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ACF/SNA SYSTEM PROBLEM DETERMINATION GUIDE

VOLUME II

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PREFACE

The material contained in this document reflects the experiences of those who contributed to this guide. IBM gives no warranty and makes no representation as to the accuracy of material in the guide and does not accept liability of any kind howsoever arising out of the use of this document.

The ACF/SNA System Problem Determination Guide represents a completely restructured revision of the SNA System Problem Determination Guide (GG24-1523-0), which is still valid for the products it supports. In the revised format, the emphasis has been placed on illustrating the usefulness of the current, state-of-the-art, interactive Problem Determination tools and Problem Management aids. It should be noted that this guide is based on ACF/VTAM Version 2.

The authors wish to express their appreciation to those people who have contributed to this guide. Valuable input has been provided by the staff of IBM Field Engineering (Branch offices, Regions and Product Development Centers), and by IBM System Engineers from numerous branch offices.

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ENTER USER NOTES HERE:

CHAPTER 5 : ACF/VTAM NETWORK OPERATOR COMMANDS

This section describes the use of the various operator commands for problem isolation and network monitoring. Sample output of the 'DISPLAY' and 'VARY' commands are provided.

The access method operator commands can be used to:

- FIND STATUS OF NETWORK COMPONENTS.
- MONITOR NETWORK ACTIVITY.
- ASSIST IN PERFORMANCE OF PROBLEM DETERMINATION ACTIVITIES.

CONTENTS

5.1 : DISPLAY ID COMMANDS

NOTE:

1. In the annotations, the term "VTAM" is used for brevity. It always implies "ACF/VTAM".

2. Operator input follows the arrow (=====>).

5.1.1 : DISPLAY APPLICATION STATUS

```
=====>                D NET,ID=CICS11,E      (see note 1)
0000 13.59.55 STC   16  IST097I  DISPLAY  ACCEPTED
0000 13.59.55 STC   16  IEE932I 737
 737 IST075I  VTAM DISPLAY - NODE TYPE= APPL
 737 IST486I  NAME= CICS11   ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 737 IST597I  CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT ONE
 737 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 737 IST271I  JOBNAME = CICS     STEPNAME = CICS
 737 IST171I  ACTIVE SESSIONS = 0001 SESSION REQUESTS = 0000
 737 IST206I  SESSIONS:
 737 IST634I  NAME      STATUS      SESS ID           SEND  RECV  VRN TP
 737 IST635I  H11L3A7   ACTIV-SEC   16012A120D18D341  0030  002E   0   0
  SYSMON 1400 1400 11
 737 IST314I  END
```

Note 1: VTAM will indicate the status of each session with the application. The Session Request value should be noted. During steady state operation, this value should be zero. If the value increases as terminals attempt to LOGON, the LOGON exit of the application is probably hung.

```
 =====>                D NET,ID=CICS11,E      (see note 2)
0000 14.01.17 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.01.17 STC   16  IEE932I 737
 737 IST075I  VTAM DISPLAY - NODE TYPE= APPL
 737 IST486I  NAME= CICS11   ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 737 IST597I  CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT ONE
 737 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 737 IST271I  JOBNAME = CICS     STEPNAME = CICS
 737 IST171I  ACTIVE SESSIONS = 0001 SESSION REQUESTS = 0001
 737 IST206I  SESSIONS:
 737 IST634I  NAME      STATUS      SESS ID           SEND  RECV  VRN TP
 737 IST635I  H11L3A7   ACTIV-SEC   16012A120D18D341  0030  002E   0   0
  SYSMON 1400 1400 11
 737 IST314I  END
```

Note 2: If the Session Request value is high when an application is first started, the application is probably limiting OPNDSTs.

If the Session Request indicates 1 and all but one terminal can LOGON and LOGOFF, it is likely that the application is not doing a CLSDST which is required if it does not do an OPNDST. This may happen if an application has an error in its error handling routine.

5.1.2 : DISPLAY NCP STATUS

```
 =====>                D NET,ID=N14BF3P,E          (see note 3)
0000 14.00.44 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.00.46 STC   16  IEE932I 797
 797 IST075I  VTAM DISPLAY - NODE TYPE= PU_T4/5
 797 IST486I  NAME= N14BF3P  ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 797 IST247I  LOAD/DUMP PROCEDURE STATUS = RESET
 797 IST484I  SUBAREA = 014
 797 IST391I  ADJ LINK STATION = 0FE-S    LINE = 0FE-L    ,NODE = ISTPUS
 797 IST391I  ADJ LINK STATION = P24028   LINE = L24028   ,NODE = N245F35
 797 IST391I  ADJ LINK STATION = P2402C   LINE = L2402C   ,NODE = N245F35
 797 IST391I  ADJ LINK STATION = P24030   LINE = L24030   ,NODE = N245F35
 797 IST391I  ADJ LINK STATION = P040A5   LINE = L040A5   ,NODE = N043F35
 797 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 797 IST752I  GPT TRACE STATUS = TRRES
 797 IST077I  SIO=00005839 CUA=0FE
 797 IST675I  VR =  0 , TP =  2
 797 IST170I  LINES:
 797 IST080I  L14023   ACTIV      L140A3   NEVAC      L14NPA   ACTIV----T
 797 IST080I  L14024   IINOP      L14026   NEVAC      L14028   ACTIV----E
 797 IST080I  L1402C   ACTIV----E L14040   ACTIV----E L14042   NEVAC
 797 IST080I  L140A5   ACTIV----E L140A6   IINOP      L14020   NEVAC
 797 IST080I  L14022   ACTIV      L140A0   ACTIV      L140A2   IINOP
 797 IST080I  L140A4   ACTIV      L140A7   NEVAC      L14043   ACTIV
 797 IST314I  END
```

Note 3: A status of INACT for the NCP indicates that VTAM has not completed the termination of all sessions with devices on the NCP. This state can be caused by a shortage of VTAM buffers or a hangup in the VTAM "VARY" processor. A status of ACT/A indicates that VTAM is waiting for the NCP to respond to an "ACTIVATE PHYSICAL". Now it is possible to inactivate the NCP remaining active, the link and link stations of cross-domain links.

```
 =====>                D NET,ID=N14BF3P            (see note 4)
0000 14.01.20 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.01.21 STC   16  IEE932I 811
 811 IST075I  VTAM DISPLAY - NODE TYPE= PU_T4/5
 811 IST486I  NAME= N14BF3P  ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 811 IST247I  LOAD/DUMP PROCEDURE STATUS = RESET
 811 IST484I  SUBAREA = 014
 811 IST391I  ADJ LINK STATION = 0FE-S    LINE = 0FE-L    ,NODE = ISTPUS
 811 IST391I  ADJ LINK STATION = P24028   LINE = L24028   ,NODE = N245F35
 811 IST391I  ADJ LINK STATION = P2402C   LINE = L2402C   ,NODE = N245F35
 811 IST391I  ADJ LINK STATION = P24030   LINE = L24030   ,NODE = N245F35
 811 IST391I  ADJ LINK STATION = P040A5   LINE = L040A5   ,NODE = N043F35
 811 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 811 IST752I  GPT TRACE STATUS = TRRES
 811 IST077I  SIO=00005858 CUA=0FE
 811 IST675I  VR =  0 , TP =  2
 811 IST314I  END

 =====>                D T
0000 14.03.29          IEE136I  TIME=14.03.29 DATE=81.271
```

Note 4: A display of the NCP node without a modifier is useful for determining if VTAM and the NCP are communicating. By also displaying the system time and repeating the displays, a rough transaction rate can be calculated. If a user enters data from a terminal and the SIO count does not increase, a dump of NCP is required.

```
 =====>                D NET,NCPSTOR,ID=N14BF3P,ADDR=1000,LENGTH=200   (see note 4a)
0000 17.21.40 STC   17  IST097I  DISPLAY  ACCEPTED
0000 17.21.41 STC   17  IEE932I 493
 493 IST244I  NCP STORAGE FOR ID = N14BF3P
 493 IST245I  001000   000149D8 00000000 00000000 00000000
 493 IST245I  001010   00000000 00000000 00000000 00000000
 493 IST245I  001020   00000000 00000000 00000000 00000000
 493 IST245I  001030   00000000 00000000 00000000 00000000
 493 IST245I  001040   4A2C4AA2 4AD24B40 4B784902 4A2C4BBC
 493 IST245I  001050   4C724C68 4D804DB0 47D04DCC 4C724E0C
 493 IST245I  001060   4C68654E 4A826400 4C144C68 50B450D8
 493 IST245I  001070   5B514C68 4E84514E 4E584C68 50E44C72
 493 IST245I  001080   524E524E 5296524E 524E524E 524E524E
 493 IST245I  001090   51785178 51785178 51785178 51785178
 493 IST245I  0010A0   54E8654E 524E6400 524E524E 524E524E
 493 IST245I  0010B0   51785178 51785178 51785178 51785178
 493 IST245I  0010C0   186C1B7A 1B7A1B7A
 493 IST314I  END
0000 17.21.43 STC   17  IST241I  NCPSTOR  COMMAND COMPLETE FOR ID = N14BF3P
```

Note 4a: It can be useful for displays of NCP statistics counters.

5.1.3 : DISPLAY LINE STATUS

```
 =====>                D NET,ID=L140A4            (see note 5)
0000 14.03.52 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.03.53 STC   16  IEE932I 922
 922 IST075I  VTAM DISPLAY - NODE TYPE= LINE
 922 IST486I  NAME= L140A4   ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 922 IST087I  LINE TYPE= LEASED     LINE GROUP= G14S1
 922 IST134I  MAJNOD= N14BF3P
 922 IST655I  LINE TRACE STATUS = TRRES TG TRACE STATUS = TRRES
 922 IST588I  SIT TRACE STATUS = TRRES
 922 IST752I  GPT TRACE STATUS = TRRES
 922 IST314I  END
```

Note 5: A status of "ACTIV" indicates that the 370X and the local modem are connected and the line is operational. A status of INACT means that either the line was made INACTIVE with the VARY command or the NCP had a local modem or interface error. The "VARY NET, ACT" command will be required on the line before it can be used.

```
 =====>                D NET,ID=L140A4,A             (see note 6)
0000 14.04.18 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.04.19 STC   16  IEE932I 926
 926 IST075I  VTAM DISPLAY - NODE TYPE= LINE
 926 IST486I  NAME= L140A4   ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 926 IST087I  LINE TYPE= LEASED     LINE GROUP= G14S1
 926 IST134I  MAJNOD= N14BF3P
 926 IST655I  LINE TRACE STATUS = TRRES TG TRACE STATUS = TRRES
 922 IST588I  SIT TRACE STATUS = TRRES
 922 IST752I  GPT TRACE STATUS = TRRES
```

```
 926 IST084I  NETWORK NODES:
 926 IST089I  P140A4A  TYPE= PHYSICAL UNIT     , ACTIV
 926 IST089I  LU1A     TYPE= LOGICAL UNIT      , ACTIV
 926 IST089I  LU2A     TYPE= LOGICAL UNIT      , ACTIV
 926 IST089I  LU3A     TYPE= LOGICAL UNIT      , ACTIV
 926 IST089I  LU4A     TYPE= LOGICAL UNIT      , ACTIV
 926 IST089I  LU5A     TYPE= LOGICAL UNIT      , ACTIV
 926 IST089I  P140A4B  TYPE= PHYSICAL UNIT     , PCTD2
 926 IST089I  LU1B     TYPE= LOGICAL UNIT      , INOP
 926 IST089I  LU2B     TYPE= LOGICAL UNIT      , INOP
 926 IST089I  LU3B     TYPE= LOGICAL UNIT      , INOP
 926 IST089I  P140A4C  TYPE= PHYSICAL UNIT     , PCTD2
 926 IST089I  LU1C     TYPE= LOGICAL UNIT      , INOP
 926 IST089I  LU2C     TYPE= LOGICAL UNIT      , INOP
 926 IST089I  LU3C     TYPE= LOGICAL UNIT      , INOP
 926 IST314I  END


 =====>                D NET,ID=L140A4,E
0000 14.04.51 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.04.52 STC   16  IEE932I 942
 942 IST075I  VTAM DISPLAY - NODE TYPE= LINE
 942 IST486I  NAME= L140A4   ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 942 IST087I  LINE TYPE= LEASED     LINE GROUP= G14S1
 942 IST134I  MAJNOD= N14BF3P
 942 IST655I  LINE TRACE STATUS = TRRES TG TRACE STATUS = TRRES
 922 IST588I  SIT TRACE STATUS = TRRES
 922 IST752I  GPT TRACE STATUS = TRRES
 942 IST084I  NETWORK NODES:
 942 IST089I  P140A4A  TYPE= PHYSICAL UNIT     , ACTIV
 942 IST089I  LU1A     TYPE= LOGICAL UNIT      , ACTIV
 942 IST089I  LU2A     TYPE= LOGICAL UNIT      , ACTIV
 942 IST089I  LU3A     TYPE= LOGICAL UNIT      , ACTIV
 942 IST089I  LU4A     TYPE= LOGICAL UNIT      , ACTIV
 942 IST089I  LU5A     TYPE= LOGICAL UNIT      , ACTIV
 942 IST089I  LU6A     TYPE= LOGICAL UNIT      , NEVAC
 942 IST089I  P140A4B  TYPE= PHYSICAL UNIT     , PCTD2
 942 IST089I  LU1B     TYPE= LOGICAL UNIT      , INOP
 942 IST089I  LU2B     TYPE= LOGICAL UNIT      , INOP
 942 IST089I  LU3B     TYPE= LOGICAL UNIT      , INOP
 942 IST089I  LU4B     TYPE= LOGICAL UNIT      , NEVAC
 942 IST089I  P140A4C  TYPE= PHYSICAL UNIT     , PCTD2
 942 IST089I  LU1C     TYPE= LOGICAL UNIT      , INOP
 942 IST089I  LU2C     TYPE= LOGICAL UNIT      , INOP
 942 IST089I  LU3C     TYPE= LOGICAL UNIT      , INOP
 942 IST089I  LU4C     TYPE= LOGICAL UNIT      , NEVAC
 942 IST089I  P140A4D  TYPE= PHYSICAL UNIT     , NEVAC
 942 IST089I  LU1D     TYPE= LOGICAL UNIT      , NEVAC
 942 IST089I  LU2D     TYPE= LOGICAL UNIT      , NEVAC
 942 IST089I  LU3D     TYPE= LOGICAL UNIT      , NEVAC
 942 IST089I  LU4D     TYPE= LOGICAL UNIT      , NEVAC
 942 IST314I  END
```

Note 6: Following are the possible status types and a brief description of each:

- INOP - inoperative, active user sessions have been terminated.
- PCTD2- pending to be contacted(2) request. For example a PU is being activated and the final contact was sent to the PU, the response was recieved, but not the associated contacted request.
- NEVAC- the resource has never been activated.

5.1.4 : DISPLAY PHYSICAL UNIT STATUS

```
 =====>                D NET,ID=P14022C
0000 23.48.10 STC   16  IST097I  DISPLAY  ACCEPTED
0000 23.48.12 STC   16  IEE932I 196
 196 IST075I  VTAM DISPLAY - NODE TYPE= PHYSICAL UNIT
 196 IST486I  NAME= P14022C  ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 196 IST081I  LINE NAME= L14022    , LINE GROUP= G14S1     , MAJNOD= N14BF3P
 196 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 196 IST752I  GPT TRACE STATUS = TRRES
 196 IST314I  END
```

5.1.5 : DISPLAY PHYSICAL UNIT FAILURE STATUS

```
4020 23.49.33 STC   18  +IST259I  INOP RECEIVED FOR P14022C  CODE= 01
4020 23.49.35 STC   18  +IST619I  ID = P14022C  FAILED - RECOVERY IN PROGRESS


0000 23.49.53           D NET,ID=P14022C            (see note 7)
0000 23.49.54 STC   16  IST097I  DISPLAY  ACCEPTED
0000 23.49.55 STC   16  IEE932I 211
 211 IST075I  VTAM DISPLAY - NODE TYPE= PHYSICAL UNIT
 211 IST486I  NAME= P14022C  ,STATUS= PCTD2           ,DESIRED STATE= ACTIV
 211 IST081I  LINE NAME= L14022    , LINE GROUP= G14S1     , MAJNOD= N14BF3P
 211 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 211 IST752I  GPT TRACE STATUS = TRRES
 211 IST314I  END

4020 23.50.32 STC   18  +IST621I  RECOVERY SUCCESSFUL FOR NETWORK NODE P14022C

0000 23.51.37           D NET,ID=P14022C
0000 23.51.37 STC   16  IST097I  DISPLAY  ACCEPTED
0000 23.51.37 STC   16  IEE932I 216
 216 IST075I  VTAM DISPLAY - NODE TYPE= PHYSICAL UNIT
 216 IST486I  NAME= P14022C  ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 216 IST081I  LINE NAME= L14022    , LINE GROUP= G14S1     , MAJNOD= N14BF3P
 216 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 216 IST752I  GPT TRACE STATUS = TRRES
 216 IST314I  END
```

Note 7: The PU is switched off and then Message IST619I indicated a physical unit failure. A display of the PU status indicates "PCTD2". This status will remain until messages IST268I and IST621I are presented by VTAM.

5.1.6 : DISPLAY LOGICAL UNIT STATUS

```
 =====>                D NET,ID=LU1A,A            (see notes 8,9,10)
0000 14.51.27 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.51.30 STC   16  IEE932I 203
 203 IST075I  VTAM DISPLAY - NODE TYPE= LOGICAL UNIT
 203 IST486I  NAME= LU1A     ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 203 IST597I  CAPABILITY-PLU INHIBITED,SLU ENABLED  ,SESSION LIMIT 00000001
 203 IST081I  LINE NAME= L140A4    , LINE GROUP= G14S1     , MAJNOD= N14BF3P
 203 IST135I  PHYSICAL UNIT= P140A4A  ,
 203 IST082I  DEVTYPE= LU    , ALLOC TO=          ,CONTROLLING APPL=
 203 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 203 IST752I  GPT TRACE STATUS = TRRES
 203 IST171I  ACTIVE SESSIONS = 0000 SESSION REQUESTS = 0000
 203 IST206I  SESSIONS:
 203 IST172I  NO SESSIONS      ACTIVE
 203 IST314I  END


 =====>                D NET,ID=LU1A
0000 14.51.47 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.51.48 STC   16  IEE932I 207
 207 IST075I  VTAM DISPLAY - NODE TYPE= LOGICAL UNIT
 207 IST486I  NAME= LU1A     ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 207 IST597I  CAPABILITY-PLU INHIBITED,SLU ENABLED  ,SESSION LIMIT 00000001
 207 IST081I  LINE NAME= L140A4    , LINE GROUP= G14S1     , MAJNOD= N14BF3P
 207 IST135I  PHYSICAL UNIT= P140A4A  ,
 207 IST082I  DEVTYPE= LU    , ALLOC TO=          ,CONTROLLING APPL=
 207 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 207 IST752I  GPT TRACE STATUS = TRRES
 207 IST171I  ACTIVE SESSIONS = 0000 SESSION REQUESTS = 0000
 207 IST314I  END
```

Note 8: An application name in the "CONTROLLING APPL" field indicates that either a LOGAPPL statement on the terminal exists or an operator issued a "V NET,LOGON= ,ID= " for the terminal. If the application or the terminal becomes active, the terminal will be "logged on" to the application. If the terminal is allocated to another application, VTAM will drive the "LOGON EXIT" of the application specified in the CONTROLLING APPL field when the current application does a CLSDST. If an entry appears in the ALLOC TO field, the terminal has been allocated to an application. If it is blank, the LU is not in session with any program.

NOTE 9: If the status is "ACT/U", a V NET,INACT,ID=xxx is required. This failure usually is caused by the SDLC physical unit not responding to a CLEAR and UNBIND.

Note 10: If the status is "ACT/B", the logical unit is not responding to the BIND command. A VARY INACT with the FORCE option is required to recover from this failure. This failure is common on 3600 Systems when the application does an OPNDST (ACQUIRE) and the logical unit is in input mode..

5.2 : DISPLAY MAJOR NODES

```
 =====>                D NET,MAJNODES                (see note 11)
0000 16.53.22 STC   19  IST097I  DISPLAY  ACCEPTED
0000 16.53.23 STC   19  IEE932I 630
 630 IST350I  VTAM DISPLAY - DOMAIN TYPE= MAJOR NODES

 630 IST089I  ISTPUS    TYPE= PU_T4/5 MAJ NODE  , ACTIV
 630 IST089I  M00       TYPE= CDRM SEGMENT      , ACTIV
 630 IST089I  A11IMS    TYPE= APPL SEGMENT      , ACTIV
 630 IST089I  A11TSO    TYPE= APPL SEGMENT      , ACTIV
 630 IST089I  A11NCF    TYPE= APPL SEGMENT      , ACTIV
 630 IST089I  A11APP    TYPE= APPL SEGMENT      , ACTIV
 630 IST089I  A11CICS   TYPE= APPL SEGMENT      , ACTIV
 630 IST089I  H11L      TYPE= LCL 3270 MAJ NODE , ACTIV
 630 IST089I  A11DPCX   TYPE= APPL SEGMENT      , ACTIV
 630 IST089I  R01ATSO   TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R01ANCF   TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R01APP    TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R01ACICS  TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R10ANCF   TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R10APP    TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R10ACICS  TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R21ATSO   TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R21ANCF   TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R21APP    TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R21AIMS   TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R21ACICS  TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R91ANCF   TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R91H      TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  R22ACICS  TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  SWSYS34   TYPE= SW SNA MAJ NODE   , ACTIV
 630 IST089I  ISTCDRDY  TYPE= CDRSC SEGMENT     , ACTIV
 630 IST089I  N245F35   TYPE= PU_T4/5 MAJ NODE  , PAPU2
 630 IST089I  N043F35   TYPE= PU_T4/5 MAJ NODE  , PAPU2
 630 IST314I  END
```

Note 11: This is a convenient way to determine the status of all active major nodes These include:

- Application program major nodes
- NCP major nodes (local and remote)
- Local non-SNA major nodes (local 3270)
- Local SNA major nodes (local 3790)
- Switched SNA major nodes that are active in the domain.
- CDRM or cross-domain resource manager
- CDRSC or cross-domain resource

With VTAM-2, it was necessary to display the status of each one individually.

