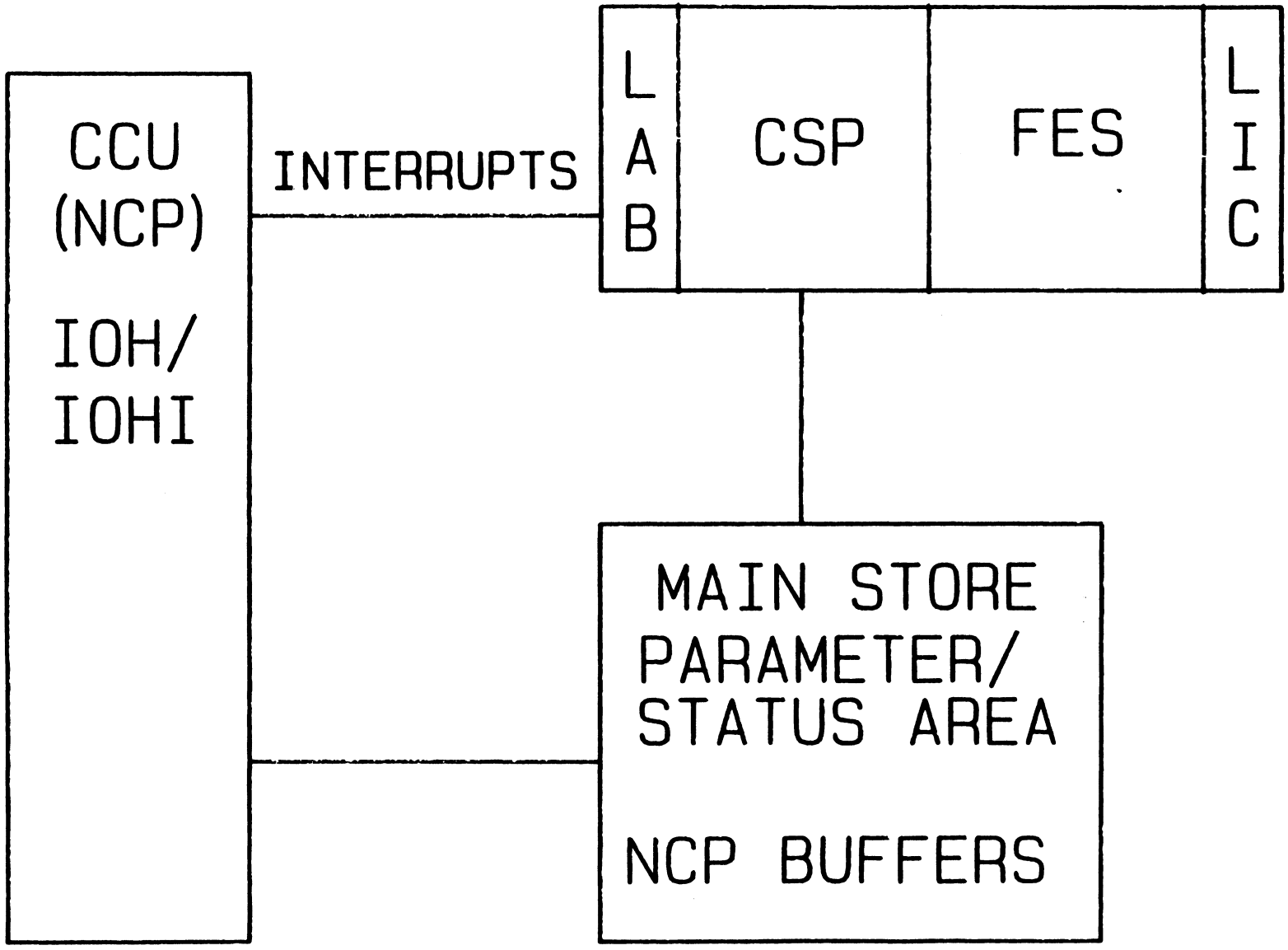
TRANSMISSION SUBSYSTEM

* LINE ATTACHMENT BASE
  - -LABA ONE SCANNER
  - -LABB TWO SCANNERS
  - -CLAB FIRST TWO LABS (LABA)

* COMMUNICATIONS SCANNER PROCESSOR
  - -NORMAL MODE
  - -CHARACTER MODE
  - -BURST MODE

* LINE INTERFACE COUPLER
  - -TYPE1 4 LOW TO MEDIUM SPEED
  - -TYPE2 1 WIDEBAND
  - -TYPE3 1 HIGHSPEED
  - -TYPE4A 4 X.21 LOW TO MEDIUM SPEED
  - -TYPE4B 1 X.21 HIGH SPEED

THE TRANSMISSION SUBSYSTEM



NCP0205

MAINTENANCE AND OPERATOR SUBSYSTEM

* CONFIGURATION

  -MAINTAINED BY CE
  -DISPLAY BY CUSTOMER
  -IPL PORTS TABLE

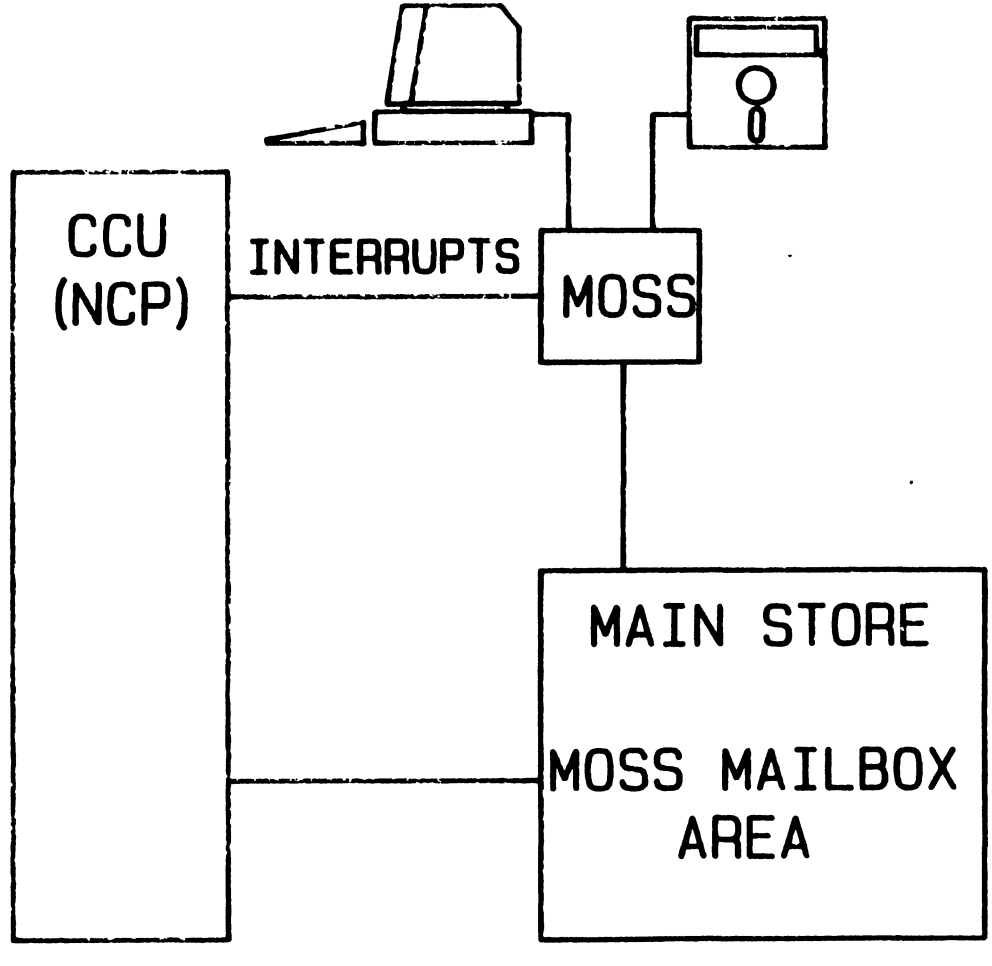
* DIAGNOSTICS

  -BOX ERROR RECORD (BER)
  -ALERT
  -ALARM
  -DISPLAY MODEM INTERFACE
  -DISPLAY AND ALTER STORAGE
  -ADDRESS STOP
  -WRAP TEST

* COMMUNICATIONS WITH NCP

  -VIA MAILBOX

MAINTAINENCE AND OPERATOR SUBSYSTEM



NCP0215

This exercise is designed to reinforce the lecture portion of the CCU topic. It should help you understand the materials just presented and, perhaps more importantly, make you aware of any areas of confusion.

The only rule is :- 'IF YOU ARE STUCK ASK SOMEONE FOR HELP'.
Ask either the instructor or one of your fellow students but don't just sit there and look bewildered !

Assume the following instructions have been entered into 3725 storage at the specified locations and the IAR set to X'1000'.
Fill in the table to show the sequence of execution and program level when the system is started.

Materials Required :-

1) 3725 Instruction Decode Tables (NCP Ref. Handbook).
2) 3725 Principles of Operation Manual (GA33-0013).

Addr	Code	Decode	Effect	Seq#/Level	
1000	B9008000	LA R1 x2000	NONE	1	1
1004	7174	OUTR R1, —	RESET ~~LEVEL~~ IPL' LVL 1 INTERRUPT	2	
1006	B9002000	LA R1, —		3	
100A	4114	OUTR R1, '41'	interrupt dsp @ = 2000 (LVL 2)	4	
100C	B9004000	LA R1, —		5	
1010	4134	OUTR R1, '3'	interrupt dsp @ = 4000 (LVL 4)	6	
1012	B9005000	LA R1, —		7	
1016	1184	SR R1, '18'	R0 LVL 5 => x5000	8	
1018	11A8	SR R1, R1	Clear R1	9	
101A	0134	OUTR R1, '13'	XREG 3 LVL 2 => 0	10	
101C	1134	OUTR R1, '13'	XREG 3 LVL 4 => 0	11	
101E	B900AAAA	LA R1, —		12	
1022	7114	OUTR R1, '71'	DISPLAY REG 1 ?	13	
1024	B900BBBB	LA R1, —		14	
1028	7124	OUTR R1, '72'	DISPLAY REG 2 ?	15	
102A	B900002C	LA R1, —		16	
102E	71F4	OUTR R1, —	Unmask prog LVL 2,4,5 INTR	17	
1030	0070	EOJ		18	

NCP0220

2000	B9000100	LA R1,x'0100'			
2004	7174	OUT R1,x'77'	reset PROG CONTR INTER LVL 2		
2006	B9000001	LA R1,x'0001'			
200A	033C	IN R3,x'03'	R3 LVL2 => 1		
200C	1398	AR R3,R1	(R3)+(R1) => R3 = [illegible]		
200E	7314	OUT R3,x'31'	[illegible] 2		
2010	0070	EXIT			
4000	B9000001	LA R1,x'0001'		21	
4004	7174	OUT R1,x'77'	reset SVC LVL 4 INTERRUPT	22	
4006	133C	IN R3,x'13'	R3 LVL 4 => R3 (NOP)	23	
4008	13A8	SR R3,R1	R3 => -1		
400A	7324	OUT R3,x'72'	DISPLAY REG 2		
400C	70B4	OUT R0,x'7B'	PCI LVL 2		
400E	B9005000	LA R1,x'5000'			
4012	1184	OUT R1,x'18'	R0 LVL 5		
4014	0070	EXIT			
5000	1188	LR R1,R1		19	
5002	0070	EXIT		20	

NOP; no EXIT as first operation.

SVC interrupt LVL 4

accept in the [illegible] interrupt

[illegible]

M1 -

NCP0230

EXERCISE ANSWERS

This exercise is designed to reinforce the lecture portion of the CCU topic. It should help you understand the materials just presented and, perhaps more importantly, make you aware of any areas of confusion.
The only rule is :- 'IF YOU ARE STUCK ASK SOMEONE FOR HELP'.
Ask either the instructor or one of your fellow students but don't just sit there and look bewildered !
Assume the following instructions have been entered into 3725 storage at the specified locations and the IAR set to X'1000'.
Fill in the table to show the sequence of execution and program level when the system is started.
Materials Required :-
1) 3725 Instruction Decode Tables (NCP Ref. Handbook).
2) 3725 Principles of Operation Manual (GA33-0013).

Addr	Code	Decode	Effect	Seq#	Level
1000	B9008000	la r1, 8000		1	1
1004	7174	out r1, 77	Reset IPL entered latch	2	1
1006	B9002000	la r1, 2000		3	1
100A	4114	out r1, 41	L2 Rupt addr = 2000	4	1
100C	B9004000	la r1, 4000		5	1
1010	4134	out r1, 43	L4 Rupt addr = 4000	6	1
1012	B9005000	la r1, 5000		7	1
1016	1184	out r1, 18	L5 IAR = 5000	8	1
1018	11A8	sr r1, r1	R1 = 0	9	1
101A	0134	out r1, 03	L2 GPR3 = 0	10	1
101C	1134	out r1, 13	L4 GPR3 = 0	11	1
101E	B900AAAA	la r1, AAAA		12	1
1022	7114	out r1, 71	Set display reg 71 to AAAA	13	1
1024	B900BBBB	la r1, BBBB		14	1
1028	7124	out r1, 72	Set display reg 72 to BBBB	15	1
102A	B900002C	la r1, 002C		16	1
102E	71F4	out r1, 7F	Enable L2, L4, L5	17	1
1030	0070	EXIT	LEAVE L1	18	1

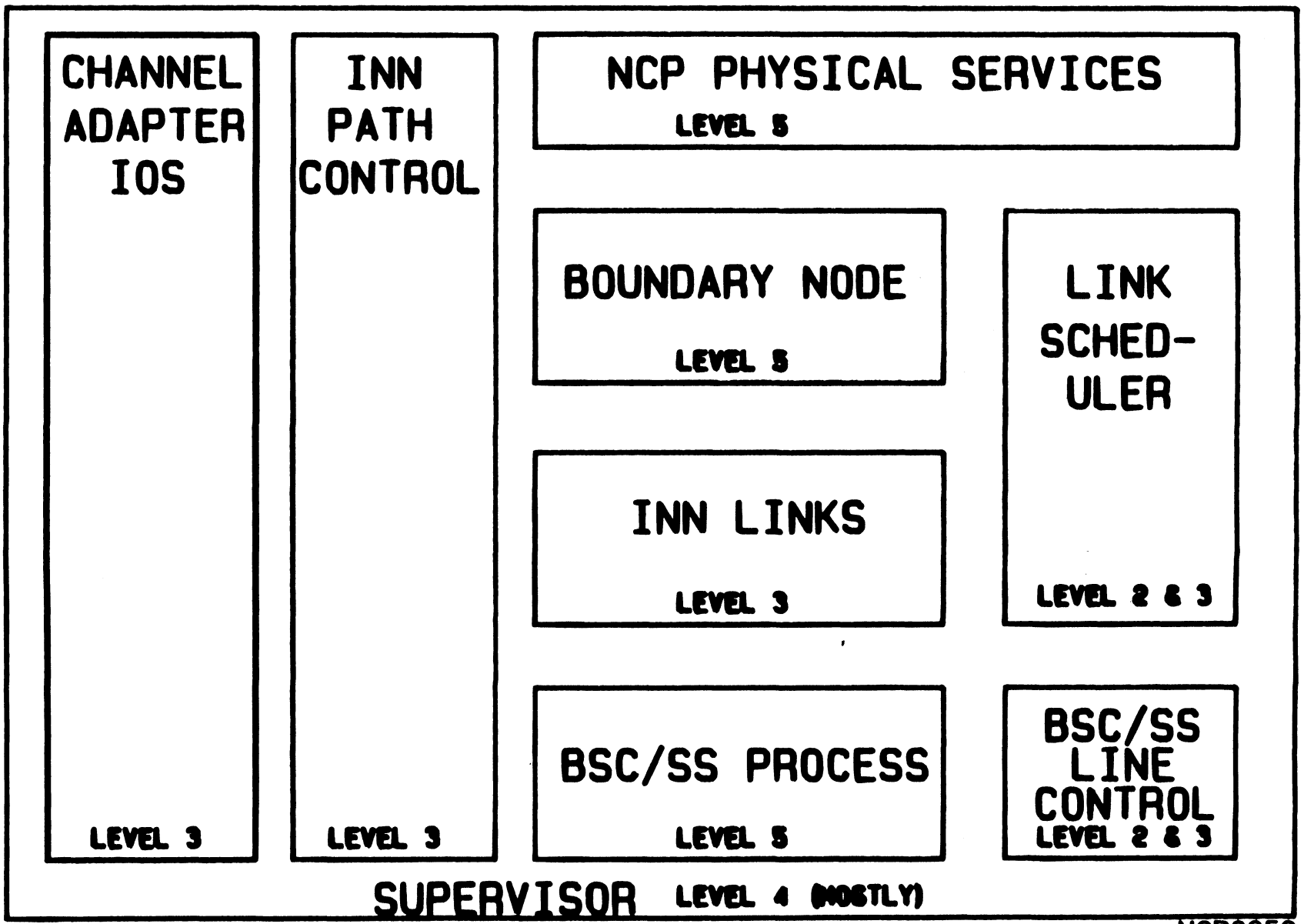
```
2000   B9000100     la r1,100                                  27   2
2004   7174         out r1,77    Reset L2 rupt latch           28   2
2006   B9000001     la  r1,1                                   29   2
200A   033C         in  r3,3     Get GPR3 from Local Store     30   2
200C   1398         ar  r3,r1    R3 = R3 + 1                   31   2
200E   7314         out r3,71    Display reg 71 = R3           32   2
2010   0070         EXIT         Leave level 2 (resume L4)     33   2
4000   B9000001     la  r1,1                                   21   4
4004   7174         out r1,77    Reset L4 SVC Latch            22   4
4006   133C         in  r3,13    Load L4 GPR3 from Loc. Stor.  23   4
4008   13A8         sr  r3,r1    R3 = R3 - 1                   24   4
400A   7324         out r3,72    Put R3 into Display Reg 72    25   4
400C   70B4         out 0,7b     Cause L2 rupt                 26   4
400E   B9005000     la  r1,5000                                34   4
4012   1184         out r1,18    set L5 IAR to 5000            35   4
4014   0070         exit         Leave L4 (drop down to L5)    36   4
5000   1188         lr  r1,r1    NO-OP                      19,37   5
5002   0070         exit         Leave L5, Raise L4 SVC.    20,38   5
```

The program will loop endlessly from L5 to L4 to L2 to L4 to L5.....

NCP COMPONENTS OVERVIEW

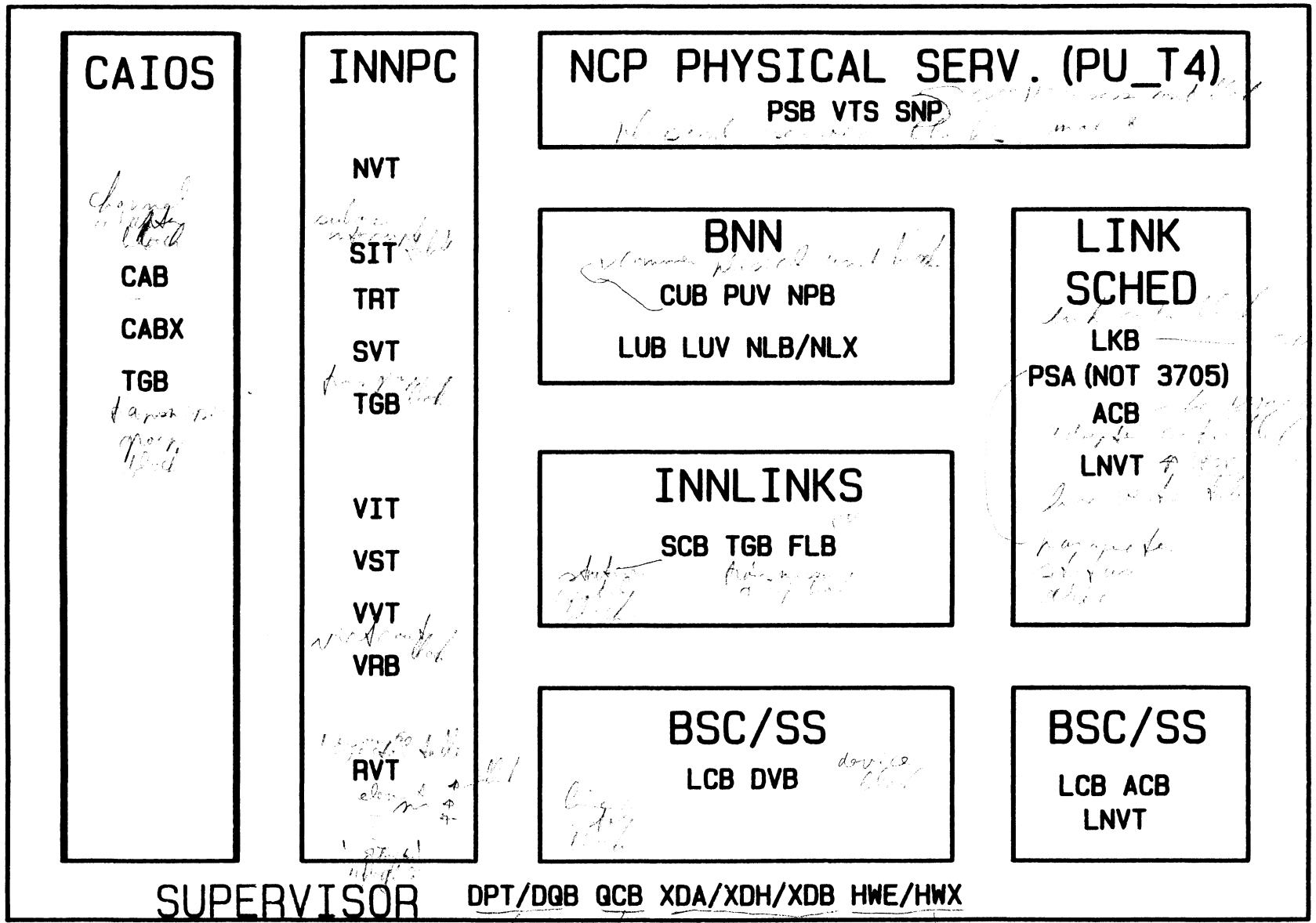
NCP0240

NCP MAJOR COMPONENTS

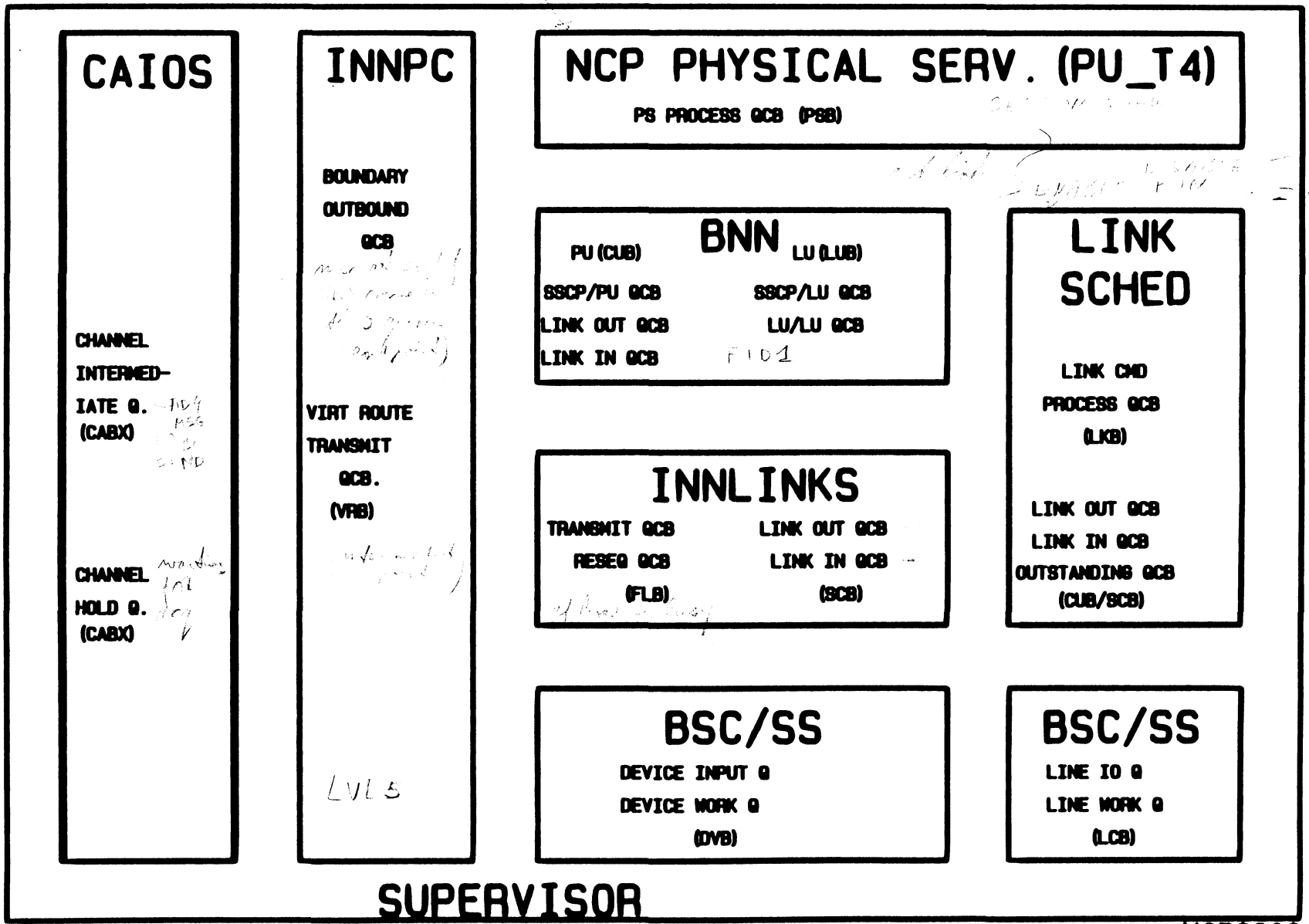


NCP0250

SOME MAJOR CONTROL BLOCKS

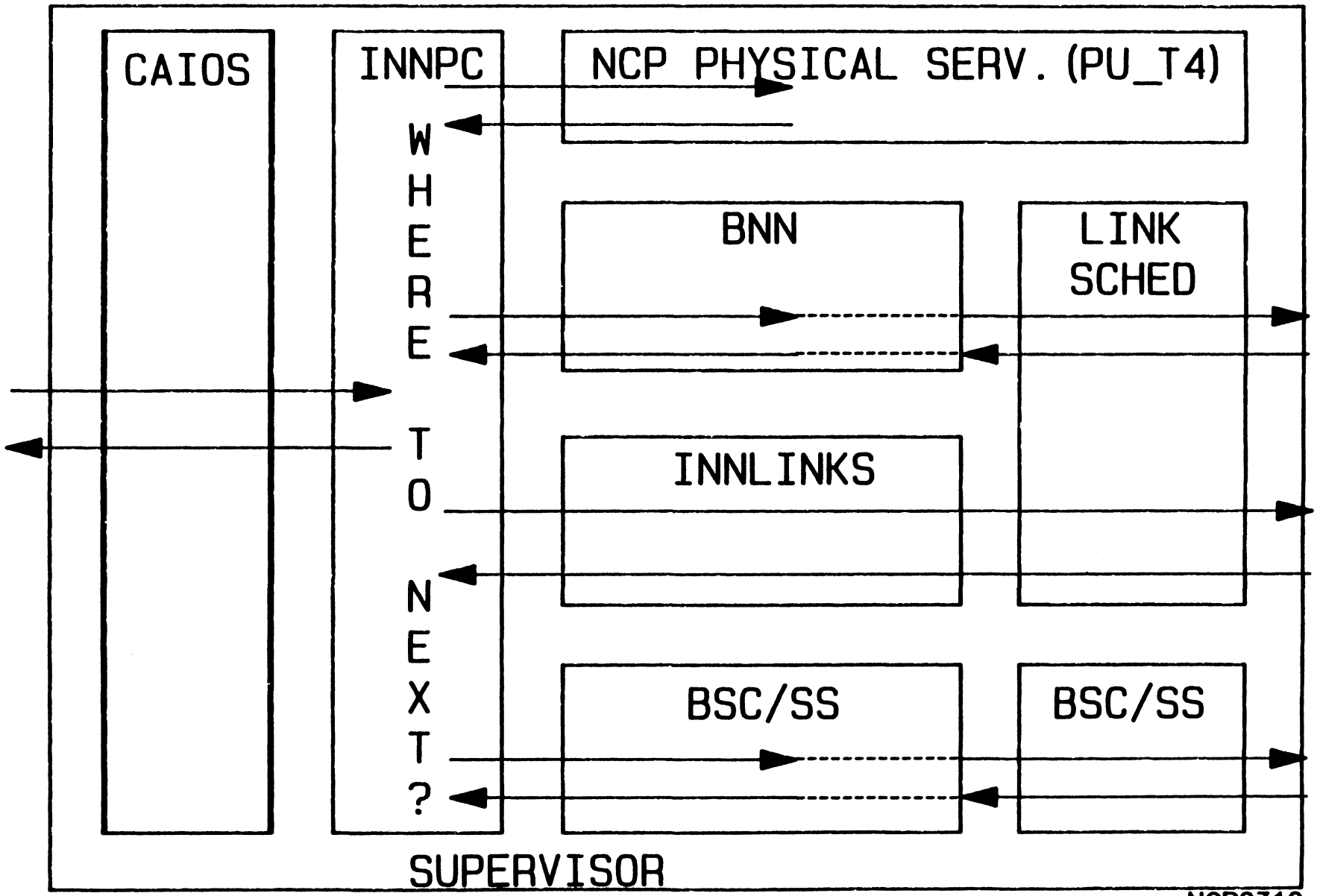


NCP QUEUES

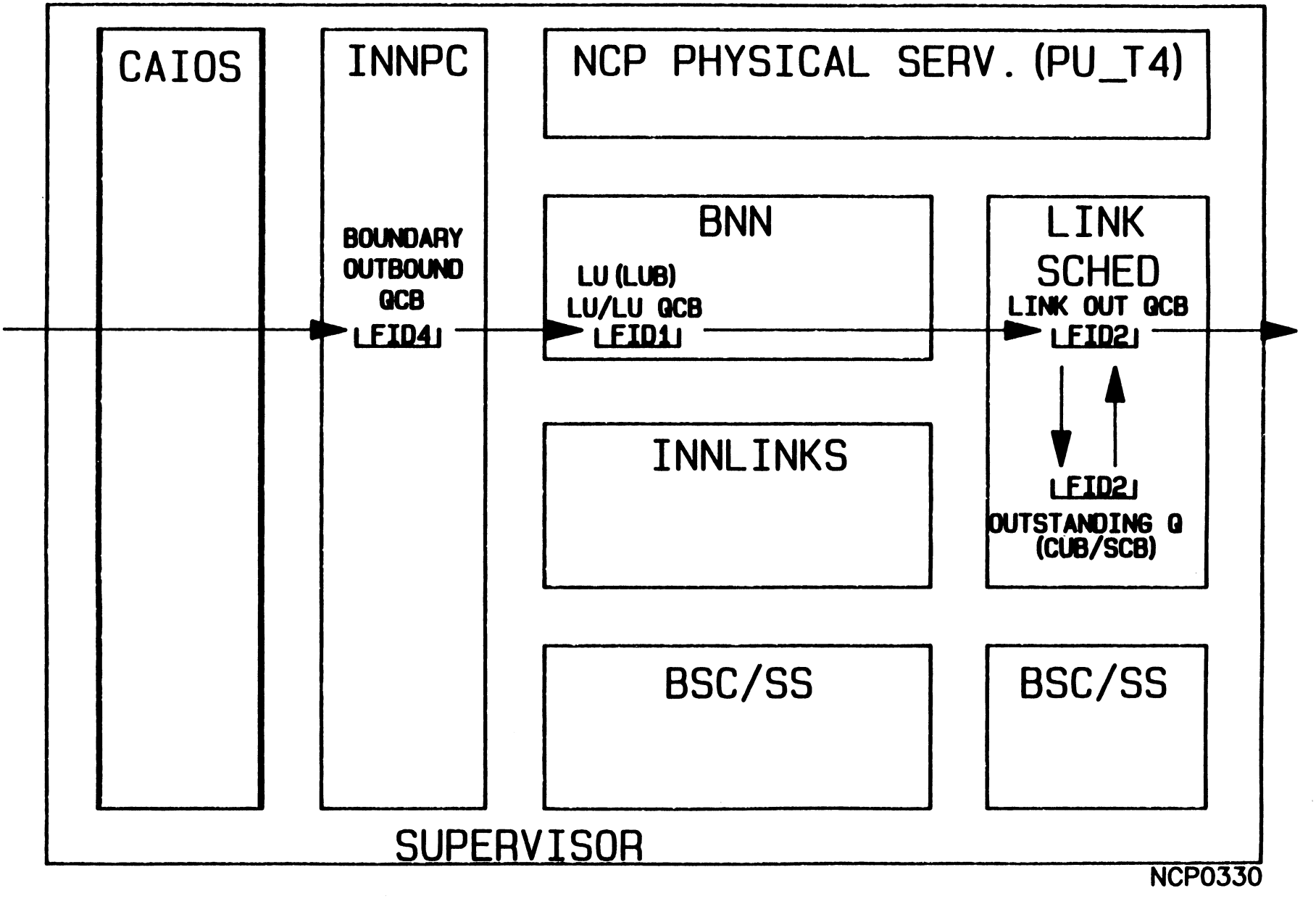


NCP0290

NCP DATA FLOW



NCP FLOW EXAMPLE - HOST TO TYPE_2 NODE



NCP DIAGNOSIS MANUALS

DIAGNOSIS REFERENCE -

THE REMAINS OF THE OLD LOGIC MANUAL.
CHAPTER ONE IS A 200 PAGE INTRODUCTION TO NCP INTERNAL OPERATION (RECOMMENDED).
CHAPTER TWO CONTAINS THE LOGIC CHARTS, HOWEVER THE NEWER FEATURES (e.g. SNI) ARE NOT INCLUDED.
THE VARIOUS APPENDICES CONTAIN SUCH THINGS AS NCP CHANNEL COMMANDS, SAVE AREA FORMATS AND NCP EXCEPTION RESPONSES.