5.3 : DISPLAY APPLICATIONS

```
 =====>                D NET,APPLS,A              (see note 12)
0000 15.40.43 STC   16  IST097I  DISPLAY  ACCEPTED
0000 15.40.44 STC   16  IEE932I 228
 228 IST350I  VTAM DISPLAY - DOMAIN TYPE= APPL MAJ NODES/NAMES
 228 IST089I  VTAMSEG  TYPE= APPL SEGMENT      , ACTIV
 228 IST360I  APPLICATIONS:
 228 IST080I  M11      ACTIV      ISTOLTEP ACTIV      ISTATA00 CO
 228 IST080I  ISTNOP   ACTIV
 228 IST089I  A11IMS   TYPE= APPL SEGMENT      , ACTIV
 228 IST360I  APPLICATIONS:
 228 IST080I  IMS11    CONCT      IMSMVS2  CONCT
 228 IST089I  A11TSO   TYPE= APPL SEGMENT      , ACTIV
 228 IST360I  APPLICATIONS:
 228 IST080I  TSO11    ACTIV      TSO1101  CONCT      TSO1102  AC
 228 IST080I  TSO1103  ACTIV      TSO1104  CONCT      TSO1105  CO
 228 IST080I  TSO1106  CONCT      TSO1107  CONCT      TSO1108  CO
 228 IST089I  A11NCF   TYPE= APPL SEGMENT      , ACTIV
 228 IST360I  APPLICATIONS:
 228 IST080I  NCF11    ACTIV      NCF11PPT ACTIV      BNHDSERV AC
 228 IST080I  NCF11000 ACTIV      NCF11001 CONCT      NCF11002 CO
 228 IST080I  NCF11009 CONCT      TAF11    CONCT      TAF12    CONCT
 228 IST080I  TAF13    CONCT      TAF14    CONCT      TAF21    CONCT
 228 IST080I  TAF22    CONCT      TAF23    CONCT      TAF24    CONCT
 228 IST089I  A11APP   TYPE= APPL SEGMENT      , ACTIV
 228 IST360I  APPLICATIONS:
 228 IST080I  NPA11    ACTIV      RMU11    CONCT      RDPD3MVS ACTIV
 228 IST080I  HCF11    ACTIV      LCV11    ACTIV      DSX11    CONCT
 228 IST080I  ADMPRINT CONCT      SENDAE11 CONCT      RECDAE11 CONCT
 228 IST080I  ECHO11   CONCT      SNAP11   CONCT      RECV11   CONCT
 228 IST080I  RECV1101 CONCT      RECV1102 CONCT      RECV111  CONCT
 228 IST080I  RECV1131 CONCT      RECV1132 CONCT      RECV114  CONCT
 228 IST080I  SEND11   CONCT      SEND111  CONCT      SEND112  CONCT
 228 IST080I  SEND113  CONCT      SEND114  CONCT      VMDISC   ACTIV
 228 IST089I  A11CICS  TYPE= APPL SEGMENT      , ACTIV
 228 IST360I  APPLICATIONS:
 228 IST080I  CICSMVS2 CONCT      CICS11   CONCT      CICSA    CONCT
 228 IST089I  A11DPCX  TYPE= APPL SEGMENT      , ACTIV
 228 IST360I  APPLICATIONS:
 228 IST080I  DIF11    CONCT      HPGM11   CONCT      IPVS11   CONCT
 228 IST080I  SIRF11   CONCT
 228 IST314I  END

 =====>                D NET,APPLS,E
0000 15.41.06 STC   16  IST097I  DISPLAY  ACCEPTED
0000 15.41.06 STC   16  IEE932I 232
 232 IST350I  VTAM DISPLAY - DOMAIN TYPE= APPL MAJ NODES/NAMES
 232 IST089I  VTAMSEG  TYPE= APPL SEGMENT      , ACTIV
 232 IST360I  APPLICATIONS:
 232 IST080I  M11      ACTIV      ISTOLTEP ACTIV      ISTATA00 CONCT
```

Note 12: Three available options exist (A,I,E), with EVERY the default. All three options are illustrated here. The network operator may determine on a collective basis which major nodes are active, inactive, or both. (Inactive application major nodes are ignored.)

```
 232 IST080I  ISTNOP    ACTIV      VTAMTERM NEVAC
 232 IST089I  A11IMS    TYPE= APPL SEGMENT      , ACTIV
 232 IST360I  APPLICATIONS:
 232 IST080I  IMS11     CONCT      IMSMVS2  CONCT
 232 IST089I  A11TSO    TYPE= APPL SEGMENT      , ACTIV
 232 IST360I  APPLICATIONS:
 232 IST080I  TSO11     ACTIV      TSO1101  CONCT      TSO1102  ACTIV
 232 IST080I  TSO1103   ACTIV      TSO1104  CONCT      TSO1105  CONCT
 232 IST080I  TSO1106   CONCT      TSO1107  CONCT      TSO1108  CONCT
 232 IST089I  A11NCF    TYPE= APPL SEGMENT      , ACTIV
 232 IST360I  APPLICATIONS:
 232 IST080I  NCF11     ACTIV      NCF11PPT ACTIV      BNHDSERV ACTIV
 232 IST080I  NCF11000  ACTIV      NCF11001 CONCT      NCF11002 CONCT
 232 IST080I  NCF11009  CONCT      TAF11    CONCT      TAF12    CONCT
 232 IST080I  TAF13     CONCT      TAF14    CONCT      TAF21    CONCT
 232 IST080I  TAF22     CONCT      TAF23    CONCT      TAF24    CONCT
 232 IST089I  A11APP    TYPE= APPL SEGMENT      , ACTIV
 232 IST360I  APPLICATIONS:
 232 IST080I  NPA11     ACTIV      RMU11    CONCT      RDPD3MVS ACTIV
 232 IST080I  HCF11     ACTIV      LCV11    ACTIV      DSX11    CONCT
 232 IST080I  ADMPRINT  CONCT      SENDAE11 CONCT      RECDAE11 CONCT
 232 IST080I  ECHO11    CONCT      SNAP11   CONCT      RECV11   CONCT
 232 IST080I  RECV1101  CONCT      RECV1102 CONCT      RECV111  CONCT
 232 IST080I  RECV1131  CONCT      RECV1132 CONCT      RECV114  CONCT
 232 IST080I  SEND11    CONCT      SEND111  CONCT      SEND112  CONCT
 232 IST080I  SEND113   CONCT      SEND114  CONCT      VMDISC   ACTIV
 232 IST089I  A11CICS   TYPE= APPL SEGMENT      , ACTIV
 232 IST360I  APPLICATIONS:
 232 IST080I  CICSMVS2  CONCT      CICS11   CONCT      CICSA    CONCT
 232 IST089I  A11DPCX   TYPE= APPL SEGMENT      , ACTIV
 232 IST360I  APPLICATIONS:
 232 IST080I  DIF11     CONCT      HPGM11   CONCT      IPVS11   CONCT
 232 IST080I  SIRF11    CONCT
 232 IST314I  END


 =====>                D NET,APPLS,I
0000 15.41.16 STC   16  IST097I  DISPLAY  ACCEPTED
0000 15.41.17 STC   16  IEE932I 236
 236 IST350I  VTAM DISPLAY - DOMAIN TYPE= APPL MAJ NODES/NAMES
 236 IST089I  VTAMSEG   TYPE= APPL SEGMENT      , ACTIV
 236 IST360I  APPLICATIONS:
 236 IST080I  VTAMTERM NEVAC
 236 IST089I  A11IMS    TYPE= APPL SEGMENT      , ACTIV
 236 IST089I  A11TSO    TYPE= APPL SEGMENT      , ACTIV
 236 IST089I  A11NCF    TYPE= APPL SEGMENT      , ACTIV
 236 IST089I  A11APP    TYPE= APPL SEGMENT      , ACTIV
 236 IST089I  A11CICS   TYPE= APPL SEGMENT      , ACTIV
 236 IST089I  A11DPCX   TYPE= APPL SEGMENT      , ACTIV
 236 IST314I  END
```

5.4 : DISPLAY LINES

```
 =====>                D NET,LINES,A                    (see note 13)
0000 14.53.00 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.53.01 STC   16  IEE932I 230
 230 IST350I  VTAM DISPLAY - DOMAIN TYPE= LINES
 230 IST354I  PU T4/5 MAJOR NODE = ISTPUS
 230 IST170I  LINES:
 230 IST080I  OFE-L    ACTIV----I
 230 IST354I  PU T4/5 MAJOR NODE = N14BF3P
 230 IST170I  LINES:
 230 IST080I  L14023   ACTIV      L14NPA   ACTIV----T L14028   ACTIV----E
 230 IST080I  L1402C   ACTIV----E L14040   ACTIV----E L140A5   ACTIV----E
 230 IST080I  L14022   ACTIV      L140A0   ACTIV      L140A4   ACTIV
 230 IST080I  L14043   ACTIV
 230 IST354I  PU T4/5 MAJOR NODE = N245F35
 230 IST170I  LINES:
 230 IST080I  L24026   ACTIV----E L24028   ACTIV----E L2402C   ACTIV----E
 230 IST080I  L24030   ACTIV----E L24033   ACTIV----E L24020   ACTIV
 230 IST080I  L24022   ACTIV
 230 IST354I  PU T4/5 MAJOR NODE = N043F35
 230 IST170I  LINES:
 230 IST080I  L04024   ACTIV----E L040A5   ACTIV----E L040A6   ACTIV----E
 230 IST080I  L040A0   ACTIV
 230 IST314I  END
```

```
 =====>                D NET,LINES,I
0000 14.53.41          S NCCF
0000 14.53.43 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.53.48 STC   16  IEE932I 246
 246 IST350I  VTAM DISPLAY - DOMAIN TYPE= LINES
 246 IST354I  PU T4/5 MAJOR NODE = ISTPUS
 246 IST354I  PU T4/5 MAJOR NODE = N14BF3P
 246 IST170I  LINES:
 246 IST080I  L140A3   NEVAC      L14024   IINOP      L14026   NEVAC
 246 IST080I  L14042   NEVAC      L140A6   IINOP      L14020   NEVAC
 246 IST080I  L140A2   IINOP      L140A7   NEVAC
 246 IST354I  PU T4/5 MAJOR NODE = N245F35
 246 IST170I  LINES:
 246 IST080I  L24023   NEVAC      L24024   NEVAC      L24032   NEVAC
 246 IST354I  PU T4/5 MAJOR NODE = N043F35
 246 IST170I  LINES:
 246 IST080I  L04026   IINOP      L04028   NEVAC      L0402C   NEVAC
 246 IST080I  L040A2   NEVAC
 246 IST314I  END
```

Note 13: For each active NCP in the domain, the name of each active local NCP, the name of each remote NCP, and its associated local NCP (and the name of the lines connecting them), is spelled out. Then the names and status of all associated lines are listed, depending on the ACT, INACT, EVERY specification. The operator is thus provided with the capability for a collective display via a single command.

```
 =====>                D NET,LINES,E
0000 14.54.17 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.54.18 STC   16  IEE932I 256
 256 IST350I  VTAM DISPLAY - DOMAIN TYPE= LINES
 256 IST354I  PU T4/5 MAJOR NODE = ISTPUS
 256 IST170I  LINES:
 256 IST080I  0FE-L    ACTIV----I
 256 IST354I  PU T4/5 MAJOR NODE = N14BF3P
 256 IST170I  LINES:
 256 IST080I  L14023   ACTIV      L140A3   NEVAC      L14NPA   ACTIV----T
 256 IST080I  L14024   IINOP      L14026   NEVAC      L14028   ACTIV----E
 256 IST080I  L1402C   ACTIV----E L14040   ACTIV----E L14042   NEVAC
 256 IST080I  L140A5   ACTIV----E L140A6   IINOP      L14020   NEVAC
 256 IST080I  L14022   ACTIV      L140A0   ACTIV      L140A2   IINOP
 256 IST080I  L140A4   ACTIV      L140A7   NEVAC      L14043   ACTIV
 256 IST354I  PU T4/5 MAJOR NODE = N245F35
 256 IST170I  LINES:
 256 IST080I  L24023   NEVAC      L24024   NEVAC      L24026   ACTIV----E
 256 IST080I  L24028   ACTIV----E L2402C   ACTIV----E L24030   ACTIV----E
 256 IST080I  L24032   NEVAC      L24033   ACTIV----E L24020   ACTIV
 256 IST080I  L24022   ACTIV
 256 IST354I  PU T4/5 MAJOR NODE = N043F35
 256 IST170I  LINES:
 256 IST080I  L04024   ACTIV----E L04026   IINOP      L04028   NEVAC
 256 IST080I  L0402C   NEVAC      L040A2   NEVAC      L040A5   ACTIV----E
 256 IST080I  L040A6   ACTIV----E L040A0   ACTIV
 256 IST314I  END
```

5.5 : DISPLAY CLUSTERS

```
 =====>                D NET,CLSTRS                    (see note 14)
0000 16.48.45 STC   19  IST097I  DISPLAY  ACCEPTED
0000 16.48.46 STC   19  IEE932I 595
 595 IST350I  VTAM DISPLAY - DOMAIN TYPE= CLUSTERS/PHYS UNITS
 595 IST089I  ISTPUS   TYPE= PU_T4/5 MAJ NODE  , ACTIV
 595 IST089I  SWSYS34  TYPE= SW SNA MAJOR NODE , ACTIV
 595 IST089I  PSYS34A  TYPE= PHYSICAL UNIT     , CONCT
 595 IST089I  P5280AA  TYPE= PHYSICAL UNIT     , CONCT
 595 IST089I  N245F35  TYPE= PU_T4/5 MAJ NODE  , PAPU2
 595 IST089I  B24023A  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  B24023B  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24020A  TYPE= PHYSICAL UNIT     , INOP
 595 IST089I  P24020B  TYPE= PHYSICAL UNIT     , INOP
 595 IST089I  P24020C  TYPE= PHYSICAL UNIT     , INOP
 595 IST089I  P24020D  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24020E  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24020F  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24020G  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24022A  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24022B  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24022C  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24022D  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24022E  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24022F  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P24022G  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  N043F35  TYPE= PU_T4/5 MAJ NODE  , PAPU2
 595 IST089I  P040A0A  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P040A0B  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P040A0C  TYPE= PHYSICAL UNIT     , INOP
 595 IST089I  P040A0D  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P040A0E  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P040A0F  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST089I  P040A0G  TYPE= PHYSICAL UNIT     , NEVAC
 595 IST314I  END
```

Note 14: The resulting display shows not only the status of each cluster/PU, depending on the ACT, INACT, EVERY option, but also the associated major node name and type: NCP, local, or switched SNA major node. A single command provides a collective display.

5.6 : DISPLAY TERMINALS

```
 =====>                D NET,TERMS,A                    (see note 15)
0000 14.54.32 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.54.33 STC   16  IEE932I 261
 261 IST350I  VTAM DISPLAY - DOMAIN TYPE= LOGICAL UNITS/TERMS
 261 IST354I  PU T4/5 MAJOR NODE = ISTPUS
 261 IST351I  LOCAL 3270 MAJOR NODE: NAME = H11L
 261 IST089I  H11L3A1  TYPE= LOGICAL UNIT      , ACT/S      ,CUA=3A1
 261 IST089I  H11L3A2  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3A2
 261 IST089I  H11L3A3  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3A3
 261 IST089I  H11L3A4  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3A4
 261 IST089I  H11L3A5  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3A5
 261 IST089I  H11L3A6  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3A6
 261 IST089I  H11L3A7  TYPE= LOGICAL UNIT      , ACT/S      ,CUA=3A7
 261 IST089I  H11L3A8  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3A8
 261 IST089I  H11L3A9  TYPE= LOGICAL UNIT      , ACT/S      ,CUA=3A9
 261 IST089I  H11L3AA  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3AA
 261 IST089I  H11L3AB  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3AB
 261 IST089I  H11L3AC  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3AC
 261 IST089I  H11L3AD  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3AD
 261 IST089I  H11L3AE  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3AE
 261 IST089I  H11L3E0  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3E0
 261 IST089I  H11L3E1  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3E1
 261 IST089I  H11L3E2  TYPE= LOGICAL UNIT      , ACT/S      ,CUA=3E2
 261 IST089I  H11L3E3  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3E3
 261 IST089I  H11L3E4  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3E4
 261 IST089I  H11L3E5  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3E5
 261 IST089I  H11L3E6  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3E6
 261 IST089I  H11L3E7  TYPE= LOGICAL UNIT      , ACTIV      ,CUA=3E7
 261 IST353I  SWITCHED SNA MAJOR NODE: NAME = SWSYS34
 261 IST089I  PSYS34A  TYPE= PHYSICAL UNIT     , CONCT
 261 IST355I  LOGICAL UNITS:
 261 IST080I  LSYS34A1 CONCT
 261 IST089I  P5280AA  TYPE= PHYSICAL UNIT     , CONCT
 261 IST355I  LOGICAL UNITS:
 261 IST080I  L5280A1  CONCT
 261 IST354I  PU T4/5 MAJOR NODE = N14BF3P
 261 IST146I  LINE NAME: L14NPA   STATUS: ACTIV
 261 IST359I  ATTACHMENT = LEASED
 261 IST089I  P14NPA   TYPE= PHYSICAL UNIT     , ACTIV----T
 261 IST355I  LOGICAL UNITS:
 261 IST080I  T14NPA   ACT/S----T
 261 IST146I  LINE NAME: L14022   STATUS: ACTIV
 261 IST359I  ATTACHMENT = LEASED
 261 IST089I  P14022E  TYPE= PHYSICAL UNIT     , ACTIV
 261 IST355I  LOGICAL UNITS:
 261 IST080I  T14022E1 ACTIV      T14022E2 ACTIV      T14022E3 ACTIV
 261 IST080I  T14022E4 ACTIV      T14022E5 ACTIV      T14022E6 ACTIV
 261 IST146I  LINE NAME: L140A0   STATUS: ACTIV
 261 IST359I  ATTACHMENT = LEASED
```

Note 15: This display type is valid for local terminals/LUs as well as for remotes. In addition to showing the status of units according to the operator's request (ACT, INACT, EVERY), the reply also indicates the name of the associated major node. CUA addresses are also displayed, where applicable. As with several other DISPLAY commands mentioned previously, the important enhancement in ACF/VTAM is that a single command occurrence can indicate the status of a multitude of units.

```
261 IST089I  P140A0F  TYPE= PHYSICAL UNIT     , ACTIV
261 IST355I  LOGICAL UNITS:
261 IST080I  T140A0F1 ACTIV      T140A0F2 ACTIV      T140A0F3 ACTIV
261 IST080I  T140A0F4 ACTIV      T140A0F5 ACT/S      T140A0F6 ACTIV
261 IST080I  T140A0F7 ACTIV      T140A0F8 ACTIV
261 IST146I  LINE NAME: L140A4   STATUS: ACTIV
261 IST359I  ATTACHMENT = LEASED
261 IST089I  P140A4A  TYPE= PHYSICAL UNIT     , ACTIV
261 IST355I  LOGICAL UNITS:
261 IST080I  LU1A     ACTIV      LU2A     ACTIV      LU3A     ACTIV
261 IST080I  LU4A     ACTIV      LU5A     ACTIV      LU6A     ACTIV
261 IST080I  LU7A     ACTIV      LU8A     ACTIV      LU9A     ACTIV
261 IST080I  L16A     ACTIV      L17A     ACTIV      L18A     ACTIV
261 IST080I  L19A     ACTIV      L20A     ACTIV      L21A     ACTIV
261 IST080I  L22A     ACTIV      L23A     ACTIV
261 IST089I  P140A4B  TYPE= PHYSICAL UNIT     , PCTD2
261 IST355I  LOGICAL UNITS:
261 IST080I  LU1B     INOP       LU2B     INOP       LU3B     INOP
261 IST080I  LU4B     INOP       LU5B     INOP       LU6B     INOP
261 IST080I  LU7B     INOP       LU8B     INOP       LU9B     INOP
261 IST089I  P140A4C  TYPE= PHYSICAL UNIT     , PCTD2
261 IST355I  LOGICAL UNITS:
261 IST080I  LU1C     INOP       LU2C     INOP       LU3C     INOP
261 IST080I  LU4C     INOP       LU5C     INOP       LU6C     INOP
261 IST080I  LU7C     INOP       LU8C     INOP       LU9C     INOP
261 IST354I  PU T4/5 MAJOR NODE = N245F35
261 IST146I  LINE NAME: L24020   STATUS: ACTIV
261 IST359I  ATTACHMENT = LEASED
261 IST089I  P24020E  TYPE= PHYSICAL UNIT     , ACTIV
261 IST355I  LOGICAL UNITS:
261 IST080I  T24020E1 ACTIV      T24020E2 ACTIV      T24020E3 ACTIV
261 IST080I  T24020E4 ACTIV
261 IST354I  PU T4/5 MAJOR NODE = N043F35
261 IST146I  LINE NAME: L040A0   STATUS: ACTIV
261 IST359I  ATTACHMENT = LEASED
261 IST089I  P040A0C  TYPE= PHYSICAL UNIT     , ACTIV
261 IST355I  LOGICAL UNITS:
261 IST080I  T040A0C1 ACTIV      T040A0C2 ACTIV      T040A0C3 ACTIV
261 IST314I  END
```

5.7 : DISPLAY BUFFER USE

```
 =====>                D NET,BFRUSE                  (see note 16)
0000 16.54.14 STC   19  IST097I  DISPLAY  ACCEPTED
0000 16.54.14 STC   19  IEE932I 638
 638 IST350I  VTAM DISPLAY - DOMAIN TYPE= BUFFER POOL DATA
 638 IST632I  BUFF   BUFF  CURR   CURR   MAX    MAX  TIMES   EXP/CONT    EXP
 638 IST633I   ID    SIZE TOTAL  AVAIL  TOTAL  USED   EXP   THRESHOLD   INCR
 638 IST356I  IO00  00206 00116  00052  00134 00096  00001 00028/-----  00018
 638 IST356I  LP00  01016 00012  00009  00012 00007  00000 00004/-----  00004
 638 IST356I  WP00  00160 00030  00012  00030 00025  00000 00001/-----  00024
 638 IST356I  LF00  00120 00002  00002  00002 00000  00000 00001/-----  00032
 638 IST356I  CRPL  00116 00032  00018  00032 00022  00000 00004/-----  00032
 638 IST356I  SF00  00072 00051  00035  00051 00020  00000 00001/-----  00051
 638 IST356I  SP00  00096 00002  00002  00002 00000  00000 00001/-----  00039
 638 IST449I  CSALIMIT = 000500K ,CURRENT = 000165K ,MAXIMUM = 000172K
 638 IST595I  IRNLIMIT = NOLIMIT, CURRENT = 000000k, MAXIMUM = 000000K
 638 IST314I  END
```

Note 16: Buffer use should be monitored for usage and numbers of times expanded. During normal operation expansion of buffers should be kept to a minimum. Note that if SMS buffer trace is on, the values displayed here are from the latest SMS recording. SMS trace should be off if using this command to monitor buffer use.

5.8 : DISPLAY PENDING SSCP INPUT/OUTPUT

```
 =====>                D NET,PENDING                 (see note 17)
0000 16.52.58 STC   19  IST097I  DISPLAY  ACCEPTED
0000 16.52.59 STC   19  IEE932I 626
 626 IST350I  VTAM DISPLAY - DOMAIN TYPE= PENDING
 626 IST159I  THE FOLLOWING NODES ARE IN A PENDING STATE
 626 IST080I  M01       PACDR      M10       PACDR      M19       PACDR
 626 IST080I  M22       PACDR      M91       PACDR      N245F35   PAPU2
 626 IST080I  L24026    INOP       P24026    INOP       L24028    INOP
 626 IST080I  P24028    INOP       L2402C    INOP       P2402C    INOP
 626 IST080I  L24030    INOP       P24030    INOP       L24033    INOP
 626 IST080I  P24033    INOP       L24020    INOP       P24020A   INOP
 626 IST080I  T24020A1  INOP       P24020B   INOP       T24020B1  INOP
 626 IST080I  P24020C   INOP       T24020C1  INOP       T24020C2  INOP
 626 IST080I  T24020C3  INOP       N043F35   PAPU2      L04024    INOP
 626 IST080I  P04024    INOP       L040A5    INOP       P040A5    INOP
 626 IST080I  L040A6    INOP       P040A6    INOP       L040A0    INOP
 626 IST080I  P040A0C   INOP       T040A0C1  INOP       T040A0C2  INOP
 626 IST080I  T040A0C3  INOP
 626 IST314I  END
```

Note 17: This command is employed to determine whether any pending I/O exists between VTAM System Services Control Point (SSCP) and any network node. As part of problem determination procedures, it can indicate a "hang" type of condition in the network.

5.9 : DISPLAY CROSS-DOMAIN RESOURCE MANAGER

```
 ====>                  D NET,CDRMS                      (see note 18)
0000 16.50.10 STC   19  IST097I  DISPLAY  ACCEPTED
0000 16.50.10 STC   19  IEE932I 607
 607 IST350I  VTAM DISPLAY - DOMAIN TYPE= CROSS-DOM. RSRC MGR
 607 IST089I  M00      TYPE= CDRM SEGMENT      , ACTIV
 607 IST482I  M01      PACDR ,SUBAREA = 001
 607 IST482I  M03      NEVAC ,SUBAREA = 003
 607 IST482I  M10      PACDR ,SUBAREA = 010
 607 IST482I  M11      ACTIV ,SUBAREA = 011
 607 IST482I  M22      PACDR ,SUBAREA = 022
 607 IST482I  M90      NEVAC ,SUBAREA = 090
 607 IST482I  M91      ACTIV ,SUBAREA = 091
 607 IST314I  END

 =====>                 D NET,ID=M00,E
0000 16.14.11 STC   17  IST097I  DISPLAY  ACCEPTED
0000 16.14.11 STC   17  IEE932I 173
 173 IST075I  VTAM DISPLAY - NODE TYPE= CDRM SEGMENT
 173 IST486I  NAME= M00      ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 173 IST477I  CDRMS:
 173 IST482I  M01      PACDR ,SUBAREA = 001
 173 IST482I  M03      NEVAC ,SUBAREA = 003
 173 IST482I  M10      INACT ,SUBAREA = 010
 173 IST482I  M11      ACTIV ,SUBAREA = 011
 173 IST482I  M22      ACTIV ,SUBAREA = 022
 173 IST482I  M90      NEVAC ,SUBAREA = 090
 173 IST482I  M91      ACTIV ,SUBAREA = 091
 173 IST314I  END

 =====>                 D NET,ID=M11,E
0000 16.14.37 STC   17  IST097I  DISPLAY  ACCEPTED
0000 16.14.37 STC   17  IEE932I 177
 177 IST075I  VTAM DISPLAY - NODE TYPE= CDRM
 177 IST486I  NAME= M11      ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 177 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 177 IST476I  CDRM TYPE = HOST     ,SUBAREA = 011
 177 IST388I  DYNAMIC CDRSC DEFINITION SUPPORT = YES
 177 IST171I  ACTIVE SESSIONS = 0002 SESSION REQUESTS = 0000
 177 IST477I  CDRMS:
 177 IST634I  NAME      STATUS      SESS ID          SEND  RECV  VRN TP
 177 IST635I  M91       ACTIV                                    0   0
 177 IST635I  M22       ACTIV                                    0   0
 177 IST314I  END
```

Note 18: This command is valid when your system is part of an ACF multi-domain network. You can display the status of Cross-Domain Manager (CDRM) major nodes in your domain. The options provide for specification, with EVERY the default (shown here).
After, it displays the minor node M11 it then gives the two CDRMs in session.

5.10 : DISPLAY CROSS-DOMAIN RESOURCES

```
 =====>                D NET,CDRSCS                    (see note 19)
0000 16.50.23 STC   19  IST097I  DISPLAY  ACCEPTED
0000 16.50.23 STC   19  IEE932I 611
 611 IST350I  VTAM DISPLAY - DOMAIN TYPE= CROSS-DOM. RESOURCES
 611 IST089I  R01ATSO  TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  TSO01    ACTIV       ,CDRM = M01
 611 IST483I  TSO0101  ACTIV       ,CDRM = M01
 611 IST483I  TSO0102  ACTIV       ,CDRM = M01
 611 IST483I  TSO0103  ACTIV       ,CDRM = M01
 611 IST089I  R01ANCF  TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  NCF01    ACTIV       ,CDRM = M01
 611 IST483I  NCF01000 ACTIV       ,CDRM = M01
 611 IST483I  NCF01003 ACTIV       ,CDRM = M01
 611 IST089I  R01APP   TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  NPA01    ACTIV       ,CDRM = M01
 611 IST483I  REMJES01 ACTIV       ,CDRM = M01
 611 IST483I  CICSMV01 ACTIV       ,CDRM = M01
 611 IST483I  HCF01    ACTIV       ,CDRM = M01
 611 IST483I  LCV01    ACTIV       ,CDRM = M01
 611 IST483I  DSX01    ACTIV       ,CDRM = M01
 611 IST483I  SENDAE01 ACTIV       ,CDRM = M01
 611 IST483I  RECDAE01 ACTIV       ,CDRM = M01
 611 IST089I  R01ACICS TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  CICS21   ACTIV       ,CDRM = M01
 611 IST089I  R10ANCF  TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  NCF10    ACTIV       ,CDRM = M10
 611 IST483I  NCF10000 ACTIV       ,CDRM = M10
 611 IST483I  NCF10001 ACTIV       ,CDRM = M10
 611 IST089I  R10APP   TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  NPA10    ACTIV       ,CDRM = M10
 611 IST483I  RDPD3MVS ACTIV--S--  ,CDRM = M10
 611 IST483I  CICSMVS2 ACTIV--S--  ,CDRM = M10
 611 IST483I  IMSMVS2  ACTIV--S--  ,CDRM = M10
 611 IST483I  HCF10    ACTIV       ,CDRM = M10
 611 IST483I  LCV10    ACTIV       ,CDRM = M10
 611 IST483I  DSX10    ACTIV       ,CDRM = M10
 611 IST483I  SEND10   ACTIV       ,CDRM = M10
 611 IST483I  RECV10   ACTIV       ,CDRM = M10
 611 IST089I  R10ACICS TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  CICS10   ACTIV       ,CDRM = M10
 611 IST089I  R21ATSO  TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  TSO21    ACTIV       ,CDRM = M21
 611 IST483I  TSO2101  ACTIV       ,CDRM = M21
 611 IST483I  TSO2102  ACTIV       ,CDRM = M21
 611 IST089I  R21ANCF  TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  NCF21    ACTIV       ,CDRM = M21
 611 IST483I  NCF21000 ACTIV       ,CDRM = M21
 611 IST483I  NCF21001 ACTIV       ,CDRM = M21
 611 IST483I  NCF21002 ACTIV       ,CDRM = M21
```

Note 19: This command is valid when your system is part of an ACF multi-domain network. You can display information about Cross-Domain Resources (CDRSCS) in an active CDRSCS major node in your domain. The option EVERY is the default (shown here).

```
 611 IST089I  R21APP    TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  ECHO21    ACTIV       ,CDRM = M21
 611 IST483I  SNAP21    ACTIV       ,CDRM = M21
 611 IST483I  REMJES21  ACTIV       ,CDRM = M21
 611 IST483I  SEND21    ACTIV       ,CDRM = M21
 611 IST483I  RECV21    ACTIV       ,CDRM = M21
 611 IST089I  R21AIMS   TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  IMS21     ACTIV       ,CDRM = M21
 611 IST089I  R21ACICS  TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  CICS21    RESET       ,CDRM = M21
 611 IST089I  R91ANCF   TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  NCF91     ACTIV       ,CDRM = M91
 611 IST483I  NCF91000  ACTIV       ,CDRM = M91
 611 IST483I  NCF91001  ACTIV       ,CDRM = M91
 611 IST089I  R91H      TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  H91L120   ACTIV       ,CDRM = M91
 611 IST483I  H91L121   ACTIV       ,CDRM = M91
 611 IST483I  H91L122   ACTIV       ,CDRM = M91
 611 IST483I  H91L012   ACTIV       ,CDRM = M91
 611 IST089I  R22ACICS  TYPE= CDRSC SEGMENT     , ACTIV
 611 IST483I  CICS22    ACTIV       ,CDRM = M22
 611 IST483I  CICSB622  ACTIV       ,CDRM = M22
 611 IST314I  END

 =====>                D NET,ID=R01ATSO,E
0000 16.15.47 STC   17  IST097I  DISPLAY  ACCEPTED
0000 16.15.48 STC   17  IEE932I 185
 185 IST075I  VTAM DISPLAY - NODE TYPE= CDRSC SEGMENT
 185 IST486I  NAME= R01ATSO  ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 185 IST478I  CDRSCS:
 185 IST483I  TSO01     ACTIV       ,CDRM = M01
 185 IST483I  TSO0101   ACTIV       ,CDRM = M01
 185 IST483I  TSO0102   ACTIV       ,CDRM = M01
 185 IST483I  TSO0103   ACTIV       ,CDRM = M01
 185 IST314I  END

 =====>                D NET,ID=TSO01,E
0000 16.16.13 STC   17  IST097I  DISPLAY  ACCEPTED
0000 16.16.14 STC   17  IEE932I 189
 189 IST075I  VTAM DISPLAY - NODE TYPE= CDRSC
 189 IST486I  NAME= TSO01    ,STATUS= ACTIV          ,DESIRED STATE= ACTIV
 189 IST479I  CDRM NAME = M01
 189 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 189 IST171I  ACTIVE SESSIONS = 0000 SESSION REQUESTS = 0000
 189 IST206I  SESSIONS:
 189 IST172I  NO SESSIONS      EXIST
 189 IST314I  END
```

5.11 : DISPLAY PATH TABLE CONTENTS

```
 =====>                D NET,PATHTAB
0000 14.55.11 STC   16  IST097I  DISPLAY  ACCEPTED
0000 14.55.12 STC   16  IEE932I 270
 270 IST350I  VTAM DISPLAY - DOMAIN TYPE= PATH TABLE CONTENTS
 270 IST516I  DESTSUB-ADJSUB-ER-ER STATUS-VR(S)
 270 IST517I  004     014     5   INACT      4  5
 270 IST517I  004     014     4   INACT      3
 270 IST517I  004     014     2   ACTIV3     2
 270 IST517I  004     014     1   INOP       1  6  7
 270 IST517I  004     014     0   ACTIV3     0
 270 IST517I  009     014     5   INOP       4  5
 270 IST517I  009     014     4   INOP       3
 270 IST517I  009     014     2   INOP       2
 270 IST517I  009     014     1   INOP       1  6  7
 270 IST517I  009     014     0   INOP       0
 270 IST517I  010     014     0   MIGR       0
 270 IST517I  011     011     0   ACTIV3     0
 270 IST517I  014     014     7   PDEFO
 270 IST517I  014     014     6   PDEFO
 270 IST517I  014     014     5   PDEFO
 270 IST517I  014     014     4   PDEFO
 270 IST517I  014     014     3   PDEFO
 270 IST517I  014     014     2   PDEFO
 270 IST517I  014     014     1   PDEFO
 270 IST517I  014     014     0   ACTIV3     0
 270 IST517I  019     014     0   INOP       0
 270 IST517I  024     014     2   PDEFO
 270 IST517I  024     014     5   INACT      3
 270 IST517I  024     014     4   INACT      4  5
 270 IST517I  024     014     3   INOP       2
 270 IST517I  024     014     1   ACTIV3     1  6  7
 270 IST517I  024     014     0   INACT      0
 270 IST314I  END
```

```
 =====>                D NET,PATHTAB,ADJSUB=14
0000 15.00.54 STC   16  IST097I  DISPLAY  ACCEPTED
0000 15.00.54 STC   16  IEE932I 360
 360 IST350I  VTAM DISPLAY - DOMAIN TYPE= PATH TABLE CONTENTS
 360 IST516I  DESTSUB-ADJSUB-ER-ER STATUS-VR(S)
 360 IST517I  004     014     5   INACT      4  5
 360 IST517I  004     014     4   INACT      3
 360 IST517I  004     014     2   ACTIV3     2
 360 IST517I  004     014     1   INOP       1  6  7
 360 IST517I  004     014     0   ACTIV3     0
 360 IST517I  009     014     5   INOP       4  5
 360 IST517I  009     014     4   INOP       3
 360 IST517I  009     014     2   INOP       2
 360 IST517I  009     014     1   INOP       1  6  7
```

```
 360 IST517I  009      014      0   INOP       0
 360 IST517I  010      014      0   MIGR       0
 360 IST517I  014      014      7   PDEFO
 360 IST517I  014      014      6   PDEFO
 360 IST517I  014      014      5   PDEFO
 360 IST517I  014      014      4   PDEFO
 360 IST517I  014      014      3   PDEFO
 360 IST517I  014      014      2   PDEFO
 360 IST517I  014      014      1   PDEFO
 360 IST517I  014      014      0   ACTIV3     0
 360 IST517I  019      014      0   INOP       0
 360 IST517I  024      014      2   PDEFO
 360 IST517I  024      014      5   INACT      3
 360 IST517I  024      014      4   INACT      4  5
 360 IST517I  024      014      3   INOP       2
 360 IST517I  024      014      1   ACTIV3     1  6  7
 360 IST517I  024      014      0   INACT      0
 360 IST314I  END

 =====>                D NET,PATHTAB,DESTSUB=24
0000 15.01.32 STC   16  IST097I  DISPLAY  ACCEPTED
0000 15.01.32 STC   16  IEE932I 377
 377 IST350I  VTAM DISPLAY - DOMAIN TYPE= PATH TABLE CONTENTS
 377 IST516I  DESTSUB-ADJSUB-ER-ER STATUS-VR(S)
 377 IST517I  024      014      2   PDEFO
 377 IST517I  024      014      5   INACT      3
 377 IST517I  024      014      4   INACT      4  5
 377 IST517I  024      014      3   INOP       2
 377 IST517I  024      014      1   ACTIV3     1  6  7
 377 IST517I  024      014      0   INACT      0
 377 IST314I  END
```

5.12 : FINDING A TSO USER ID

```
 =====>                D NET,APPLS,A
0000 15.02.34 STC   16  IST097I  DISPLAY  ACCEPTED
0000 15.02.36 STC   16  IEE932I 389
 389 IST350I  VTAM DISPLAY - DOMAIN TYPE= APPL MAJ NODES/NAMES
 389 IST089I  VTAMSEG  TYPE= APPL SEGMENT      , ACTIV
 389 IST360I  APPLICATIONS:
 389 IST080I  M11      ACTIV      ISTOLTEP ACTIV      ISTATA00 CONCT
 389 IST080I  ISTNOP   ACTIV
 389 IST089I  A11IMS   TYPE= APPL SEGMENT      , ACTIV
 389 IST360I  APPLICATIONS:
 389 IST080I  IMS11    CONCT      IMSMVS2  CONCT
 389 IST089I  A11TSO   TYPE= APPL SEGMENT      , ACTIV
 389 IST360I  APPLICATIONS:
 389 IST080I  TSO11    ACTIV      TSO1101  ACTIV      TSO1102  ACTIV
 389 IST080I  TSO1103  ACTIV      TSO1104  CONCT      TSO1105  ACTIV
 389 IST080I  TSO1106  CONCT      TSO1107  CONCT      TSO1108  CONCT
 389 IST089I  A11NCF   TYPE= APPL SEGMENT      , ACTIV
 389 IST360I  APPLICATIONS:
 389 IST080I  NCF11    CONCT      NCF11PPT CONCT      BNHDSERV CONCT
 389 IST080I  NCF11000 CONCT      NCF11001 CONCT      NCF11002 CONCT
 389 IST080I  NCF11003 CONCT      NCF11004 CONCT      NCF11005 CONCT
 389 IST080I  NCF11006 CONCT      NCF11007 CONCT      NCF11008 CONCT
 389 IST080I  NCF11009 CONCT      TAF11    CONCT      TAF12    CONCT
 389 IST080I  TAF13    CONCT      TAF14    CONCT      TAF21    CONCT
 389 IST080I  TAF22    CONCT      TAF23    CONCT      TAF24    CONCT
 389 IST089I  A11APP   TYPE= APPL SEGMENT      , ACTIV
 389 IST360I  APPLICATIONS:
 389 IST080I  NPA11    ACTIV      RMU11    CONCT      RDPD3MVS ACTIV
 389 IST080I  HCF11    ACTIV      LCV11    ACTIV      DSX11    CONCT
 389 IST080I  ADMPRINT CONCT      SENDAE11 CONCT      RECDAE11 CONCT
 389 IST080I  ECHO11   CONCT      SNAP11   CONCT      RECV11   CONCT
 389 IST080I  RECV1101 CONCT      RECV1102 CONCT      RECV111  CONCT
 389 IST080I  RECV1111 CONCT      RECV1112 CONCT      RECV112  CONCT
 389 IST080I  RECV1121 CONCT      RECV1122 CONCT      RECV113  CONCT
 389 IST080I  RECV1131 CONCT      RECV1132 CONCT      RECV114  CONCT
 389 IST080I  SEND11   CONCT      SEND111  CONCT      SEND112  CONCT
 389 IST080I  SEND113  CONCT      SEND114  CONCT      VMDISC   ACTIV
 389 IST089I  A11CICS  TYPE= APPL SEGMENT      , ACTIV
 389 IST360I  APPLICATIONS:
 389 IST080I  CICSMVS2 CONCT      CICS11   ACTIV      CICSA    CONCT
 389 IST080I  CICSB    CONCT
 389 IST089I  A11DPCX  TYPE= APPL SEGMENT      , ACTIV
 389 IST360I  APPLICATIONS:
 389 IST080I  DIF11    CONCT      HPGM11   CONCT      IPVS11   CONCT
 389 IST080I  SIRF11   CONCT
 389 IST314I  END
```

```
 =====>                D NET,ID=TSO1102,E
0000 15.05.25 STC   16  IST097I  DISPLAY  ACCEPTED
0000 15.05.27 STC   16  IEE932I 407
 407 IST075I  VTAM DISPLAY - NODE TYPE= APPL
 407 IST486I  NAME= TSO1102  ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 407 IST212I  ACBNAME = TSO0002
 407 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 407 IST271I  JOBNAME = WTCCNM1  STEPNAME = IKJACCNT
 407 IST171I  ACTIVE SESSIONS = 0001 SESSION REQUESTS = 0000
 407 IST206I  SESSIONS:
 407 IST634I  NAME      STATUS      SESS ID           SEND  RECV  VRN TP
 407 IST635I  H11L3E2   ACTIV-SEC   16012A1062BC4847  0187  0179   0   0
 407 IST314I  END

 =====>                D NET,U,ID=WTCCNM1
0000 22.54.54 STC   16  IST097I  DISPLAY  ACCEPTED
0000 22.54.56 STC   16  IEE932I 726
 726 IST075I  VTAM DISPLAY - NODE TYPE= TSO USERID
 726 IST486I  NAME= WTCCNM1  ,STATUS= ACTIV           ,DESIRED STATE=  N/A
 726 IST576I  TSO TRACE=OFF
 726 IST262I  APPLNAME = TSO0002  , STATUS = ACTIV
 726 IST262I  LUNAME   = T14022C1 , STATUS = ACTIV
 726 IST314I  END
```

Note 20: Using this command, obtain;
-name of the TSO user
-status of the TSO user
-if TSO trace is active.

5.13 : GENERATE AND DISPLAY TUNING STATISTICS

(see note 21)

```
0000 22.51.23 STC   16  IEE932I 695
 695 IST440I  TIME = 22512342 DATE = 81281 LOCAL PC NAME = 0FE-L
 695 IST441I  DLRMAX = 1        CHWR  = 26       CHRD  = 32
 695 IST442I  ATTN   = 32       RDATN = 0        IPIU  = 36
 695 IST443I  OPIU   = 28       RDBUF = 36       SLODN = 0
 695 IST314I  END
```

Note 21: The new ACF/VTAM tuning statistics can provide valuable information as a basis for adjusting ACF/VTAM and NCP variables to improve system performance. To generate this data, be sure to specify the TNSTAT parameter in the 'START' command.