DIAGNOSIS GUIDE -

HOW TO OBTAIN AND PRINT DUMPS AND TRACES.
DESCRIBES A REASONED APROACH TO PROBLEM DIAGNOSIS. SEE ALSO VTAM DIAGNOSIS GUIDE.

CUSTOMISATION -

HOW TO WRITE YOUR OWN NCP CODE A LA NTO/NPSI.
DOCUMENTS NCP INTERNAL MACROS AND SVC CODES.

NCP REFERENCE SUMMARY HANDBOOK -

NCP V2.2 +

LY30-5570-1

YOUR BEST FRIEND FOR THIS COURSE. CONTAINS LOTS OF USEFUL INFORMATION FOR THE WOULD BE DUMP SOLVER, e.g. DATA AREAS (HALF THE BOOK), CONTROL BLOCK RELATIONSHIPS, ABEND CODES AND MUCH MUCH MORE.
TAKE A LONG LOOK AT THE INDEX SO YOU KNOW WHATS INCLUDED IN THE BOOK.

THE NCP SUPERVISOR

SUP0010

SUPERVISOR FUNCTIONS

HANDLE LEVEL 4 INTERRUPTS -

- L5 SVC CALL
- PCI FROM L3 AND L4 (+ L1 AT NCP INIT TIME)
- TALK TO MOSS

DISPATCHER -

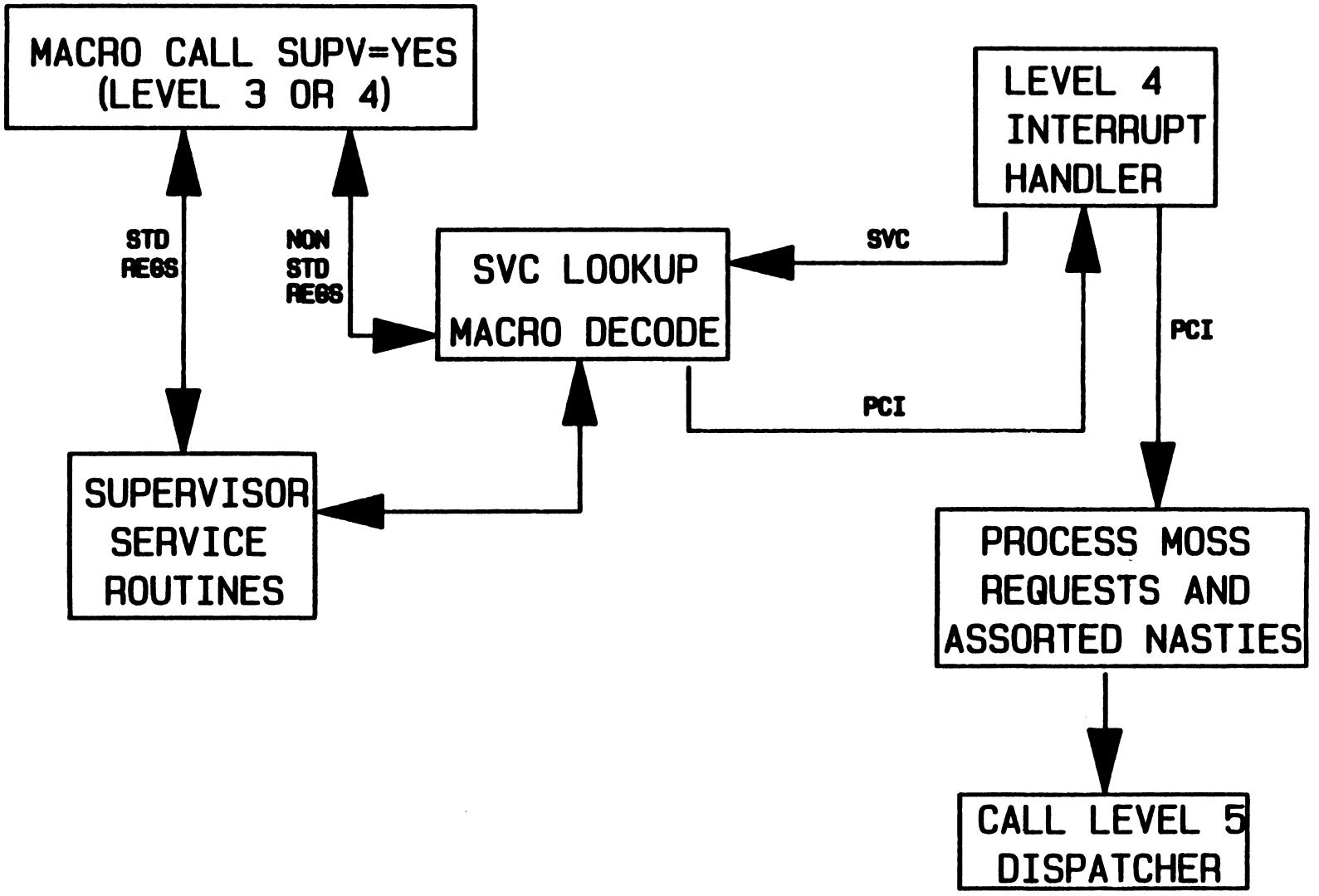
- DISPATCHES LEVEL 5 TASKS

SUPERVISOR SERVICES -

- DECODE MACRO CALLS
- INVOKE MACRO SERVICE ROUTINES

DOCUMENTATION - DIAGNOSIS REF CHAP 1 : 'THE NETWORK CONTROL PROGRAM SUPERVISOR'

SUPERVISOR PROCESSING



SUP0030

SUPERVISOR CALLS FROM LEVEL 5

LEVEL 5 CODE :-

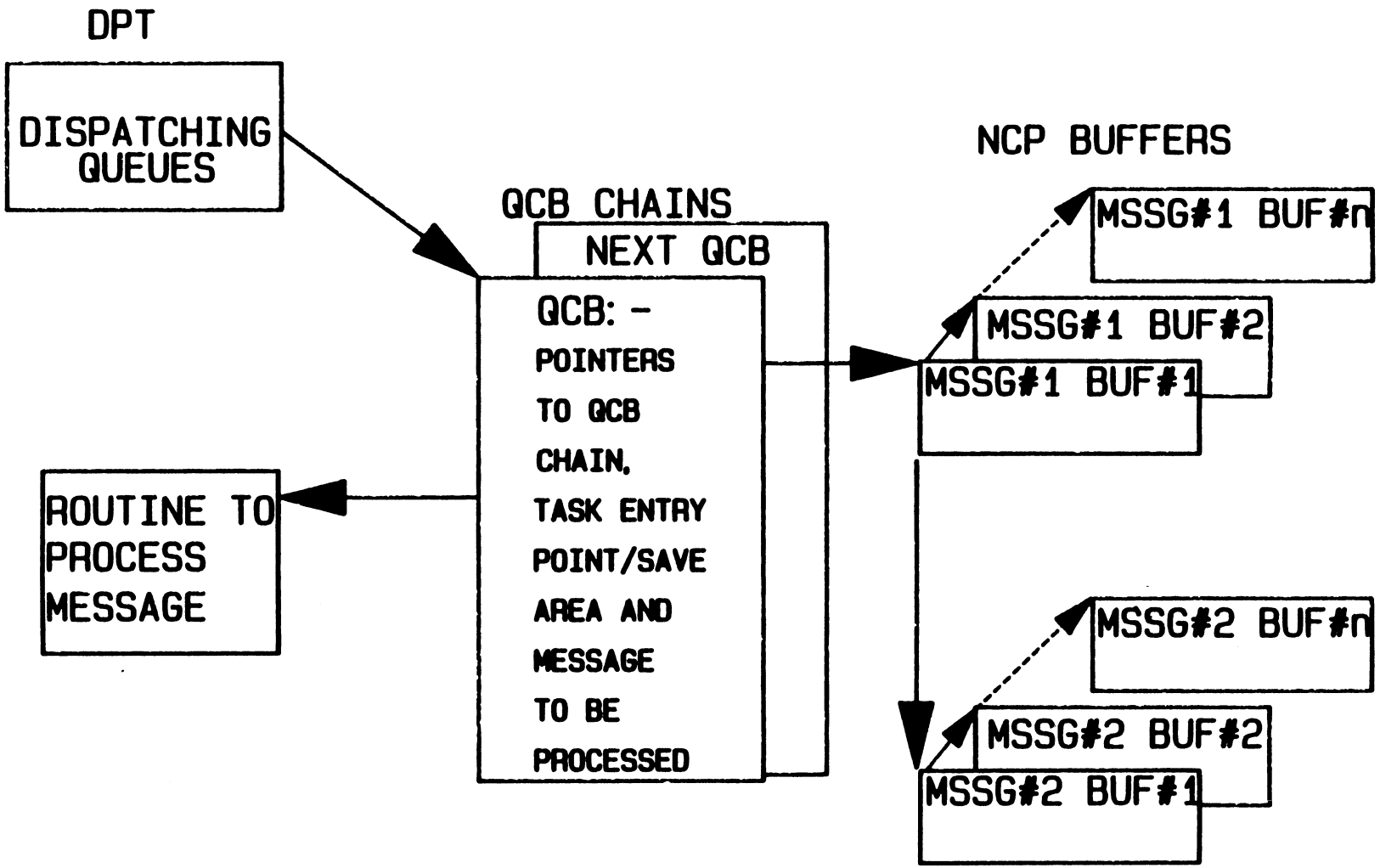
EXIT INSTRUCTION	SVC CODE AND PARMS
2 BYTES	2 OR MORE BYTES

SEE NCP CUSTOMISATION FOR DETAILS

E.G. X'00703500'

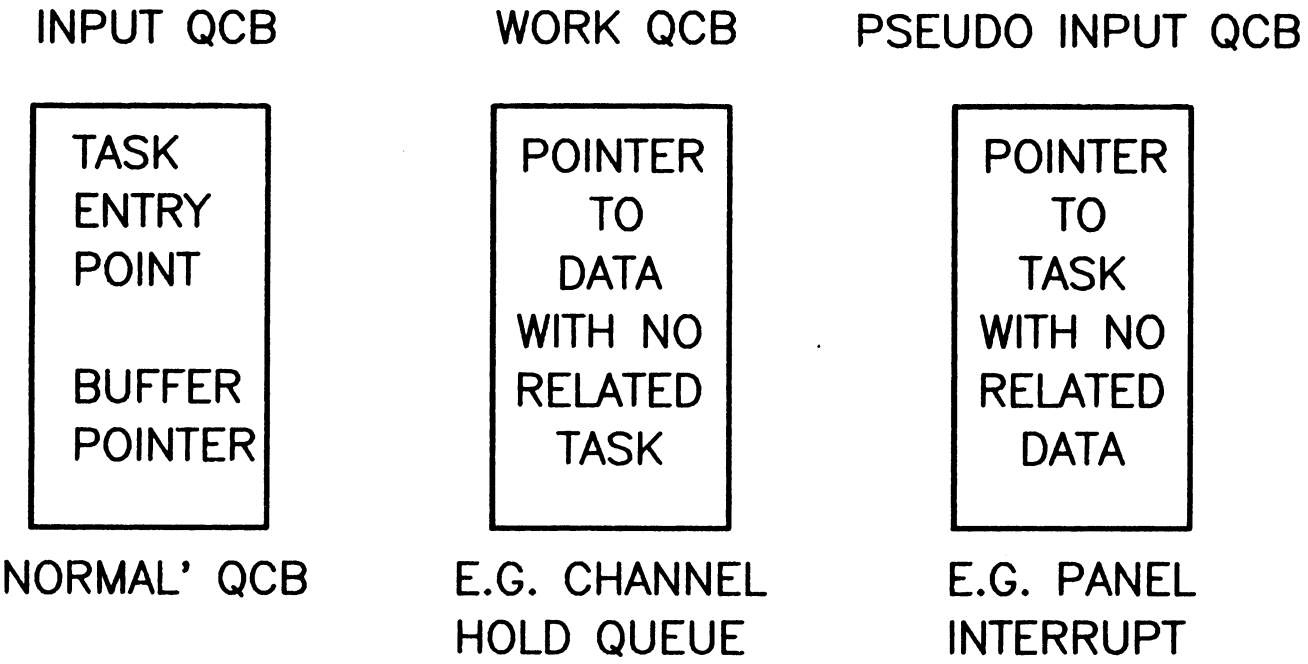
X'B9001014 07000000'

DISPATCHER CONTROL BLOCKS



SUP0040

QCB TYPES

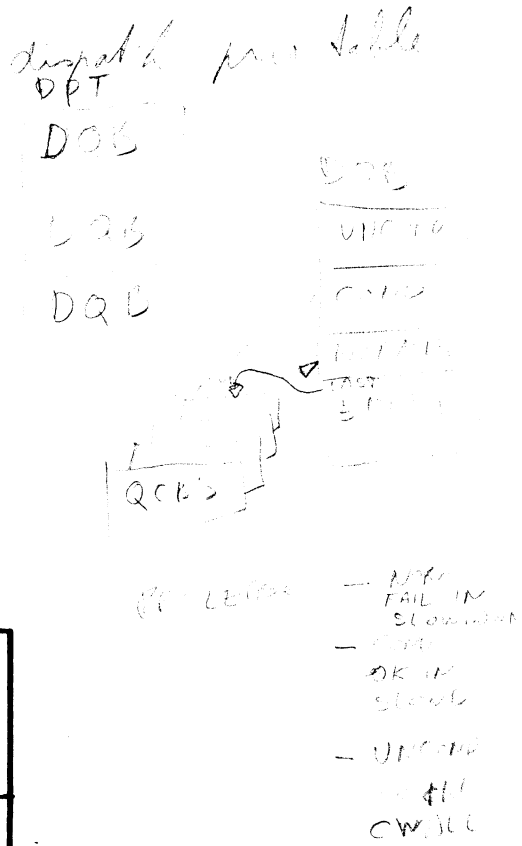


Current active QCB is anchored in the HWE

DISPATCHER QUEUES

TWO OBJECTIVES :-

1) MOVE DATA (DO I/O).
2) FREE BUFFERS, PREVENT CONGESTION.



FOUR QUEUES IN DPT :-

APPENDAGEQ - I/O TERMINATION (C.F. CHAN END APPENDAGE IN S370)
IMMEDIATE - OTHER I/O RELATED TASKS
PRODUCTIVEQ - TASK CONSIDERED LIKELY TO FREE OFF SOME BUFFERS.
NONPRODUCTIVEQ - TASK CONSIDERED LIKELY TO USE UP (LEASE) BUFFERS.

SUP0080

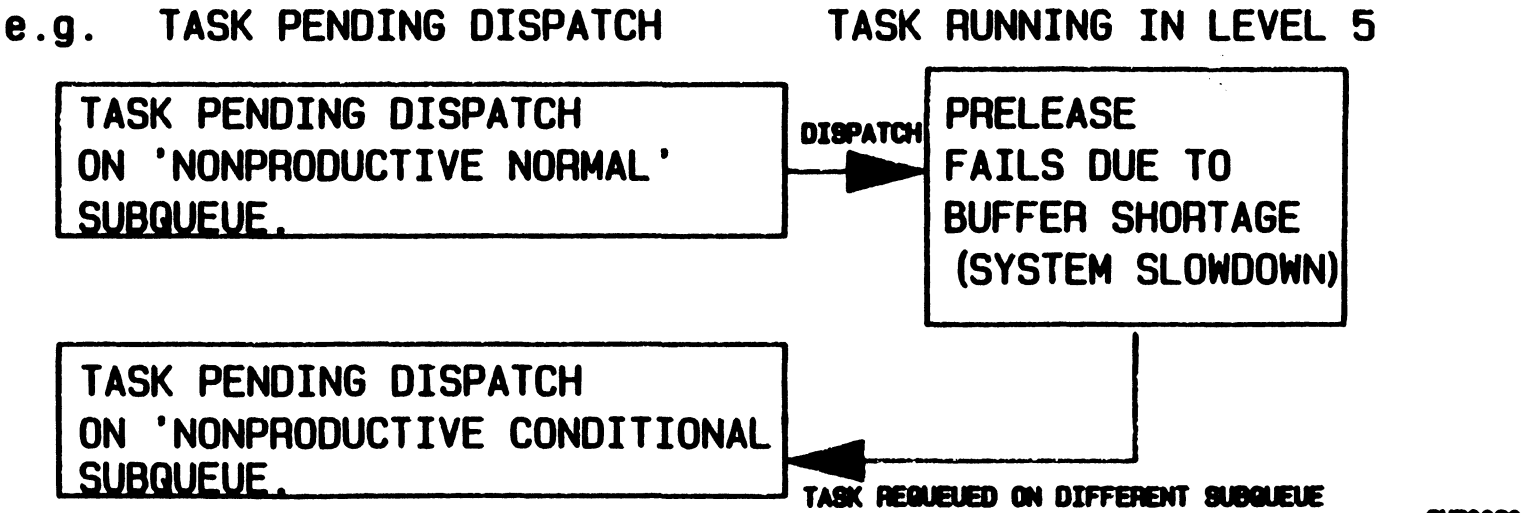
PRELEASE AND COMMIT

A LEVEL 5 TASK WHO INTENDS TO LEASE BUFFERS MUST WARN THE SUPERVISOR OF HIS INTENTION BY ISSUING A PRELEASE MACRO AS HE BEGINS EXECUTION.

THERE ARE THREE FLAVORS OF PRELEASE :-

1) NORMAL - MUST NOT CAUSE SYSTEM SLOWDOWN.
2) CONDITIONAL - HONOURED IN SLOWDOWN BUT NOT IF IN CWALL STATE.
3) UNCONDITIONAL - ALWAYS HOUNOURED IF FREE BUFF COUNT >= 0.

'DISHONOURED' REQUESTS CAUSE THE TASK TO BE REQUED ON ANOTHER DISPATCHER SUBQUEUE.



SUP0080

PRELEASE AND COMMIT

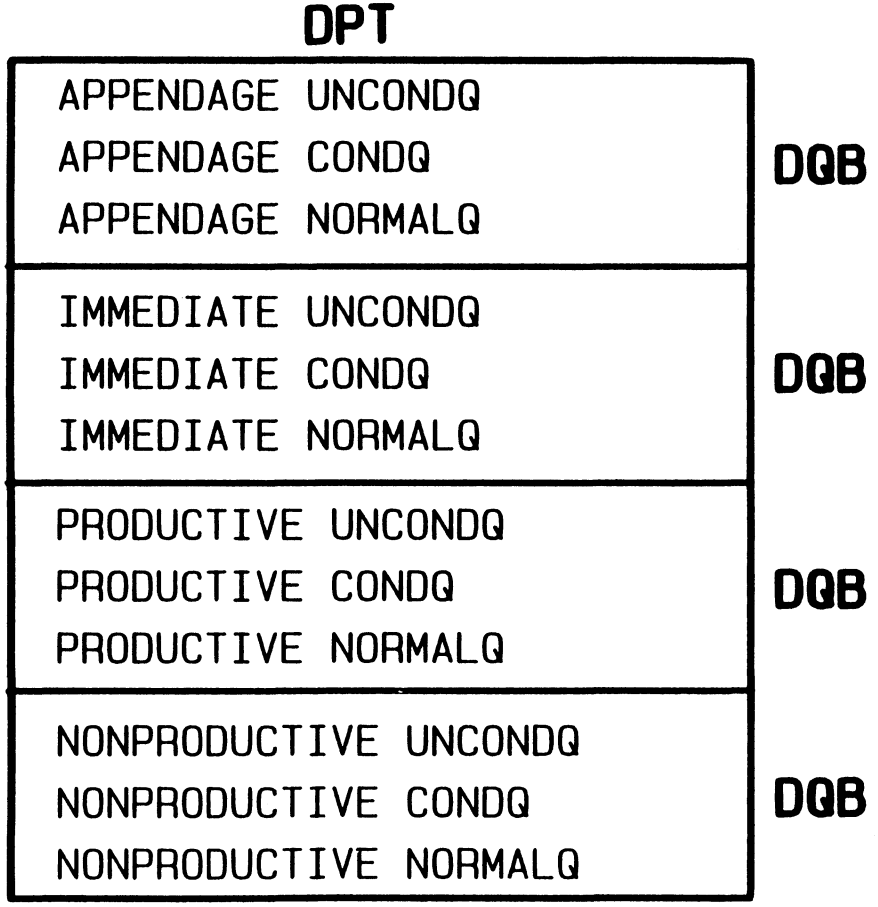
COMMIT IS SIMILAR TO PRELEASE IN THAT IT IS A WARNING TO THE BUFFER MANAGEMENT ROUTINES THAT THERE WILL BE A REQUEST FORTHCOMING FOR BUFFER LEASE SOON.

COMMIT IS USED BY THE I/O ROUTINES TO RESERVE BUFFERS FOR RECEIVE REQUESTS.

THE CRB CONTROL BLOCK CONTAINS HEAD OF QUEUE POINTERS FOR FAILED COMMIT REQUESTS. EACH INDIVIDUAL REQUEST IS REPRESENTED BY A CBB CONTROL BLOCK. IF YOUR CRB QUEUE IS NOT EMPTY THEN YOU HAVE SEVERE CONGESTION IN YOUR NCP (SEE FOIL SUP0120).

DISPATCHER SUBQS

THE DISPATCH QUEUES COMPRISE FOUR MAJOR QUEUES (SEE FOIL SUP0050). EACH MAJOR QUEUE IS FURTHER SUB-DIVIDED INTO THREE SUBQS CORRESPONDING TO THE THREE POSSIBLE SYSTEM STATES AS FOLLOWS.



ALL LEVEL 5 TASKS START OUT ON THE NORMAL QUEUE. IF PRELEASE FAILS THEY WILL BE REQUEUED TO ONE OF THE OTHER TWO SUB-QUEUES IN ACCORD WITH THE TYPE OF PRELEASE REQUEST.

DISPATCHABILITY OF SUBQS

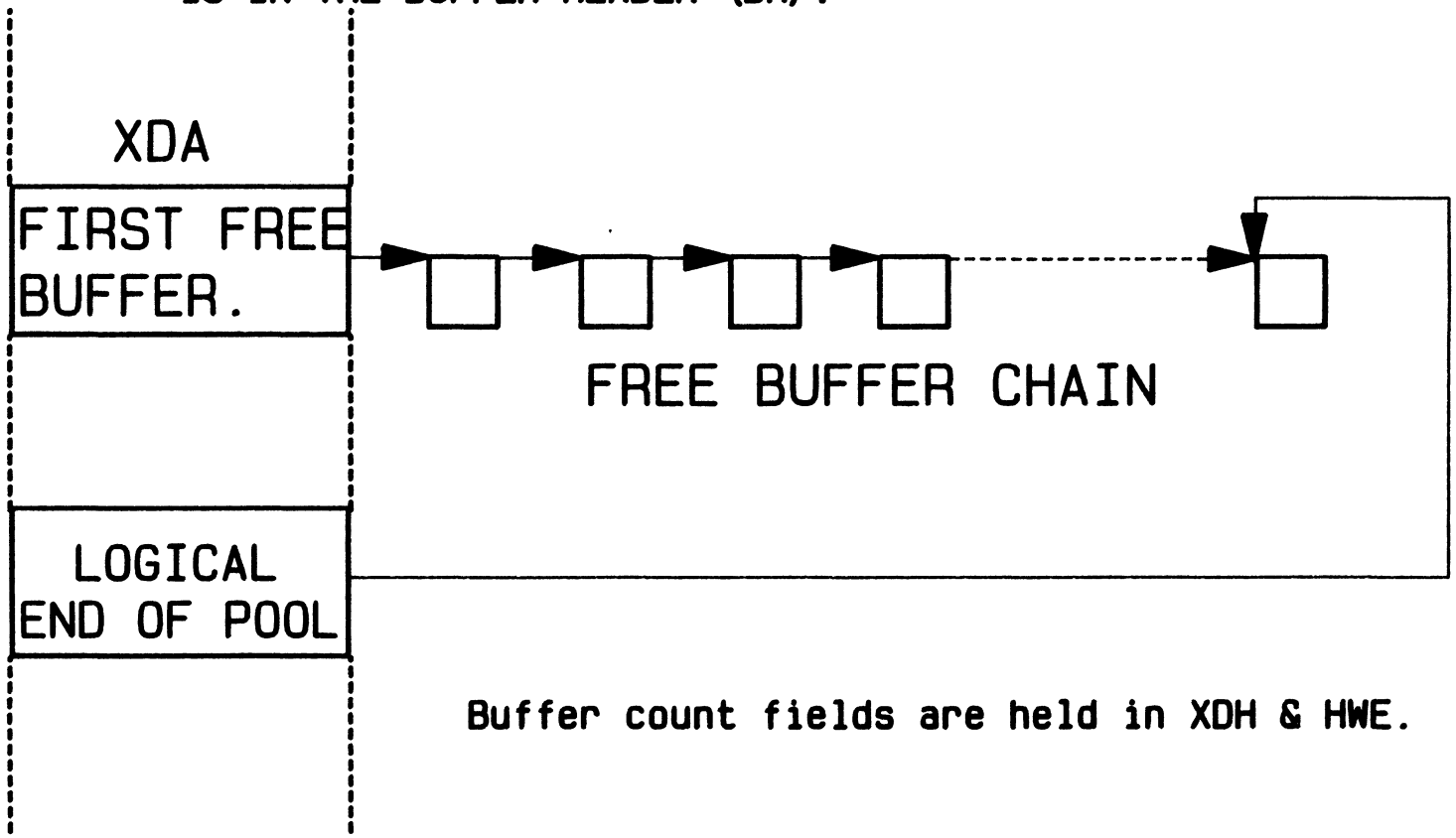
SYSTEM STATE	DISPATCHER SUBQS: NORMALQ	CONDQ	UNCONDQ
NORMAL	RUN	RUN	RUN
SLODN	RUN	HOLD	RUN
CWALL	RUN	HOLD	HOLD

SUP0090

NCP BUFFER POOL

AFTER INITIALISATION ALL FREE STORAGE IS FORMATTED INTO NCP BUFFERS. THERE IS NO GET/FREEMAIN IN NCP ALL STORAGE MUST BE ACQUIRED VIA LEASE/RELEASE OF BUFFERS.

WHEN NOT LEASED, BUFFERS ARE CHAINED TOGETHER OFF THE XDA CONTROL BLOCK. THE CHAIN POINTER IS IN THE BUFFER HEADER (BH).