5.14 : HALT NET COMMAND

OPERATION	OPERAND	MODIFIER	CONDITIONS	VTAM ACTION	APPLICATION ACTION	DISPLAY STATUS
HALT NET z net	NONE			Deactivates all active devices not in session. Drives TPEND exit with reason code 0. VTAM remains active until application closes ACB.	None required.	INACT for all devices not in session.
HALT NET, z net,	QUICK quick		Devices active and inactive.	Deactivates all active devices not in session. Drives TPEND exit with reason code 4. VTAM remains active until application closes ACB.	Application should close ACB.	INACT for all devices not in session until VTAM shutdown complete.
HALT NET, z net,	CANCEL cancel		Devices active and inactive.	Drives TPEND exit with reason code 8.	Application should expect error when closing ACB.	None because VTAM is not active.

5.15 : VARY NET ACTIVE COMMAND

OPERATION	OPERAND	MODIFIER	CONDITIONS	VTAM ACTION	APPLICATION ACTION	DISPLAY STATUS
VARY NET, v net,	ACTIVE, act,		Device inactive	Activates device. (IST093I) when Vary complete. Drives LOGON exit if LOGAPPL specified and device becomes active.	Application should issue OPNDST.	INACT/C until CONTACT complete. act if contact complete.
VARY NET, v net,	ACTIVE, act,		Devices active and inactive.	Activates inactive devices if issued against NCP. Gives error message for device other than NCP if already active (IST067I).	NA	Same as above.

5.16 : VARY NET INACT COMMAND

OPERATION	OPERAND	MODIFIER	CONDITIONS	VTAM ACTION	APPLICATION ACTION	DISPLAY STATUS
VARY NET v net,	INACT, inact,	NONE	device inactive.	Error message indicating already inactive (IST104I).	NA	INACT
VARY NET, v net,	INACT, inact,	NONE	device Inactive, and contact pending.	Error message (IST604I), (unable to contact).	NA	INACT/C (before) INACT (after).
VARY NET, v net,	INACT, inact,	NONE	Active and not in session.	VTAM deactivates and message indicating complet- ion is returned (IST105I).	NA	INACT
VARY NET, v net,	INACT, inact,	NONE	Active and in session.	VTAM saves command and does nothing until applica- tion does CLSDST.	LOSTERM is not driven.	ACT until CLSDST issued.
VARY NET, v net,	INACT, inact,	IMMEDIATE, i,	Active and in session.	VTAM drives losterm exit. When application does CLSDST, VTAM does CLEAR,and UNBIND. When CLSDST completes, VTAM indicates device INACT.	Application must do CLSDST. If application does not do a CLSDST, device remains active.	ACT until CLSDST issued.
VARY NET, v net,	INACT, inact,	FORCE, f,	Active, in session, but no path	VTAM sets indicator and drives LOSTERM exit. VTAM does not do a CLEAR, and UNBIND, but responds to CLSDST immediately. VTAM will indicate when vary is complete (IST105I).	Application must do CLSDST. If application does not, device remains active.	ACT until CLSDST issued.
VARY NET, v net,	INACT, INACT,	RESTART, r,	Active, in session, but no path	VTAM sets indicator and drives LOSTERM exit. VTAM does not do a CLEAR, and UNBIND, but responds to CLSDST immediately. VTAM will indicate when vary is complete and device is active again (IST621I).	Application must do CLSDST. If,application does not, device remains active.	ACT until CLSDST issued.

5.17 : DISPLAY STATIONS

```
 =====>                D NET,STATIONS
0000 17.26.47 STC   17  IST097I  DISPLAY  ACCEPTED
0000 17.26.47 STC   17  IEE932I 545
 545 IST350I  VTAM DISPLAY - DOMAIN TYPE= STATIONS
 545 IST393I  PU T4/5 MAJOR NODE: NAME = ISTPUS   ,SUBAREA = 011
 545 IST396I  LINENAME STATUS     LNKSTA   STATUS     CTG GTG ADJNODE  ADJSA
 545 IST397I  0FE-L    ACTIV----I 0FE-S    ACTIV----I   1   1 N14BF3P  014
 545 IST393I  PU T4/5 MAJOR NODE: NAME = N245F35  ,SUBAREA = 024
 545 IST396I  LINENAME STATUS     LNKSTA   STATUS     CTG GTG ADJNODE  ADJSA
 545 IST397I  L24024   NEVAC      P24024   NEVAC        8   8           000
 545 IST397I  L24026   ACTIV----E P24026   ACTIV----E   8   8 N043F35  004
 545 IST397I  L2402C   ACTIV----E P2402C   ACTIV----E   8   8 N14BF3P  014
 545 IST397I  L24032   NEVAC      P24032   NEVAC        6   6           000
 545 IST393I  PU T4/5 MAJOR NODE: NAME = N043F35  ,SUBAREA = 004
 545 IST396I  LINENAME STATUS     LNKSTA   STATUS     CTG GTG ADJNODE  ADJSA
 545 IST397I  L04024   ACTIV----E P04024   ACTIV----E   8   0 N245F35  024
 545 IST397I  L04026   IINOP      P04026   IINOP        0   0           000
 545 IST397I  L04028   NEVAC      P04028   NEVAC        0   0           000
 545 IST397I  L040A2   NEVAC      P040A2   NEVAC        7   7           000
 545 IST397I  L040A5   ACTIV----E P040A5   ACTIV----E   4   4 N14BF3P  014
 545 IST397I  L040A6   ACTIV----E P040A6   ACTIV----E   3   3 N245F35  024
 545 IST393I  PU T4/5 MAJOR NODE: NAME = N14BF3P  ,SUBAREA = 014
 545 IST396I  LINENAME STATUS     LNKSTA   STATUS     CTG GTG ADJNODE  ADJSA
 545 IST397I  L14024   IINOP      P14024   IINOP        8   8           000
 545 IST397I  L14026   NEVAC      P14026   NEVAC        8   8           000
 545 IST397I  L14028   ACTIV----E P14028   ACTIV----E   8   8 N245F35  024
 545 IST397I  L14042   ACTIV----E P14042   PCTD1        5   5           000
 545 IST397I  L140A5   ACTIV----E P140A5   ACTIV----E   4   4 N043F35  004
 545 IST397I  L140A6   NEVAC      P140A6   NEVAC        4   4           000
 545 IST314I  END

 =====>                D NET,STATIONS,ID=N14BF3P
0000 17.27.36 STC   17  IST097I  DISPLAY  ACCEPTED
0000 17.27.36 STC   17  IEE932I 549
 549 IST350I  VTAM DISPLAY - DOMAIN TYPE= STATIONS
 549 IST393I  PU T4/5 MAJOR NODE: NAME = N14BF3P  ,SUBAREA = 014
 549 IST396I  LINENAME STATUS     LNKSTA   STATUS     CTG GTG ADJNODE  ADJSA
 549 IST397I  L14024   IINOP      P14024   IINOP        8   8           000
 549 IST397I  L14026   NEVAC      P14026   NEVAC        8   8           000
 549 IST397I  L14028   ACTIV----E P14028   ACTIV----E   8   8 N245F35  024
 549 IST397I  L1402C   ACTIV----E P1402C   ACTIV----E   8   8 N245F35  024
 549 IST397I  L14040   ACTIV----E P14040   ACTIV----E   2   2 N245F35  024
 549 IST397I  L14042   ACTIV----E P14042   PCTD1        5   5           000
 549 IST397I  L140A5   ACTIV----E P140A5   ACTIV----E   4   4 N043F35  004
 549 IST397I  L140A6   NEVAC      P140A6   NEVAC        4   4           000
 549 IST314I  END
```

5.18 : DISPLAY ROUTES

```
 =====>                D NET,ROUTE,DESTSUB=04
0000 17.22.09 STC   17  IST097I  DISPLAY  ACCEPTED
0000 17.22.09 STC   17  IEE932I 498
 498 IST535I  ROUTE DISPLAY  10 TO SA =   4
 498 IST536I  VR TP   STATUS   ER   ADJSUB   STATUS
 498 IST537I   0  0   INACT     0      14    ACTIV3
 498 IST537I   0  1   INACT     0      14    ACTIV3
 498 IST537I   0  2   ACTIV     0      14    ACTIV3
 498 IST537I   1  0   INACT     1      14    INOP
 498 IST537I   1  1   INACT     1      14    INOP
 498 IST537I   1  2   INACT     1      14    INOP
 498 IST537I   6  0   INACT     1      14    INOP
 498 IST537I   6  1   INACT     1      14    INOP
 498 IST537I   6  2   INACT     1      14    INOP
 498 IST537I   7  0   INACT     1      14    INOP
 498 IST537I   7  1   INACT     1      14    INOP
 498 IST537I   7  2   INACT     1      14    INOP
 498 IST537I   2  0   INACT     2      14    INACT
 498 IST537I   2  1   INACT     2      14    INACT
 498 IST537I   2  2   INACT     2      14    INACT
 498 IST537I                    3            UNDEF
 498 IST537I   3  0   INACT     4      14    INACT
 498 IST537I   3  1   INACT     4      14    INACT
 498 IST537I   3  2   INACT     4      14    INACT
 498 IST537I   4  0   INACT     5      14    INACT
 498 IST537I   4  1   INACT     5      14    INACT
 498 IST537I   4  2   INACT     5      14    INACT
 498 IST537I                    6            UNDEF
 498 IST314I  END

 =====>                D NET,ROUTE,DESTSUB=22
0000 17.22.51 STC   17  IST097I  DISPLAY  ACCEPTED
0000 17.22.54 STC   17  IEE932I 502
 502 IST535I  ROUTE DISPLAY  11 TO SA =  22
 502 IST536I  VR TP   STATUS   ER   ADJSUB   STATUS
 502 IST537I   0  0   ACTIV     0      14    MIGR
 502 IST537I   0  1   INACT     0      14    MIGR
 502 IST537I   0  2   INACT     0      14    MIGR
 502 IST537I                    1            UNDEF
 502 IST537I                    2            UNDEF
 502 IST314I  END


 =====>                D NET,ROUTE,DESTSUB=04,TEST=YES
0000 17.23.34 STC   17  IST097I  DISPLAY  ACCEPTED
0000 17.23.34 STC   17  IEE932I 506
 506 IST535I  ROUTE DISPLAY  12 TO SA =   4
 506 IST536I  VR TP   STATUS   ER   ADJSUB   STATUS
 506 IST537I   0  0   INACT     0      14    ACTIV3
```

Note 22: The option TEST of the DISPLAY ROUTE command allows verifying the status of the paths to one subarea. It is very interesting given the automatic activation of links in ACF/VTAM Rel.3.

```
 506 IST537I   0  1   INACT     0       14    ACTIV3
 506 IST537I   0  2   ACTIV     0       14    ACTIV3
 506 IST537I   1  0   INACT     1       14    INOP
 506 IST537I   1  1   INACT     1       14    INOP
 506 IST537I   1  2   INACT     1       14    INOP
 506 IST537I   6  0   INACT     1       14    INOP
 506 IST537I   6  1   INACT     1       14    INOP
4020 17.23.41 STC  179  +IST533I   0    1    11    4   FAILED
4020 17.23.42 STC  179  +IST534I                                    1
4020 17.23.42 STC  179  +IST572I                                                14   4   8
4020 17.23.42 STC  179  +IST573I  Reason: A REQUIRED TG IS INACTIVE , ER MASK = 8000
 506 IST537I   6  2   INACT     1       14    INOP
 506 IST537I   7  0   INACT     1       14    INOP
 506 IST537I   7  1   INACT     1       14    INOP
 506 IST537I   7  2   INACT     1       14    INOP
 506 IST537I   2  0   INACT     2       14    INACT
 506 IST537I   2  1   INACT     2       14    INACT
 506 IST537I                     3             UNDEF
 506 IST537I   3  0   INACT     4       14    INACT
 506 IST537I   3  1   INACT     4       14    INACT
 506 IST537I   3  2   INACT     4       14    INACT
 506 IST537I   4  0   INACT     5       14    INACT
 506 IST537I   4  1   INACT     5       14    INACT
 506 IST537I                     6             UNDEF
 506 IST314I  END
0000 17.23.37 STC   17  IST538I  ROUTE TEST  12 IN PROGRESS
0000 17.23.37 STC   17  IEE932I 508
 508 IST533I  ER 1 FAILED       ROUTE TEST  12  FROM SA =  11  TO SA =   4
 508 IST534I                    ERLENGTH =   1  ADJSUB  =  14     TG =   1
 508 IST572I          REJECTING SA =  14 ADJACENT TO SA =   4 VIA TG =   8
 508 IST573I                    A REQUIRED TG IS INACTIVE,  ER MASK = 8000
0000 17.23.38 STC   17  IEE932I 509
 509 IST533I  ER 2 SUCCEEDED IN ROUTE TEST  12  FROM SA =  11  TO SA =   4
 509 IST534I                    ERLENGTH =   3  ADJSUB  =  14     TG =   1
0000 17.23.38 STC   17  IEE932I 510
 510 IST533I  ER 0 SUCCEEDED IN ROUTE TEST  12  FROM SA =  11  TO SA =   4
 510 IST534I                    ERLENGTH =   2  ADJSUB  =  14     TG =   1
0000 17.23.38 STC   17  IEE932I 511
 511 IST533I  ER 5 SUCCEEDED IN ROUTE TEST  12  FROM SA =  11  TO SA =   4
 511 IST534I                    ERLENGTH =   2  ADJSUB  =  14     TG =   1
0000 17.23.38 STC   17  IEE932I 512
 512 IST533I  ER 4 SUCCEEDED IN ROUTE TEST  12  FROM SA =  11  TO SA =   4
 512 IST534I                    ERLENGTH =   3  ADJSUB  =  14     TG =   1
```

CHAPTER 6 : SNA DEVICE FLOW

This chapter describes the SNA flow for many of the more common activities. Data flow diagrams and several trace examples for SNA devices are provided to indicate the correct operation of the device in the system. This chapter, when used in conjunction with a trace, should allow the user to determine the failing sequence when the trace and the flow disagree.

The traces employed here are VTAM I/O, BUFFER and NCP LINE traces.

CONTENTS

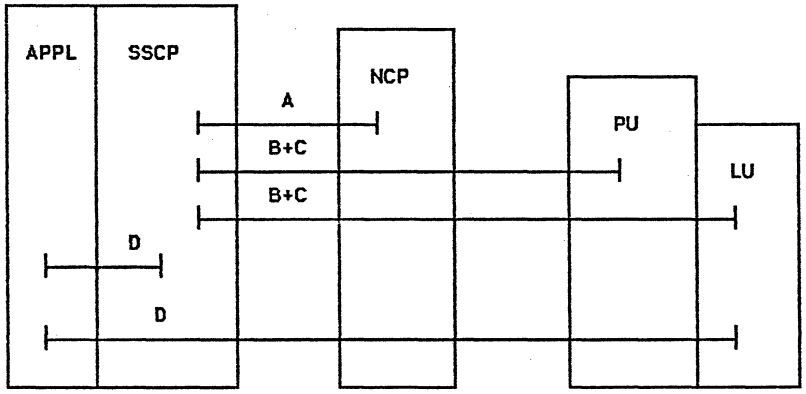
6.1 : SNA FLOW DIAGRAMS - SESSION CONCEPTS

This section shows the session concepts, single and multiple-domain, that are described in detail in subsequent sections. Specific activities illustrated in these models can be found on the pages listed below.

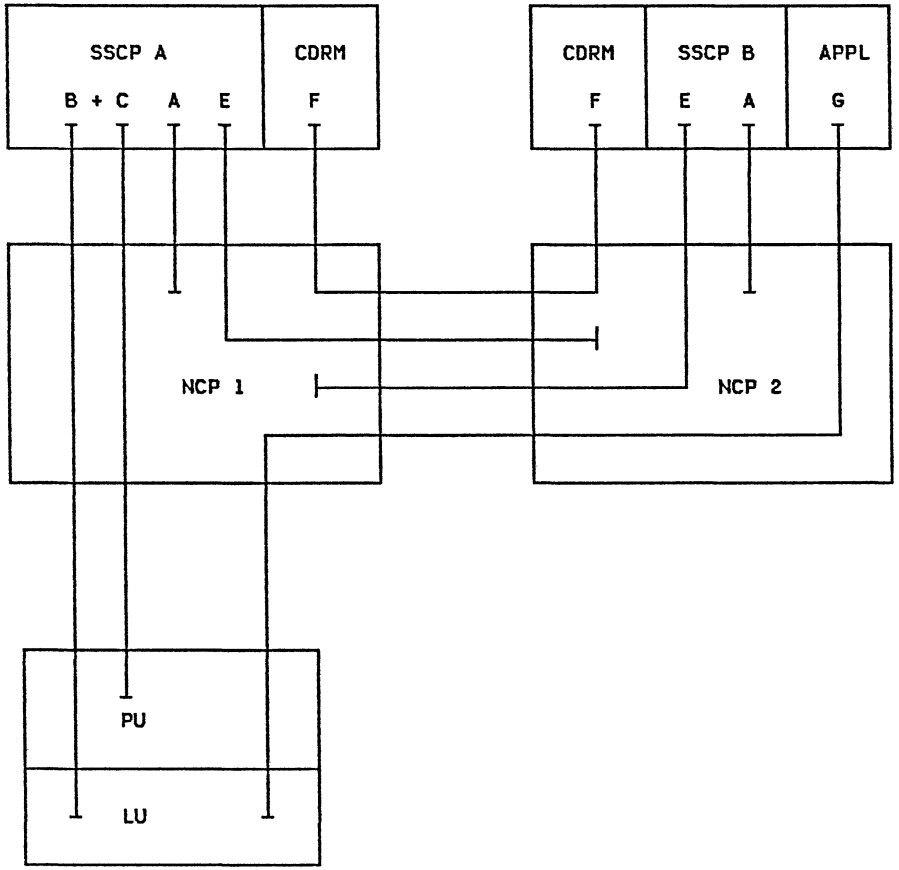
FOR MORE DETAILS SEE: INTRODUCTION TO ACF/VTAM LOGIC
NCP PLM
INSTALLATION GUIDE SCENARIOS FOR REL 3 ACF (G320-5869)

SESSION CONCEPTS

SINGLE DOMAIN



MULTI DOMAIN



	PAGE
A : Activation of NCP (PU Type 4)	6-5
B : Acticate PU Type 1 (SDLC Terminal)	6-14
C : Activate PU Type 2 (Cluster)	6-16
D : Logon LU to LU	6-23
E : Activate PU Type 4 Cross-Domain	6-35
F : Activate CDRM	6-44
G : Logon LU to LU Cross-Domain	6-45

6.2 : SDLC COMMAND AND RESPONSE ACRONYMS

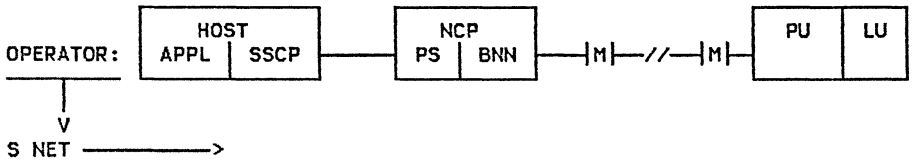
Given below are the current and the old set of acronyms for SDLC commands and responses and the relationship between them. Acronyms from both sets may be encountered in this chapter, although it is likely that the majority will be from the old set.

	NEW ACRONYM AND MEANING	OLD ACRONYM AND MEANING
•	UI - unnumbered information frame	NSI - nonsequenced information frame
•	SNRM - set normal response mode	unchanged
•	DISC - disconnect	unchanged
•	UA - unnumbered acknowledgement	NSA - nonsequenced acknowledgement
•	RIM - request initialization mode	RQI - request for initialization
•	SIM - set initialization mode	unchanged
•	DM - disconnect mode	ROL - request online
•	FRMR - frame reject	CMDR - command reject
•	TEST - test	unchanged
•	RD - request disconnect	RQD - request disconnect

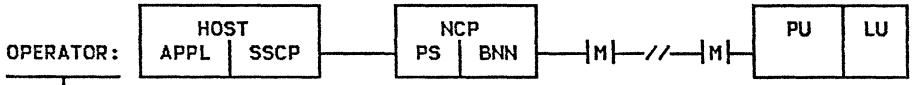
6.3 : ACTIVATION OF NCP

6.3.1 : FLOW DIAGRAM

The following diagram illustrates the flow associated with the activation of an NCP. Events included in the diagram are the load of the NCP (initialization), the activation of the Physical Unit Type 4 (ACT PU NCP) and the activation of related links (ACT LINK). If both the SSCP and the NCP are at the release 3 or higher level, there will be additional flows such as XIDs and eventually the ER and VR activation protocols (as shown in the trace example in the next section).




```
V NET,ACT,ID=NCP-->
                        NO- OP      (ALLOCATION)
                       ---------->
                        SENSE       (LOADED OR NOT INITIALIZED ?)
                       ---------->
                       WRITE IPL    (FIRST LOADER)
                       ---------->  (LOADED TO HEX '00400' IN THE 3705)
                                    (INITIAL TEST LOADED IF SPECIFIED)
                       WRITE BREAK  (SECOND LOADER)
                       ---------->  (LOADED INTO HIGH CORE OF 3705)
                        WRITES
                       ---------->  (NCP LOAD)
                       ---------->  (WRITE OP CODE X'01',FOLLOWED BY A
                       ---------->   NO-OP X'03')
                       -------//->  (EACH WRITE TRANSFERS WITH ONE CCW
                       ------//-->   HEX 200 BYTES)
                       -----//---->
                       ----//------>
                       //---------->  (NUMBER OF WRITES DEPENDS ON
                       ---------->   NCP SIZE: CONFIGURATION)
                       ---------->
                       ---------->  (LAST OP CODE IS X'09' (WRITE BREAK))
```



V

WRITE (LAST WRITE X'01', TRANSFERS 4 BYTES: ENTRY POINT TO "CXFINIT")

CE (CHANNEL END)

AFTER NCP INITIALIZATION:

DE (DEVICE END)

NO-OP (TRANSFERS CONTROL FROM LOADER TO VTAM)

ACT PU NCP

IC (NCP INITIALIZATION COMPLETE)

(ANSC)

(AUTO NETWORK SHUTDOWN COMPLETE)

+RSP ACT PU

SDT (START DATA TRAFFIC)

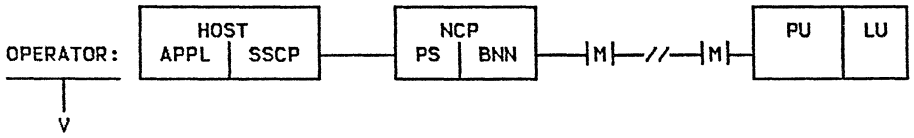
+RSP SDT

SCV (SET CONTROL VECTOR: DATE AND TIME)

+RSP SCV

SCV (SET CHANNEL ATTENTION DELAY TO ZERO)

+RSP SCV



ISTATUS ACTIVE:

ACT LINK ——————>

DTR SET "DATA TERMINAL READY" ——————>

DSR <—————— EXPECTS "DATA SET READY"
(IF NO "DSR":
ENABLE TIMEOUT: -RSP)

+RSP ACT LINK <——————

ISTATUS INACTIVE:

INACT LINK ——————>

+RSP INACT LINK <—————— POSITIVE RESPONSE:
ONLY IF LINK WAS ACTIVE

OR:

-RSP INACT LINK <—————— SENSE: LINK WAS ALREADY
INACTIVE.

AFTER ALL LINKS HAVE BEEN ACTIVATED OR INACTIVATED
ACCORDING TO "ISTATUS =":

SCV ——————> SET CHANNEL ATTENTION DELAY
TO THE NCP GENERATED VALUE.

+RSP SCV <——————

CONSOLE MESSAGE: NCPXXX ACTIVE

6.3.2 : CONSOLE LOG AND VTAM IO TRACE

This section shows the sequence of events that occur when an NCP is activated. Console log output and VTAM IO trace output illustrate the activation.

The following console messages show GTF being activated to trace VTAM IO activity. The USR and RNIO options are selected to allow GTF to accept trace data from VTAM. The modify command used to initiate the trace specifies 'ID=ISTPUS' which indicates that all PIUs between the host (PU type 5) and other PUs of type 4 or 5 are to be traced. PU Services (ISTPUS) must be specified rather than the node ID of the NCP because only active resources can be traced.

An MVS/SP 1.3 system with ACF/VTAM Release 3 and ACF/NCP was used to create the following trace and console output.

CONSOLE LOG OF NCP ACTIVATION

```
0000 13.00.15           s gtfcnm.gtf

0200 13.00.16 STC 1439  $HASP100 GTFCNM   ON STCINRDR
4000 13.00.17 STC 1439  $HASP373 GTFCNM   STARTED
4000 13.00.17 STC 1439  IEF403I GTFCNM - STARTED - TIME=13.00.17
4020 13.00.21 STC 1439  AHL121I  SYS1.PARMLIB INPUT INDICATED
0020 13.00.21 STC 1439  TRACE=RNIO,USR
4020 13.00.21 STC 1439  AHL103I  TRACE OPTIONS SELECTED --USR,RNIO
4020 13.00.40 STC 1439 *26 AHL125A  RESPECIFY TRACE OPTIONS OR REPLY U

0000 13.00.46           r 26,u

4020 13.00.46           IEE600I REPLY TO 26 IS;U
4000 13.00.46           IEF170I 1 CONSOLE  IEE600I REPLY TO 26 IS;U
0020 13.00.47 STC 1439  U
4020 13.00.48 STC 1439  AHL031I GTF INITIALIZATION COMPLETE

0000 13.01.10           f net,trace,type=io,id=istpus

0000 13.01.10 STC 1416  IST097I  MODIFY   ACCEPTED
0000 13.01.10 STC 1416  IST513I  TRACE INITIATED FOR NODE ISTPUS

0000 13.01.31           v net,act,id=n36r30,scope=only

0000 13.01.31 STC 1416  IST097I  VARY     ACCEPTED
0000 13.01.31 STC 1416  IST197I  SAVED CONFIGURATION N36R30   READ FROM VTAMOBJ
0000 13.01.32 STC 1416  IST461I  ACTIVATE   FOR U/RNAME ENTRY ID = 507-S    STARTED
0000 13.01.32 STC 1416  IST462I  ACTIVATION OF LINK STATION PU370B0  IS DEFERRED PENDING HIGHER LEVEL NODE ACTIVATION
0000 13.01.32 STC 1416  IST462I  ACTIVATION OF LINK STATION PU370A8  IS DEFERRED PENDING HIGHER LEVEL NODE ACTIVATION
0000 13.01.32 STC 1416  IST462I  ACTIVATION OF LINK STATION PU370AA  IS DEFERRED PENDING HIGHER LEVEL NODE ACTIVATION
```

```
0000 13.01.32 STC 1416  IST462I  ACTIVATION OF LINK STATION PU370AE  IS DEFERRED PENDING HIGHER LEVEL NODE ACTIVATION
0000 13.01.32 STC 1416  IST464I  LINK STATION 507-S    HAS CONTACTED NODE N36R30   SUBAREA  36
0000 13.01.32 STC 1416 *27 IST183A  N36R30   FOUND LOADED WITH N36R30   REPLY YES TO REIPL OR NO TO CONTINUE

0000 13.01.41           r 27,yes

0000 13.01.41           IEE600I REPLY TO 27 IS;YES
4020 13.01.41 STC 1420  +IST526I  ER INOP, ROUTE ORIG SA =  31, REASON = TG DEACTIVATION
4020 13.01.41 STC 1420  +IST527I  REPORTING NODE SA =  31 USING TG   1 ADJACENT TO SA =  36
4020 13.01.41 STC 1420  +IST568I  DSA =   1, ERN =  0
4020 13.01.41 STC 1420  +IST569I             VRN =  0
4020 13.01.41 STC 1420  +IST568I  DSA =   5, ERN =  0 1 2
4020 13.01.42 STC 1420  +IST569I             VRN =  0 1 2 3 4
4020 13.01.42 STC 1420  +IST568I  DSA =  36, ERN =  0 1 2
4020 13.01.42 STC 1420  +IST569I             VRN =  0 1 2 3 4
4020 13.01.42 STC 1420  +IST568I  DSA =  37, ERN =  2
4020 13.01.42 STC 1420  +IST569I             VRN =  2 3 4
4020 13.01.42 STC 1420  +IST570I  END ER INOP REPORT
0000 13.02.18 STC 1416  IST464I  LINK STATION 507-S    HAS CONTACTED NODE N36R30   SUBAREA  36
4020 13.02.19 STC 1420  +IST270I  3705 N36R30   NOW LOADED WITH LOADMOD N36R30
0000 13.02.19 STC 1416  IST093I  N36R30   ACTIVE

0000 13.02.40           f net,notrace,type=io,id=istpus

0000 13.02.40 STC 1416  IST097I  MODIFY   ACCEPTED
0000 13.02.40 STC 1416  IST512I  TRACE TERMINATED FOR NODE= ISTPUS

0000 13.02.45           p gtf

4020 13.02.45 STC 1439  AHL006I GTF ACKNOWLEDGES STOP COMMAND
4000 13.02.48 STC 1439  IEF404I GTFCNM - ENDED - TIME=13.02.48
4000 13.02.48 STC 1439  $HASP395 GTFCNM   ENDED
0200 13.02.49 STC 1439  $HASP250 GTFCNM   IS PURGED

0000 13.03.05           d net,id=n36r30

0000 13.03.05 STC 1416  IST097I  DISPLAY  ACCEPTED
0000 13.03.05 STC 1416  IEE932I 181
 181 IST075I  VTAM DISPLAY - NODE TYPE= PU_T4/5
 181 IST486I  NAME= N36R30   ,STATUS= ACTIV           ,DESIRED STATE= ACTIV
 181 IST247I  LOAD/DUMP PROCEDURE STATUS = RESET
 181 IST484I  SUBAREA = 036
 181 IST391I  ADJ LINK STATION = PU370AE  LINE =          ,NODE =
 181 IST391I  ADJ LINK STATION = PU370AA  LINE =          ,NODE =
 181 IST391I  ADJ LINK STATION = PU370A8  LINE =          ,NODE =
 181 IST391I  ADJ LINK STATION = PU370B0  LINE =          ,NODE =
 181 IST391I  ADJ LINK STATION = 507-S    LINE = 507-L    ,NODE = ISTPUS
 181 IST654I  I/O TRACE= OFF ,BUFFER TRACE= OFF
 181 IST077I  SIO=00000046 CUA=507
 181 IST675I  VR =  1 , TP =  2
 181 IST314I  END
```

VTAM IO TRACE OF NCP ACTIVATION

```
                                        ADVANCED COMMUNICATIONS FUNCTION
                                             TRACE ANALYSIS PROGRAM
        DATE: 02:08:82                  SYSTEMS NETWORK ARCHITECTURE DETAIL                    PAGE: 00001

MESSAGE   GROUP                                                                                  ENTRY
 NUMBER   SUMMARY                          D E S C R I P T I V E   A N A L Y S I S              SUMMARY

0000001  DATA FLOW   40 00 00 02 00 00 00 00 00 00 00 1F 00 00 00 24 1D 00 00 00 00 00 00 00 00 2A 2B 00 00 0F 00 00 01
                     00 00 00

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  0 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
         TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 0000                *           SNF SEQUENCE NUMBER: 00000 *
         TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0000          * FLOW: EXPEDITED   COUNT (DCF): 00042 *

         RH  00-02   RU TYPE: NETWORK CONTROL   REQUEST  * RESPONSE/REQUEST:                  * CHAIN: ONLY ELEMENT   *
                     RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF              *                       *
                     BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF    * RU CODE: EBCDIC       *

         RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA: 00 00 0F 00 00 01                              ER OP

0000001  USER DATA   *......                                                                   *


0000002  DATA FLOW   40 00 00 02 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 00 00 00 00 00 00 18 2B 00 00 0F 00 00 01
                     00 00 00

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  0 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
         TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0000                *           SNF SEQUENCE NUMBER: 00000 *
         TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 0000          * FLOW: EXPEDITED   COUNT (DCF): 00024 *

         RH  00-02   RU TYPE: NETWORK CONTROL   REQUEST  * RESPONSE/REQUEST:                  * CHAIN: ONLY ELEMENT   *
                     RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF              *                       *
                     BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF    * RU CODE: EBCDIC       *

         RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA: 00 00 0F 00 00 01                              ER OP

0000002  USER DATA   *......                                                                   *


0000003  DATA FLOW   40 00 00 02 00 00 00 00 00 00 00 1F 00 00 00 24 1D 00 00 00 00 00 00 00 00 18 2B 00 00 0F 00 00 01
                     00 00 00

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  0 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
```

```
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *             NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 0000               *          SNF SEQUENCE NUMBER: 00000 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0000          * FLOW: EXPEDITED   COUNT (DCF): 00024 *

        RH  00-02   RU TYPE: NETWORK CONTROL   REQUEST  * RESPONSE/REQUEST:                  * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF              *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF    * RU CODE: EBCDIC       *

        RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA: 00 00 0F 00 00 01                                ER OP

0000003 USER DATA  *......                                                                                              *


0000004 DATA FLOW   40 00 00 02 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 00 00 00 00 00 00 18 2B 00 00 0F 00 00 01
                    00 00 00

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  0 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *             NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0000               *          SNF SEQUENCE NUMBER: 00000 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 0000          * FLOW: EXPEDITED   COUNT (DCF): 00024 *

        RH  00-02   RU TYPE: NETWORK CONTROL   REQUEST  * RESPONSE/REQUEST:                  * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF              *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF    * RU CODE: EBCDIC       *

        RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA: 00 00 0F 00 00 01                                ER OP

0000004 USER DATA  *......                                                                                              *


0000005 DATA FLOW   48 00 01 00 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 00 00 00 00 00 00 28 2B 00 00 0B 00 00 01
                    00 00 7F

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: ON   MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 01 *
        TH  03-04   VR NUMBER (VRN):  0 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 0  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *             NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0000               *          SNF SEQUENCE NUMBER: 00000 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 0000          * FLOW: EXPEDITED   COUNT (DCF): 00040 *

        RH  00-02   RU TYPE: NETWORK CONTROL   REQUEST  * RESPONSE/REQUEST:                  * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF              *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF    * RU CODE: EBCDIC       *

        RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA: 00 00 0B 00 00 01                                ER ACT

0000005 USER DATA  *....."                                                                                              *


0000006 DATA FLOW   48 00 00 00 00 00 00 00 00 00 00 1F 00 00 00 24 1D 00 00 00 00 00 00 00 00 34 2B 00 00 0C 00 00 01
                    00 01 7F
```

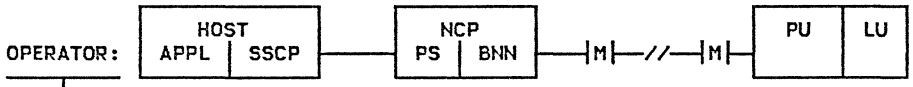
```
        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: ON   MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  0 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 0  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 0000                *           SNF SEQUENCE NUMBER: 00000 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0000          * FLOW: EXPEDITED   COUNT (DCF): 00052 *

        RH  00-02   RU TYPE: NETWORK CONTROL   REQUEST  * RESPONSE/REQUEST:                  * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF             *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF   * RU CODE: EBCDIC       *

        RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA: 00 00 0C 00 00 01                              ERACTRPL

0000006 USER DATA  *....."                                                                                            *


0000007 DATA FLOW   48 00 11 12 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 00 00 00 00 00 00 16 2B 80 00 0D 00 00 01
                    00 80 00

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: ON   MIGRATION: OFF       * RRI: OFF            IERN: 01 ERN: 01 *
        TH  03-04   VR NUMBER (VRN):  1 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0000                *           SNF SEQUENCE NUMBER: 00000 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 0000          * FLOW: EXPEDITED   COUNT (DCF): 00022 *

        RH  00-02   RU TYPE: NETWORK CONTROL   REQUEST  * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF             *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF   * RU CODE: EBCDIC       *

        RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA: 80 00 0D 00 00 01                              ACT VR

0000007 USER DATA  *......                                                                                            *


0000008 DATA FLOW   48 00 10 12 00 00 40 00 00 00 00 1F 00 00 00 24 1D 00 00 00 00 00 00 00 00 04 AB 80 00 0D

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: ON   MIGRATION: OFF       * RRI: OFF            IERN: 01 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  1 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: REQUEST  * SOURCE: 00000024 0000                *           SNF SEQUENCE NUMBER: 00000 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0000          * FLOW: EXPEDITED   COUNT (DCF): 00004 *

        RH  00-02   RU TYPE: NETWORK CONTROL   RESPONSE * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF             *                       *

        RU  00-     COMMAND: ******** UNDEFINED COMMAND       CMD DATA:                                                ACT VR
  *   *   *   *   *   *    END OF REPORT    *   *   *   *   *   *   *
```

```
                 *******SDLC******  **********TRANSMISSION HEADER*********  ************************REQUEST HEADER************************

                 ..-SDLC ADDRESS    .-FORMAT IDENTIFIER (FID)                .-REQUEST(Q) OR RESPONSE(S)  .-PACING INDICATOR
                 |||.-CMND/RESP     | .-F/M/L/( =ENTIRE)SEGMENT  **FID3**    | .-SC/DFC/NC/( =FMDATA)RU   | .-BEGIN BRACKET INDICATOR
DIRECTION-.      ||| .-POLL/FINAL   | | .-EXPEDITED                          | | .-FORMATTED              | | .-END BRACKET INDICATOR
          |      ||| | .-RECEIVE    | | |                          LSID--.   | | | .-F/M/L( =ONLY)CHAIN     | | | .-CHANGE DIRECTION IND
  TYPE--. |      ||| | | .-SEND     | | |   SAF-EF    FROM/TO SSCP--. |   | | | |                | | | | .-ALT CODE
  ------- |      ||| | | | .-TYPE   | | |     OR      FROM/TO PU--. | |   | | | |                | | | | |   *********RU*********
MESSAGE   |      ||| | | | | CMND    | | |  OAF  DAF   SEQNO COUNT | | |   | | | |  REQUEST/RESPONSES | | | | |    COMMAND   SENSE
NUMBER  V V      VV V V V V V ____    V V V ____________ _____ _____ V V V   V V V V  ________________  V V V V V    ________  ________

0000001 I I                           4   E 00000024 0000 00000 00042       Q N F                                    ER OP
                                              0000001F 0000
0000002 I O                           4   E 0000001F 0000 00000 00024       Q N F                                    ER OP
                                              00000024 0000
0000003 I I                           4   E 00000024 0000 00000 00024       Q N F                                    ER OP
                                              0000001F 0000
0000004 I O                           4   E 0000001F 0000 00000 00024       Q N F                                    ER OP
                                              00000024 0000
0000005 I O                           4   E 0000001F 0000 00000 00040       Q N F                                    ER ACT
                                              00000024 0000
0000006 I I                           4   E 00000024 0000 00000 00052       Q N F                                    ERACTRPL
                                              0000001F 0000
0000007 I O                           4   E 0000001F 0000 00000 00022       Q N F    DR1                             ACT VR
                                              00000024 0000
0000008 I I                           4   E 00000024 0000 00000 00004       S N F    DR1                             ACT VR
                                              0000001F 0000
   *    *    *    *    *    *     END OF REPORT     *    *    *    *    *    *    *
```

6.4 : ACTIVATION OF A PU TYPE 1

6.4.1 : FLOW DIAGRAM

This section illustrates the flow associated with the activation of a physical unit type 1. The sequences for both the PU activation and the activation of a related LU (establishing a session) are shown. Each may be activated explicitly by a VARY command or implicitly when a higher node becomes active and 'ISTATUS=ACTIVE' is specified.



V NET,ACT,ID=PU OR
PU: ISTATUS=ACTIVE:

CONTACT ——————>

SDLC COMMAND:
"SNRM" = HEX '93'

+RSP CONTACT <——————

IF NO RESPONSE RECEIVED:
"SNRM" IS SENT AGAIN AFTER
"REPLY TIMEOUT" EXPIRED.

VTAM DISPAY OF PU STATUS
SHOWS: "ACT/C"

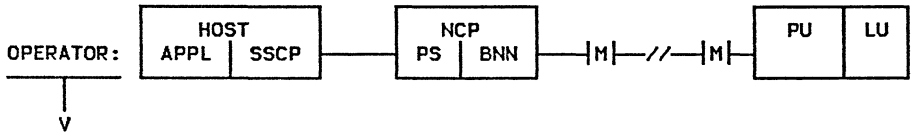
3705 PANEL "ICW DISPLAY"
SHOWS "PCF" OF HEX '5',
CHECK RECEIVE LEG IF
1H LINE SET.

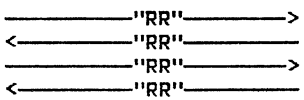
NORMAL OPERATION:

SDLC COMMAND:
"NSA" = HEX '73'

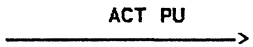
CONTACTED <——————

"RR" POLLING STARTS AFTER "NSA"
WAS RECEIVED.

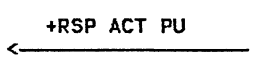




CONTINUOUSLY SENT AND
RECEIVED.

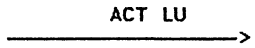


ACT PU: NOT SHIPPED TO PU.

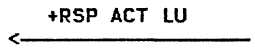


RESPONSE GENERATED BY NCP.

V NET,ACT,ID=LU OR:
ISTATUS=ACTIVE



ACT LU: NOT SHIPPED TO 3270
BUT TO 3767.



RESPONSE GENERATED BY NCP
FOR 3270 SDLC.

SSCP SESSION TO THE LU OF A PU TYPE 1 IS ESTABLISHED.

LU IS READY FOR

A: LOGON

B: ACQUIRE

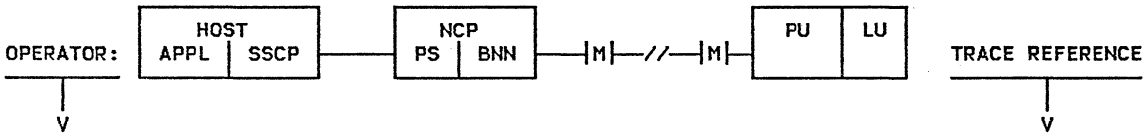
SINGLE OR CROSS-DOMAIN

6.5 : ACTIVATION OF A PU TYPE 2

6.5.1 : FLOW DIAGRAM

This section illustrates the flow associated with the activation of a physical unit type 2. The sequences for both the PU activation and the activation of a related LU (establishing a session) are shown. Each may be activated explicitly by a VARY command or implicitly when a higher node becomes active and 'ISTATUS=ACTIVE' is specified.

Reference flags refer to the VTAM LINE traces appearing in the next section.



V NET,ACT,ID=PU OR
PU: ISTATUS=ACTIVE:

CONTACT ——————>

SDLC COMMAND:
"SNRM" = HEX '93'

+RSP CONTACT <—————— ——————————> < 1 >

IF NO RESPONSE RECEIVED:
"SNRM" IS SENT AGAIN AFTER
"REPLY TIMEOUT" EXPIRED. < 2 >

VTAM DISPAY OF PU STATUS
SHOWS: "INACT/C"

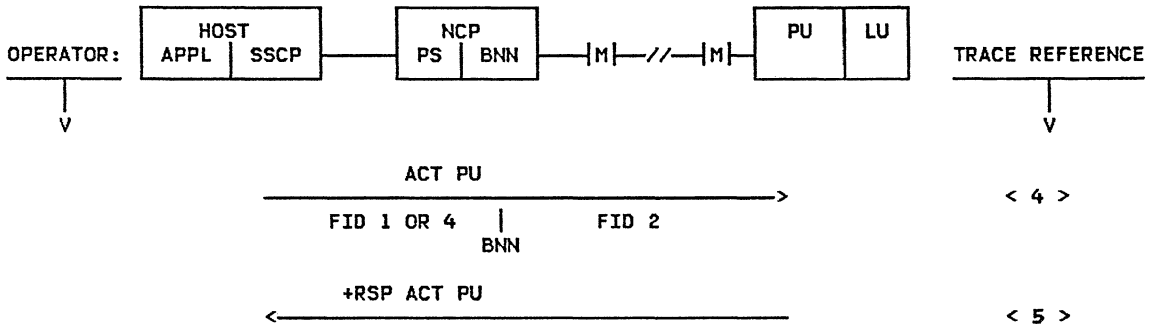
3705 PANEL "ICW DISPLAY"
SHOWS "PCF" OF HEX '5',
CHECK RECEIVE LEG IF
1H LINE SET.