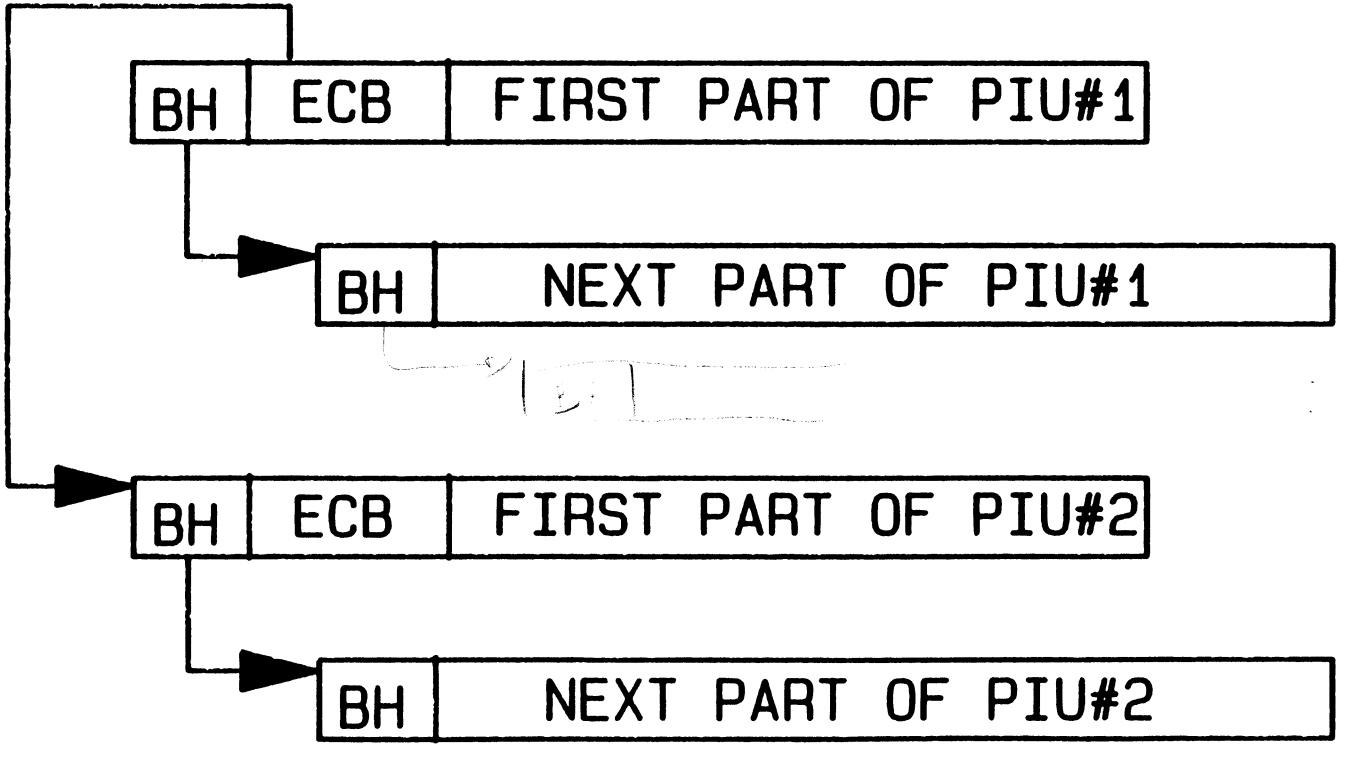
Buffer count fields are held in XDH & HWE.

SUP0100

NCP BUFFER CHAINING

BUFFERS WITHIN A MESSAGE ARE CHAINED VIA THE BUFFER HEADER (BH) JUST LIKE THE FREE POOL.

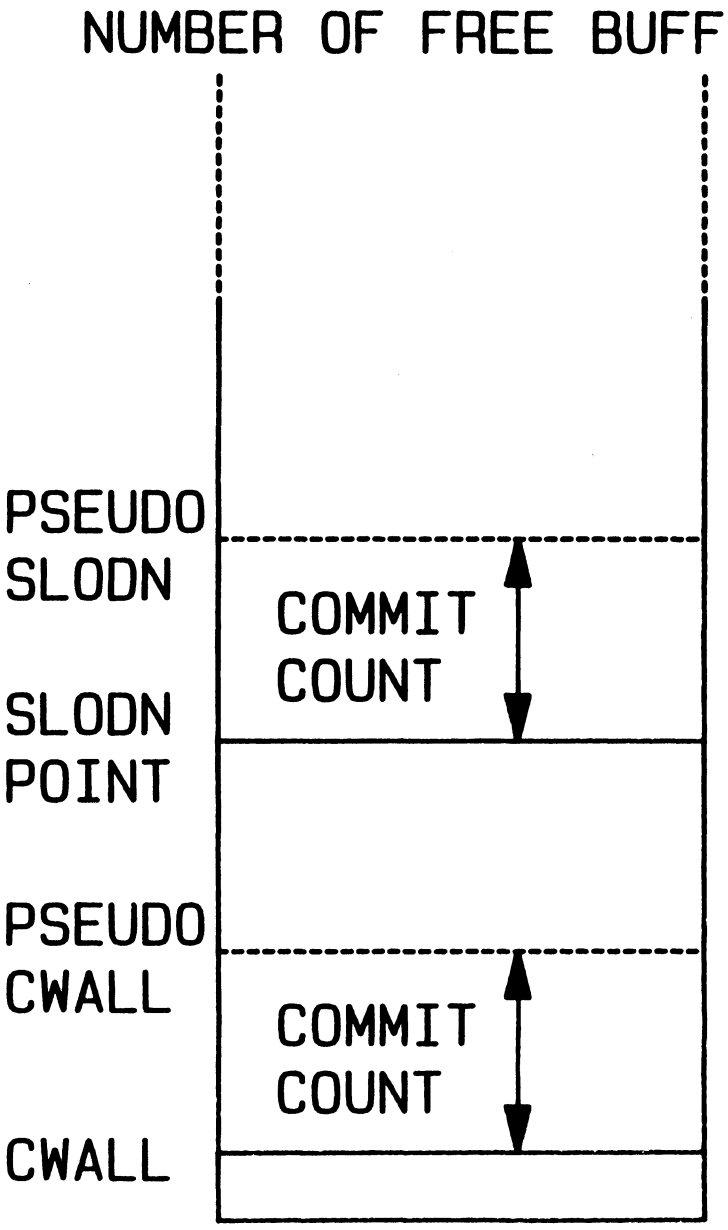
MESSAGES ARE CHAINED VIA AN ECB CONTROL BLOCK CONTAINED IN THE FIRST (ONLY THE FIRST) BUFFER OF THE MESSAGE.



N.B. THE DATA MAY NOT START AT THE BEGINNING OF THE BUFFER. ALWAYS CHECK THE 'DATA OFFSET' FIELD IN THE BUFFER HEADER. SINCE NCP NEVER MOVES DATA IF HE CAN HELP IT HE ALWAYS ALLOWS ROOM FOR A FID4 TH AT THE BEGINNING OF THE DATA.

SUP0110

NCP BUFFER POOL DEPLETION



SYSPROG SPECIFIES SLOWDOWN AND CWALL POINTS IN THE NCPGEN.

PSEUDO SLOWDOWN - POLL BNN LINKS RNR, STOP BSC READS.

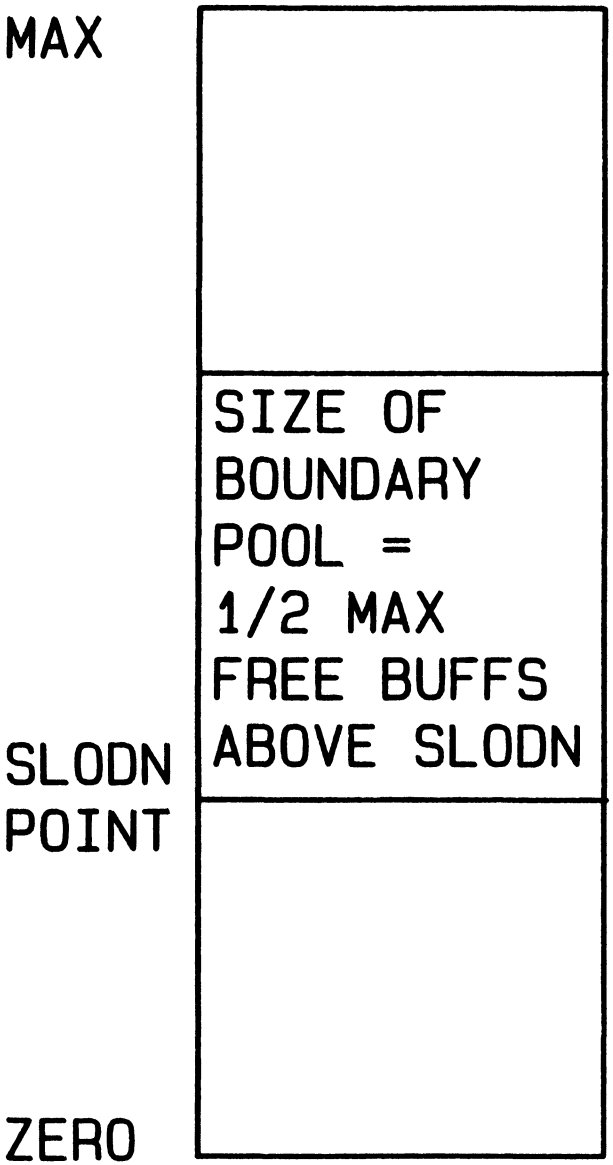
SLOWDOWN - WITHHOLD VR AND SESSION PACING RESPONSES. DO NOT SATISFY TYPE=COND BUFFER REQUESTS.

PSEUDO CWALL- POLL RNR ON INN LINKS.

CWALL STATE - STOP CHANNEL AND RECEIVING LINES FROM LEASING BUFFERS TYPE=CHARSERV AND TYPE=CWALL.

SUP0120

BOUNDARY POOL



BOUNDARY POOL IS NOT A SEPARATE POOL OF BUFFERS. ITS JUST A COUNTER.

WHEN THE NUMBER OF BUFFERS LEASED FOR BOUNDARY OUTBOUND MESSAGES REACHES 62.5% OF THE BOUNDARY POOL VALUE, FIRST VR PACING WINDOWS ARE REDUCED AND THEN VR PACING RESPONSES ARE WITHHELD ON A TPRIO BASIS AS THE PERCENTAGE INCREASES TOWARDS 100%.

(SEE DESTINATION BOUNDARY POOL IN THE DIAG REF FOR DETAILS.)

BPB Control Block holds current status.

NCP SAVE AREAS

CHAINED OFF R6 (C.F. R13 IN S370).

THREE TYPES

1) SYSTEM (NCPGEN) PROVIDED. USED BY HIGH LEVEL TASKS AND SOME LEVEL 5 TASKS.

2) CALL ATTR=REENT, USES SAVE AREAS BUILT IN NCP BUFFERS.

3) CALL ATTR=NONREENT, USES SAVE AREAS BUILT INLINE IN THE PROGRAM'S CODE.

```
E.G.    LA   Rx, . . . . . .
        LA   Ry, . . . . . .
             LA   R0, RETURN ADDR
```

(FOR DETAILS SEE DIAG REF APPENDICES)

SUPERVISOR FUNCTIONS (REVIEW)

HANDLE LEVEL 4 INTERRUPTS -

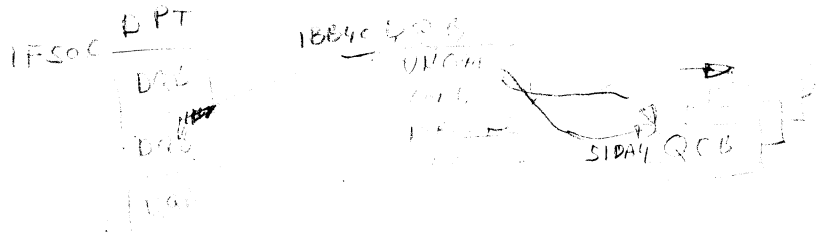
- L5 SVC CALL
- PCI FROM L3 AND L4 (+ L1 AT NCP INIT TIME)
- TALK TO MOSS

DISPATCHER -

- DISPATCHES LEVEL 5 TASKS

SUPERVISOR SERVICES -

- DECODE MACRO CALLS
- INVOKE MACRO SERVICE ROUTINES



SUPERVISOR EXERCISE

QUESTIONS

1) How many free buffers are there in the free buffer pool? (XDH Page 1 of dump).

2) What is the size of each buffer? (XDB Page 1 of dump).

3) Examine the level 5 dispatcher queues in the DPT on page 57 of the dump.
   a) Find a QCB awaiting dispatch.
   b) What is the address and name (from load map in the dump) of the program waiting for dispatch?
   c) What is the address of the work element associated with this QCB?
   d) Decode the SNA RU contained in the buffer.

4) Look up the ABEND code for this dump in the NCP ref. Using the general purpose registers on page 60 of the dump and the storage locations listed below answer the following questions.

   STORAGE LOCATION CONTENTS: -

   02ABA0 12FC12AE 11321202 B9002000 71947004 A805B824
   001A30 28AE0070 25392B40 DB9A2953 F916D310
   029C80 EF82A808 BD0000D1 BF42A41E 0070090B
   02D370 13B41288 73824588 0000BF42 DBB00F41
   04B580 7088A804 A802A800 BF04B438 A8C3B900 10140700 0000

   a) What is the address of the next instruction to be executed in level 1?
   b) Back up 8 bytes from L1 IAR. Decode the instructions contained in these 8 bytes.
   c) What is the effect of the instructions decoded above?
   d) What was the last instruction issued on level 2 and what does the instruction do?
   e) What was the last instruction issued on level 3 and what does the instruction do?
   f) What was the last instruction issued on level 4 and what does the instruction do?
   g) Examine the instructions to be issued on level 5. What do the instructions do?
   h) Which level do you think generated the level 1 interrupt, why?

b) Back up 8 bytes from L1 IAR. Decode the instructions contained in these 8 bytes.

X'B900 2000 7194 7004'

c) What is the effect of the instructions decoded above?

```
X'B900 2000'  LA    R1, X'2000'
X'7194'       OUT   R1, X'79'        SET  IPL
X'7004'       OUT   0, X'70'         HARD STOP
```

This is the NCP forcing a REIPL of the 3725.

d) What was the last instruction issued on level 2 and what does the instruction do?

X'0070' EXIT from level 2

e) What was the last instruction issued on level 3 and what does the instruction do?

X'0070' EXIT from level 3

f) What was the last instruction issued on level 4 and what does the instruction do?

X'0000' Invalid operation code

g) Examine the instructions on level 5.

B9001014 (LA R1, X'1014') 07000000 (ISSUE ABEND SVC)
R0=>ABEND 1014 means that L5 is waiting for work.

h) Which level do you think generated the level 1 interrupt, why?

A level 4 routine has several bytes of zeros at the beginning. This gives a program check level 1 interrupt and results in level 1 code abending the NCP with code 001B.

1) How many free buffers are there in the free buffer pool? (XDH Page 1 of dump).
   XDH + X'54' = X'1467'.

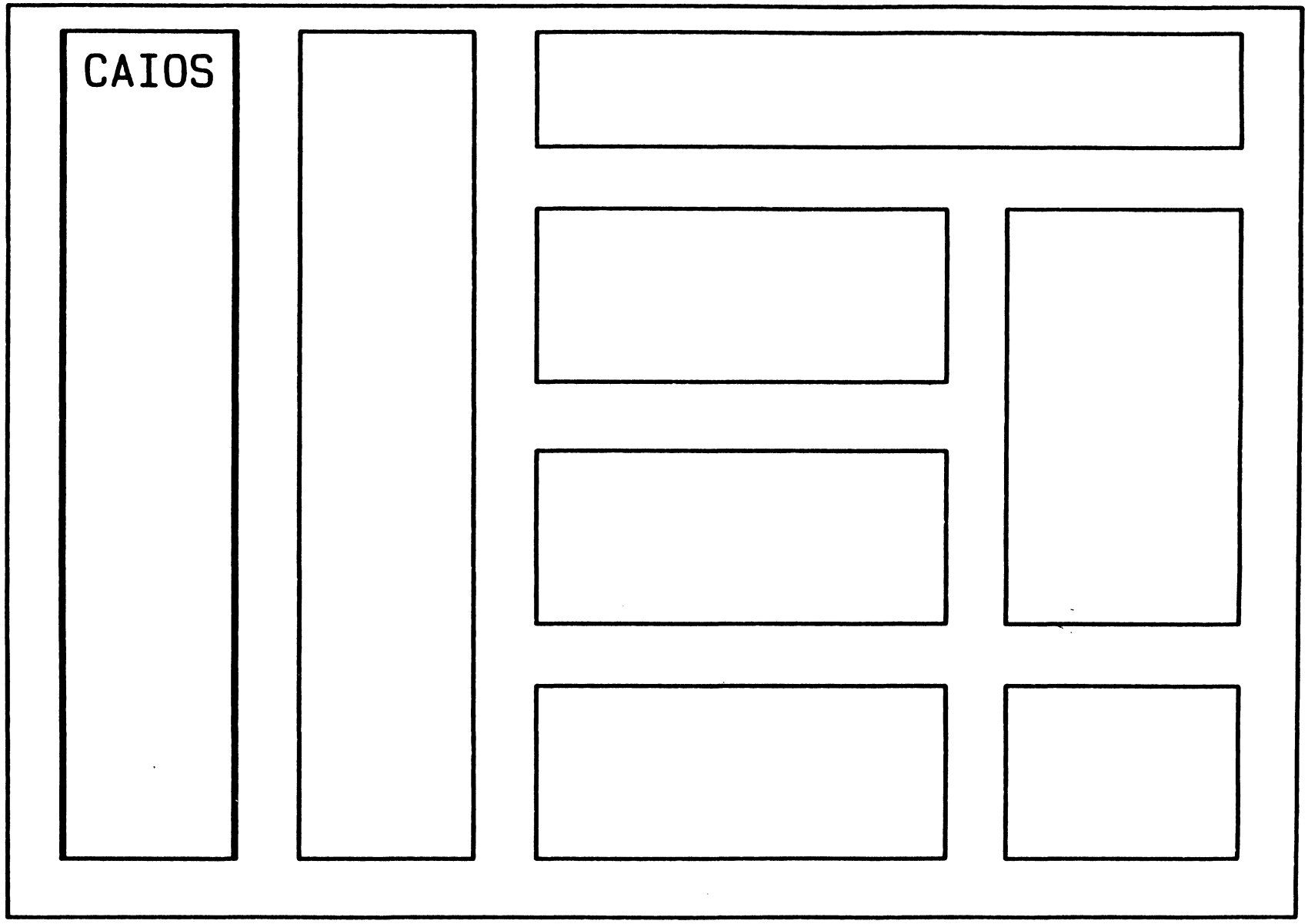
2) What is the size of each buffer? (XDB Page 1 of dump).
   XDB + X'10' = X'88' (true buffer size)
   XDB + X'07' = X'80' (buffer size minus prefix)

3) Examine the level 5 dispatcher queues in the DPT on page 57 of the dump.
   a) Find a QCB awaiting dispatch.
      IMMED PRIO QUEUE points to QCB at X'1BB4C'
   b) What is the name of the csect waiting for dispatch?
      Task entry point = X'36050' module name (from load map) is CXDCVR0.
   c) What is the address of the work element associated with this QCB?
      Only one element is queued off this QCB. The buffer address is X'51DA4'.
   d) Decode the SNA RU contained in the buffer.
      At +6 is the offset(X'12') of the text. The text comprises a FID4 TH (X'1A' long) a 3 byte RH and an RU of 01020B 0027 which decodes to a DACTLINK for element 0027.

4) Look up the ABEND code for this dump in the NCP ref. Examine the general purpose registers on page 60 of the dump and answer the following questions.
   a) What is the address of the next instruction to be executed in level 1?
      R0 = Address of Next Instruction = X'2ABB0'

THE CHANNEL ADAPTER AND CAIOS

CI00010



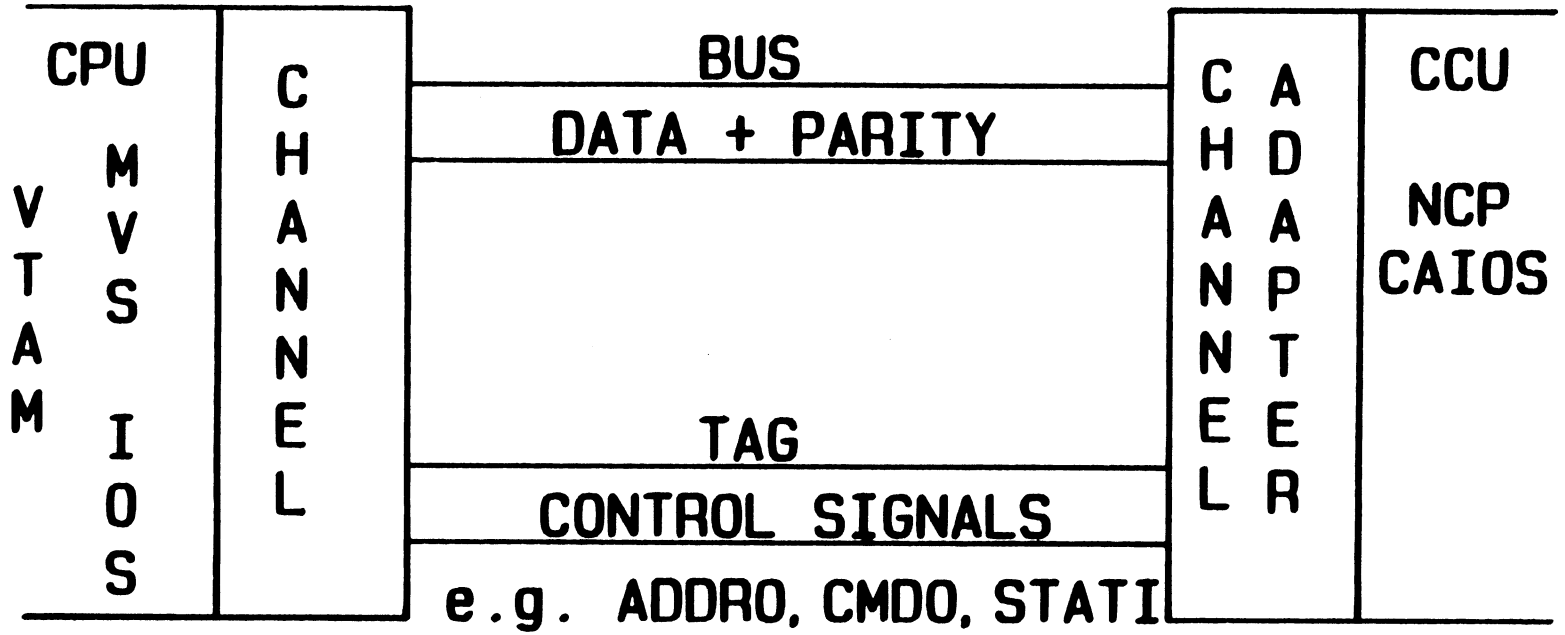
CIO0020

CAIOS FUNCTIONS

1) TALK TO CHANNEL/CHANNEL ADAPTER

2) PERFORM SNA DLC FUNCTION FOR CHANNEL LINKS.
   TRANSFER PIUS TO/FROM HOST.
   IMPLEMENT ERROR RETRY FACILITIES.

THE CHANNEL INTERFACE

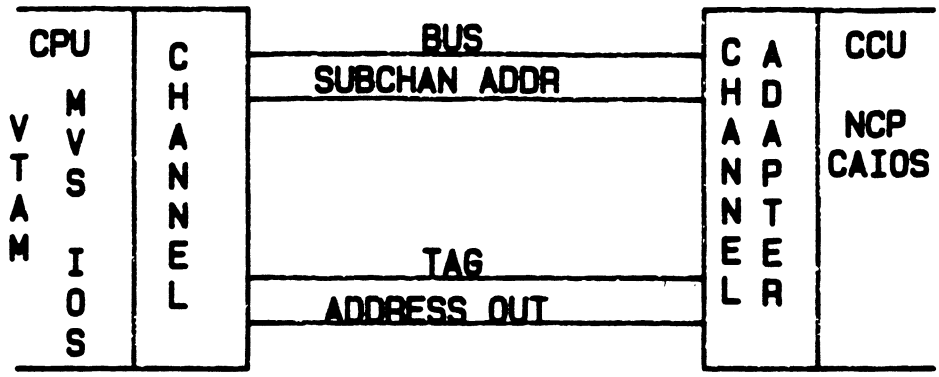


SYSTEM 370 ORIGINAL EQUIPMENT
MANUFACTURERS INFORMATION GA22-6974

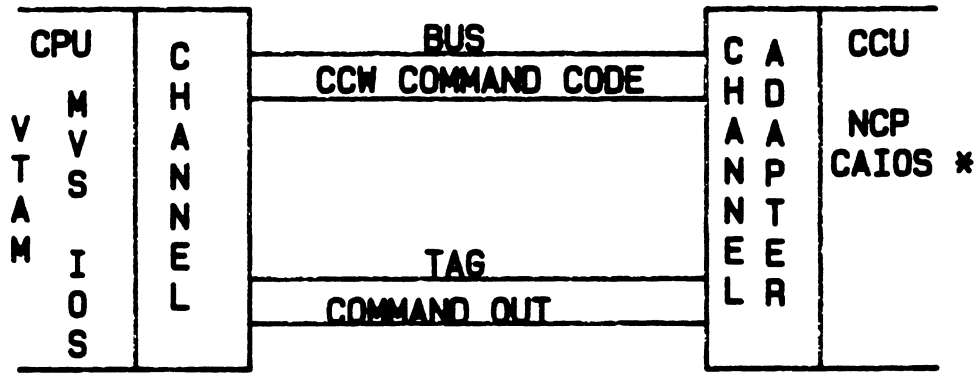
C100030

INITIAL SELECTION

1) SELECT THE DEVICE.

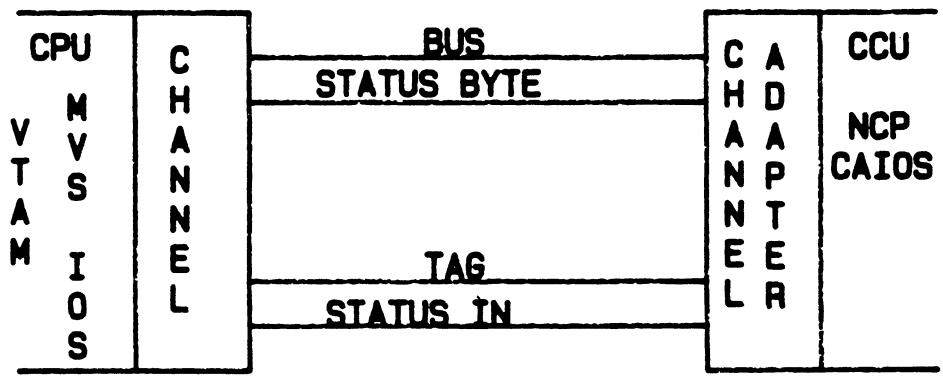


2) PASS THE CCW COMMAND TO THE DEVICE



* PROCESS INITIAL SELECTION LEVEL 3 INTERUPT

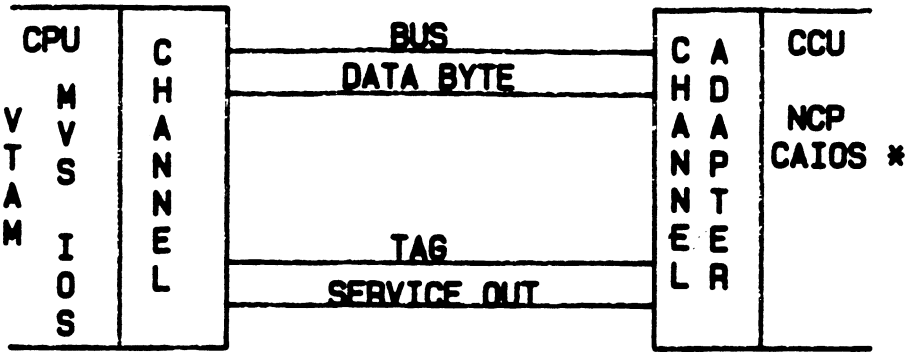
3) DEVICE RETURNS INITIAL STATUS (OK OR CMD REJECT)



CI00040

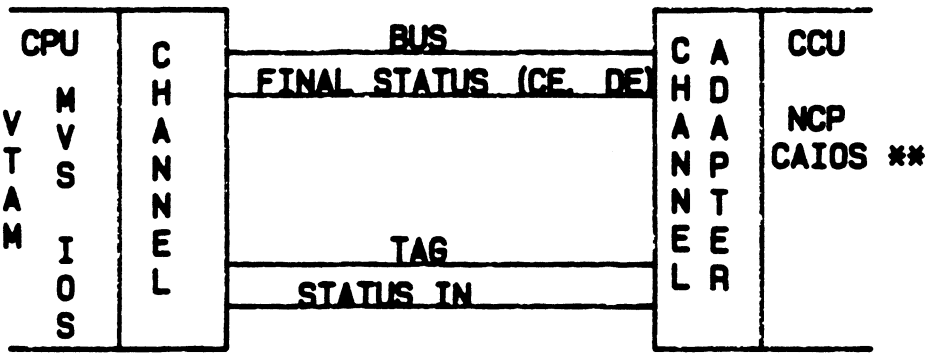
DATA TRANSFER

1) TRANSFER DATA BYTES



* A LEVEL 3 DATA SERVICE INTERRUPT IS GENERATED AT LEAST EVERY 255 BYTES.

3) RETURN THE ENDING STATUS TO THE HOST (VTAM)



** PROCESS FINAL STATUS LEVEL 3 INTERRUPT

COMMON VALUES FOR FINAL STATUS :

'CE, DE' NORMAL END
'CE, DE, UC' UNUSUAL CONDITION, ISSUE SENSE CCW
'CE, DE, UE' NORMAL END OF READ (NO MORE DATA)
'CE, DE, ATTN' ISSUE ANOTHER READ, MORE DATA TO SEND YOU

'ATTN' ASYNCH ATTN, ISSUE A READ (SEE 'DELAY' IN NCPGEN)

SOME CCW COMMANDS

CMD	ADDR	FLAG	LEN

WRITE START 0/1	READ START 0/1
WRITE	READ
WRITE BREAK	
WRITE IPL	RESTART/RESET
	SENSE

DOCUMENTATION : -

NCP DIAG REF APPENDIX G (good overview)

NCP REF SUM CHAP 4

VTAM DIAG REF

370 PRIN OF OPS (CCW FORMAT)

3705/3725 PRIN OF OPS (CHAN ADAPTER)

CHANNEL PROGRAM COATTAILING

WRITE CHANNEL PROGRAM

WRITE START 0/1	C
WRITE	C
WRITE	C
WRITE	C
WRITE	C
WRITE	C
WRITE BREAK *	C
NOOP	N
TIC	C

C = CHAIN TO NEXT CCW
N = DO NOT CHAIN TO NEXT CCW

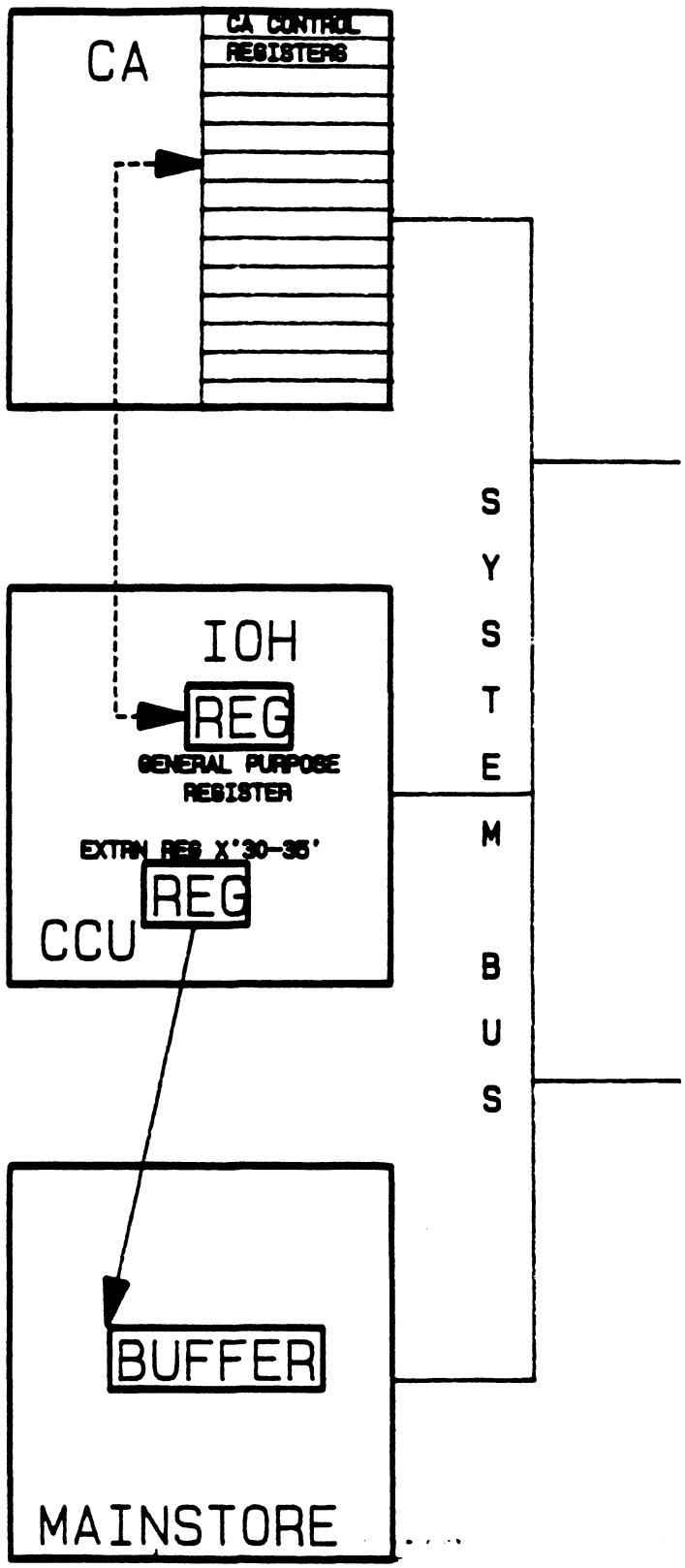
* STATUS MODIFIER AFTER WRITE BREAK TELLS CHANNEL TO SKIP NEXT CCW.

READ CHANNEL PROGRAM
MAXBFRU=7

READ START 0/1	C
READ	C
READ	C
READ	C
READ	C
READ	C
READ	C
READ	C
NOOP	N

C100070

CHANNEL ADAPTER OPERATION



CI00080

CA CONTROL REGISTERS

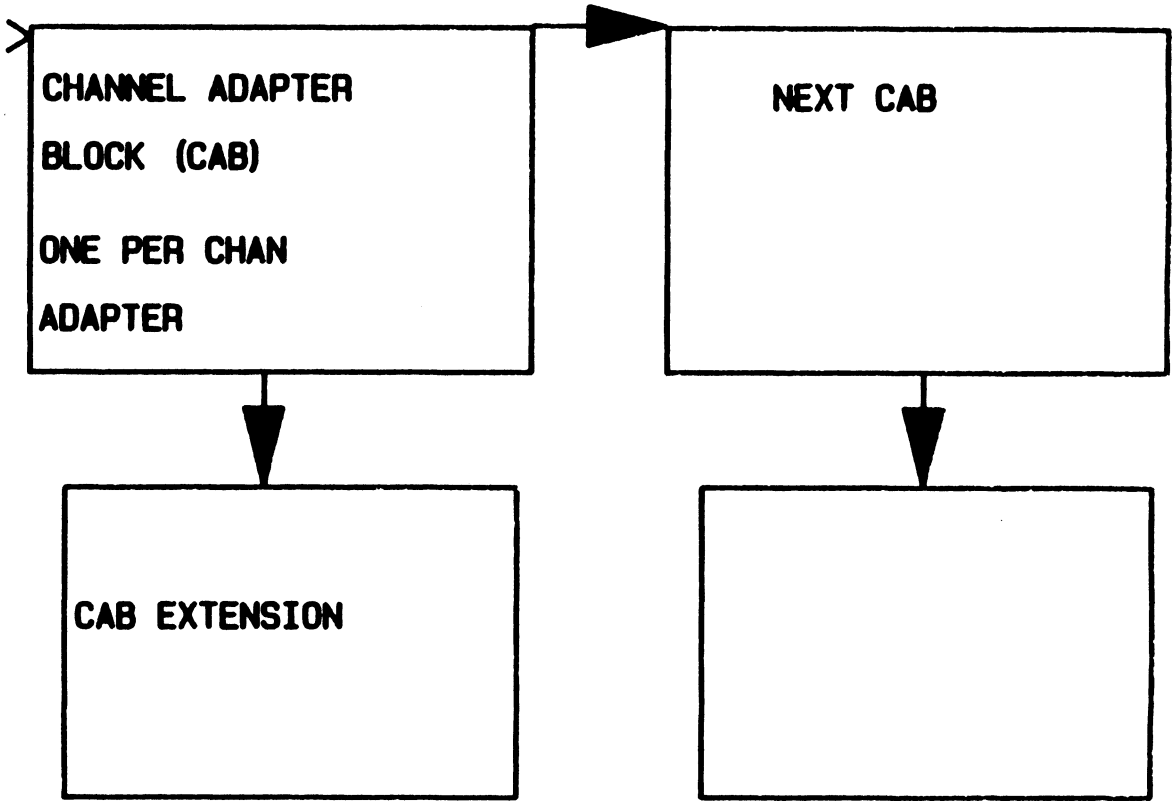
- USED TO COMMUNICATE BETWEEN NCP (OR EP) AND THE CHANNEL ADAPTER HARDWARE.

SPECIFIED IN IOH/IOHI INSTRUCTION

X'0' - INITIAL SELECTION CONTROL
X'1' - INITIAL SELECTION ADDRESS AND COMMAND
X'2' - DATA/STATUS CONTROL
X'3' - ESC ADDRESS AND STATUS
X'4' - DATA BUFFER
X'5' - DATA BUFFER
X'6' - NSC STATUS/CONTROL
X'7' - CHANNEL ADAPTER CONDITION
X'8' - X'A' INVALID
X'B' - ESC TEST I/O ADDRESS AND STATUS
X'C' - CYCLE STEAL MODE CONTROL
X'D' - LEVEL 1 INTERRUPT CHECK
X'E' - LEVEL 1 INTERRUPT REQUESTS
X'F' - LEVEL 3 INTERRUPT REQUESTS

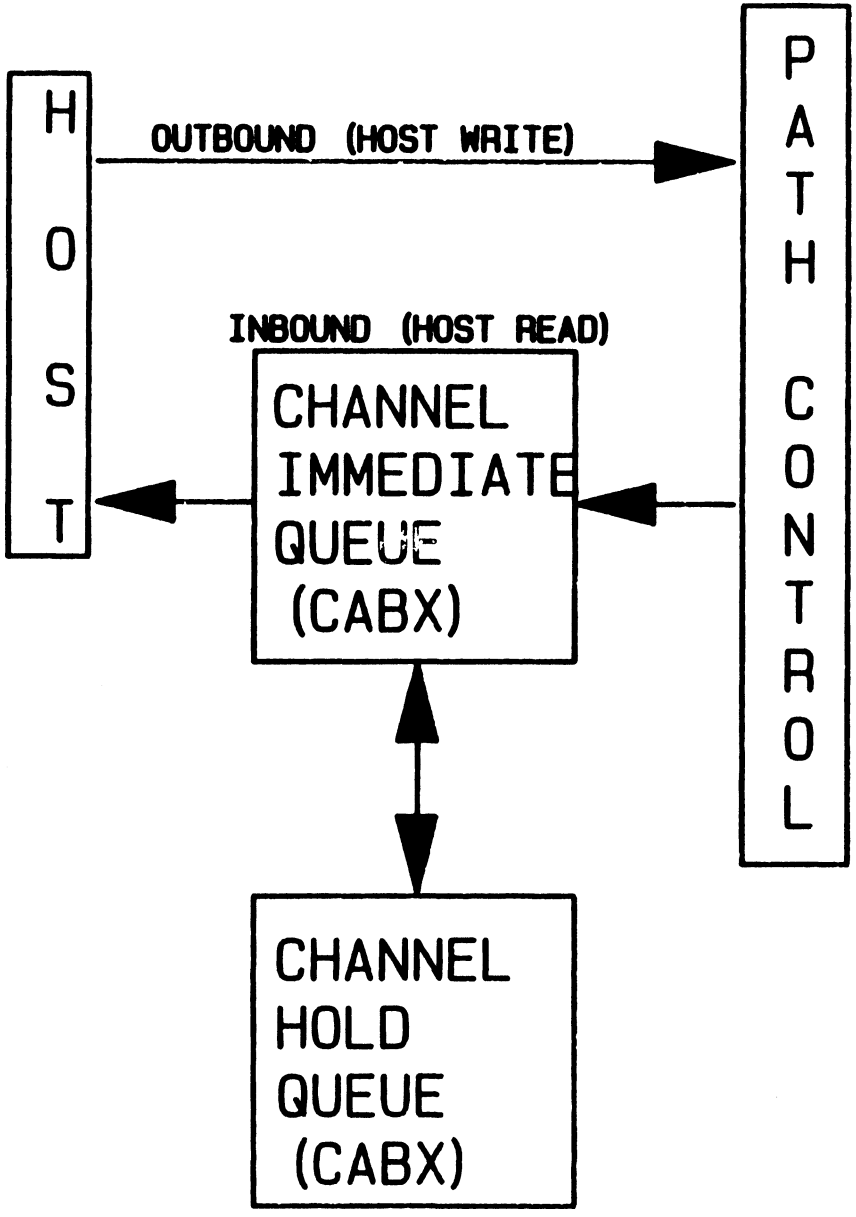
CAIOS CONTROL BLOCKS

FROM
DIRECT
ADDRESSABLES
XDA->HWE->



CI00080

CHANNEL QUEUES



DLC RETRY FUNCTION

ENQ COUNTER.

HOW MANY PIUS PASSED TO PATH CONTROL.

SKIP COUNTER.

HOW MANY PIUS TO SKIP ON A RETRANSMISSION FROM THE HOST.

CI00100

CAIOS FUNCTIONS (REVIEW)

1) TALK TO CHANNEL/CHANNEL ADAPTER

2) PERFORM SNA DLC FUNCTION FOR CHANNEL LINKS.
   TRANSFER PIUS TO/FROM HOST.
   IMPLEMENT ERROR RETRY FACILITIES.

CAIOS EXERCISE

QUESTIONS

1) How many channel adapters are GEN'ed in this NCP? (Page 16 of dump). 2

   ****
   * From now on consider only XCXTCAB1 and its extension *
   ****

2) Which read start and write start commands are expected next over this channel adapter? 52 31
3) What are the latest NSC status flags saved in the CAB? c0480
4) What values have been set in the CAB extension for.....
   a) The number of NCP buffers allocated for a host WRITE.
   b) The number of VTAM buffers allocated for a host READ.
   c) The length of a VTAM I/O buffer. x'104'

   and which NCP GEN parameters correspond to them?
5) From the CAB extension what, if anything is on the channel intermediate and hold queues?
   Which RU did we last send to the host?
6) From the CAB extension what was the last thing we passed to path control?
7) What was the last thing we received over the channel?
8) How much of the current input buffer can we use for data? Why cant we use all of it?

1) How many channel adapters are GEN'ed in this NCP? (Page 16 of dump).

   There are two CABs therefore there are two channel adapters specified in the NCP generation.

   ****
   * From now on consider only XCXTCAB1 and its extension *
   ****

2) Which read start and write start commands are expected next over this channel adapter?

   CAB+X'D' = X'31' Write start 0
   CAB+X'F' = X'52' Read start 1

3) What are the NSC status flags set to?

   CAB+X'20' = contents of CA register 6 = X'000C'
   X'000C' decodes to CE, DE (chan end, device end)

4) What values have been set in the CAB extension for.....

   a) The number of NCP buffers allocated for a host WRITE.
      INBFRS = 4 (CABX+X'27')
   b) The number of VTAM buffers allocated for a host READ.
      MAXBFRU = 40 (X'28') CABX+X'64'
   c) The length of a VTAM I/O buffer.
      UNITSZ = 260 (X'104') CABX+X'60'

and which NCP GEN parameters correspond to them?

5) From the CAB extension what, if anything is on the channel intermediate and hold queues?
Which RU did we last send to the host?

Channel Intermediate queue is empty (CABX+0). There is no data waiting to go to the host.
Hold queue = X'51D18'. The RU in this buffer is an SNA command (01020A) ACTLINK for resource 0027.

6) From the CAB extension what was the last thing we passed to path control?

CABX+X'18' = X'51DA4' the Ru in this buffer is an SNA command (01020B) DACTLINK for resource 0027 (see supervisor lab questions 3C and 3D).

7) What was the last thing we received over the channel?

CABX+X'28' = X'51DA4' same PIU as previous question.

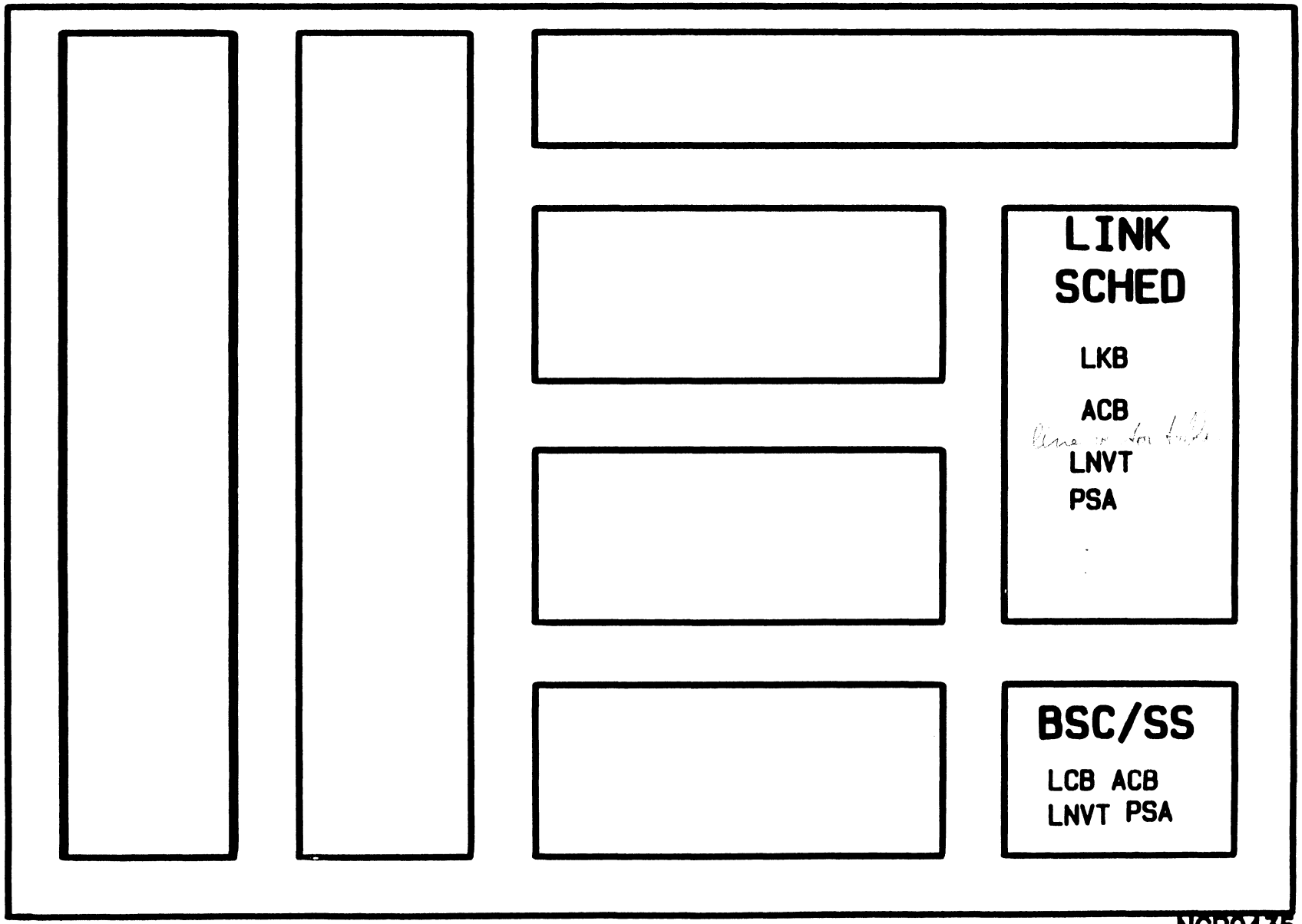
8) How much of the current input buffer can we use for data?
Why cant we use all of it?

CABX+X'30' = X'6E' = buffer size (X'88) minus headers and control information. See PIU (FID4) in NCPREF for details.

LINK SCHEDULER

NCP0430

LINK SCHEDULER MAJOR CONTROL BLOCKS



LINK SCHEDULER FUNCTIONS

INTERFACE TO SCANNER HARDWARE

- THE LINK SCHEDULER PROPER RUNS SDLC ONLY
- THE BSC EQUIVALENT IS KNOWN AS CCP/CSP (COMMS CTRL/CHAR SERVICE PGM)
- INTERFACE TO SCANNER VIA IOH/IOHI INSTRUCTIONS

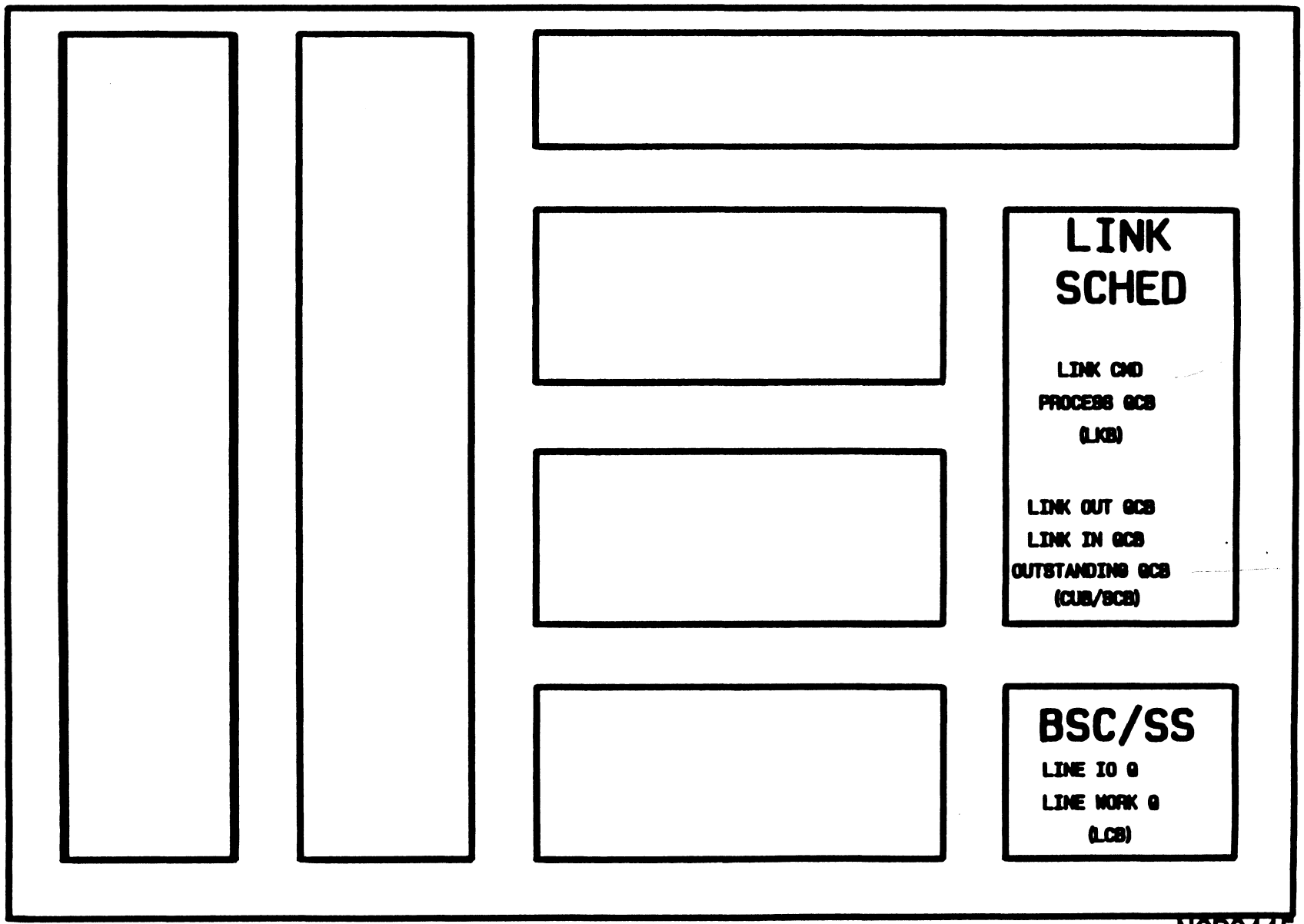
INITIATE/TERMINATE/SCHEDULE/CONTROL OF TP LINKS

INTERFACE TO:

- BNN (PU_T1/2)
- BSC/SS PROCESS
- INN LINKS (PU_T4)
- PHYSICAL SERVICES (ACTLINK, TRACE etc.)

OPERATES IN LEVELS 2, 3, AND 5

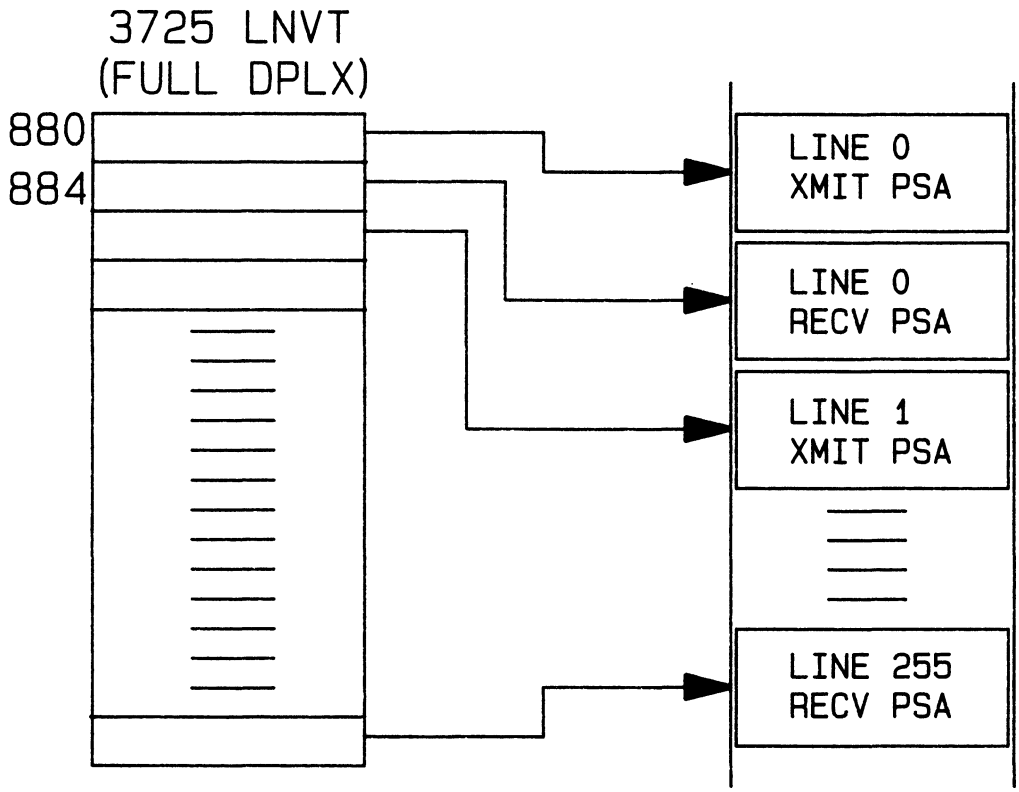
LINK SCHEDULER QUEUES

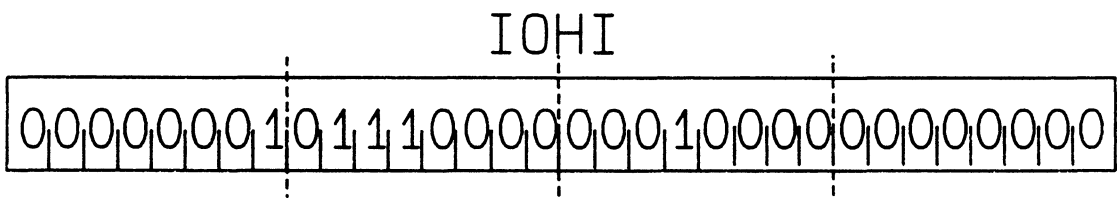


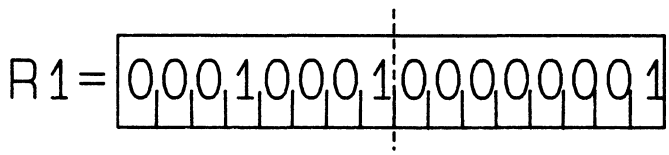
NCP0445

CONTROLLING THE LINK HARDWARE

LNVT contains halfword ACB pointer (3705) OR
LNVT contains TWO fullword PSA pointers (3725)
First PSA is for TRANSMIT (FDX) or for TRANSMIT/RECEIVE (HDX).
Second PSA is for RECEIVE (FDX) or set to zeros (HDX).