NORMAL OPERATION:

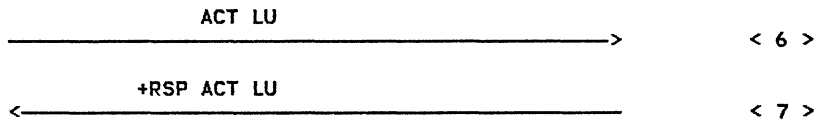
SDLC COMMAND:
"NSA" = HEX '73'

<—————— < 3 >

CONTACTED
<——————



V NET,ACT,ID=LU OR:
ISTATUS=ACTIVE



SSCP SESSION TO THE LU OF A PU TYPE 2 IS ESTABLISHED.

LU IS READY FOR

A: LOGON

B: ACQUIRE

SINGLE- OR CROSS-DOMAIN

6.5.2 : LINE TRACE (3274-1C)

Two examples of output from an NCP Line Trace on the activation of a 3274-1C Cluster Controller (PU Type 2) are given below. The first was produced with a Communications Scanner Type 2 on a 3705 Commmunications Controller and the second with a Communications Scanner Type 3. The Logical Unit attached to the 3274 (a 3278) is also activated because it is defined with ISTATUS=ACTIVE specified.

The traces shown here as examples are intended to illustrate the flow described in the previous diagram and to compare the trace output format produced by ACF/TAP for different scanner types. Both the Line Trace Summary and the SNA Summary reports are included for each CS type.

The reference flags can be matched to those found in the flow diagram in the previous section.

NOTE:

- The complete traces are not shown, only the first portion up to the LU activation response is given.
- In the Line Trace Summary reports, activation requests for more than one LU can be seen but are not referenced.
- Note that the 'Set Normal Response Mode' and 'Non-sequenced Acknowledge' SDLC Commands do not appear in the SNA Summary for the CS type 3.

CS TYPE 2 LINE TRACE OF A PU TYPE 2 ACTIVATION:

```
                                      ADVANCED COMMUNICATIONS FUNCTION
                                          TRACE ANALYSIS PROGRAM
       DATE: 02:04:82                       LINE TRACE SUMMARY                              PAGE: 00001

ELEMENT  TRACE                                                                                          PROGRAM
REC/MSG FIELDS          V              V              V              V              V              V              V     RESULT

0000035 LCDPCF   99 99 99 99 99 99 95 99 99 99 99 99 99 95 96 97 97 97 97 96 99 99 99 99 99 99 95 96 97 97 97 97 96 99 99 I-IGNOR CHR
        TIME     E8 E8 E8 E8 E8 E8 E8 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F3 F4 F4 F4 F4 F4 F4 F4 F4 R-RESET BFR
0000002 SCF      45 40 40 40 40 45 45 45 40 40 40 40 45 45 0D 49 49 49 49 0D 45 40 40 40 40 45 45 0D 49 49 49 49 0D 45 40 S-START MSG
        PDF      7E C1 93 27 7A 7E 7E 7E C1 93 27 7A 7E 7E 7E C1 73 29 9D 9D 7E C1 11 3D DD 7E 7E 7E C1 11 3D DD DD 7E C1 E-END MSG
0000005          S  -----------  E  R  X  -----------  E  R  S  -----------  E  I                 E  R  S              E  I     X-EXCEPTION
                       < 1 >                 < 2 >                 < 3 >

0000070 LCDPCF   99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 95 96 97 97 97 97 97 I-IGNOR CHR
        TIME     F4 F4 F4 F4 F4 F4 F4 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 R-RESET BFR
0000003 SCF      40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 45 45 40 40 40 40 45 45 0D 49 49 49 49 49 S-START MSG
        PDF      00 2D 00 00 00 00 8D 6B 80 00 11 02 01 05 00 00 00 00 1F 8C CE 7E 7E C1 11 3D DD 7E 7E 7E C1 30 2D 00 00 E-END MSG
0000007          ---------------------------------------------------------------  E  I                 E  R  S  ------------- X-EXCEPTION
                                           < 4 >

0000105 LCDPCF   97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 96 99 99 99 99 99 99 I-IGNOR CHR
        TIME     F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F5 F7 F7 F7 F7 F7 F7 R-RESET BFR
0000003 SCF      49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 0D 45 40 40 40 40 45 S-START MSG
        PDF      00 00 8D EB 80 00 11 11 40 40 40 40 40 40 40 40 00 00 07 01 00 00 00 00 00 00 D6 5D 5D 7E C1 31 3F FC 7E E-END MSG
0000008          -------------------------------------------------------------------------------------  E  I              E  X-EXCEPTION
                                           < 5 >

0000140 LCDPCF   95 96 97 97 97 97 96 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 I-IGNOR CHR
        TIME     F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 R-RESET BFR
0000004 SCF      45 0D 49 49 49 49 0D 4D 48 48 48 48 48 48 48 40 40 40 40 40 40 40 40 40 45 45 40 40 40 40 40 40 40 40 40 S-START MSG
        PDF      7E 7E C1 31 3F FC FC 7E C1 22 2D 00 02 00 00 8E 6B 80 00 0D 02 01 41 A8 7E 7E C1 24 2D 00 03 00 00 8F 6B E-END MSG
0000011          R  S              E  I  ------------------------------------------------  E  I                                X-EXCEPTION
                                                             < 6 >

0000175 LCDPCF   99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 95 99 99 I-IGNOR CHR
        TIME     F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F7 F8 F8 F8 F8 F8 F8 F8 F8 F8 F8 F8 F8 F8 F9 F9 F9 F9 F9 F9 04 04 R-RESET BFR
0000006 SCF      40 40 40 40 40 40 40 45 45 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 45 45 40 40 40 40 45 45 45 40 S-START MSG
        PDF      80 00 0D 02 01 5D 06 7E 7E C1 26 2D 00 05 00 00 90 6B 80 00 0D 02 01 E8 49 7E 7E C1 31 3F FC 7E 7E 7E C1 E-END MSG
0000014                               E  I                                                  E  I                 E  R  X     X-EXCEPTION

0000210 LCDPCF   99 99 99 99 95 96 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 I-IGNOR CHR
        TIME     04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04 R-RESET BFR
0000006 SCF      40 40 40 45 45 0D 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 49 S-START MSG
        PDF      31 3F FC 7E 7E 7E C1 82 2D 00 00 02 00 8E EB 80 00 0D 01 01 00 85 00 00 00 0C 06 03 00 01 00 00 00 90 FF E-END MSG
0000015                   E  R  S  ------------------------------------------------------------------------------------- X-EXCEPTION
                                                                    < 7 >
```

```
                                         ADVANCED COMMUNICATIONS FUNCTION
                                              TRACE ANALYSIS PROGRAM
          DATE: 02:04:82                 SYSTEMS NETWORK ARCHITECTURE SUMMARY                       PAGE: 00001

            *******SDLC******  **********TRANSMISSION HEADER*********  ***********************REQUEST HEADER**********************

            ..-SDLC ADDRESS    .-FORMAT IDENTIFIER (FID)               .-REQUEST(Q) OR RESPONSE(S)  .-PACING INDICATOR
            || .-CMND/RESP     | .-F/M/L/( =ENTIRE)SEGMENT  **FID3**   | .-SC/DFC/NC/( =FMDATA)RU   | .-BEGIN BRACKET INDICATOR
DIRECTION-. || | .-POLL/FINAL  | | .-EXPEDITED                         | | .-FORMATTED              | | .-END BRACKET INDICATOR
          | || | | .-RECEIVE   | | |                      LSID---.    | | |  .-F/M/L( =ONLY)CHAIN | | | .-CHANGE DIRECTION IND
  TYPE--. | || | | | .-SEND    | | |    SAF-EF     FROM/TO SSCP--. |    | | |  |                    | | | | .-ALT CODE
 -------  | || | | | | .-TYPE  | | |      OR       FROM/TO PU--. | |    | | |  |                    | | | | |  *********RU********
MESSAGE | | || | | | | | CMND  | | |   OAF  DAF    SEQNO COUNT | | |    | | |  |  REQUEST/RESPONSES | | | | |  COMMAND   SENSE   REFERENCE
NUMBER  V V VV V V V V V ____  V V V  __________   _____ _____ V V V    V V V  V  _________________ V V V V V  ________  ______  _________

0000001 L O C1 C S     N SNRM                                                                                                   < 1 >
0000002 L O C1 C S     N SNRM                                                                                                   < 2 >
0000003 L I C1 R S     N NSA                                                                                                    < 3 >
0000006 L O C1     0 0 I       2   E  00    00     00141                Q S F     DR1                          ACTPU            < 4 >
0000008 L I C1   S 1 0 I       2   E  00    00     00141                S S F     DR1                          ACTPU            < 5 >
0000011 L O C1     1 1 I       2   E  00    02     00142                Q S F     DR1                          ACTLU            < 6 >
0000016 L I C1     4 1 I       2   E  02    00     00142                S S F     DR1                          ACTLU            < 7 >
0000017 L I C1     4 2 I       2      02    00     00000                Q   F     DR1                          NOTIFY
0000022 L O C1     5 4 I       2      00    02     00001                Q         DR1
0000023 L O C1     5 5 I       2      00    02     00000                S   F     DR1                          NOTIFY
0000027 L I C1   S 6 5 I       2      02    00     00001                S         DR1
   *    *    *    *    *    *    END OF REPORT     *    *    *    *    *    *    *
```

CS TYPE 3 LINE TRACE OF A PU TYPE 2 ACTIVATION:

```
                                    ADVANCED COMMUNICATIONS FUNCTION
                                         TRACE ANALYSIS PROGRAM
DATE: 02:04:82                           LINE TRACE SUMMARY                                  PAGE: 00001

RECORD ELEMENT                                                                                          MESSAGE
NUMBER  NUMBER ************************************** T R A C E  D A T A **************************************  NUMBER

0000002 0000003 STATUS: 4799000001AFC19330AA111E22  TEXT: BFA5  STATUS: 4396038000AFC17330B2331F02
                                  ----------< 1 >                          ----------< 3 >

0000002 0000007 4797058000AFC17330BA661F35  TEXT: 299D  STATUS: 4799000001AFC11130AA111E22  TEXT: C31A

0000002 0000010 STATUS: 4396038000B0C11130B2331F02  STATUS: 4797058000B0C11130BA661F35  TEXT: 3DDD

0000002 0000012 STATUS: 4799020004B1C10030AA331E22  TEXT: 2D00000000B46B80001102010500000001F3909                  0000001
                                                    ----------------------------------------< 4 >

0000002 0000015 STATUS: 4799000001B1C11130AA551E22  TEXT: C31A  STATUS: 4396038000B1C13030B2771F02

0000003 0000018 4797058000B2C13030BA771F34  TEXT: 2D00000000B4EB800011114040404040404040000000701  TEXT: 000000000000BE60  0000002
                                            ----------------------------------------------------< 5 >

0000003 0000021 STATUS: 4799000001B3C13130AA111E22  TEXT: F039  STATUS: 4396038000B3C13130BA331F02

0000003 0000024 4797058000B3C13130BA661F35  TEXT: 3FFC  STATUS: 4799020004B3C12230AADD1E22  TEXT: 2D00020000B56B80000D0201
                                                                                            ----------< 6 >

0000003 0000028 8908  STATUS: 4799020004B3C12430AABB1E22  TEXT: 2D00030000B66B80000D0201  TEXT: 2E91              0000004

0000003 0000031 STATUS: 4799020004B4C12630AA991E22  TEXT: 2D00050000B76B80000D020173ED  STATUS: 4799000001B5C13130AABB1E22  0000005

0000003 0000035 TEXT: F039  STATUS: 4396038000B5C18230B2DD1F02  4797058000B5C18230B2991F34  TEXT: 2D00000200B5EB80
                                                                                            ----------< 7 >

0000004 0000038 TEXT: 000D0101008500000000C060300010000007BF2  STATUS: 4396038000B5C18430B2BB1F02  4797058000B6C18430B2221F34 0000006
                < 7 >----------

0000004 0000040 TEXT: 2C00000200000B80008106200C060300010000001262  STATUS: 4396038000B6C18630BA441F02          0000007

0000004 0000042 4797058000B6C18630B2001F34  TEXT: 2D00000300B6EB80000D0101008500000000C06010001000000E817          0000008

0000004 0000045 STATUS: 4396038000B6C19830B2221F02  4797058000B6C19830BAEE1F34  TEXT: 2D00000500  TEXT: B7EB80000D010100
```

```
                                        ADVANCED COMMUNICATIONS FUNCTION
                                             TRACE ANALYSIS PROGRAM
          DATE: 02:04:82                SYSTEMS NETWORK ARCHITECTURE SUMMARY                           PAGE: 00001

             *******SDLC******  **********TRANSMISSION HEADER*********  ************************REQUEST HEADER**********************

             ..-SDLC ADDRESS    .-FORMAT IDENTIFIER (FID)               .-REQUEST(Q) OR RESPONSE(S)  .-PACING INDICATOR
             || .-CMND/RESP     | .-F/M/L/( =ENTIRE)SEGMENT  **FID3**   | .-SC/DFC/NC/( =FMDATA)RU   | .-BEGIN BRACKET INDICATOR
DIRECTION-.  || | .-POLL/FINAL  | | .-EXPEDITED                         | | .-FORMATTED              | | .-END BRACKET INDICATOR
          |  || | | .-RECEIVE   | | |                        LSID---.   | | |  .-F/M/L( =ONLY)CHAIN  | | | .-CHANGE DIRECTION IND
  TYPE--. |  || | | | .-SEND    | | |     SAF-EF     FROM/TO SSCP--. |  | | |  |                      | | | | .-ALT CODE
  ----- | |  || | | | | .-TYPE  | | |       OR       FROM/TO PU--. | |  | | |  |                      | | | | |  *********RU********
MESSAGE | |  || | | | | | CMND  | | |    OAF   DAF   SEQNO COUNT | | |  | | |  |  REQUEST/RESPONSES   | | | | |  COMMAND    SENSE     REFERENCE
NUMBER  V V  VV V V V V V ____  V V V  ___________  _____ _____ V V V  V V V  V  ________________     V V V V V  _________  ________  _________

0000001 L O                     2   E  00      00    00180              Q S F    DR1                                  ACTPU                 < 4 >
0000002 L I                     2   E  00      00    00180              S S F    DR1                                  ACTPU                 < 5 >
0000003 L O                     2   E  00      02    00181              Q S F    DR1                                  ACTLU                 < 6 >
0000006 L I                     2   E  02      00    00181              S S F    DR1                                  ACTLU                 < 7 >
0000007 L I                     2      02      00    00000              Q   F    DR1                                  NOTIFY
0000010 L O                     2      00      02    00001              Q        DR1
0000011 L O                     2      00      02    00000              S   F    DR1                                  NOTIFY
0000013 L I                     2      02      00    00001              S        DR1
   *     *     *     *     *     *   END OF REPORT    *    *    *    *    *    *    *
```

6.6 : LOGON LU TO LU.

6.6.1 : FLOW DIAGRAM (TSO LOGON)

Following is a diagram of the flow associated with a logon to TSO/VTAM from a terminal, an example of an LU to LU logon.

The Secondary Logical Unit (SLU) is the terminal from which the logon request is initiated. There are two different applications that act as the Primary Logical Unit (PLU) during the course of the logon. The first is TCAS which initially performs an OPNDST Accept to the SLU to accept the TSO logon, and which then creates an address space for this individual user. The session with TCAS must then be Unbound (via a CLSDST Pass) so the user address space can become the PLU through an OPNDST Accept of its own. The different PLUs can be recognized in the trace of the next section by their different Network Addresses (i.e., Source and Destination).

The trace references are to the VTAM Buffer trace in the next section.

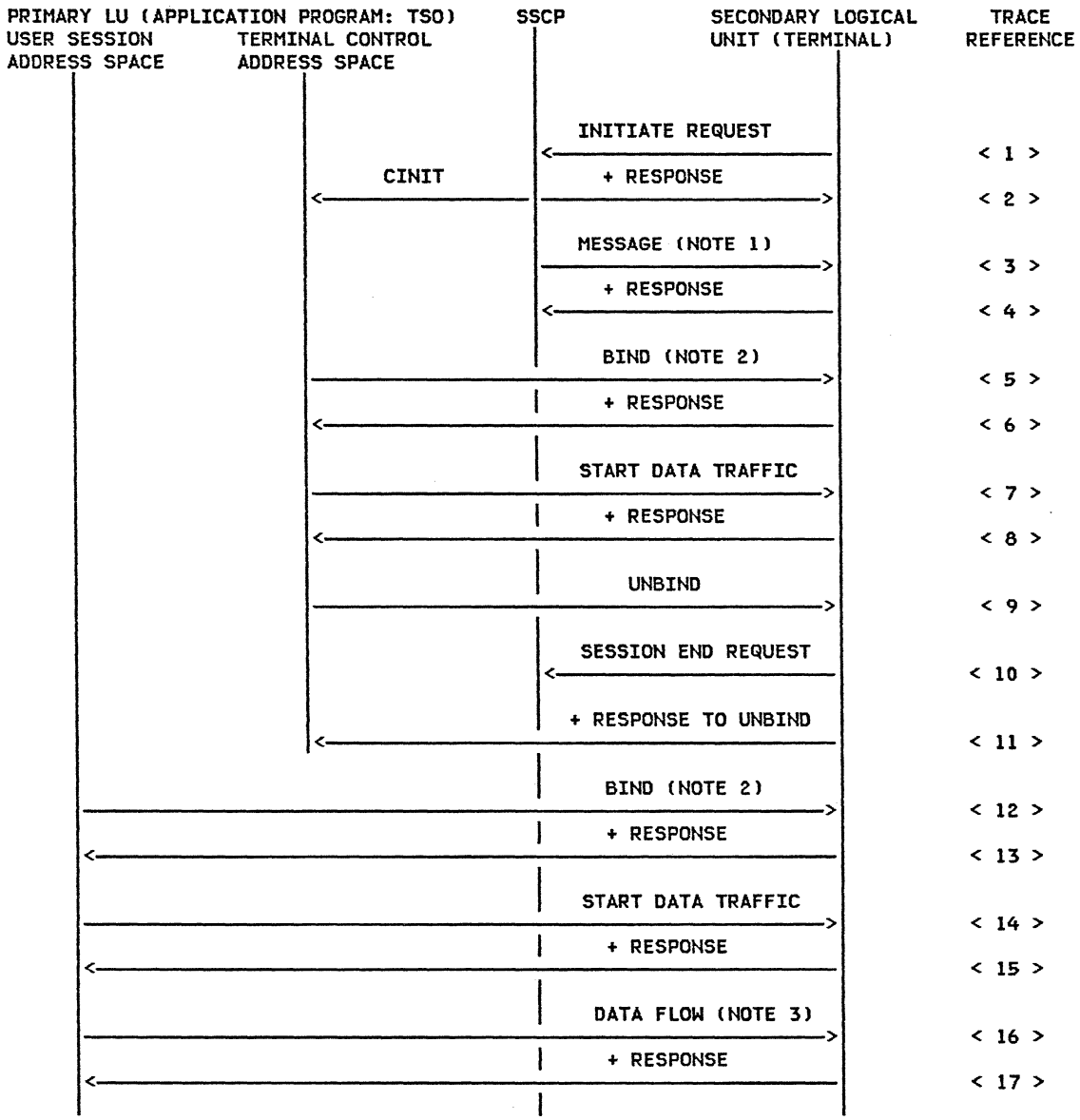
NOTE:

(Refer to the notes in the flow diagram)

1. This message from VTAM to the terminal is optional and may not be seen.

2. OPNDST Accept start.

3. At this point, TSO requests entry of USERID.


PRIMARY LU (APPLICATION PROGRAM: TSO)
USER SESSION ADDRESS SPACE
TERMINAL CONTROL ADDRESS SPACE
SSCP
SECONDARY LOGICAL UNIT (TERMINAL)
TRACE REFERENCE
INITIATE REQUEST
< 1 >
CINIT
+ RESPONSE
< 2 >
MESSAGE (NOTE 1)
< 3 >
+ RESPONSE
< 4 >
BIND (NOTE 2)
< 5 >
+ RESPONSE
< 6 >
START DATA TRAFFIC
< 7 >
+ RESPONSE
< 8 >
UNBIND
< 9 >
SESSION END REQUEST
< 10 >
+ RESPONSE TO UNBIND
< 11 >
BIND (NOTE 2)
< 12 >
+ RESPONSE
< 13 >
START DATA TRAFFIC
< 14 >
+ RESPONSE
< 15 >
DATA FLOW (NOTE 3)
< 16 >
+ RESPONSE
< 17 >

6.6.2 : BUFFER TRACE (TSO LOGON)

The following is the output resulting from a VTAM Buffer trace of a logon to TSO (LU to LU logon). GTF was started with options USR and RNIO for the trace. ACF/TAP was used to process the trace output: both the detail and summary reports are included here.