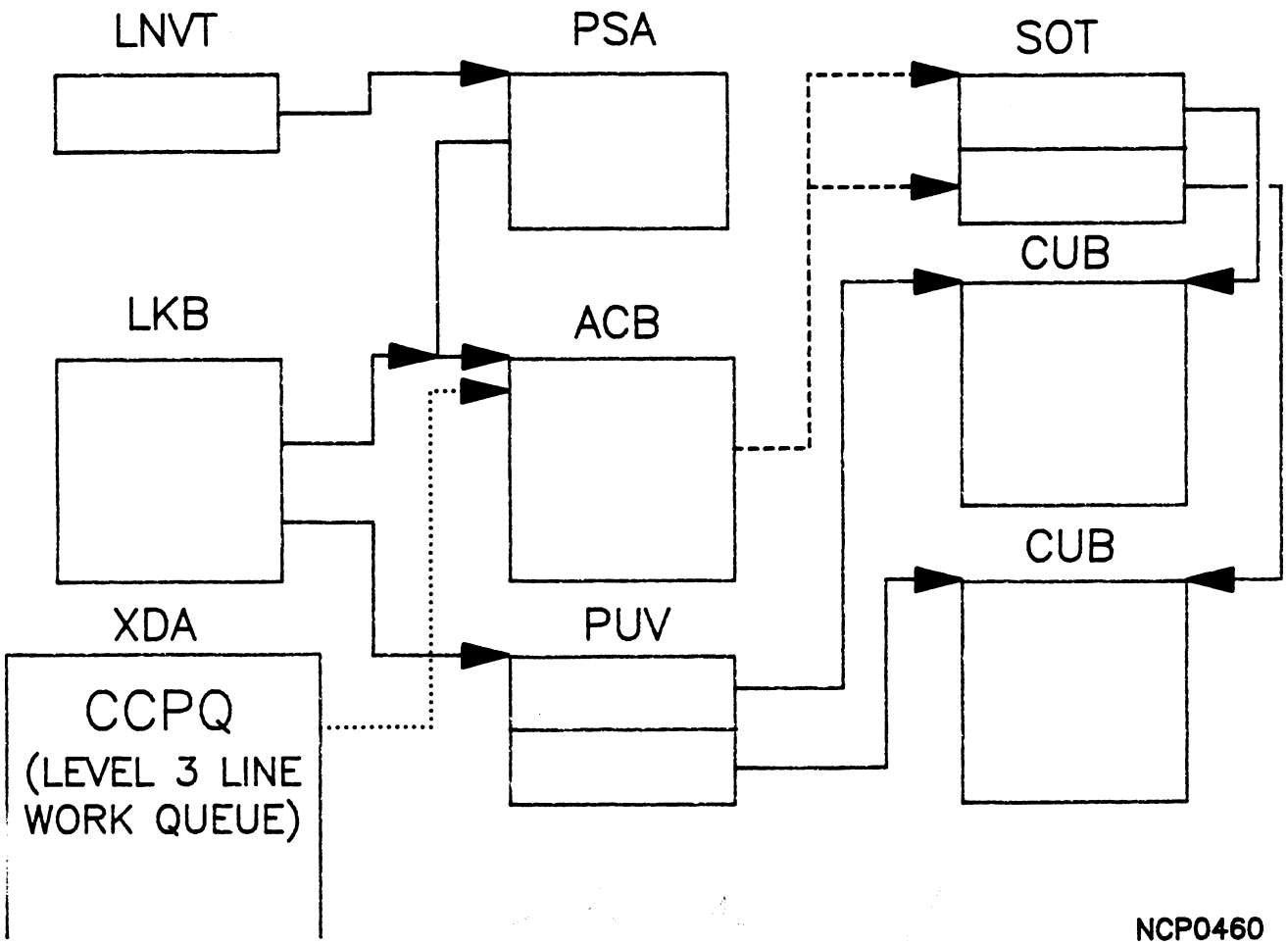




NCP0450

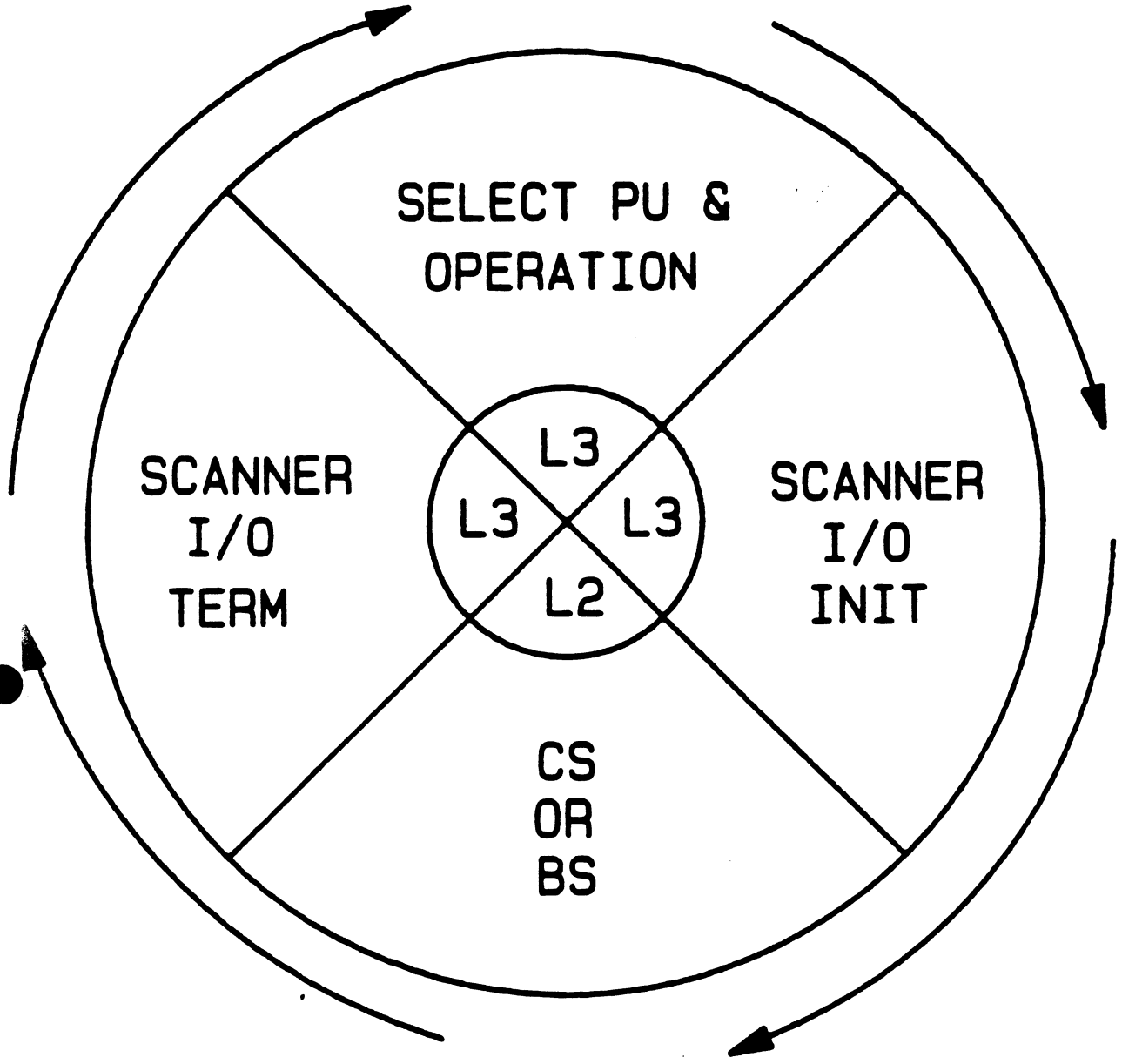
SDLC LINK SCHEDULER CONTROL BLOCKS

```
GROUP1   GROUP     LNCTL=SDLC
LINE1    LINE      ADDRESS=(001,HALF)
SRV1     SERVICE   ORDER=(PU1,PU2)
PU1      PU        PUTYPE=2
PU2      PU        PUTYPE=2
```



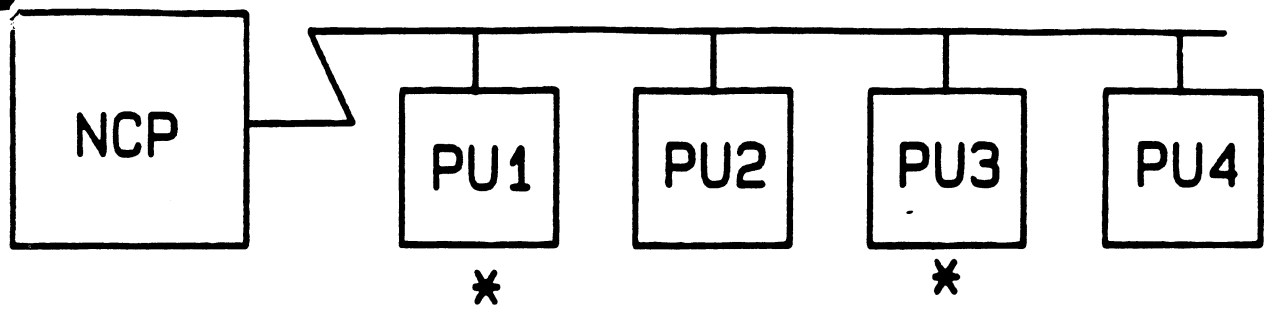
NCP0460

LINK SCHEDULING



NCP0470

SERVICE CYCLE



SERVLIM=2 PAUSE=1 REPLYTO=2

SERVICE ORDER= (PU1, PU2, PU3, PU4)

SERVICE CYCLE

WRITE/POLL PU1	FIRST
IGNORE PU2	NORMAL
WRITE/POLL PU3	SERVICE
IGNORE PU4	PASS
WRITE/POLL PU1	SECOND
IGNORE PU2	NORMAL
WRITE/POLL PU3	SERVICE
IGNORE PU4	PASS

NORMAL SERVICE

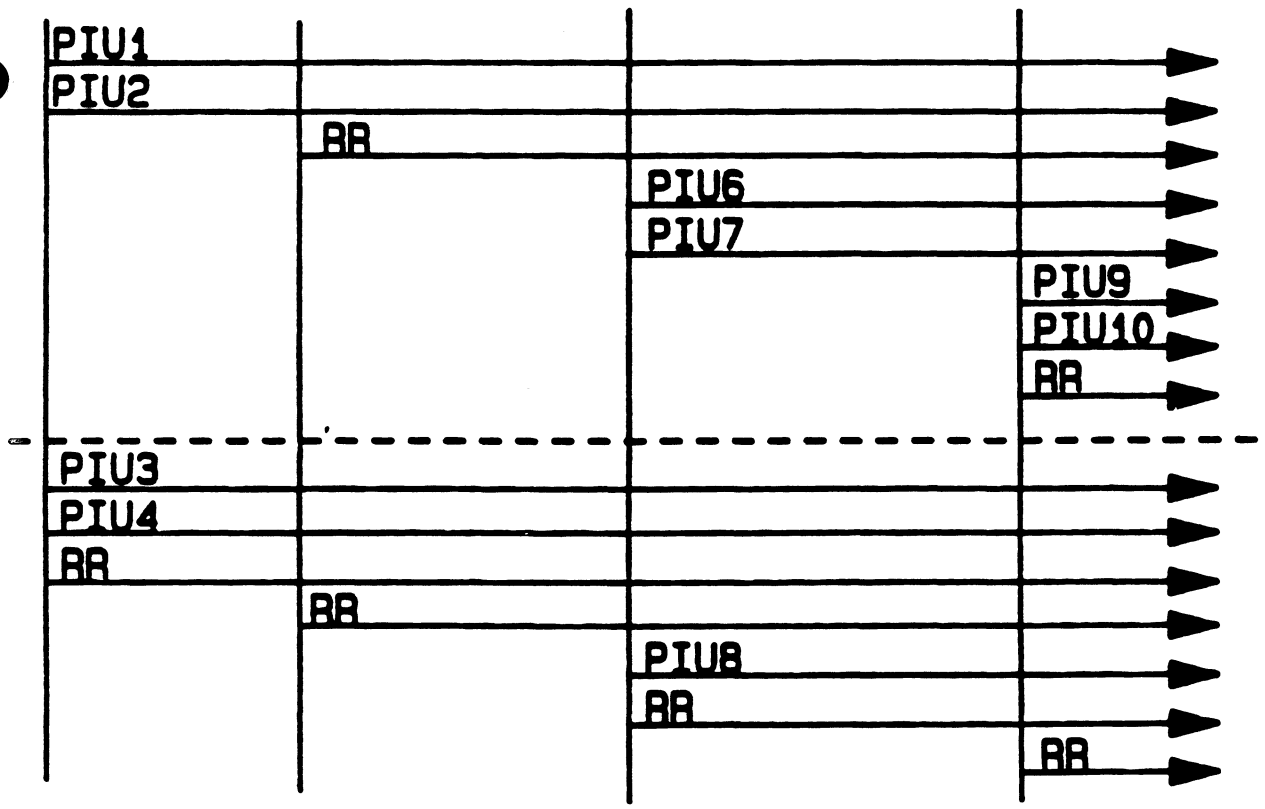
CONTACT POLL PU2 — CONTROL PASS

NCP0480

MAXOUT & PASSLIM

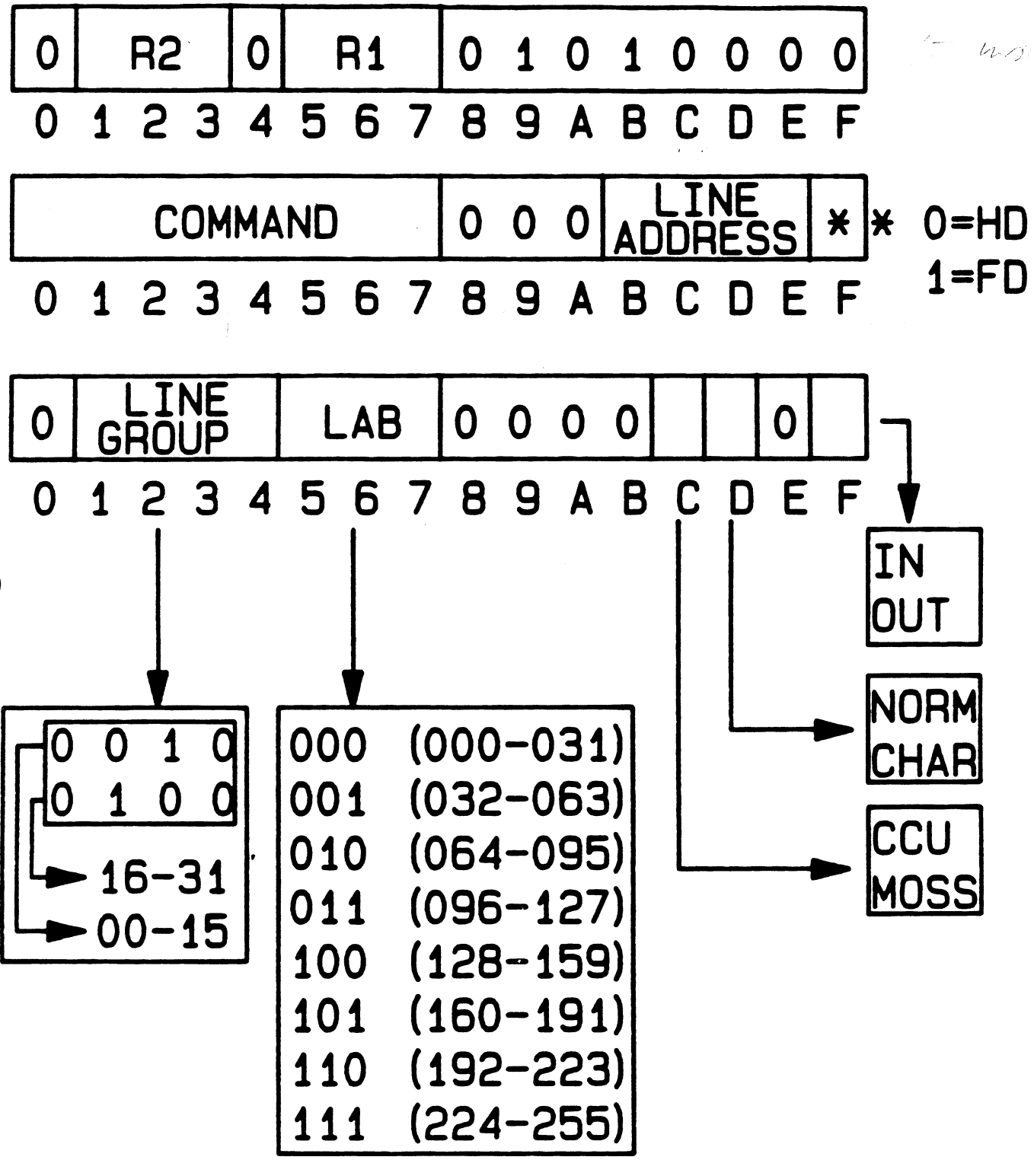
MAXOUT=4 PASSLIM=2

PU1	PU2	PU3	PU4
PIU1		PIU6	PIU9
PIU2		PIU7	PIU10
PIU3		PIU8	
PIU4			
PIU5			



NCP0490

SCANNER IOH CHEAT SHEET



NCP0500

SCANNER LAB ANSWERS

1. TRACE ELEMENT 7 IS AN IOH INSTRUCTION. TO WHAT LINE WAS THE WAS THE IOH ISSUED?

   LAB (R2+5) = 011 - LINES 96-127
   LINE GROUP (R2+1) = 0010 (00-15)
   LINE ADDRESS (R1+8) = 1000 (8)
   96+0+8 = 104 (SPECIFIC LINE ADDRESS)

2. IN TRACE ELEMENT 9 IS THE PARAMETER PORTION OF THE PSA FOR THE IOH INSTRUCTION IN QUESTION 1. INTERPRET THE PARAMETER AREA.

BYTE	VALUE	DESCRIPTION
0	00	TRANSMIT CORRELATION COUNT
1	06	ANSWER REQUESTED/DROP RTS
2	26	DATA STARTS 26 BYTES INTO THE BUFFER
3	00	NOT USED
4	5A	COUNT OF DATA (FROM BUFFER PREFIX)
5-7	0EAD34	POINTER TO DATA BUFFER

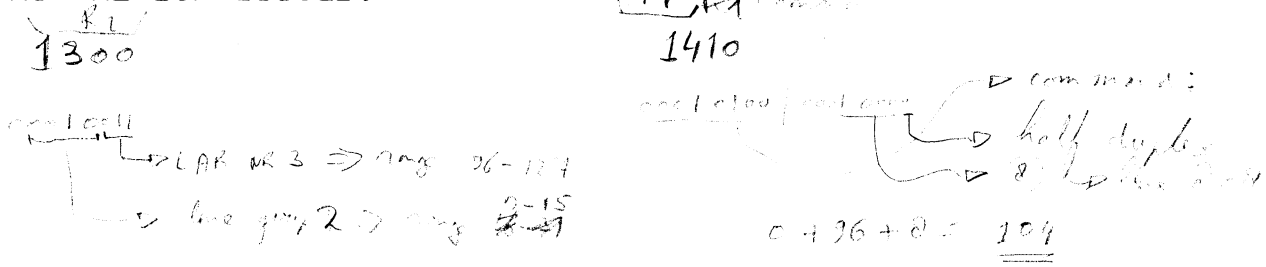
3. IN TRACE RECORD 15 IS THE STATUS PORTION OF THE PSA FOR THE IOH INSTRUCTION IN QUESTION 1. WHAT WAS THE NR AND NS COUNT OF THE SDLC FRAME THE WAS RECEIVED?

   IN THE STATUS PORTION OF THE PSA AT +9 (PSA+19) IS THE CONTROL FIELD OF THE SDLC FRAME. IT HAS A VALUE OF B2 OR OR 1011 0010. IN CHAPTER 6 OF THE NCP REFERENCE SUMMARY IS A BREAK DOWN OF THE SDLC CONTROL FIELD. THE FIRST THREE BITS INDICATE THE NR VALUE WHICH IS 5. THE NEXT BIT IS THE POLL FINAL BIT WHICH IS ON. THE NEXT THREE BITS ARE THE NS COUNT WHICH IS 1 AND THE LAST BIT IS 0 INDICATING THE INFORMATION FORMAT OF THE SDLC CONTROL FIELD.

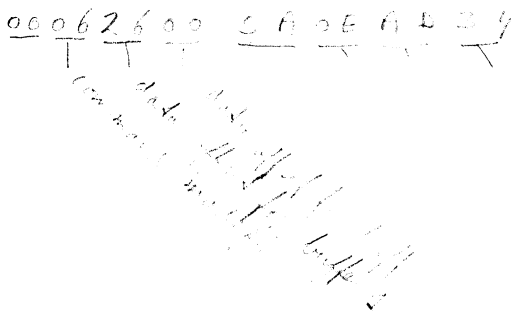
N.B. SIT Trace printout shows R2 then R1 in IOH entry.

SCANNER LAB QUESTIONS

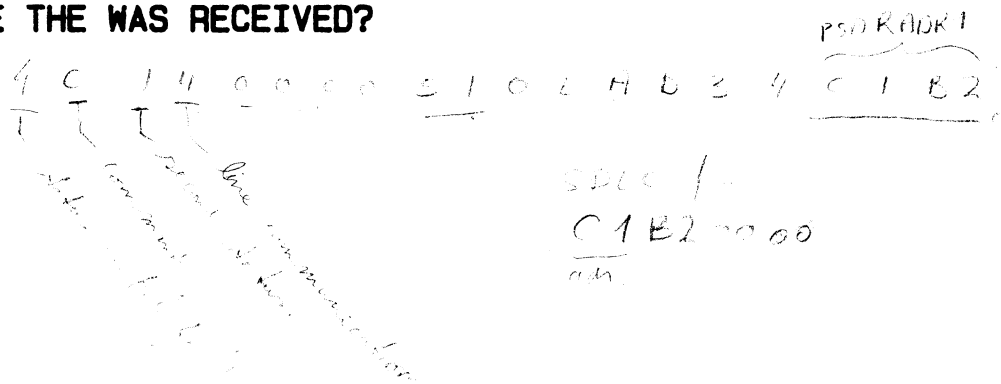
1. TRACE ELEMENT 7 IS AN IOH INSTRUCTION. TO WHAT LINE WAS THE WAS THE IOH ISSUED?



2. IN TRACE ELEMENT 9 IS THE PARAMETER PORTION OF THE PSA FOR THE IOH INSTRUCTION IN QUESTION 1. INTERPRET THE PARAMETER AREA.



3. IN TRACE RECORD 15 IS THE STATUS PORTION OF THE PSA FOR THE IOH INSTRUCTION IN QUESTION 1. WHAT WAS THE NR AND NS COUNT OF THE SDLC FRAME THE WAS RECEIVED?



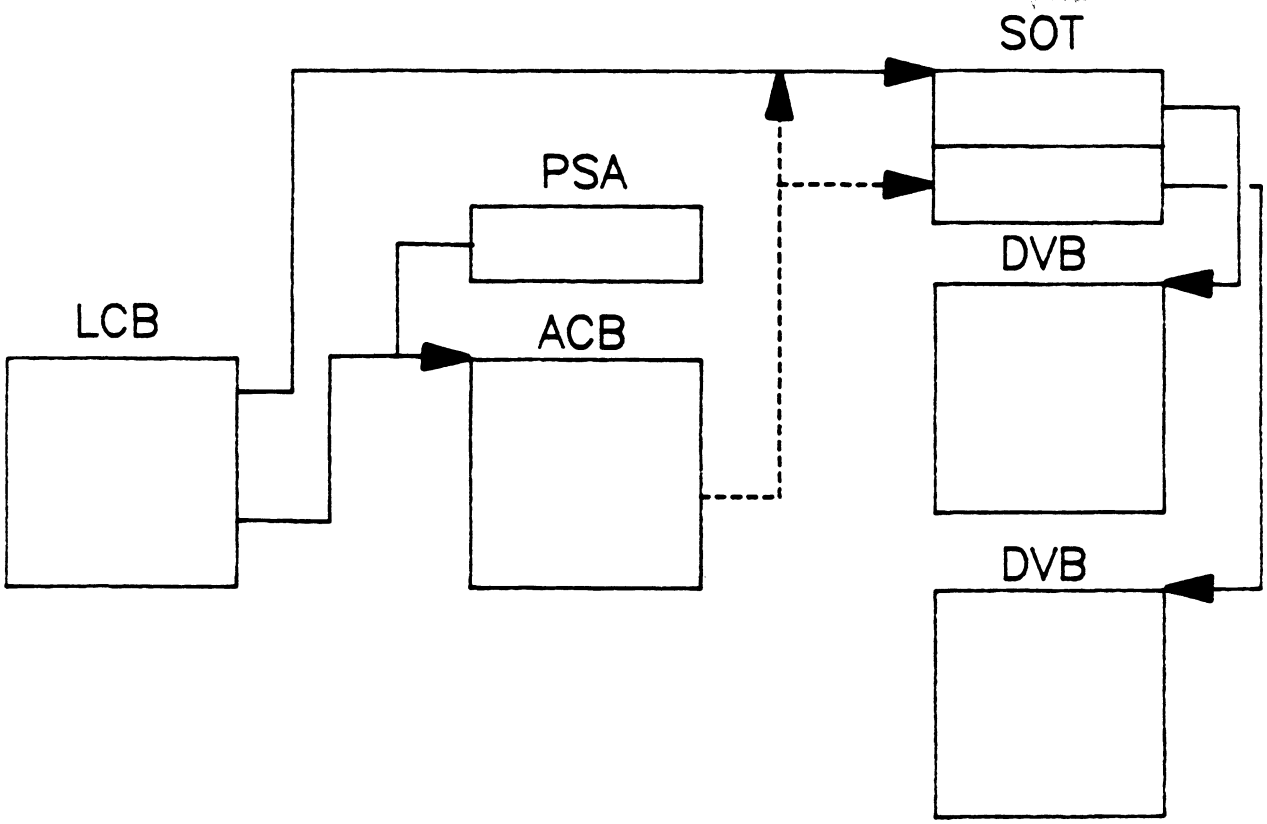
N.B. SIT Trace printout shows R2 then R1 in IOH entry.

NCP0510

RECORD NUMBER	TYPE	LINE ADDR	ELEMNT NUMBER	ID - COMMAND SCANNER STATE	TIME	TCC	HEX	TRANSLATION
000002	SIT	01D7	000001	CONTINUITY ERROR, LOST DATA				
			000002	XDATA			C1310000 8240	• A...b
			000003	XDATA			7EFFA04C	• =..<
			000004	RDATA			C1B22C00 0104004A A740	• A.....¢x
			000005	STAT XMIT CTL BUFFER REQ			41100000 00000000 C1B20000	• .....A...
			000006	CHKPT			AE0015A0	• ....
			000007	IOH RCV CONT			13001410	• ....
			000008	CHKPT			D44104A0	• M...
			000009	PARM		00	00062600 5A0EAD34	• ....!...
			000010	CHKPT			D12705A0	• J...
			000011	CHKPT			D02105A0	• ....
			000012	CHKPT			D76A05A0	• P...
			000013	RDATA			83800036 1C7E8544	• c....=e.
			000014	CHKPT			D7FB85A0	• P.e.
			000015	STAT RCV CONT END OF FRAME			4C140000 510EAD34 C1B20000	• <.....A...
			000016	CHKPT			AE0085A0	• ..e.
			000017	IOH FLUSH			13000910	• ....
			000018	IOH HALT IMM			1300F110	• ..1.
			000019	CHKPT			A0E00421	• ....
			000020	CHKPT			D42D0421	• M...
			000021	IOH HALT IMM			1300F110	• ..1.
			000022	IOH XMIT CTL			13001010	• ....
			000023	CHKPT			D47204A0	• M...
000003	SIT	01D7	000024	CHKPT			D48104A0	• Ma..
			000025	PARM		00	00060000 00000000 C1510000	• .....A...
			000026	CHKPT			D4B604A0	• M...
			000027	CHKPT			D5BF85A0	• N.e.
			000028	XDATA			00007E7E 8244	• ..==b.
			000029	XDATA			C1510000 8240	• A...b
			000030	XDATA			7EFFA04C	• =..<
			000031	RDATA			C1B42C00 01040012 A740	• A.....x
			000032	STAT XMIT CTL BUFFER REQ			41100000 00000000 C1B40000	• .....A...
			000033	CHKPT			AE0015A0	• ....
			000034	IOH RCV CONT			13001410	• ....
			000035	CHKPT			D44104A0	• M...
			000036	PARM		00	00062600 5A0E9F88	• ....!..h
			000037	CHKPT			D12705A0	• J...
			000038	CHKPT			D02105A0	• ....
			000039	CHKPT			D76A05A0	• P...
			000040	RDATA			0390207D 5AD1D2B3 8740	• ...'!JK.g
			000041	RDATA			7E008044	• =...
			000042	CHKPT			D7FB85A0	• P.e.
			000043	STAT RCV CONT END OF FRAME			4C140000 4E0E9F88 C1B40000	• <...+..hA...
			000044	CHKPT			AE0085A0	• ..e.
000004	SIT	01D7	000045	IOH FLUSH			13000910	• ....
			000046	IOH HALT IMM			1300F110	• ..1.
			000047	CHKPT			A0E00421	• ....
			000048	CHKPT			D42D0421	• M...
			000049	IOH XMIT DAT			13001110	• ....
			000050	CHKPT			D47204A0	• M...
			000051	CHKPT			D48104A0	• Ma..
			000052	PARM		00	00002600 5A0B9E14 C16A0000 00000000	• ....!...A.....

BSC LINK SCHEDULER CONTROL BLOCKS

```
LROUP1    GROUP     LNCTL=BSC
LINE1     LINE      ADDRESS=(035,HALF)
SRV1      SERVICE   ORDER=(C1,C2)
C1        CLUSTER
C2        CLUSTER
```



NCP0540

LINK SCHEDULER FUNCTIONS (REVIEW)

INTERFACE TO SCANNER HARDWARE

- THE LINK SCHEDULER PROPER RUNS SDLC ONLY
- THE BSC EQUIVALENT IS KNOWN AS CCP/CSP (COMMS CTRL/CHAR SERVICE PGM)
- INTERFACE TO SCANNER VIA IOH/IOHI INSTRUCTIONS

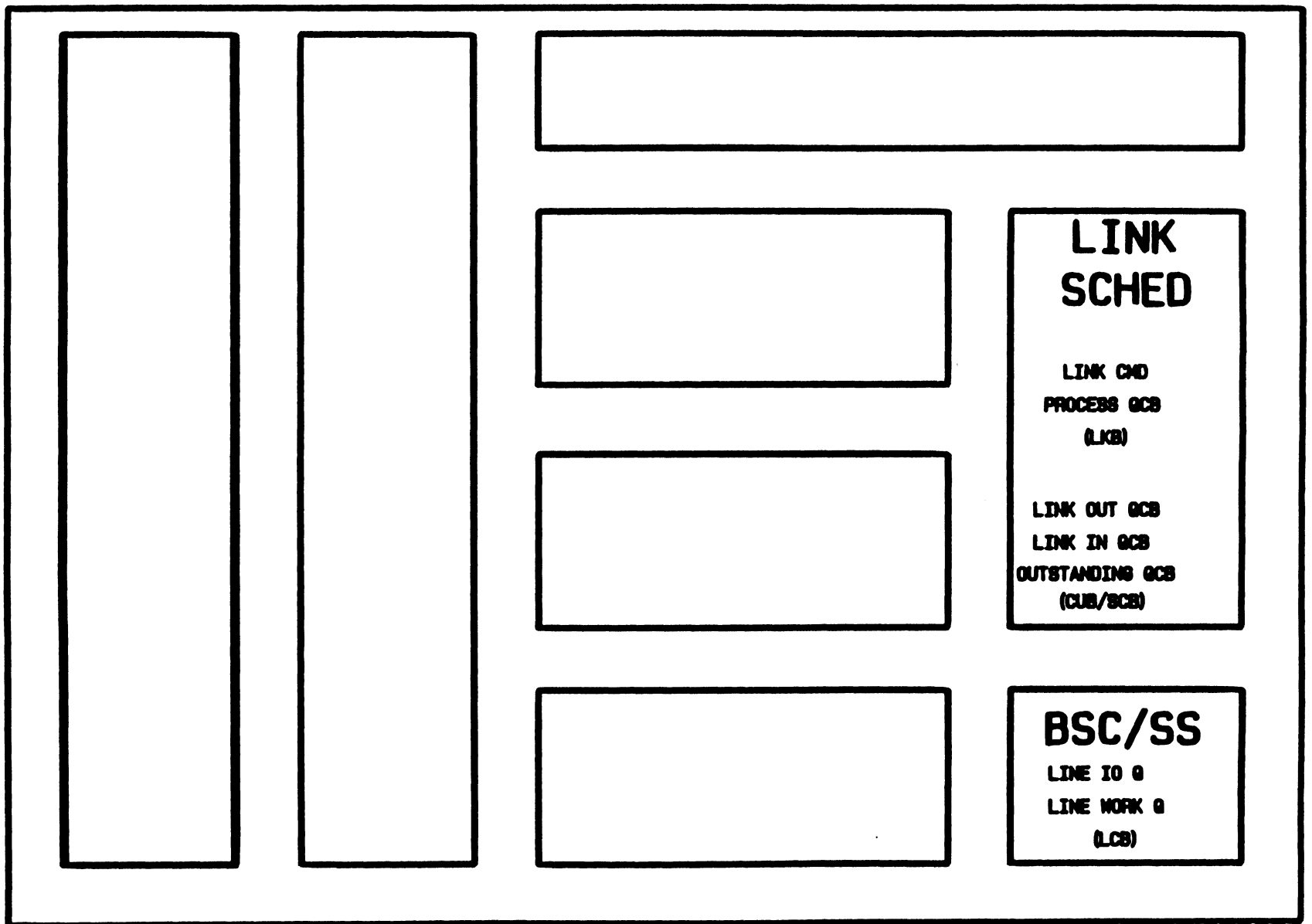
INITIATE/TERMINATE/SCHEDULE/CONTROL OF TP LINKS

INTERFACE TO:

- BNN (PU_T1/2)
- BSC/SS PROCESS
- INN LINKS (PU_T4)
- PHYSICAL SERVICES (ACTLINK, TRACE etc.)

OPERATES IN LEVELS 2, 3, AND 5

LINK SCHEDULER QUEUES (REVIEW)

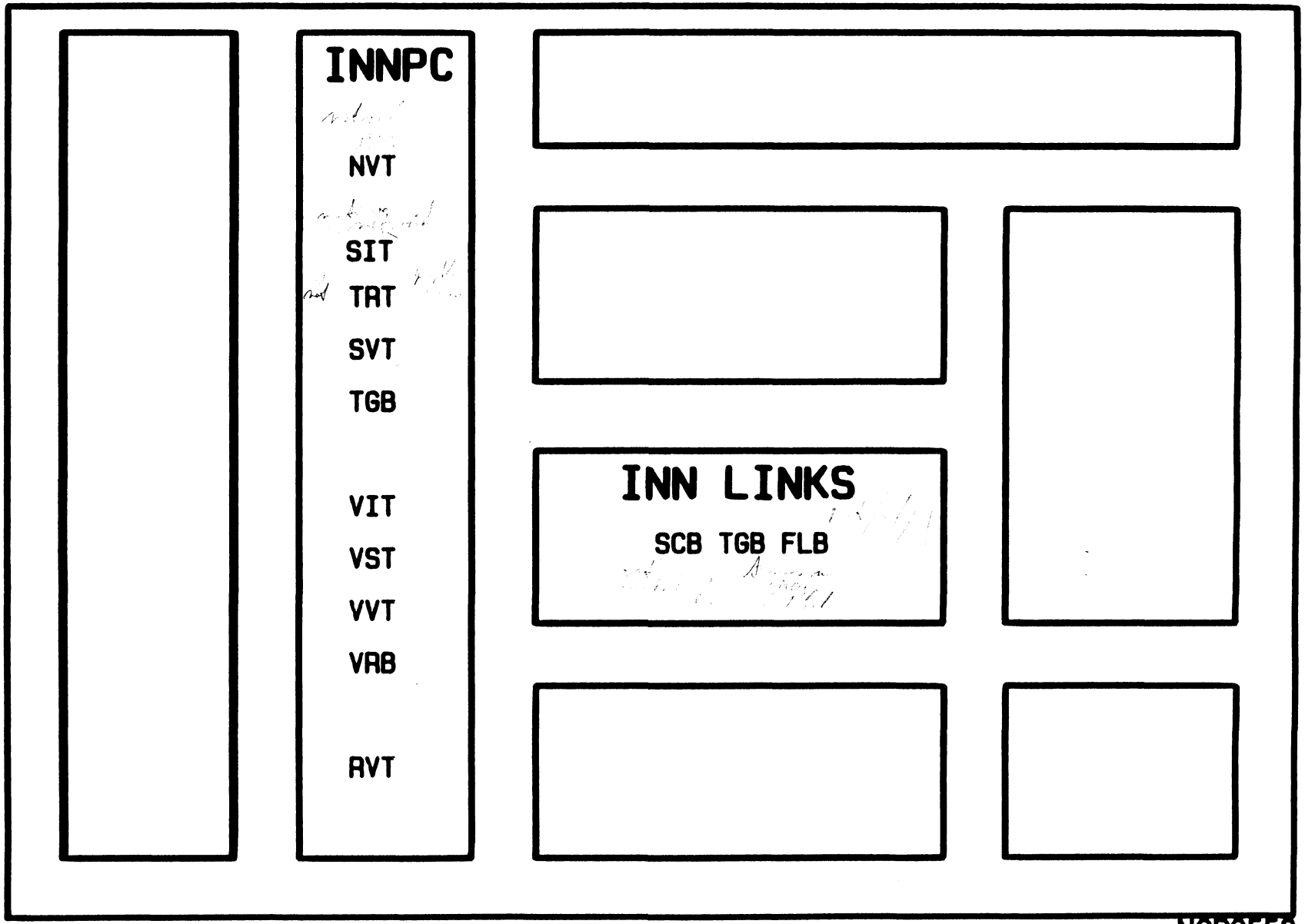


NCP0554

INN PATH CONTROL & INN LINKS

NCP0556

INN MAJOR CONTROL BLOCKS



NCP0558

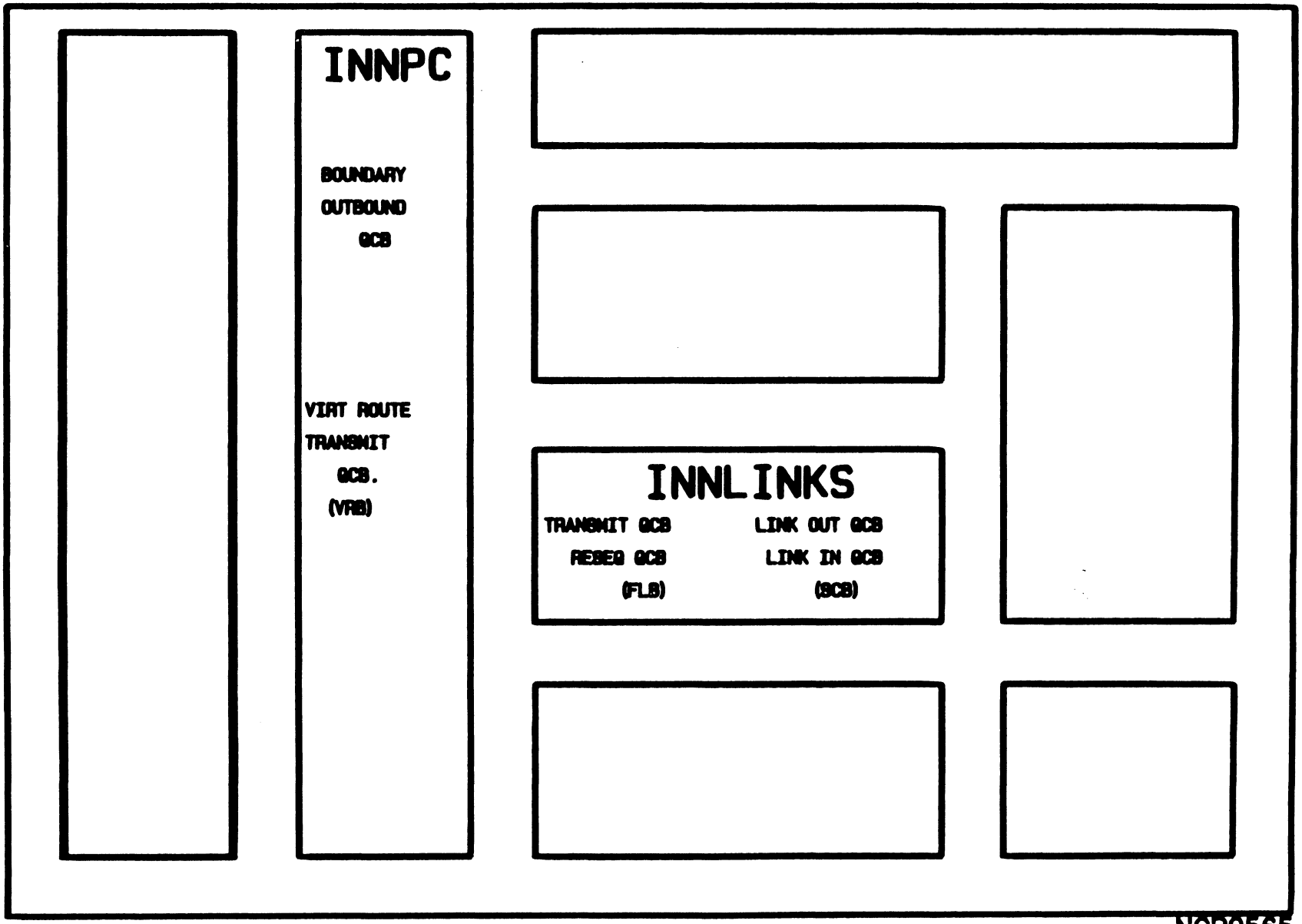
INTERMEDIATE NETWORK NODE

* TRANSMISSION GROUP
  - CHANNEL ATTACHED
  - SINGLE LINK
  - MULTI LINK

* EXPLICIT ROUTE

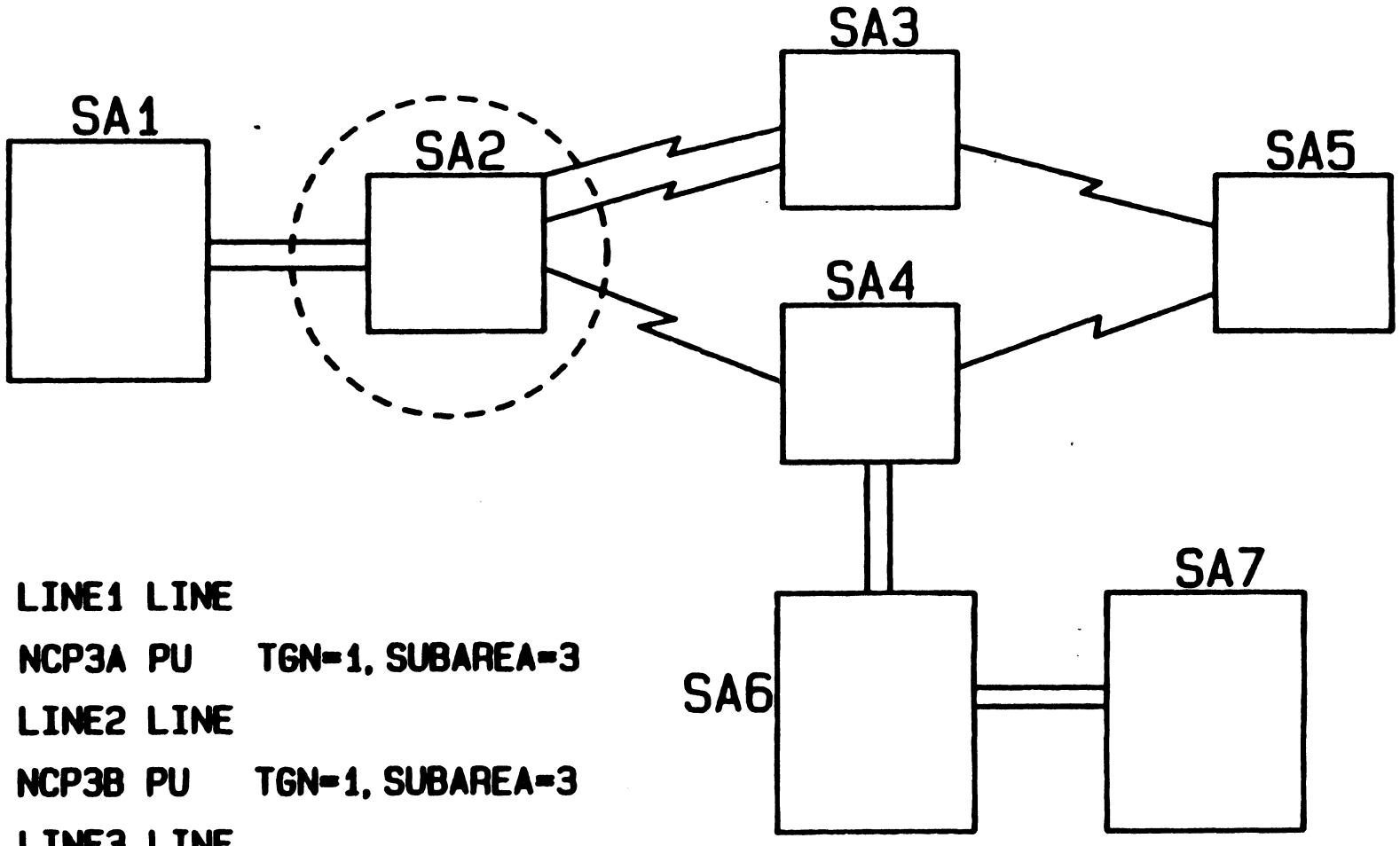
* VIRTUAL ROUTE

INN QUEUES



NCP0565

INN CONFIGURATION TRANSMISSION GROUPS

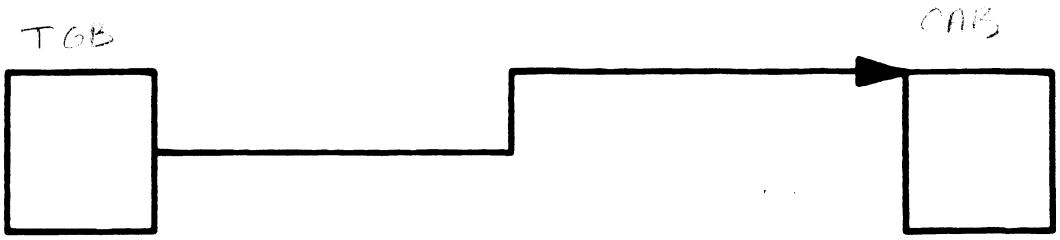



```
LINE1 LINE
NCP3A PU    TGN=1, SUBAREA=3
LINE2 LINE
NCP3B PU    TGN=1, SUBAREA=3
LINE3 LINE
NCP6  PU    TGN=1, SUBAREA=4
```

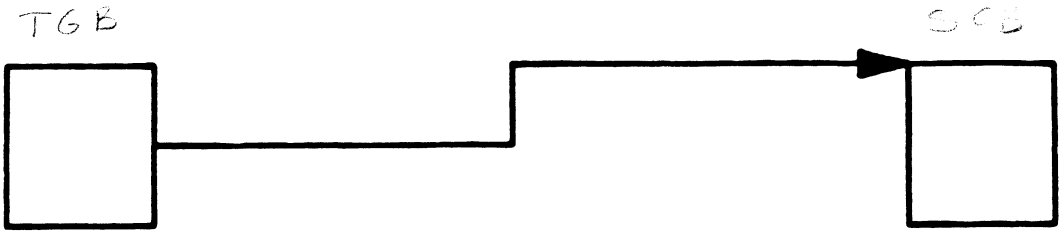
NCP057O

TRANSMISSION GROUP

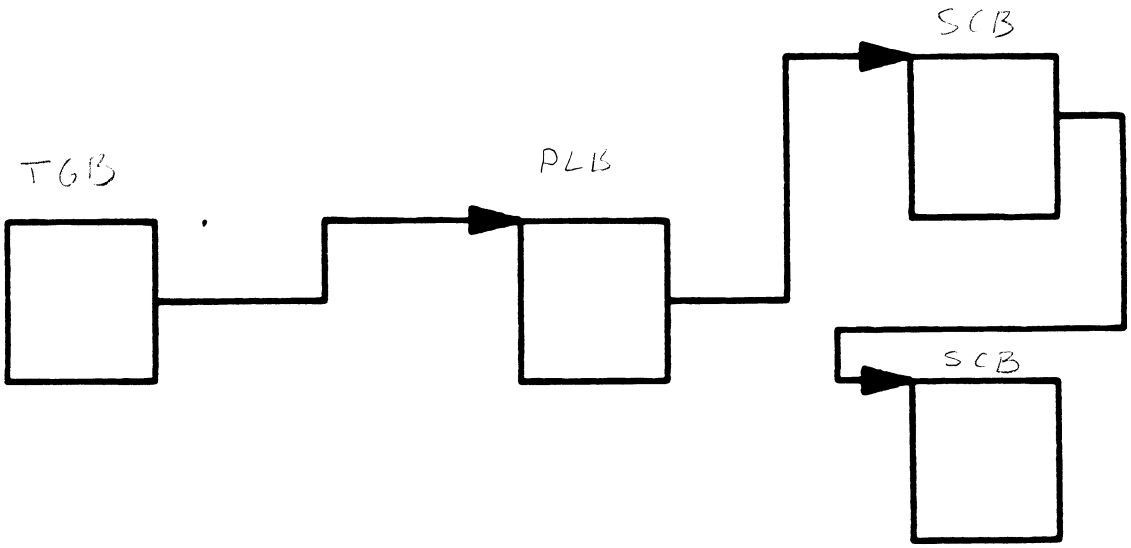
* CHANNEL



* SINGLE LINK

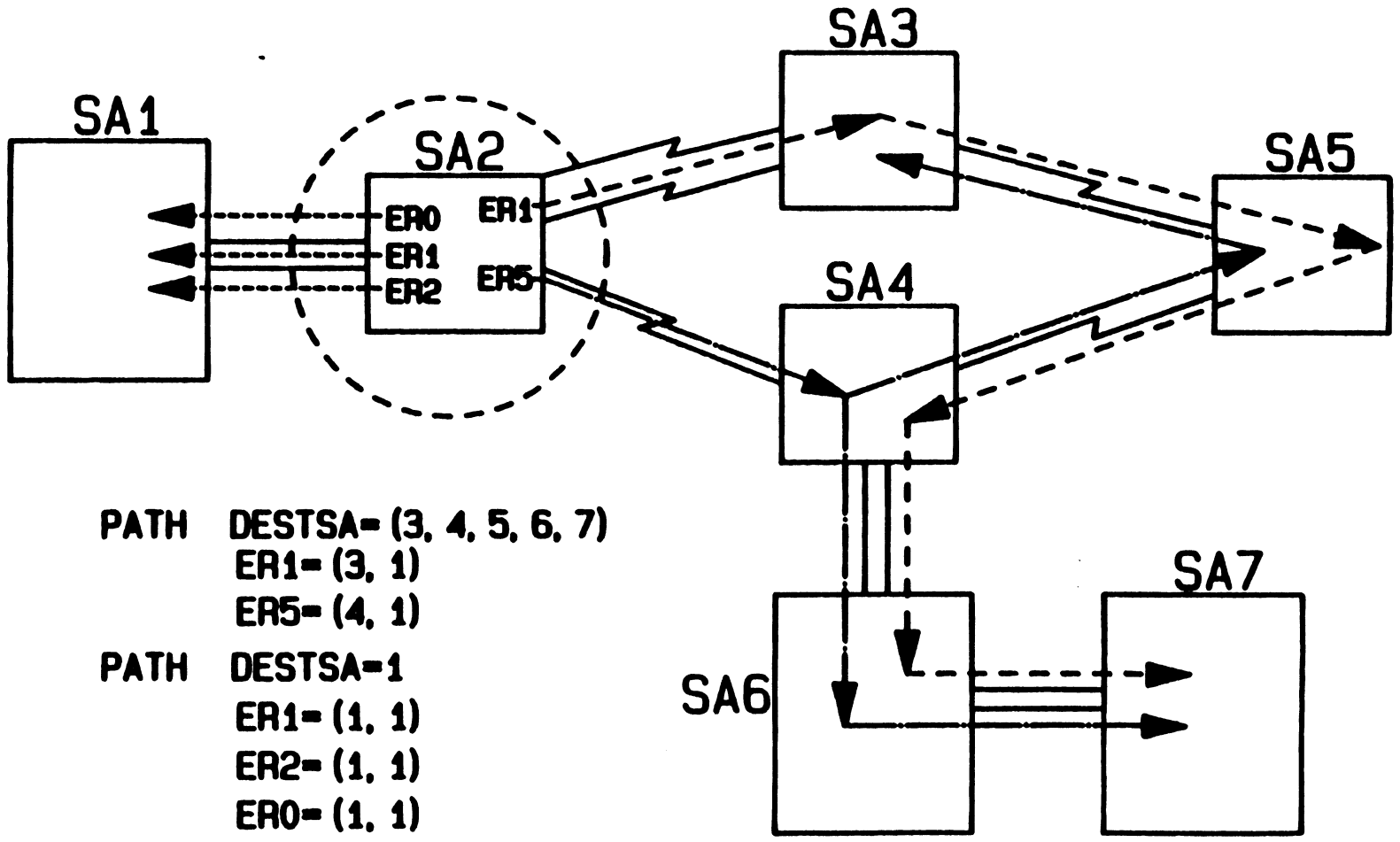


* MULTI LINK



NCP0580

INN CONFIGURATION EXPLICIT ROUTES

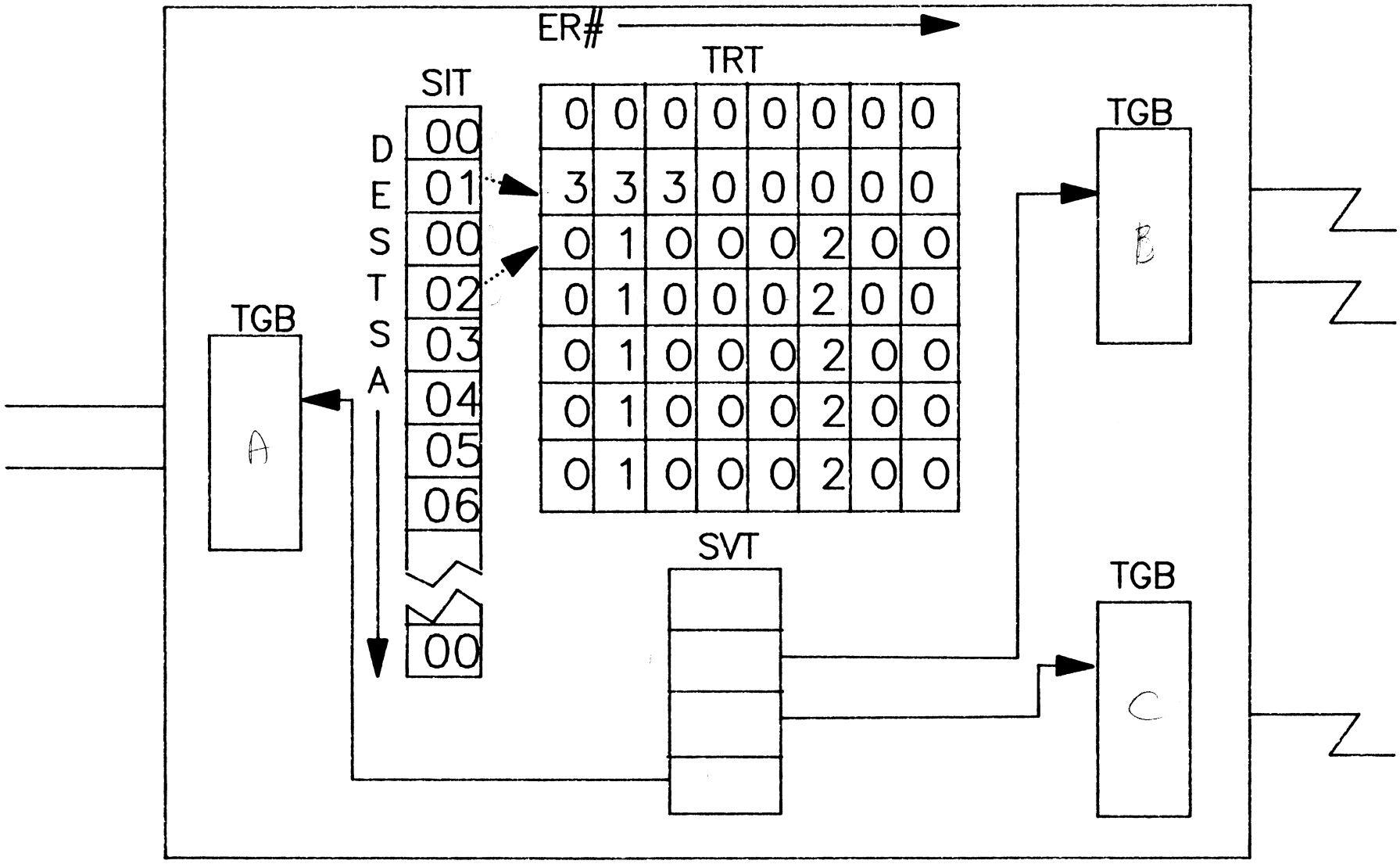


PATH DESTSA=(3, 4, 5, 6, 7)
ER1=(3, 1)
ER5=(4, 1)

PATH DESTSA=1
ER1=(1, 1)
ER2=(1, 1)
ER0=(1, 1)

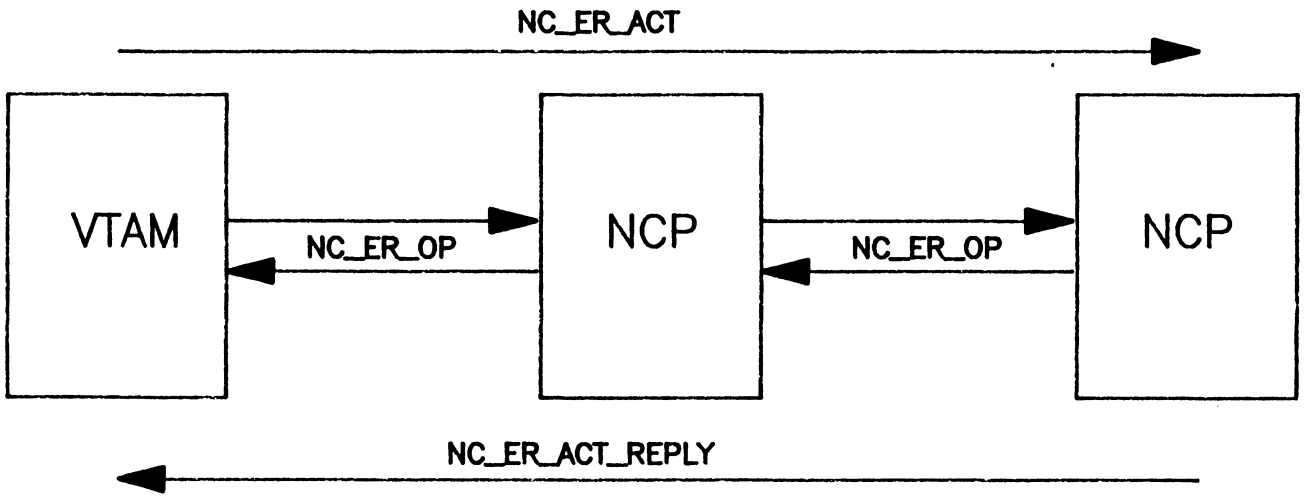
NCP0590

EXPLICIT ROUTES



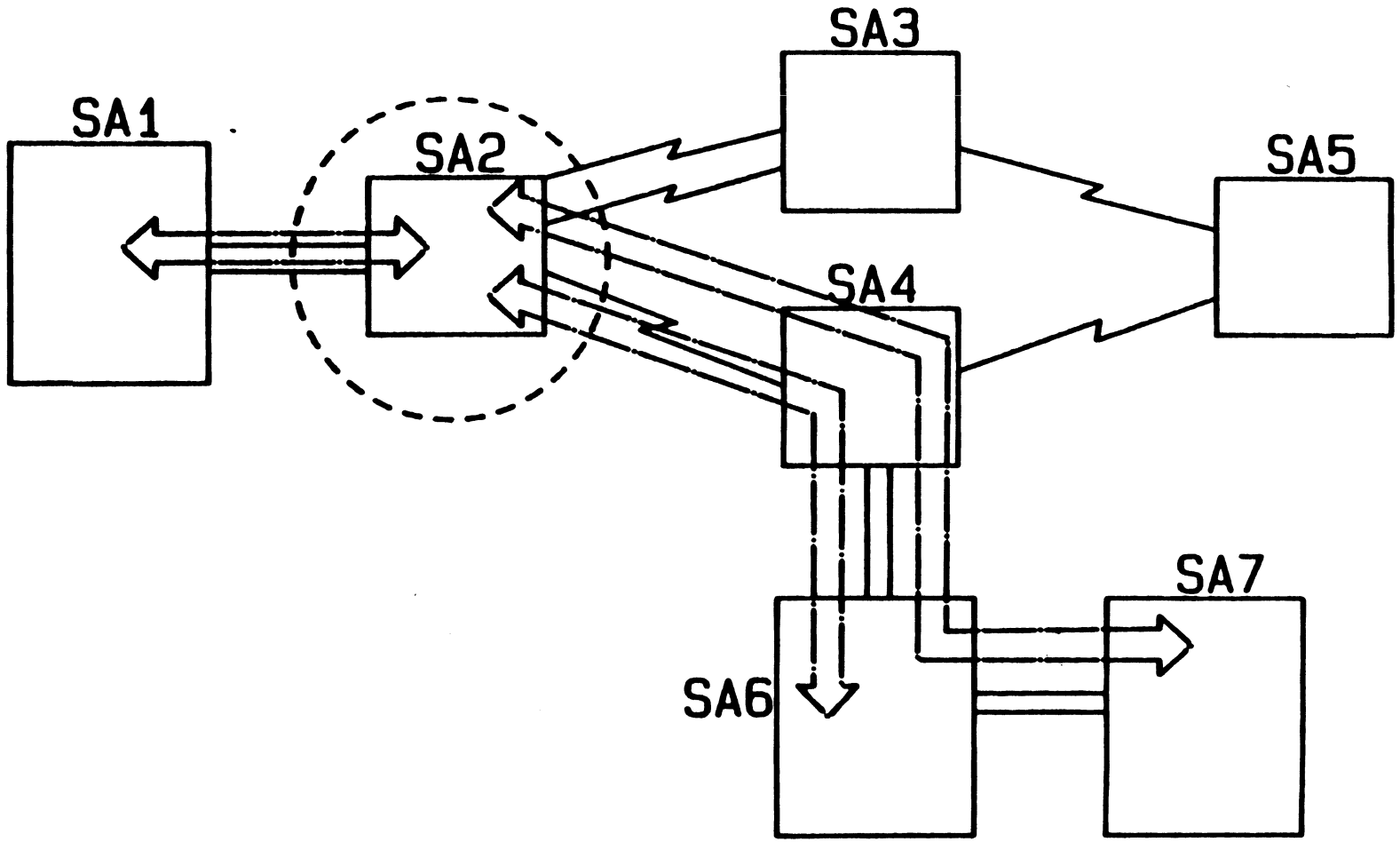
NCP0600

EXPLICIT ROUTE ACTIVATION AND STATUS



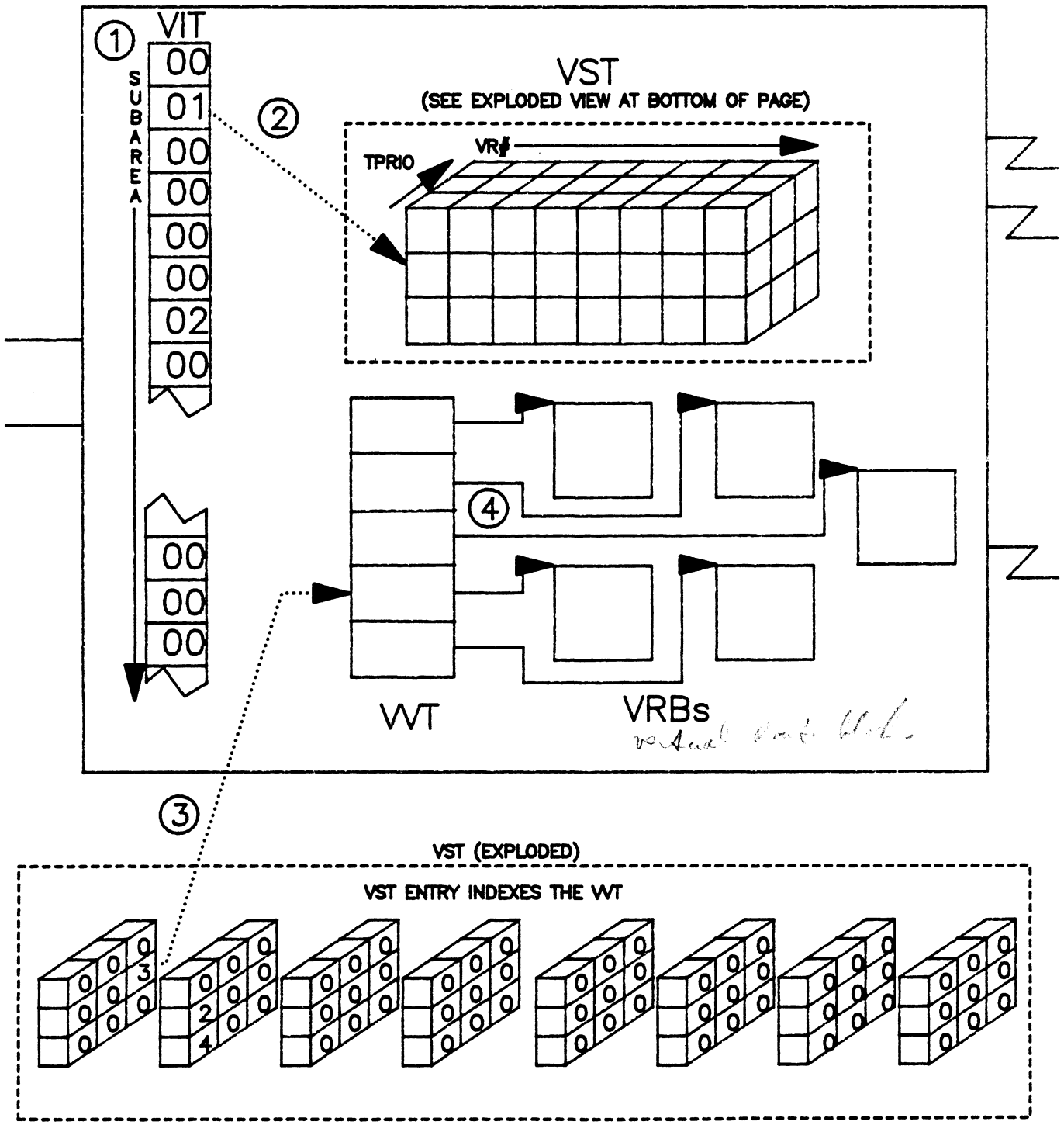
CURRENT STATUS (OPERATIVE AND ACTIVE) IS HELD
IN RMB, RST, RAT CONTROL BLOCKS.