The reference flags refer to the flow diagram presented in the previous section.

```
                                   ADVANCED COMMUNICATIONS FUNCTION
                                        TRACE ANALYSIS PROGRAM
DATE: 02:01:82                     SYSTEMS NETWORK ARCHITECTURE DETAIL                    PAGE: 00001

MESSAGE   GROUP                                                                            ENTRY      REFERENCE
 NUMBER   SUMMARY                          D E S C R I P T I V E   A N A L Y S I S       SUMMARY      FLAG

0000001  DATA FLOW   40 00 10 12 20 00 00 7D 00 00 00 1F 00 00 00 24 1C 00 00 01 00 0E 00 00 00 15 03 80 00 93 96 87 96          < 1 >
                     95 40 81 97 97 93 89 84 4D 93 A3 A2 96 5D

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 01 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  1 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 125 *
         TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E               *           SNF SEQUENCE NUMBER: 00000 *
         TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0001          * FLOW: NORMAL      COUNT (DCF): 00021 *

         RH  00-02   RU TYPE: FM DATA FLOW      REQUEST  * RESPONSE/REQUEST: DR1             * CHAIN: ONLY ELEMENT   *
                     RU FORMAT: UNFORMATTED              * PACING INDICATOR: OFF             *                       *
                     BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF   * RU CODE: EBCDIC       *

0000001  USER DATA   *LOGON APPLID(LTSO)                                                                               *

0000002  DATA FLOW   40 00 00 12 00 00 00 00 00 00 00 24 00 00 00 1F 1C 00 00 0E 00 01 00 00 00 03 83 80 00                 < 2 >

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 00 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  1 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
         TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0001               *           SNF SEQUENCE NUMBER: 00000 *
         TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: NORMAL      COUNT (DCF): 00003 *

         RH  00-02   RU TYPE: FM DATA FLOW      RESPONSE * RESPONSE/REQUEST: DR1             * CHAIN: ONLY ELEMENT   *
                     RU FORMAT: UNFORMATTED              * PACING INDICATOR: OFF             *                       *
```

```
0000003  DATA FLOW   40 00 00 12 00 00 00 00 00 00 00 24 00 00 00 1F 1C 00 00 0E 00 01 00 02 00 68 03 80 00 40 15 40 15          < 3 >
                     E8 96 A4 99 40 99 85 98 A4 85 A2 A3 40 88 81 A2 40 82 85 85 95 40 81 83 83 85 97 A3 85 84 40 82 A8
                     40 C1 C3 C6 61 E5 E3 C1 D4 4B 15 40 15 D7 93 85 81 A2 85 40 82 85 40 97 81 A3 89 85 95 A3 6B 40 A6
                     85 40 94 A4 A2 A3 40 A6 81 89 A3 40 86 96 99 40 88 96 A2 A3 40 99 85 A2 96 A4 99 83 85 A2 4B

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 00 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  1 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
         TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0001               *          SNF SEQUENCE NUMBER: 00002 *
         TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: NORMAL      COUNT (DCF): 00104 *

         RH  00-02   RU TYPE: FM DATA FLOW      REQUEST  * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                     RU FORMAT: UNFORMATTED              * PACING INDICATOR: OFF              *                       *
                     BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF    * RU CODE: EBCDIC       *

0000003  USER DATA   * . .YOUR REQUEST HAS BEEN ACCEPTED BY ACF/VTAM.. .PLEASE BE PATIENT, WE MUST WAIT FOR HOST RESOUR*
                     *CES.                                                                                              *


0000004  DATA FLOW   40 00 10 12 20 00 80 7E 00 00 00 1F 00 00 00 24 1C 00 00 01 00 0E 00 02 00 03 83 80 00                 < 4 >
         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 01 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  1 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 126 *
         TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E               *          SNF SEQUENCE NUMBER: 00002 *
         TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0001          * FLOW: NORMAL      COUNT (DCF): 00003 *

         RH  00-02   RU TYPE: FM DATA FLOW      RESPONSE * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                     RU FORMAT: UNFORMATTED              * PACING INDICATOR: OFF              *                       *


0000005  DATA FLOW   40 00 30 31 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 0E 00 05 00 91 00 24 6B 80 00 31 01 03 03          < 5 >
                     B1 90 30 80 00 00 87 C7 00 00 02 00 00 00 00 00 18 50 18 50 7F 00 00 04 D3 E3 E2 D6 00

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 03 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
         TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0005               *          SNF SEQUENCE NUMBER: 00145 *
         TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: EXPEDITED   COUNT (DCF): 00036 *

         RH  00-02   RU TYPE: SESSION CONTROL   REQUEST  * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                     RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF              *                       *
                     BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF    * RU CODE: EBCDIC       *
         RU  00-     COMMAND: BIND    BIND SESSION             CMD DATA: 80 00 31 01 03 03 B1 90 30 80 00 00 87 C7        BIND

0000005  USER DATA   *.........GG.........⊥.⊥"...LTSO.                                                                   *

0000006  DATA FLOW   40 00 30 31 20 00 80 9C 00 00 00 1F 00 00 00 24 1D 00 00 05 00 0E 00 91 00 04 EB 80 00 31                 < 6 >

         TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 03 ERN: 00 *
         TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
         TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 156 *
```

```
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E              *          SNF SEQUENCE NUMBER: 00145 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0005         * FLOW: EXPEDITED   COUNT (DCF): 00004 *

        RH  00-02   RU TYPE: SESSION CONTROL   RESPONSE * RESPONSE/REQUEST: DR1             * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED             * PACING INDICATOR: OFF             *                       *
        RU  00-     COMMAND: BIND    BIND SESSION            CMD DATA:                                              BIND


0000007 DATA FLOW   40 00 00 31 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 0E 00 05 00 92 00 04 6B 80 00 A0                < 7 >

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 00 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *             NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0005               *          SNF SEQUENCE NUMBER: 00146 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: EXPEDITED   COUNT (DCF): 00004 *

        RH  00-02   RU TYPE: SESSION CONTROL   REQUEST  * RESPONSE/REQUEST: DR1             * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED             * PACING INDICATOR: OFF             *                       *
                    BRACKET:                           * CHANGE DIRECTION INDICATOR: OFF   * RU CODE: EBCDIC       *
        RU  00-     COMMAND: SDT     START DATA TRAFFIC      CMD DATA:                                              SDT


0000008 DATA FLOW   40 00 30 31 20 00 00 9D 00 00 00 1F 00 00 00 24 1D 00 00 05 00 0E 00 92 00 04 EB 80 00 A0                < 8 >
        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 03 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *             NS SEQUENCE NUMBER: 157 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E               *          SNF SEQUENCE NUMBER: 00146 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0005          * FLOW: EXPEDITED   COUNT (DCF): 00004 *

        RH  00-02   RU TYPE: SESSION CONTROL   RESPONSE * RESPONSE/REQUEST: DR1             * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED             * PACING INDICATOR: OFF             *                       *
        RU  00-     COMMAND: SDT     START DATA TRAFFIC      CMD DATA:                                              SDT


0000009 DATA FLOW   40 00 00 31 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 0E 00 05 00 93 00 05 6B 80 00 32 02          < 9 >

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF           IERN: 00 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *             NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0005               *          SNF SEQUENCE NUMBER: 00147 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: EXPEDITED   COUNT (DCF): 00005 *

        RH  00-02   RU TYPE: SESSION CONTROL   REQUEST  * RESPONSE/REQUEST: DR1             * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED             * PACING INDICATOR: OFF             *                       *
                    BRACKET:                           * CHANGE DIRECTION INDICATOR: OFF   * RU CODE: EBCDIC       *
        RU  00-     COMMAND: UNBIND  UNBIND SESSION         CMD DATA: 80                                           UNBIND

0000009 USER DATA   *.                                                                                              *


0000010 DATA FLOW   40 00 10 12 20 00 00 7F 00 00 00 1F 00 00 00 24 1C 00 00 01 00 0E 00 00 00 0E 0B 00 00 81 06 88 20      < 10 >
                    02 01 07 3E 05 48 0E
```

```
        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 01 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  1 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 2  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 127 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E                *          SNF SEQUENCE NUMBER: 00000 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0001          * FLOW: NORMAL      COUNT (DCF): 00014 *

        RH  00-02   RU TYPE: FM DATA FLOW      REQUEST  * RESPONSE/REQUEST:                  * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF               *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF     * RU CODE: EBCDIC       *

0000010 USER DATA  *A.H........                                                                                      *

0000011 DATA FLOW   40 00 30 31 20 00 80 9E 00 00 00 1F 00 00 00 24 1D 00 00 05 00 0E 00 93 00 04 EB 80 00 32                    < 11 >

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 03 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 158 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E                *          SNF SEQUENCE NUMBER: 00147 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0005          * FLOW: EXPEDITED   COUNT (DCF): 00004 *

        RH  00-02   RU TYPE: SESSION CONTROL   RESPONSE * RESPONSE/REQUEST: DR1               * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF               *                       *
        RU  00-     COMMAND: UNBIND  UNBIND SESSION           CMD DATA:                                          UNBIND

0000012 DATA FLOW   40 00 30 31 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 0E 00 07 00 94 00 27 6B 80 00 31 01 03 03          < 12 >
                    B1 90 30 80 00 00 87 C7 00 00 02 00 00 00 00 00 18 50 18 50 7F 00 00 07 E3 E2 D6 F0 F0 F0 F2 00

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 03 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA   *              NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0007                *          SNF SEQUENCE NUMBER: 00148 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: EXPEDITED   COUNT (DCF): 00039 *

        RH  00-02   RU TYPE: SESSION CONTROL   REQUEST  * RESPONSE/REQUEST: DR1               * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF               *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF     * RU CODE: EBCDIC       *
        RU  00-     COMMAND: BIND    BIND SESSION           CMD DATA: 80 00 31 01 03 03 B1 90 30 80 00 00 87 C7          BIND

0000012 USER DATA  *.........GG.........⊥.⊥"...TSO0002.                                                              *

0000013 DATA FLOW   40 00 30 31 20 00 00 9F 00 00 00 1F 00 00 00 24 1D 00 00 07 00 0E 00 94 00 04 EB 80 00 31                    < 13 >

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 03 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 159 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E                *          SNF SEQUENCE NUMBER: 00148 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0007          * FLOW: EXPEDITED   COUNT (DCF): 00004 *
```

```
        RH  00-02   RU TYPE: SESSION CONTROL   RESPONSE * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF               *                       *
        RU  00-     COMMAND: BIND    BIND SESSION             CMD DATA:                                                BIND

0000014 DATA FLOW   40 00 00 31 00 00 00 00 00 00 00 24 00 00 00 1F 1D 00 00 0E 00 07 00 95 00 04 6B 80 00 A0                < 14 >

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0007               *          SNF SEQUENCE NUMBER: 00149 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: EXPEDITED   COUNT (DCF): 00004 *

        RH  00-02   RU TYPE: SESSION CONTROL   REQUEST  * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF               *                       *
                    BRACKET:                            * CHANGE DIRECTION INDICATOR: OFF     * RU CODE: EBCDIC       *
        RU  00-     COMMAND: SDT     START DATA TRAFFIC       CMD DATA:                                                SDT

0000015 DATA FLOW   40 00 30 31 20 00 80 A0 00 00 00 1F 00 00 00 24 1D 00 00 07 00 0E 00 95 00 04 EB 80 00 A0                < 15 >

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 03 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 160 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E               *          SNF SEQUENCE NUMBER: 00149 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0007          * FLOW: EXPEDITED   COUNT (DCF): 00004 *

        RH  00-02   RU TYPE: SESSION CONTROL   RESPONSE * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                    RU FORMAT:   FORMATTED              * PACING INDICATOR: OFF               *                       *
        RU  00-     COMMAND: SDT     START DATA TRAFFIC       CMD DATA:                                                SDT

0000016 DATA FLOW   40 00 00 31 00 00 00 00 00 00 00 24 00 00 00 1F 1C 00 00 0E 00 07 00 01 00 2D 03 80 A0 F5 C3 11 5D    < 16 >
                    7F 1D 40 11 40 40 1D C8 C9 D2 D1 F5 F6 F7 F0 F0 C1 40 C5 D5 E3 C5 D9 40 E4 E2 C5 D9 C9 C4 40 60 1D
                    40 11 C1 50 13

        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 00 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
        TH  04-06   RWRI: OFF DWRI: OFF * NOT SUPERVISORY NON-SEQUENCED DATA  *              NS SEQUENCE NUMBER: 000 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 0000001F 0007               *          SNF SEQUENCE NUMBER: 00001 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 00000024 000E          * FLOW: NORMAL      COUNT (DCF): 00045 *

        RH  00-02   RU TYPE: FM DATA FLOW      REQUEST  * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                    RU FORMAT: UNFORMATTED              * PACING INDICATOR: OFF               *                       *
                    BRACKET: BEGIN BRACKET              * CHANGE DIRECTION INDICATOR: SET     * RU CODE: EBCDIC       *

0000016 USER DATA   *5C.)". .  .HIKJ56700A ENTER USERID -. .A1.                                                          *

0000017 DATA FLOW   40 00 30 31 20 00 00 A1 00 00 00 1F 00 00 00 24 1C 00 00 07 00 0E 00 01 00 03 83 80 00                < 17 >
        TH  00-02   FORMAT ID (FID):  4 * TG SWEEP: OFF  MIGRATION: OFF       * RRI: OFF            IERN: 03 ERN: 00 *
        TH  03-04   VR NUMBER (VRN):  3 * DWI: OFF  TG RECORDER REQUIRED: OFF * PRIORITY: 1  NR SEQUENCE NUMBER: 000 *
```

```
        TH  04-06   RWRI: OFF DWRI: OFF * DUAL SEQUENCED DATA                 *              NS SEQUENCE NUMBER: 161 *
        TH  06-     VR PACING: RESPONSE * SOURCE: 00000024 000E               *           SNF SEQUENCE NUMBER: 00001 *
        TH    -25   SEGMENT(MPF): ENTIRE* DESTINATION: 0000001F 0007          * FLOW: NORMAL      COUNT (DCF): 00003 *

        RH  00-02   RU TYPE: FM DATA FLOW      RESPONSE * RESPONSE/REQUEST: DR1              * CHAIN: ONLY ELEMENT   *
                    RU FORMAT: UNFORMATTED              * PACING INDICATOR: OFF             *                       *
*   *   *   *   *   *    END OF REPORT    *   *   *   *   *   *   *
```

```
         *******SDLC******  **********TRANSMISSION HEADER*********  ***********************REQUEST HEADER**********************

         ..-SDLC ADDRESS    .-FORMAT IDENTIFIER (FID)               .-REQUEST(Q) OR RESPONSE(S)  .-PACING INDICATOR
         || .-CMND/RESP     | .-F/M/L/( =ENTIRE)SEGMENT  **FID3**  | .-SC/DFC/NC/( =FMDATA)RU   | .-BEGIN BRACKET INDICATOR
DIRECTION-.  | .-POLL/FINAL | | .-EXPEDITED                          | | .-FORMATTED              | | .-END BRACKET INDICATOR
  TYPE--. | || | .-RECEIVE  | | |                        LSID---.  | | |  .-F/M/L( =ONLY)CHAIN    | | | .-CHANGE DIRECTION IND
        | | || | | .-SEND   | | |   SAF-EF    FROM/TO SSCP--.    |  | | |  |                       | | | | .-ALT CODE
        | | || | | | .-TYPE | | |     OR      FROM/TO PU--. |    |  | | |  |                       | | | | |  ********RU********  REFERENCE
MESSAGE | | || | | | | CMND | | |  OAF  DAF   SEQNO COUNT | |    |  | | |  |  REQUEST/RESPONSES    | | | | |  COMMAND    SENSE      FLAG
NUMBER  V V VV V V V V ____ V V V  _________  _____ _____ V V    V  V V V  V  _________________    V V V V V  _______    _____    ______
```

MESSAGE NUMBER	TYPE	DIRECTION	FID	F/M/L	EXPEDITED	OAF	DAF	SEQNO	COUNT	Q/S	SC/DFC/NC	FORMATTED	F/M/L CHAIN	REQUEST/RESPONSES	PACING	BB	EB	CD	ALT CODE	COMMAND	SENSE	REFERENCE FLAG
0000001	B	I	4			00000024	000E	00000	00021	Q				DR1								< 1 >
						0000001F	0001															
0000002	B	O	4			0000001F	0001	00000	00003	S				DR1								< 2 >
						00000024	000E															
0000003	B	O	4			0000001F	0001	00002	00104	Q				DR1								< 3 >
						00000024	000E															
0000004	B	I	4			00000024	000E	00002	00003	S				DR1								< 4 >
						0000001F	0001															
0000005	B	O	4		E	0000001F	0005	00145	00036	Q	S	F		DR1						BIND		< 5 >
						00000024	000E															
0000006	B	I	4		E	00000024	000E	00145	00004	S	S	F		DR1						BIND		< 6 >
						0000001F	0005															
0000007	B	O	4		E	0000001F	0005	00146	00004	Q	S	F		DR1						SDT		< 7 >
						00000024	000E															
0000008	B	I	4		E	00000024	000E	00146	00004	S	S	F		DR1						SDT		< 8 >
						0000001F	0005															
0000009	B	O	4		E	0000001F	0005	00147	00005	Q	S	F		DR1						UNBIND		< 9 >
						00000024	000E															
0000010	B	I	4			00000024	000E	00000	00014	Q		F										< 10 >
						0000001F	0001															
0000011	B	I	4		E	00000024	000E	00147	00004	S	S	F		DR1						UNBIND		< 11 >
						0000001F	0005															
0000012	B	O	4		E	0000001F	0007	00148	00039	Q	S	F		DR1						BIND		< 12 >
						00000024	000E															
0000013	B	I	4		E	00000024	000E	00148	00004	S	S	F		DR1						BIND		< 13 >
						0000001F	0007															
0000014	B	O	4		E	0000001F	0007	00149	00004	Q	S	F		DR1						SDT		< 14 >
						00000024	000E															
0000015	B	I	4		E	00000024	000E	00149	00004	S	S	F		DR1						SDT		< 15 >
						0000001F	0007															
0000016	B	O	4			0000001F	0007	00001	00045	Q				DR1		B		S				< 16 >
						00000024	000E															
0000017	B	I	4			00000024	000E	00001	00003	S				DR1								< 17 >
						0000001F	0007															

*   *   *   *   *   *   END OF REPORT   *   *   *   *   *   *   *

6.6.3 : FLOW DIAGRAM (NCCF LOGON)

Following is a diagram of the flow associated with a logon to NCCF from a terminal, an example of an LU to LU logon.

The Secondary Logical Unit (SLU) is the terminal from which the logon request is initiated. There are two different applications that act as the Primary Logical Unit (PLU) during the course of the logon. The first is the NCCF main task which initially performs an OPNDST Accept to the SLU to accept the logon. The session with NCCF main task must then be Unbound (via a CLSDST Pass) so that an NCCF subtask can become the PLU through an OPNDST Accept of its own. The different PLUs can be recognized in the trace of the next section by their different Network Addresses (i.e., Source and Destination).

The trace references are to the VTAM Buffer trace in the next section.

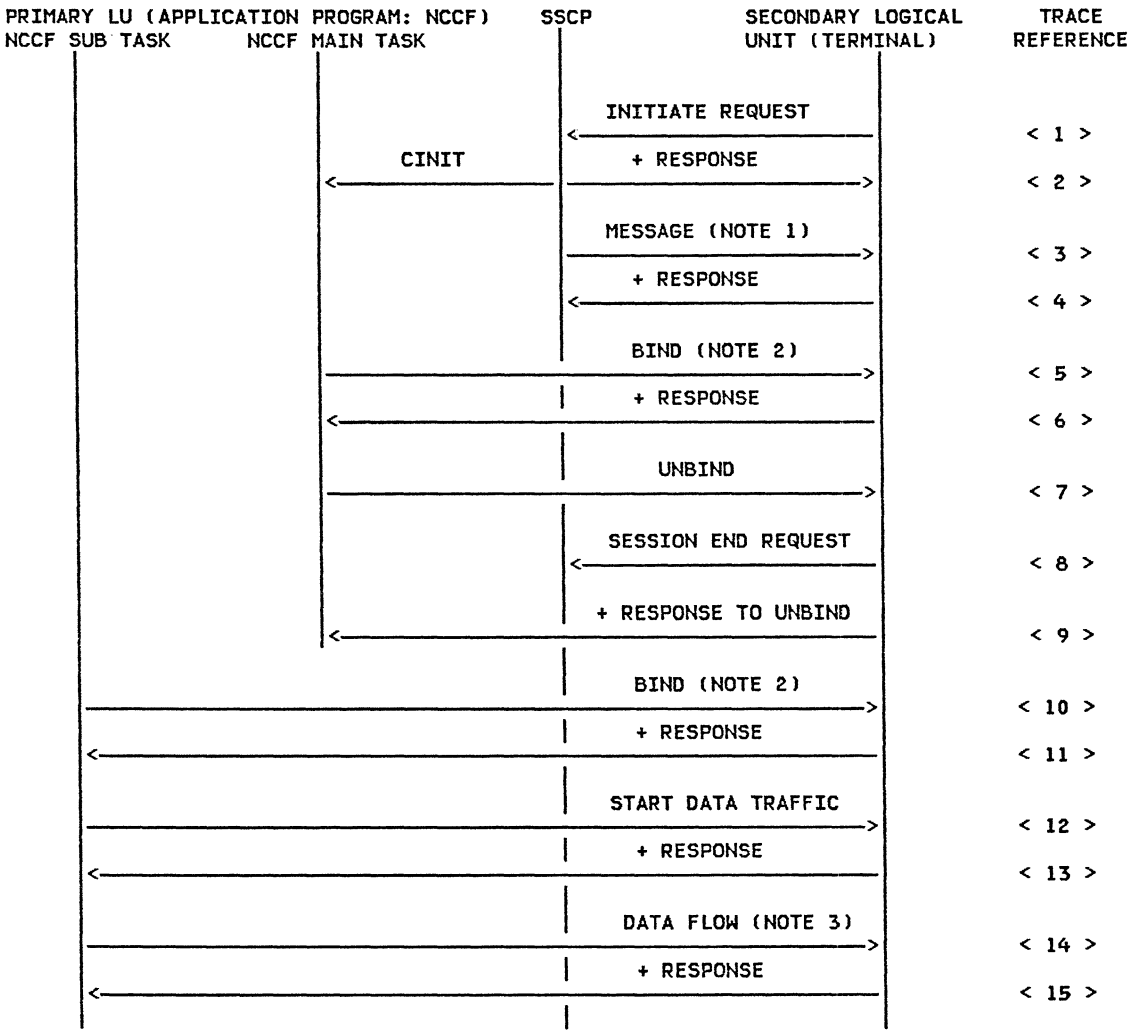
NOTE:

(Refer to the notes in the flow diagram)

1. This message from VTAM to the terminal is optional and may not be seen.

2. OPNDST Accept start.

3. At this point, NCCF requests entry of operator identification.


PRIMARY LU (APPLICATION PROGRAM: NCCF)
NCCF SUB TASK
NCCF MAIN TASK
SSCP
SECONDARY LOGICAL UNIT (TERMINAL)
TRACE REFERENCE
INITIATE REQUEST
< 1 >
CINIT
+ RESPONSE
< 2 >
MESSAGE (NOTE 1)
< 3 >
+ RESPONSE
< 4 >
BIND (NOTE 2)
< 5 >
+ RESPONSE
< 6 >
UNBIND
< 7 >
SESSION END REQUEST
< 8 >
+ RESPONSE TO UNBIND
< 9 >
BIND (NOTE 2)
< 10 >
+ RESPONSE
< 11 >
START DATA TRAFFIC
< 12 >
+ RESPONSE
< 13 >
DATA FLOW (NOTE 3)
< 14 >
+ RESPONSE
< 15 >

6.6.4 : BUFFER TRACE (NCCF LOGON)

The following is the output resulting from a VTAM Buffer trace of a logon to NCCF (LU to LU logon). ACF/TAP was used to process the trace output: only the SNA summary report is included here. The reference flags refer to the flow diagram presented in the previous section.