INN CONFIGURATION VIRTUAL ROUTES



NCP0010

VIRTUAL ROUTE



NCP0620

INNPC & INN LINKS (REVIEW)

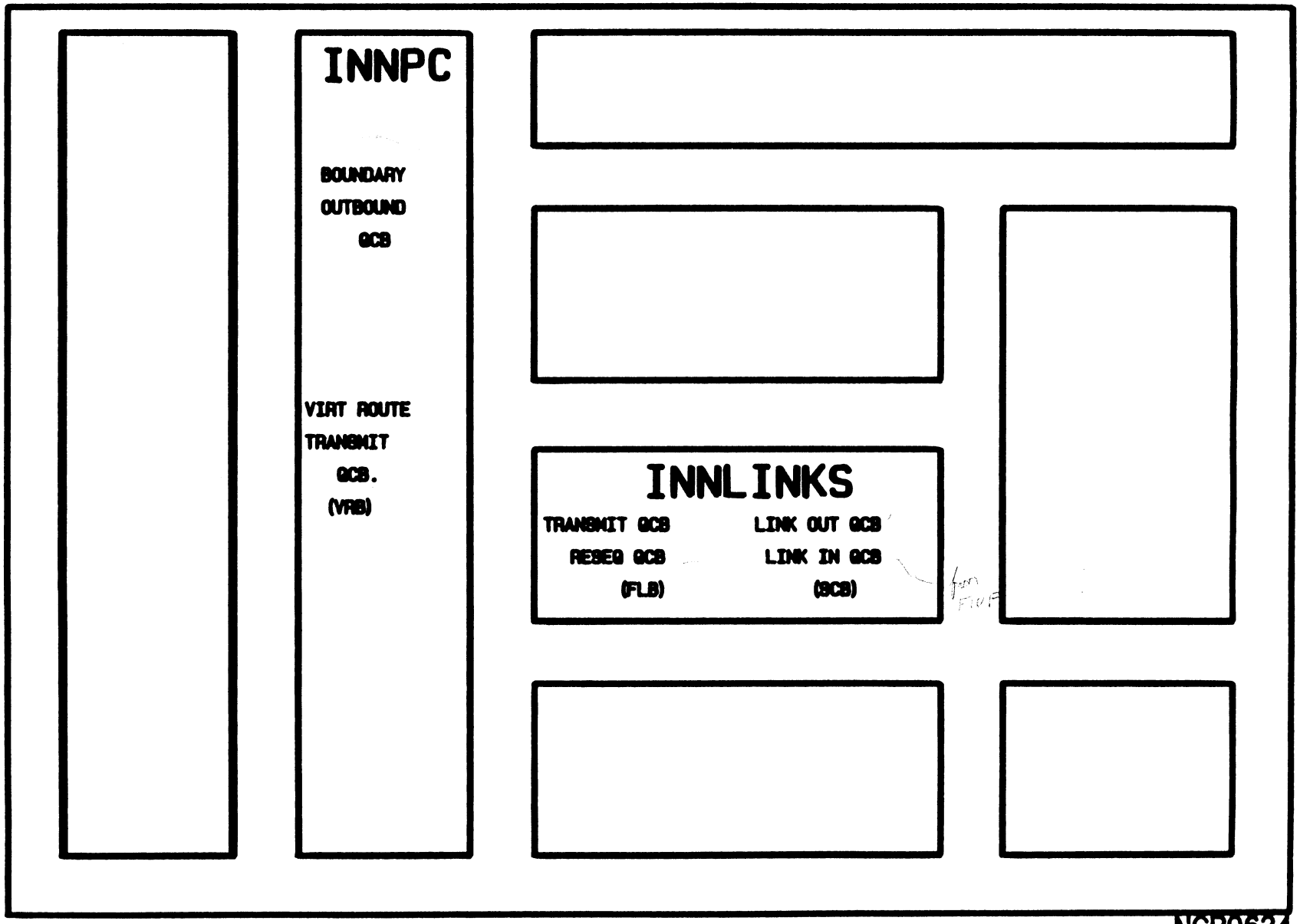
INN PATH CONTROL

- TRANSMISSION GROUP CONTROL
- EXPLICIT ROUTE CONTROL
- VIRTUAL ROUTE CONTROL

INN LINKS

- MULTI- LINK TRANSMISSION GROUPS
- OUTBOUND QUEUEING
- INBOUND RESEQUENCING

INN QUEUES (REVIEW)

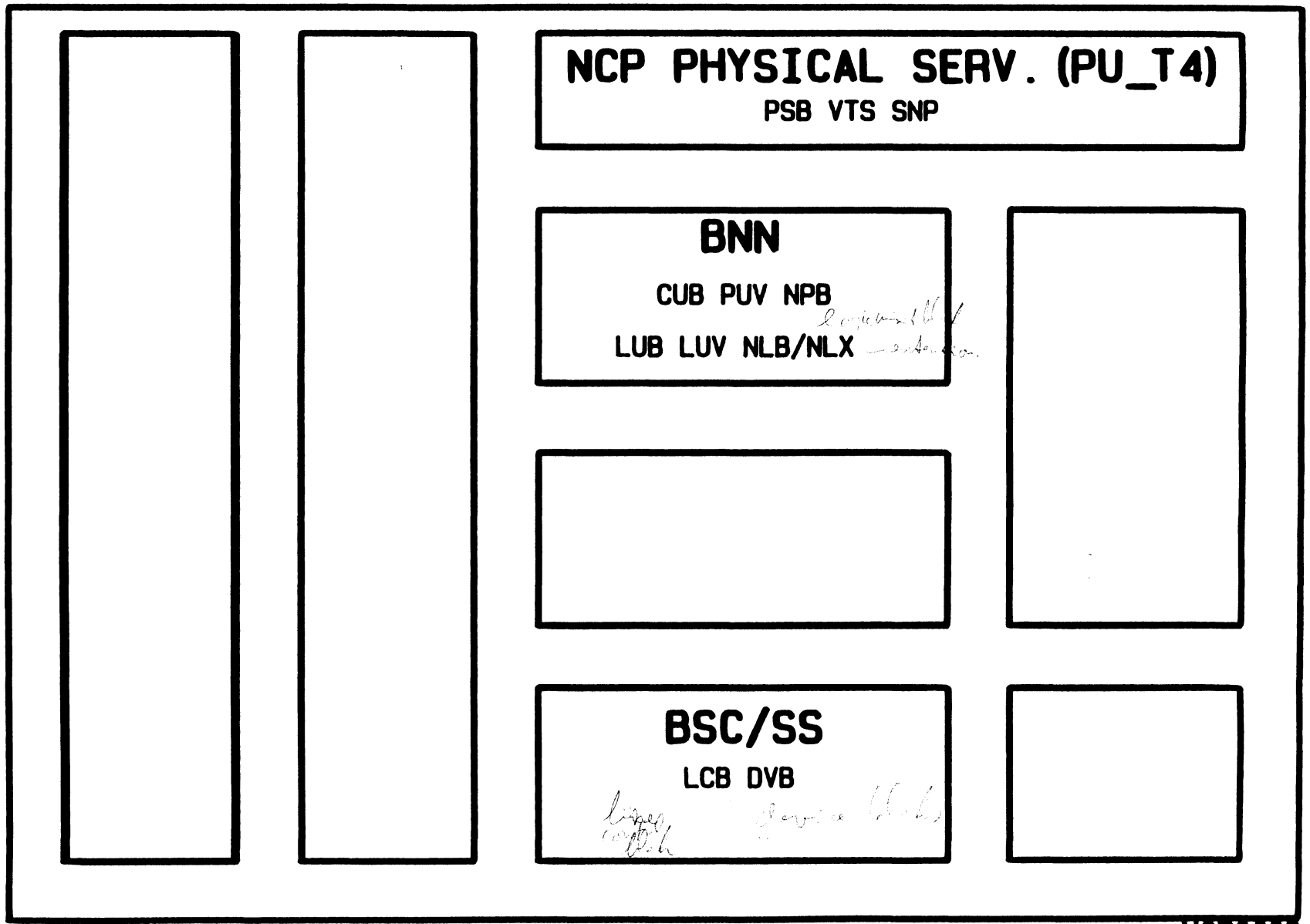


NCP0624

BNN PATH CONTROL & PHYSICAL SERVICES

NCP0626

BNN/PS MAJOR CONTROL BLOCKS



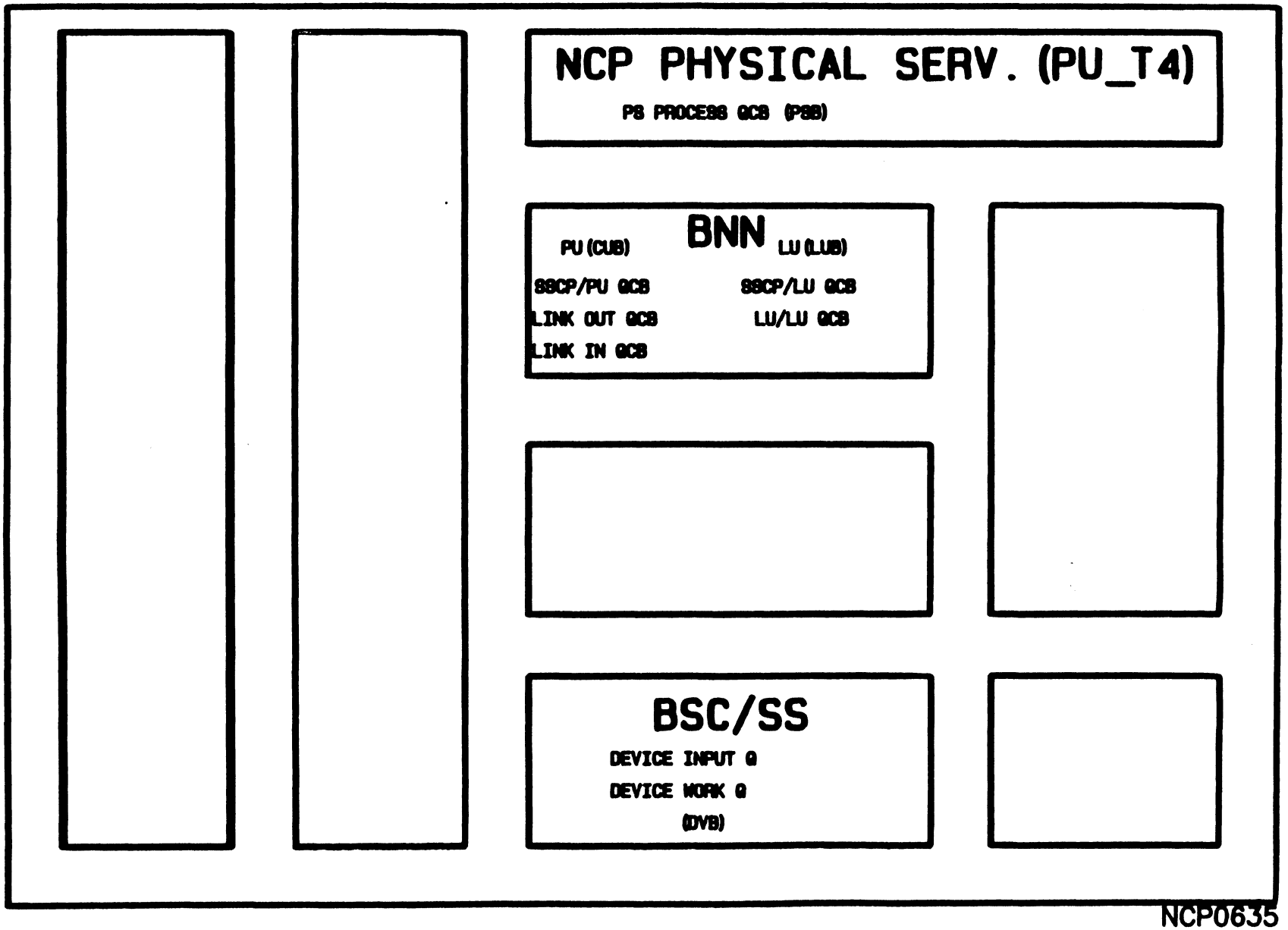
BOUNDARY NETWORK NODE

* PHYSICAL UNIT SERVICES
  - SUPPORT SNA PU TYPE 4
  - COMMUNICATE WITH MOSS

* BNN FOR SNA DEVICES
  - FID CONVERSION
  - SEGMENTATION
  - SESSION PACING

* BNN FOR BSC/SS DEVICES
  - BTU PROCESSING

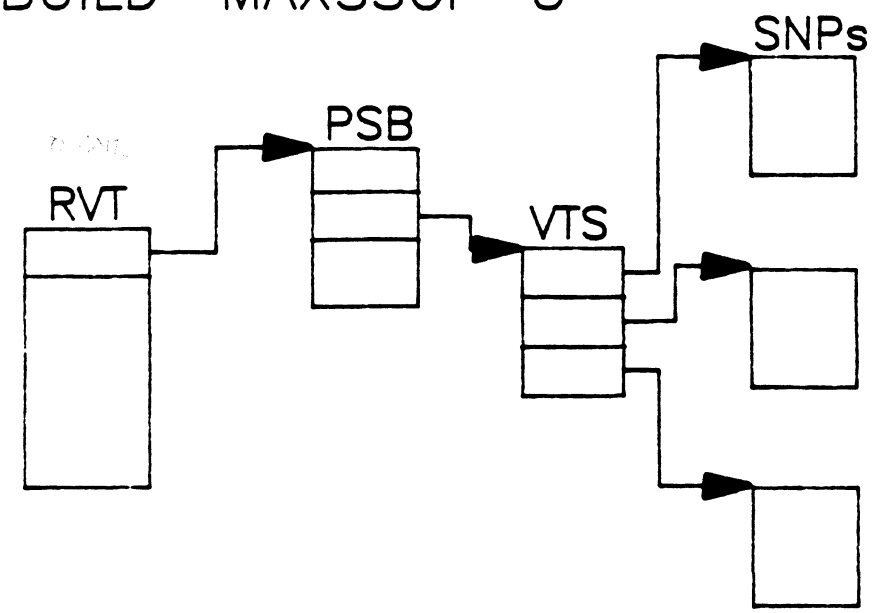
BNN/PS QUEUES

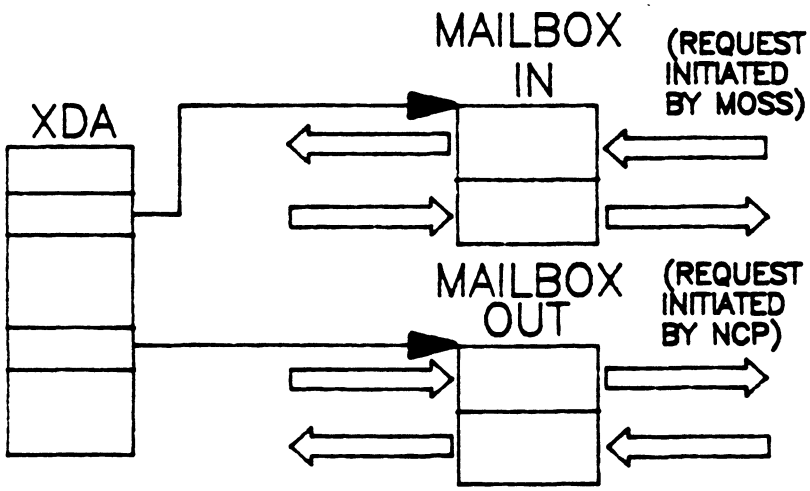


NCP0635

PHYSICAL UNIT CONTROL BLOCKS

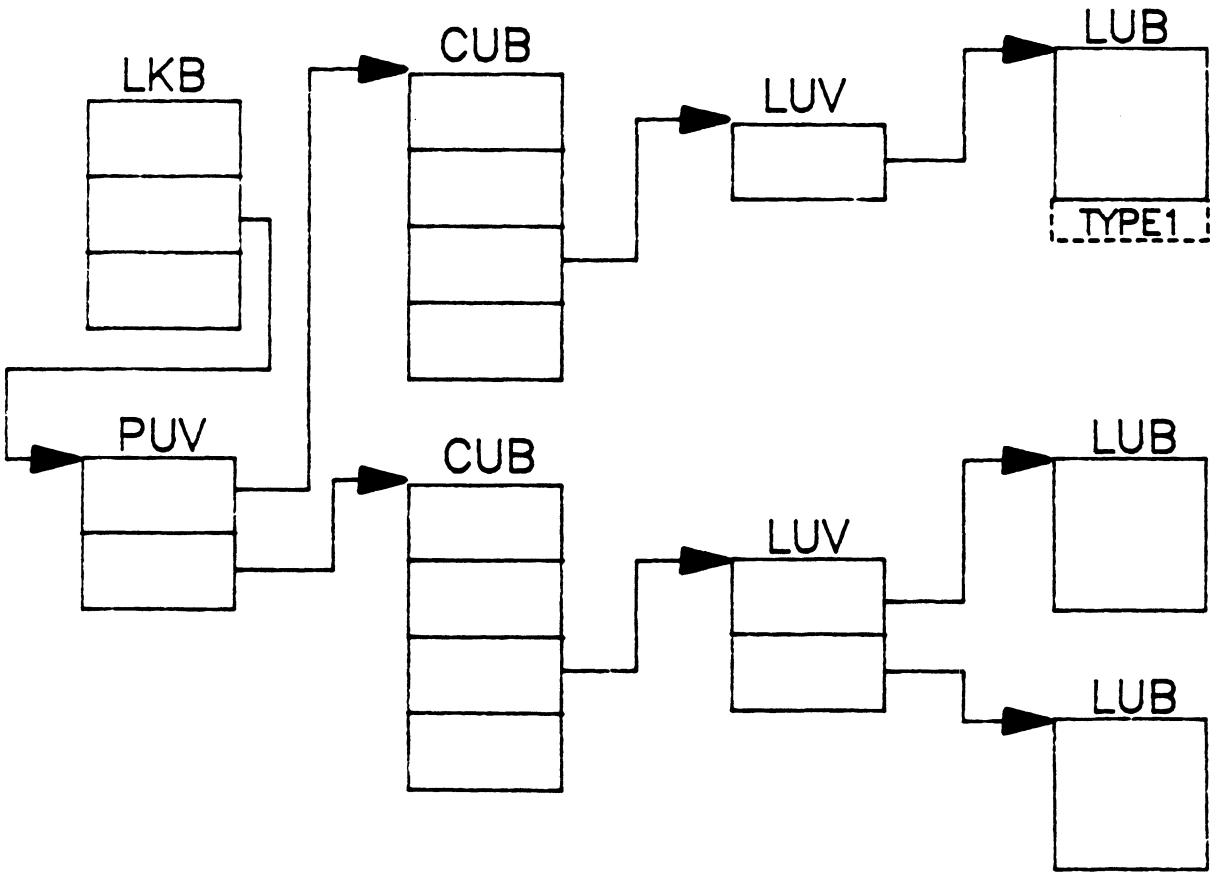
BUILD MAXSSCP=3





SNA/SDLC CONTROL BLOCKS

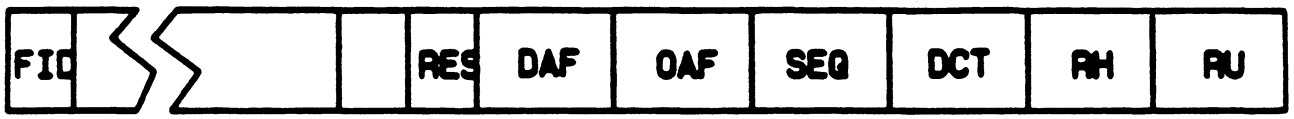
```
LINE1   LINE  ADDRESS=(000,HALF)
PU1     PU     ADDR=C1,PUTYPE=1
LU11    LU     LOCADDR=0
PU2     PU     ADDR=C2,PUTYPE=2
LU21    LU     LOCADDR=2
LU22    LU     LOCADDR=3
```



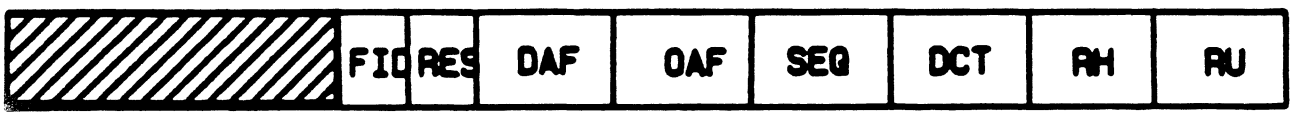
NCP0650

FID CONVERSION

FID4

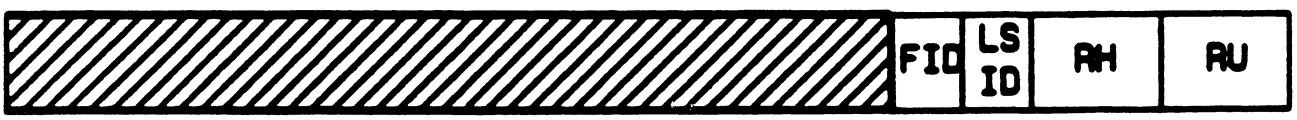


FID1



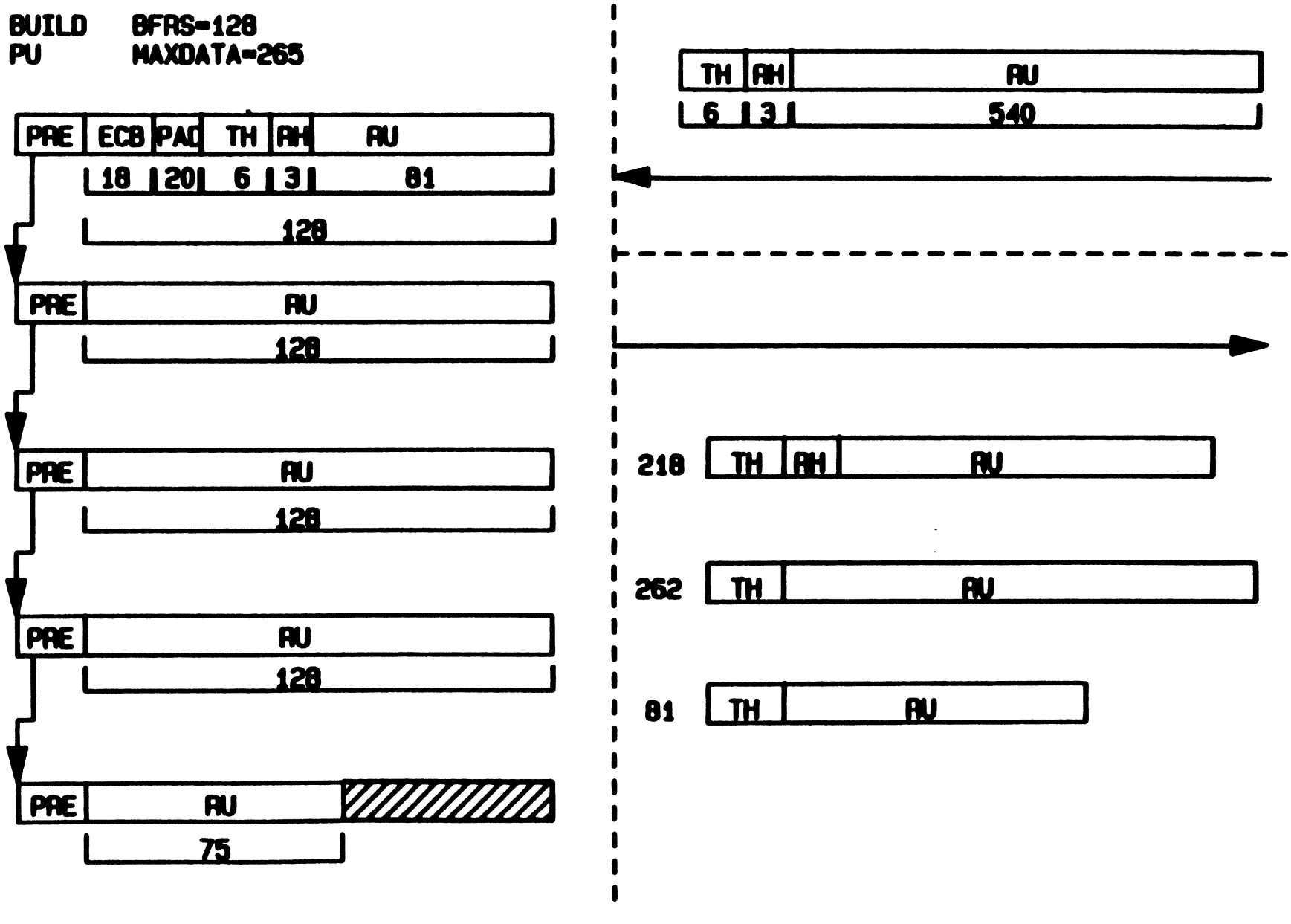
FID2

FID3



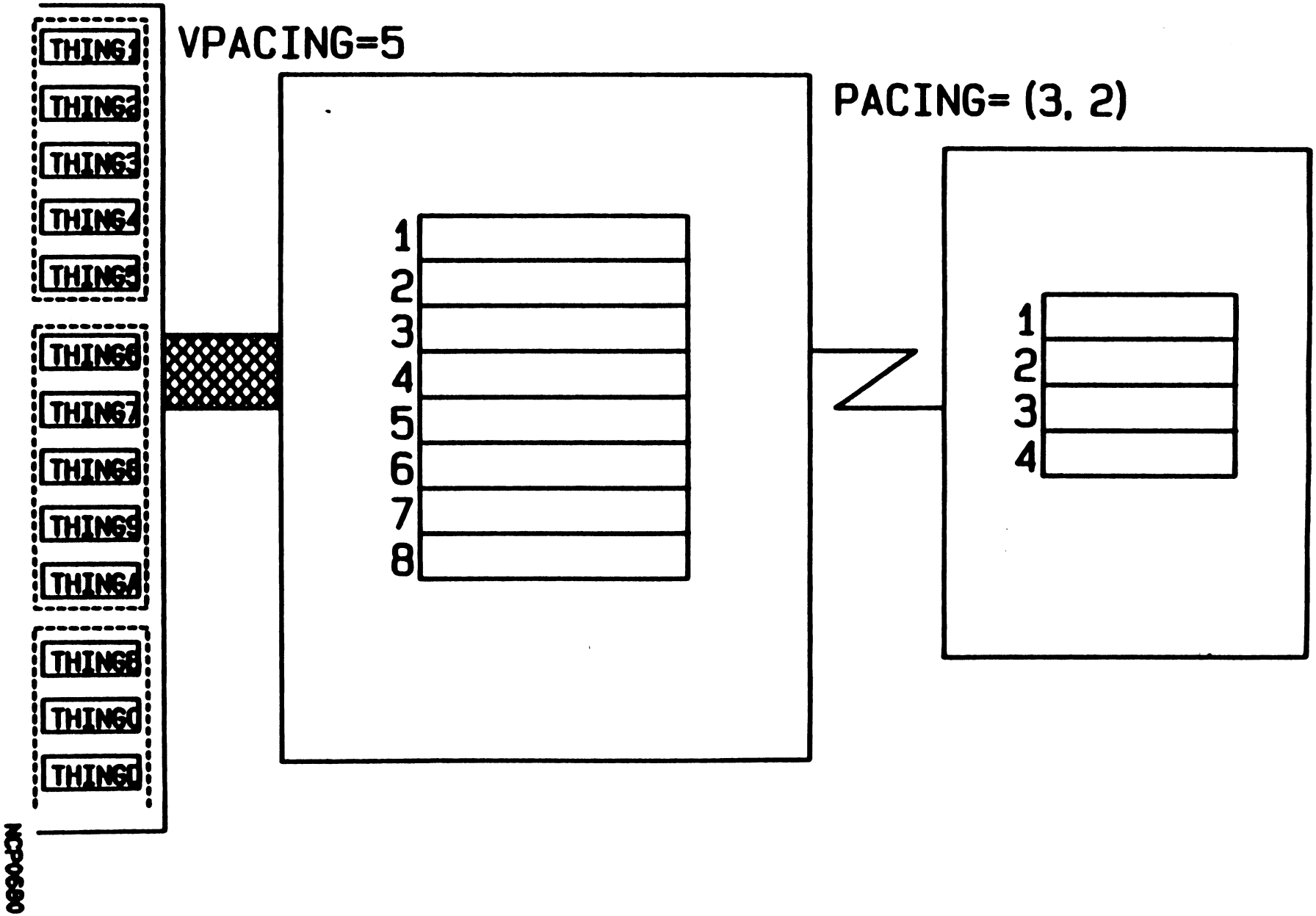
NCP0660

BNN SEGMENTATION



NCP0670

BNN SESSION PACING



00 - SSCP
01 - ABC

BNN LAB QUESTIONS

1) In DUMP 0 there is a CUB at address X'1EAB0' (page 24).
   What is the name and entry point of the outbound SSCP/PU processor?

   3KDA0 $CXDCBID

2) Look at the next CUB (page 35), what is the local address of the of the first LUB?

   020B20

   What are the module names for the outbound LU-LU and LU-SSCP processors?

   3B620 CXDCSIC
   3C480 CXDCBMA APPL-LU

   Is this LU in session? How can you tell?

   no session partner
   Avoran. count 0. (+X'36')

3) In DUMP 2 there is a FID1 PIU queued to the LUB for element address 001E. Convert it to a FID2.

BNN LAB ANSWERS

1) In DUMP 0 there is a CUB at address X'1EAB0' (page 24).
What is the name and entry point of the outbound SSCP/PU processor?

EP = CUB+X'84' = X'3CBC8' NAME FROM LOAD MAP = CXDCBOP
MODULE NAME : CXD=BNN COMPONENT, C=CPM, BO=BOUNDARY OUTBOUND.
P=PU-SSCP SESSION PROCESSOR.

2) Look at the next CUB (page 35), what is the local address of the of the first LUB?

LUV ENTRY = 02 20B20
LOCADDR, LUB ADDR

What are the module names for the outbound LU-LU and LU-SSCP processors?

CXDCSIC (SESSION INT CONTROL MODULE), CXDC80A (APPL-LU)

Is this LU in session? How can you tell?

NO - BECAUSE LUB+X'40' = X'00'

3) THE LOGICAL UNIT BLOCK FOR REPRESENTING ELEMENT ADDRESS 001E IS FORMATTED ON PAGE 35 OF THE DUMP. AT +1C IS A POINTER TO THE FIRST PIU ON THE LU-LU CPM QUEUE.

THE BUFFER CONTAINING THE PIU IS FROMATTED ON PAGE 402.
THERE ARE TWO WAYS TO LOCATE THE FID 1 PIU WITHIN THE BUFFER.
A. THE BUFFER PREFIX + 6 IS THE CONTAINS THE OFFSET FROM THE END OF THE BUFFER PREFIX TO THE BEGINNING OF THE TRANSMISSION HEADER. THE TRANSMISSION HEADER STARTS 22 BYTES PAST THE BUFFER PREFIX.
B. USING THE FOLD-OUT CHART FOR PIU FORMATS IN NCP BUFFERS, NOTICE THAT A FID 1 TRANSMISSION HEADER STARTS AT +2A FROM THE BEGINNING OF THE BUFFER.

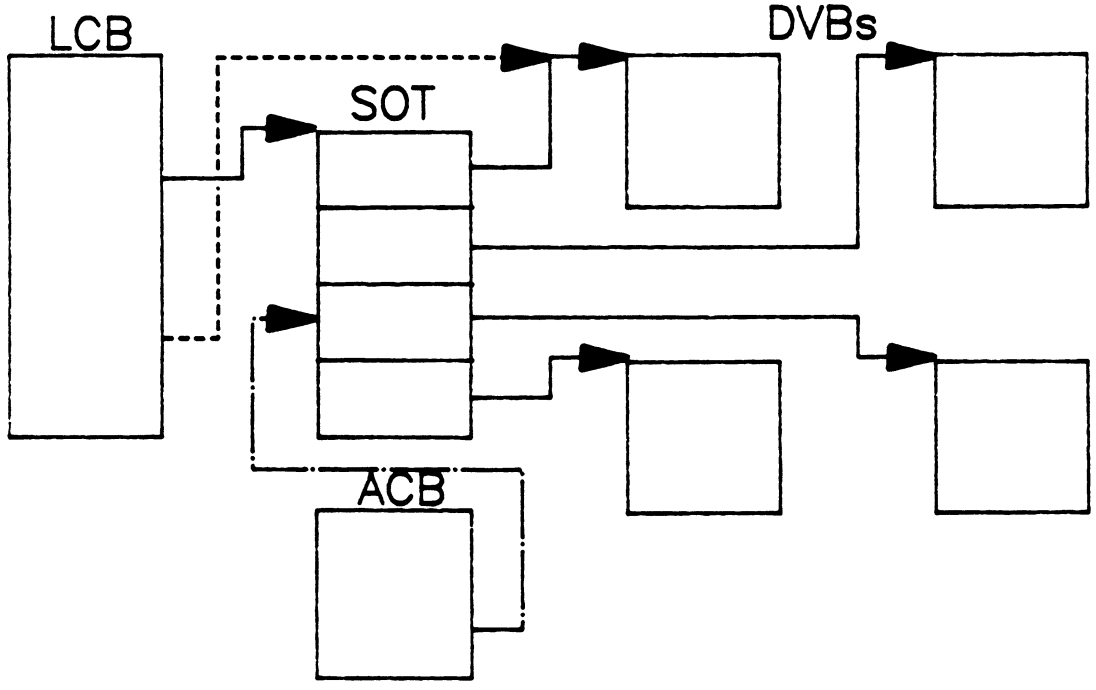
IN EITHER CASE, THE VALUE IN THE FID 1 TRANSMISSION HEADER IS 1C00001E000A000802DC.

TO ACCOMPLISH FID CONVERSION THE FRIST STEP IS TO CHANGE THE DATA OFFSET FIELD IN THE BUFFER PREFIX (BH+6) FROM 22 TO 26. THEN CHANGE THE COUNT FIELD (BH+7) FROM 5E TO 5A. NEXT AT +2E INTO THE BUFFER, PUT IN A BYTE WHICH CONTAINS 2C. (2=FID 2, C=SEGMENTING INDICATORS COPIED FROM SECOND HALF BYTE OF FID 1 TRANSMISSION HEADER.)
THE NEXT BYTE FOR THE FID 2 TRANSMISSION HEADER IS RESERVED AND REQUIRES A VALUE OF 00. THE BYTE AFTER THAT IS A 1 BYTE LOCAL DESTINATION ADDRESS QUEUE. THE VALUE IS OBTAINED FROM THE LUB AT +47 (02). AN ORIGIN ADDRESS FIELD OF 01 CAN BE ASSUMED SINCE THE PIU WAS QUEUED TO THE LU-LU CONNECTION POINT MANAGER. ALSO NOTE THAT THE OAF IN THE FID 1 IS EQUAL TO THE ELEMENT ADDRESS OF SESSION PARTNER IN THE LUB (LUB+36).
THE SEQUENCE NUMBER FIELD CAN BE COPIED FROM THE FID 1 SEQUENCE NUMBER FIELD.
IN CONCLUSION, THE FID 2 WILL HAVE A VALUE OF 2C0002010008.

ANS0080

BNN BSC/SS CONTROL BLOCKS

```
LINE1   LINE    ADDRESS=(005,HALF)
BSCPU1 CLUSTER GPOLL=40407F7F
BSCLU1 TERMINAL ADDR=60604040
BSCLU2 TERMINAL ADDR=6060C1C1
BCSLU3 TERMINAL ADDR=6060C2C2
```



NCP0710

BNN/PHYSICAL SERVICES (REVIEW)

PHYSICAL UNIT SERVICES

- SUPPORT SNA PU_4
- COMMUNICATE WITH MOSS

BNN FOR SNA DEVICES

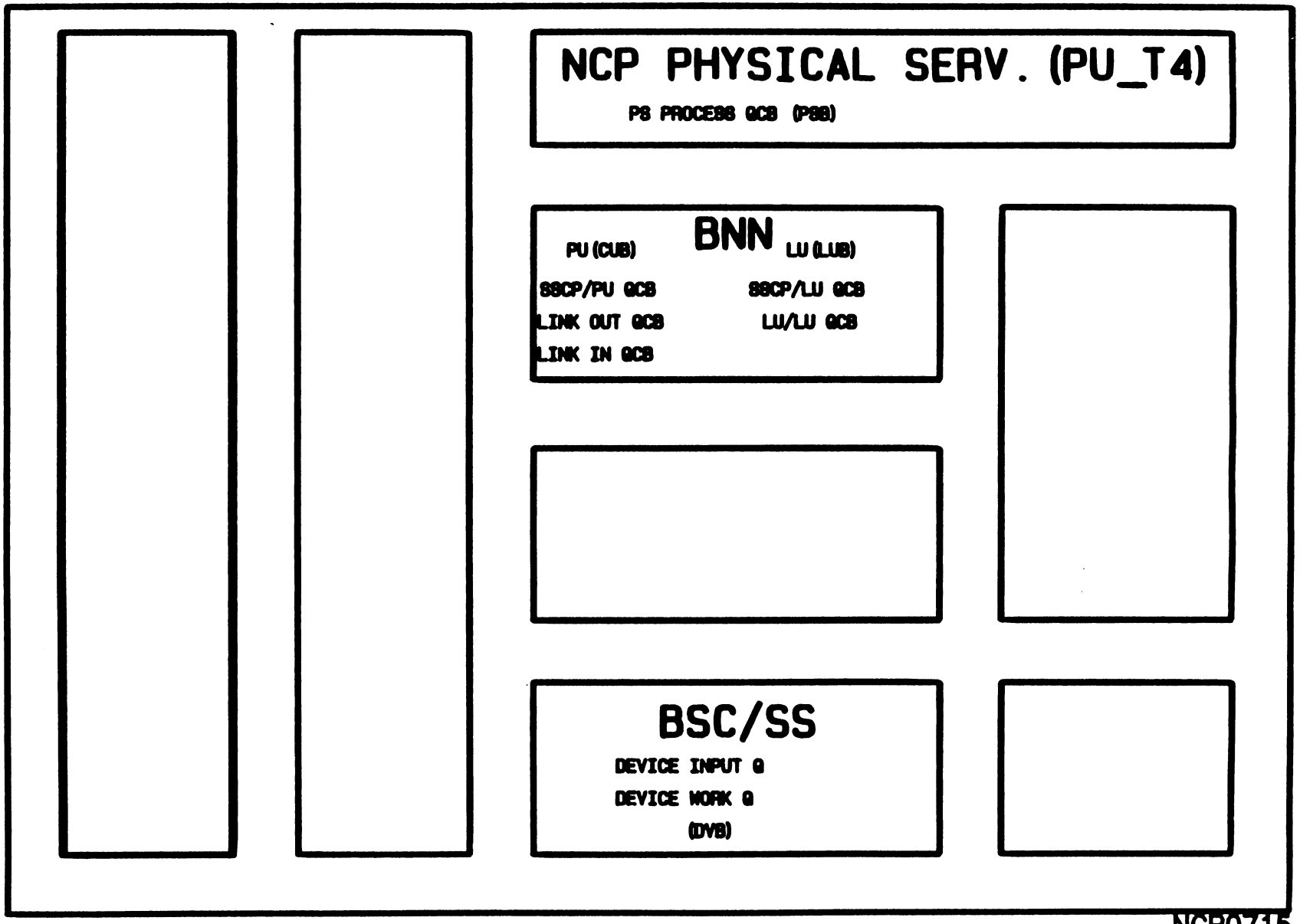
- FID CONVERSION
- SEGMENTATION
- SESSION PACING

BNN FOR BSC/SS DEVICES

- BTU PROCESSING

NCP0713

BNN/PS QUEUES (REVIEW)



NCP0715

METHOD

NCP0717

TYPES OF PROBLEMS

ABEND

LOOP

WAIT

INCORRECT OUTPUT

PERFORMANCE

ABEND

* ABENDING PROGRAM LEVEL
  R1 = 2000
  LAST INSTRUCTION NOT EXIT
  L5 IDLE? R0=LA R1, X'1014' then EXIT

* MODULE DETECTING ABEND
  - LEVEL1
    LAR, Level One Block (L1B)
  - LEVEL2
  - LEVEL3
    R6--->SAVE AREA--->PREV SAVE
    RETURN FROM BAL ON R7
  - LEVEL4
    LEVEL5 DETECTED ABEND IF
      LAST LEVEL5 INSTR IS SVC0
    LEVEL4 DETECTED ABEND IF
      LAST LEVEL5 INSTR NOT SVC0
      R6--->SAVE AREA--->PREV SAVE
      RETURN FROM BAL ON R7

* Check Record Pool (CRP)

* NCP V4+
  FIRST PAGE OF DUMP

LOOP

* DETERMINE CURRENT PROGRAM LEVEL

  - START WITH PROGRAM LEVEL1

    IF LAST INSTR = EXIT

      GO TO NEXT PROGRAM LEVEL

    ELSE

      THIS LEVEL EXECUTING

  - IF ALL LEVELS HAVE EXITS

    TRY WAIT

WAIT

* WHAT IS WAITING
  - SESSION
  - PU
  - LINE
  - ROUTE
  - NCP
  - APPLICATION

* QUEUEING PATH
  - BOUNDARY OUTBOUND
    - BO-QCB-->CPM-QCB-->OUTB-Q
  - BOUNDARY INBOUND
    - INBOUND-QCB-->VR-QCB-<->INTM-Q

->OUTB-Q

* ANYTHING QUEUED --- WHY?

* NOTHING QUEUED --- WHY NOT?

SNA NETWORK INTERCONNECTION

NCP0755

SNA NETWORK INTERCONNECTION

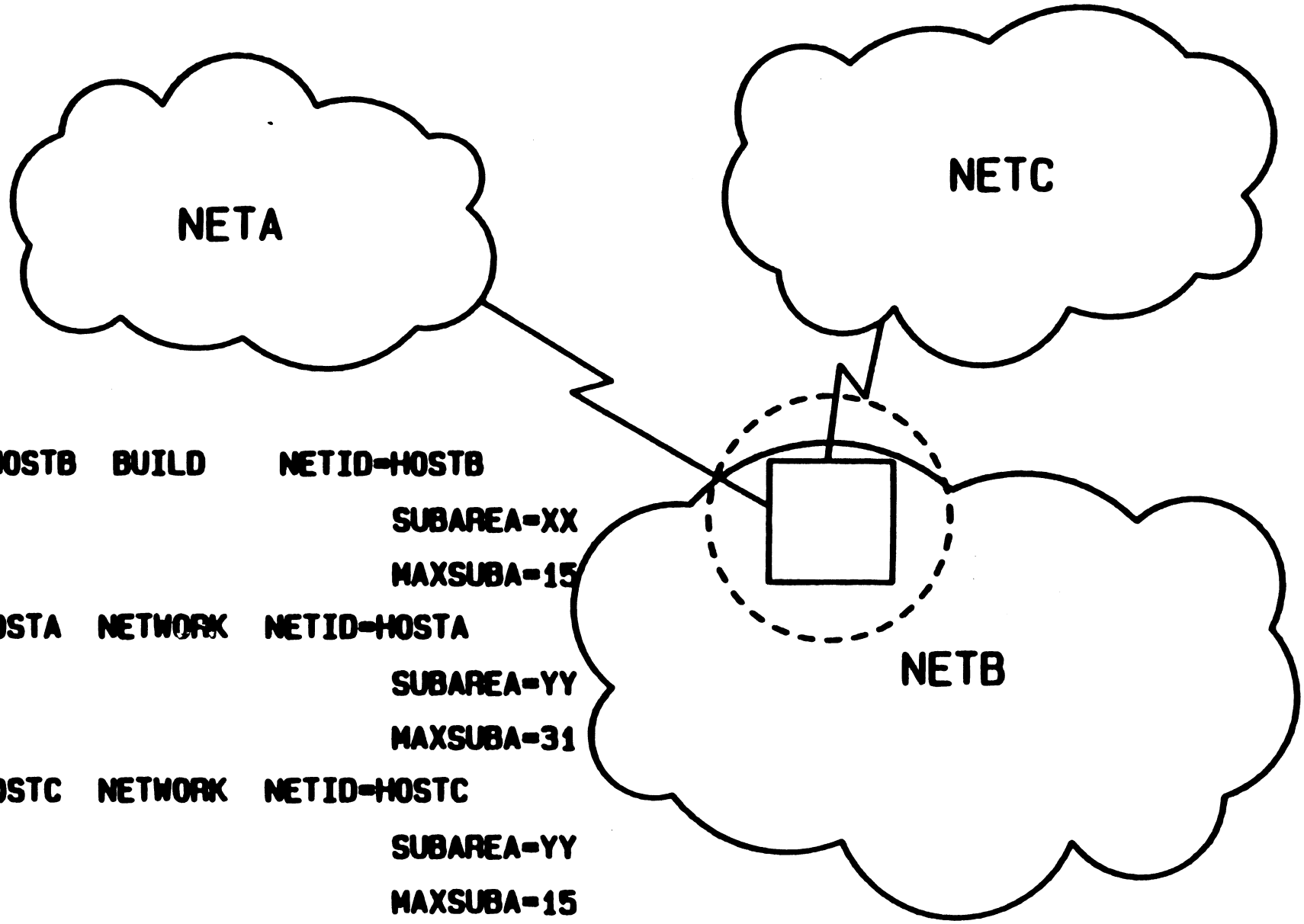
* CONNECTING UNLIKE NETWORKS
  - CORPORATE MERGERS
  - ADDRESS RELIEF

* GATEWAY
  - NCP SHARED BETWEEN NETWORKS
  - NATIVE NETWORK
  - NON-NATIVE NETWORK
  - VTAM SUPPORT

* NCP V3 +

* VTAM V2.2 +

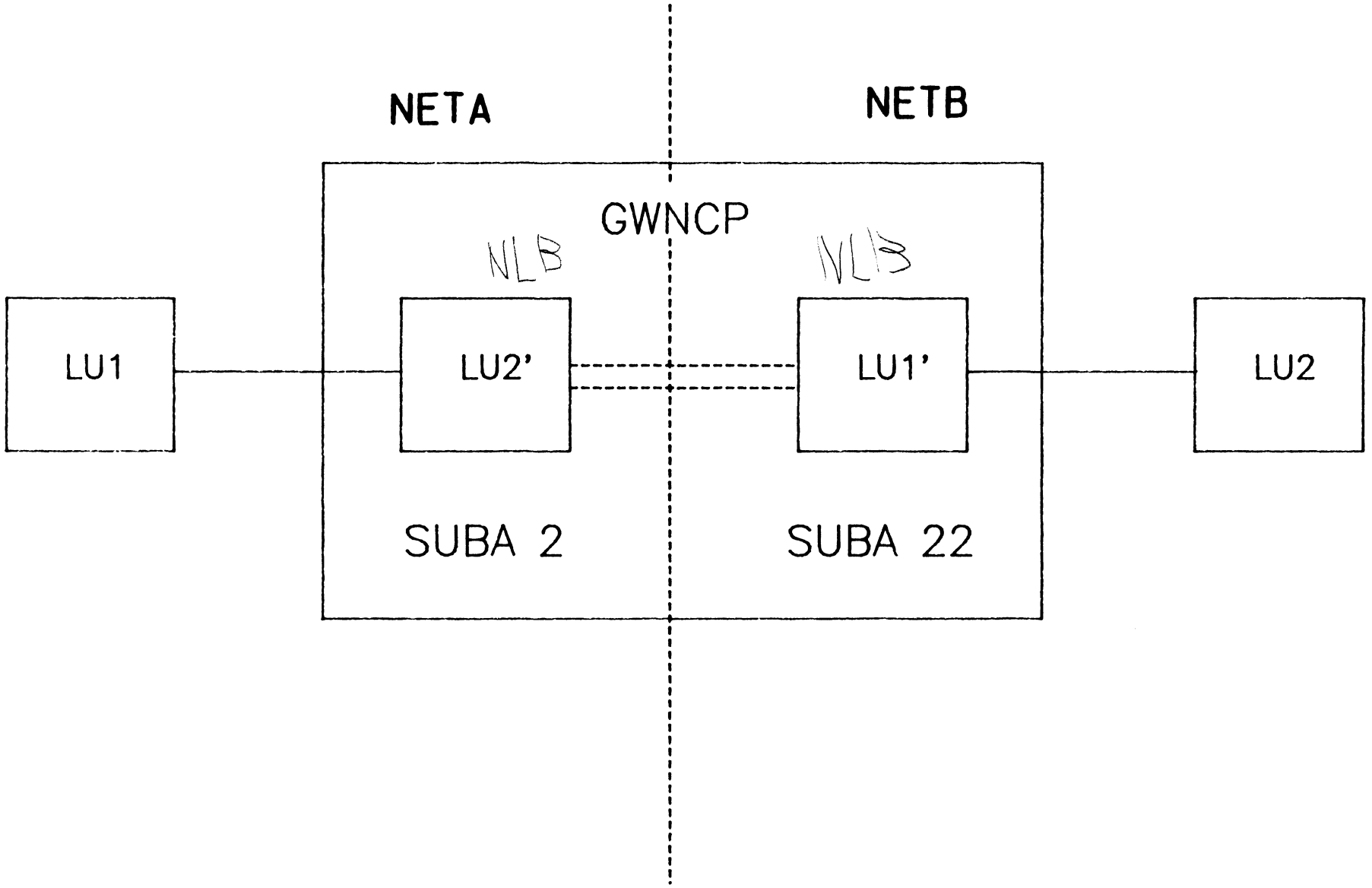
GATEWAY CONFIGURATION




```
HOSTB  BUILD    NETID=HOSTB
                        SUBAREA=XX
                        MAXSUBA=15
HOSTA  NETWORK  NETID=HOSTA
                        SUBAREA=YY
                        MAXSUBA=31
HOSTC  NETWORK  NETID=HOSTC
                        SUBAREA=YY
                        MAXSUBA=15
```

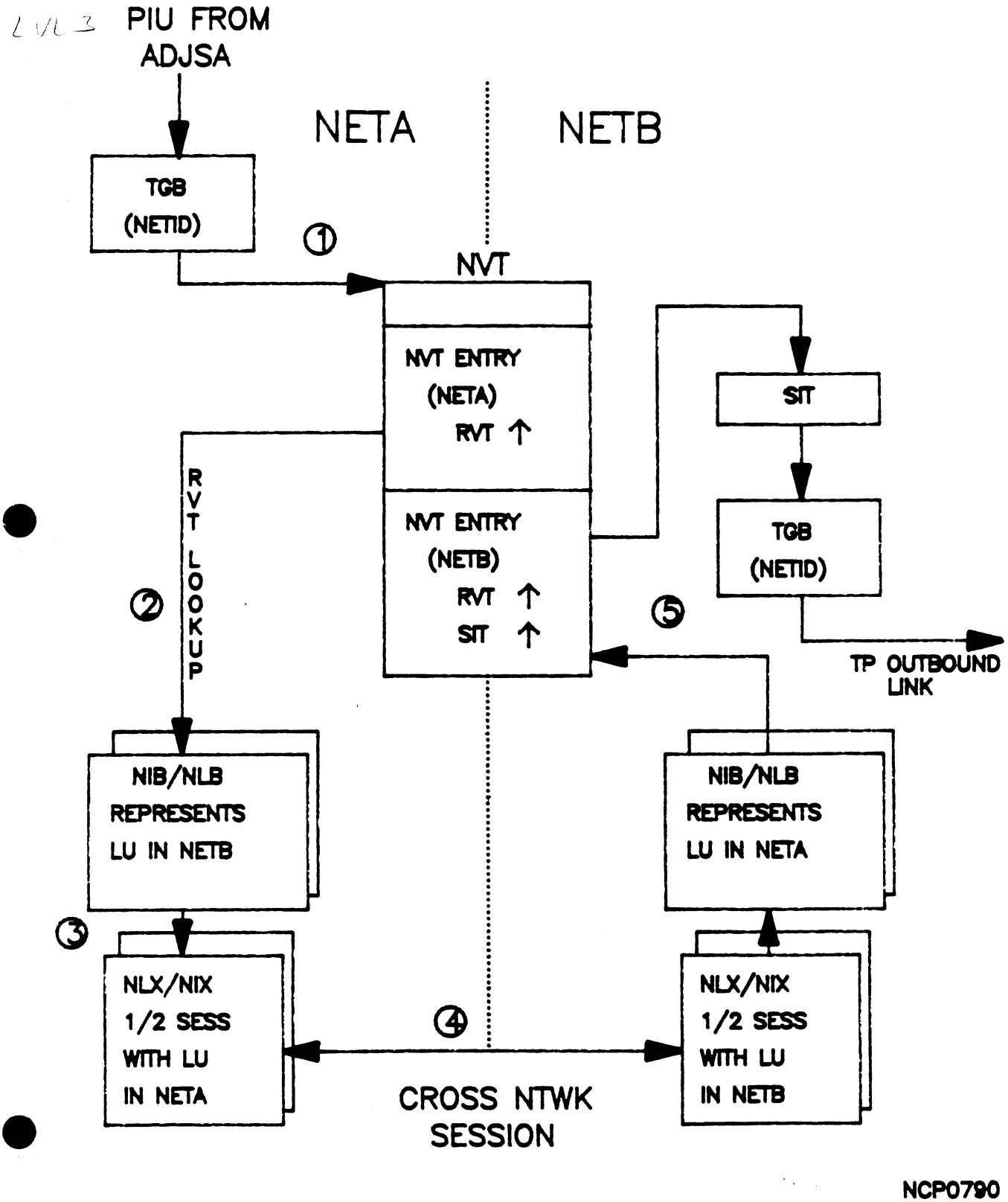
NCP0770

SNI GATEWAY ROUTING



NCP0780

GATEWAY CONTROL BLOCK DATA FLOW



DUMP EXERCISE 1

The NCP has ABENDED. The objective of this exercise is find out what events led up to the ABEND.
You should be able to discover an invalid instruction address.
See if you can work out why the invalid address got loaded into the instruction address register.

STORAGE CONTENTS :-

ADDRESS	CONTENTS
338A0	B9002000 71947004 A805B843 56806292
020F0	28AE0070 25392B40 DB9A2953 F916D310
329D0	980B0070 A800A800 47AF4262 77282573
361A0	6212250E 40814582 00700936 E1EF09B6
00000	714C01AA 719C09A8 B900000D B84337DA

DUMP 1 ANALYSIS

1) ABEND CODE 954 - LEVEL 5 Branch to zero.

2) Examine register zero for each level (Page 106)

   L1 HARDSTOP (OUT 70)
   L2 EXIT
   L3 EXIT
   L4 EXIT
   L5 IAR = 000002

   At location zero is aninstruction 'IN R1, X'74' (save LAR).
   'IN' is a privileged instruction, will cause a program
   check if issued in level 5.

3) LAR points to the level 4 exit instruction.
   Looks like level 4 loaded zero into level 5's IAR then exited.

4) Dispatcher trace gives QCB plus entry point.
   HWE+X'70' = address of current active QCB (page 11).
   QCB address is 2997C.

5) Look through RVT to find major control block.
   Resource X'001E' (LUB) LU/LU QCB has task entry point = ZERO

6) What next? Try INFOMVS search on modules found in dispatcher
   trace. Set up address trace to track the overwritten address.

DUMP EXERCISE 2

Symptom :– 'Line 2 is not responding'

Clue ACB (or CCB) + X'30' contains the LNVT entry address.

STORAGE CONTENTS :–

ADDRESS	CONTENTS
006A0	75D4B900 A00071A4 B9000040 71340070 0070B846
020F0	28AE0070 25392B40 DB9A2953 F916D310
2C7D0	C802A808 E67F2ED2 B842C64A 007011C8
360E0	1486B906 A0661184 00700000 00050DBC
6A060	BF069F10 A8C3B900 10140070 00008400

2 X 8 = 16 => 10

DUMP 2 ANALYSIS

1) LINE#2 not working?

2) Look at resource status and QCBs.

LKB	CUB	LUBs	VRB
ACB	LOBQ	SSCP/LU	XMITQ
PSA	LIBQ	LU/LU	HELD?
	SSCP/PU		
	LOSQ		

and find that :-

3) LUB LU/LU QCB not empty.

4) LUB+X'48' = X'08' = WAITING PACING RESPONSE.

5) FIX : Change BIND parms. Device does not support pacing.
(The report implied the whole line was broken, in fact the dump shows that only one terminal is stuck)

DUMP EXERCISE 3

Symptom :– 'Cant talk to communication lines'

STORAGE CONTENTS :–

ADDRESS	CONTENTS
006A0	75D4B900 A00071A4 B9000040 71340070 0070B846
020F0	28AE0070 25392B40 DB9A2953 F916D310
69E20	BF002000 77740070 712CF982 A854711C
360E0	1486B906 A0661184 00700000 00050DBC
6A060	BF069F10 A8C3B900 10140070 00008400

DUMP 3 ANALYSIS

1) The instructor will tell you (if you ask) that there is no polling taking place (modem lights not flashing).

2) If polling has stopped then suspect level 3 or level 2 has a problem (link scheduler perhaps?).

3) Both level 2 and level 3 show exit instructions.

4) CCPQ (start of XDA) has tail pointer but not head pointer.

5) Level 2 will queue ACBs to back of CCPQ, but level 3 interrupt handler will not find anything on the front so eventually level 3 line activity will stop.

6) What happened? Someone stored a value of X'00000000' at offest zero on base register zero. This will actually result in using REG46 as a base and overwriting the CCPQ pointer at the start of the XDA.

7) What do we do next?
Try searching INFOMVS based on the XDA overwrite. If you find nothing set an address trace up so that next time you will get a trace of the overwrite.

DUMP EXERCISE 4

Symptom :- 'Cant talk to communication lines'

STORAGE CONTENTS :-

ADDRESS	CONTENTS				
006A0	75D4B900	A00071A4	B9000040	71340070	0070B846
02310	A8024915	282F1048	28AE0070	B8401CFE	
2D650	A8049802	A82667A2	01560452	17B89806	
360E0	1486B906	A0661184	00700000	00050DBC	
6A060	BF069F10	A8C3B900	10140070	00008400	

DUMP 4 ANALYSIS

1) Level three active (not exited).

2) Data on CCPQ and CABQ.

3) Level three task is CXDCG00E (from Load Map),
   This is the link scheduler.
   (gleaned from INFOMVS, or version 3 Diagnosis Ref.)

4) Level 3 Queues not being processed, looks like a loop.

DUMP EXERCISE 5

Symptom :- 'NCP has gone to sleep'

STORAGE CONTENTS :-

ADDRESS	CONTENTS
006A0	75D4B900 A00071A4 B9000040 71340070 0070B846
020F0	28AE0070 25392B40 DB9A2953 F916D310
69E20	BF002000 77740070 712CF982 A854711C
360E0	1486B906 A0661184 00700000 00050DBC
6A060	BF069F10 A8C3B900 10140070 00008400

DUMP 5 ANALYSIS

1) NCP asleep? - check main queueing points.
CABs, CCPQ, Routes. i.e. DLC and Path Control are
favorite points to investigate if the whole NCP had stopped.

2) Only one route defined to the host.

3) VST -> VVT -> VRB
VRB+X'14' = X'10' = Route held (VTAM calls it route blocked).

4) WHY? - This NCP has been zapped!
However for a real problem check the route.
   a) TGB in all nodes on route, check outstanding byte counts.
   b) CAB/SCB Look for traffic buildup on queues.
   c) VRB Transmit queue traffic buildup?
   d) BPB (Boundary Pool) exhausted?