ADVANCED COMMUNICATIONS FUNCTION
TRACE ANALYSIS PROGRAM
SYSTEMS NETWORK ARCHITECTURE SUMMARY

DATE: 02:01:82 PAGE: 00001

MESSAGE NUMBER	DIRECTION	TYPE	SDLC ADDRESS	CMND/RESP	POLL/FINAL	RECEIVE	SEND	TYPE CMND	FID	EXPEDITED	SAF-EF OR OAF DAF	LSID	FROM/TO SSCP SEQNO	FROM/TO SSCP COUNT	FROM/TO PU SEQNO	FROM/TO PU COUNT	REQUEST(Q) OR RESPONSE(S)	SC/DFC/NC/(=FMDATA)RU	FORMATTED	F/M/L(=ONLY)CHAIN	REQUEST/RESPONSES	PACING INDICATOR	BEGIN BRACKET INDICATOR	END BRACKET INDICATOR	CHANGE DIRECTION IND	ALT CODE	RU COMMAND	RU SENSE	REFERENCE FLAG
0000001	B	I							4		00000024 000E 0000001F 0001		00000	00022			Q				DR1								< 1 >
0000002	B	O							4		0000001F 0001 00000024 000E		00000	00003			S				DR1								< 2 >
0000003	B	O							4		0000001F 0001 00000024 000E		00006	00104			Q				DR1								< 3 >
0000004	B	I							4		00000024 000E 0000001F 0001		00006	00003			S				DR1								< 4 >
0000005	B	O							4	E	0000001F 0042 00000024 000E		00161	00037			Q S F				DR1						BIND		< 5 >
0000006	B	I							4	E	00000024 000E 0000001F 0042		00161	00004			S S F				DR1						BIND		< 6 >
0000007	B	O							4	E	0000001F 0042 00000024 000E		00162	00005			Q S F				DR1						UNBIND		< 7 >
0000008	B	I							4		00000024 000E 0000001F 0001		00000	00014			Q F												< 8 >
0000009	B	I							4	E	00000024 000E 0000001F 0042		00162	00004			S S F				DR1						UNBIND		< 9 >
0000010	B	O							4	E	0000001F 0046 00000024 000E		00164	00040			Q S F				DR1						BIND		< 10 >
0000011	B	I							4	E	00000024 000E 0000001F 0046		00164	00004			S S F				DR1						BIND		< 11 >
0000012	B	O							4	E	0000001F 0046 00000024 000E		00165	00004			Q S F				DR1						SDT		< 12 >
0000013	B	I							4	E	00000024 000E 0000001F 0046		00165	00004			S S F				DR1						SDT		< 13 >
0000014	B	O							4		0000001F 0046 00000024 000E		00001	00265			Q				DR1		B E						< 14 >
0000015	B	I							4		00000024 000E 0000001F 0046		00001	00003			S				DR1								< 15 >

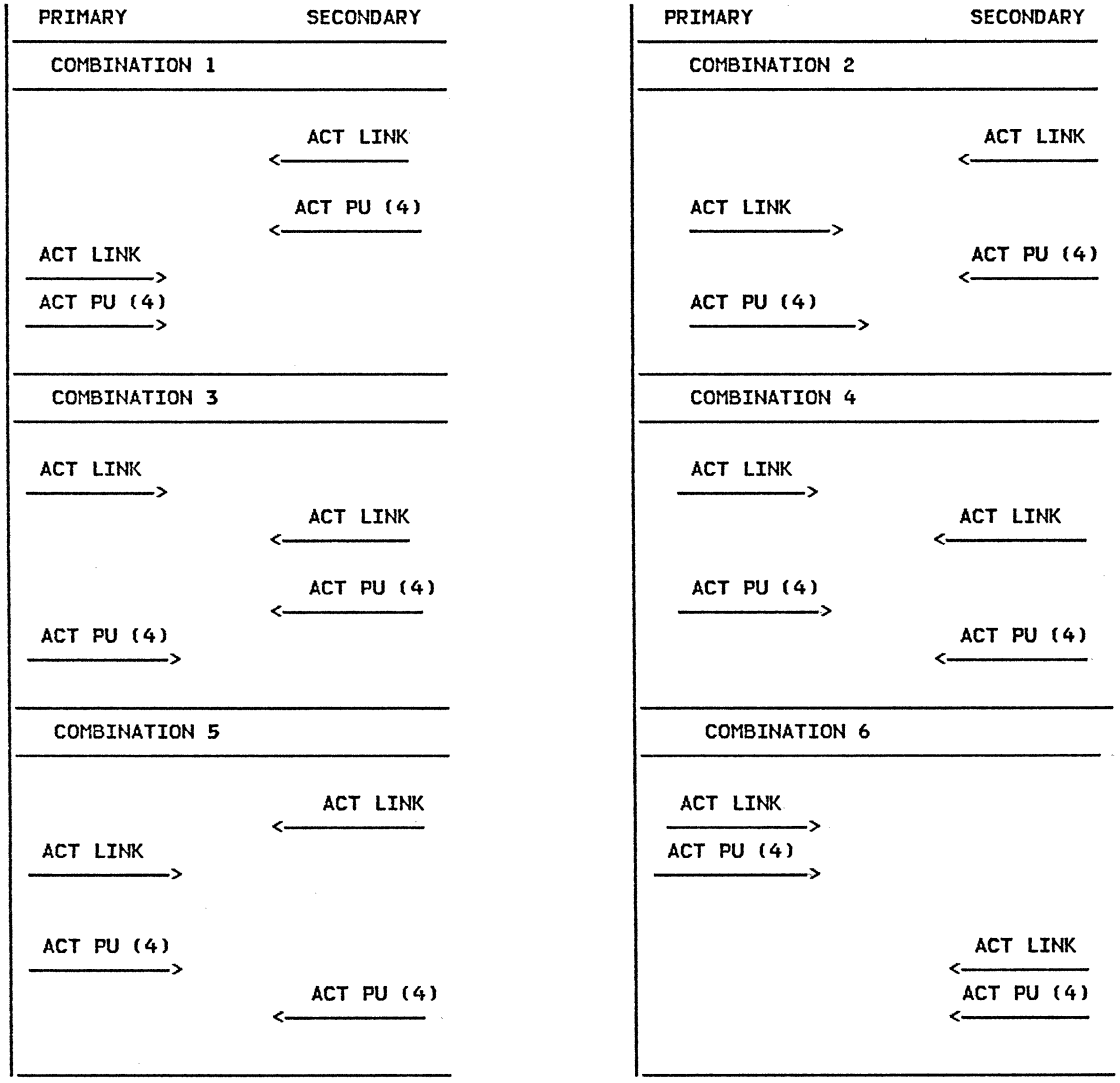
6.7 : ACTIVATE CROSS-DOMAIN LINK

This section deals with the activation of a Cross-Domain Link and the PU Type 4s connected by the link. From each domain, the CD link and the NCP (PU type 4) in the cross-domain must be activated. These four activations can occur in any one of 6 combinations of timing sequences. They are described briefly below and are illustrated in more detail by flow diagrams on subsequent pages.

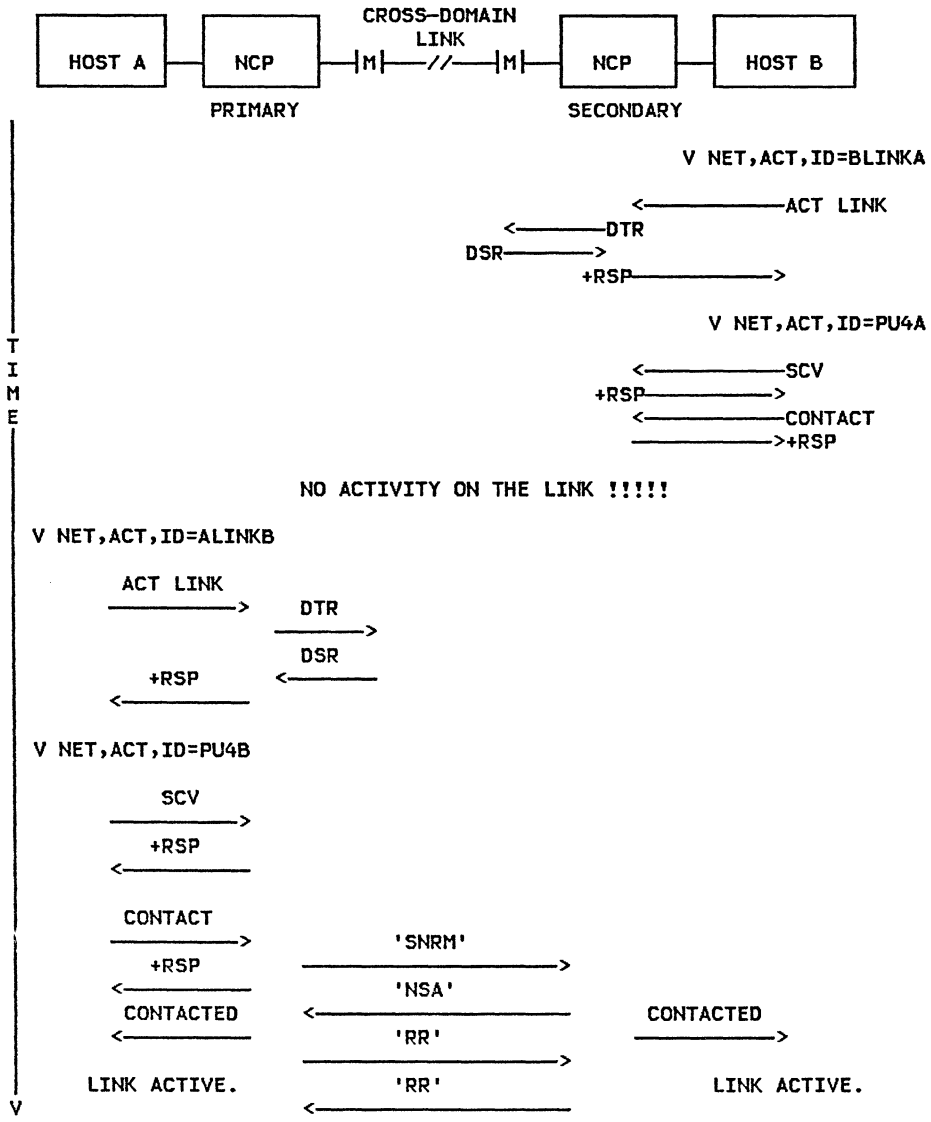
These 6 combinations assume that the NCPs have been generated as PRI or SEC. This will be the case if either NCP is not Release 3. However, ACF/NCP R3 has a CONFIGURABLE STATIONS function in which the PRI/SEC mode is determined dynamically, based on the NCP Subareas. A typical flow on the link when both NCPs are Release 3 is shown at the end of this section.

In the flow diagrams, the CD link as seen from the domain of HOST A is named 'ALINKB' and the NCP in the cross-domain (that of HOST B) is named 'PU4B'. Similarily, to HOST B the CD link is called 'BLINKA' and the NCP in HOST A's domain is called 'PU4A'.

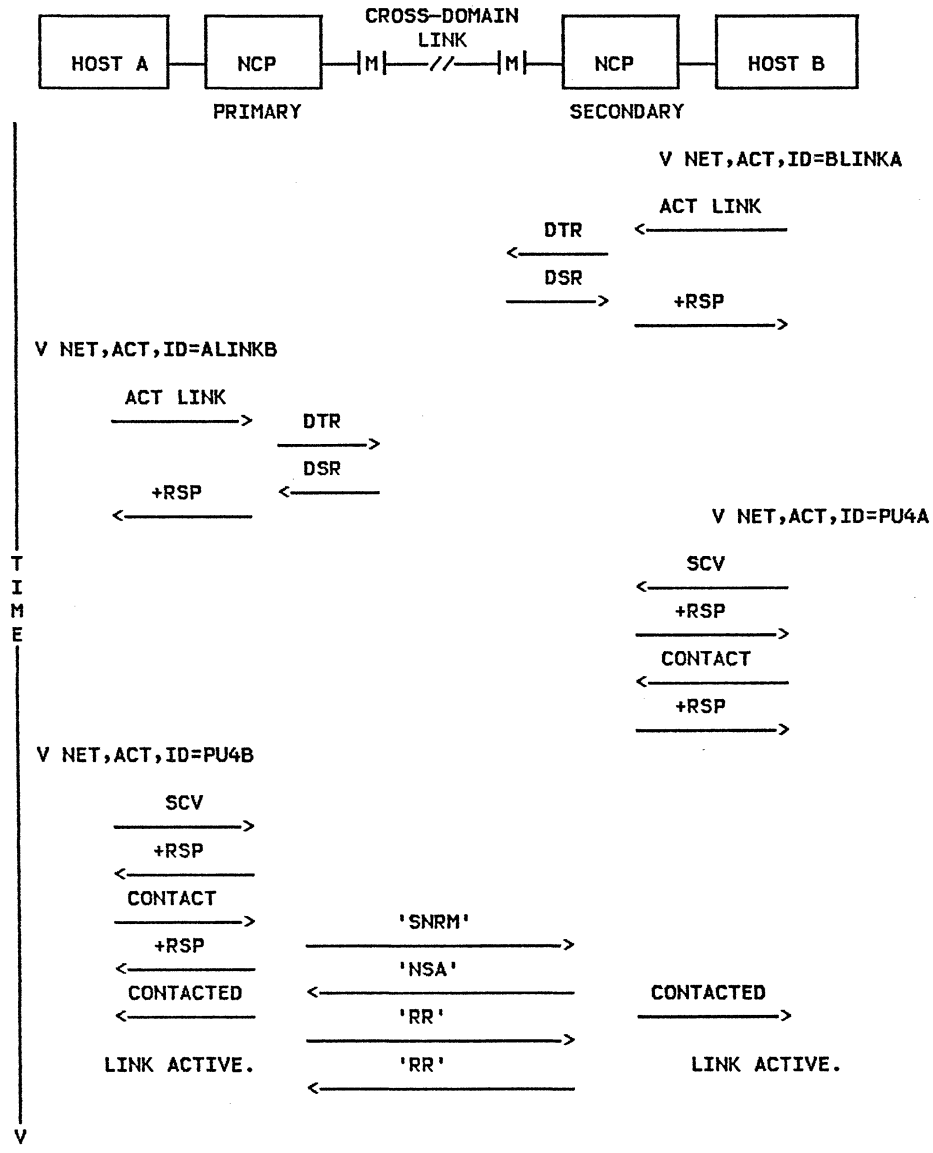
TIMING SEQUENCE FOR ACTIVATION OF CROSS-DOMAIN LINK



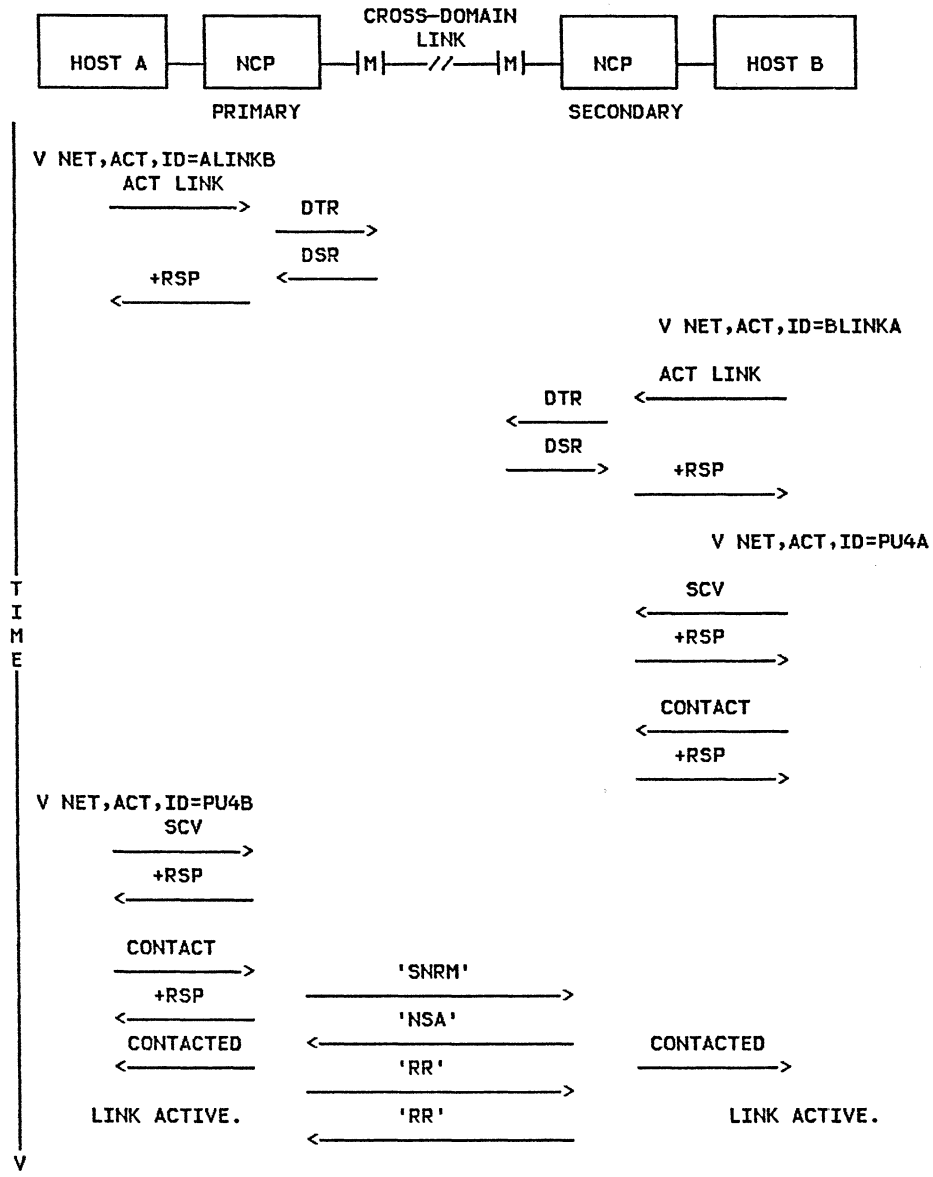
FLOW FOR COMBINATION 1



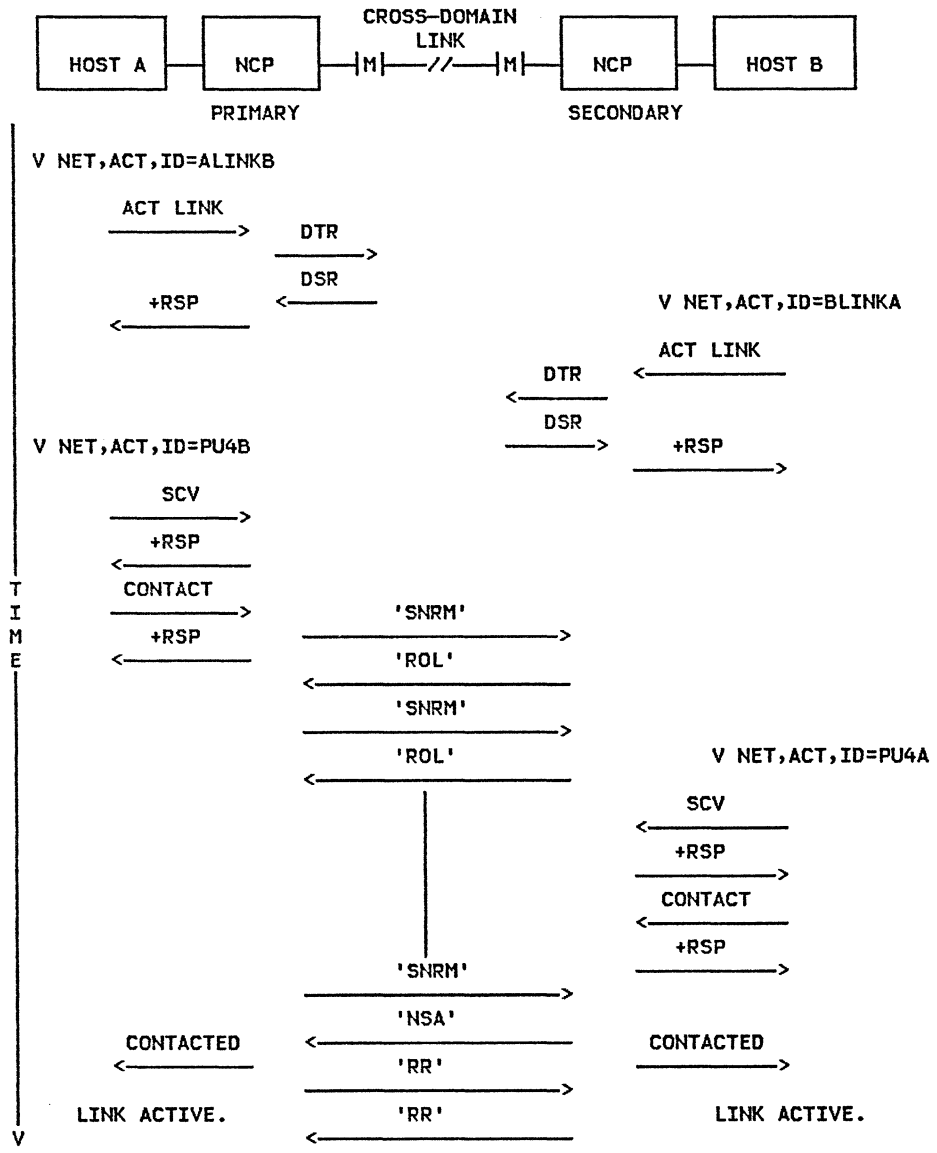
FLOW FOR COMBINATION 2



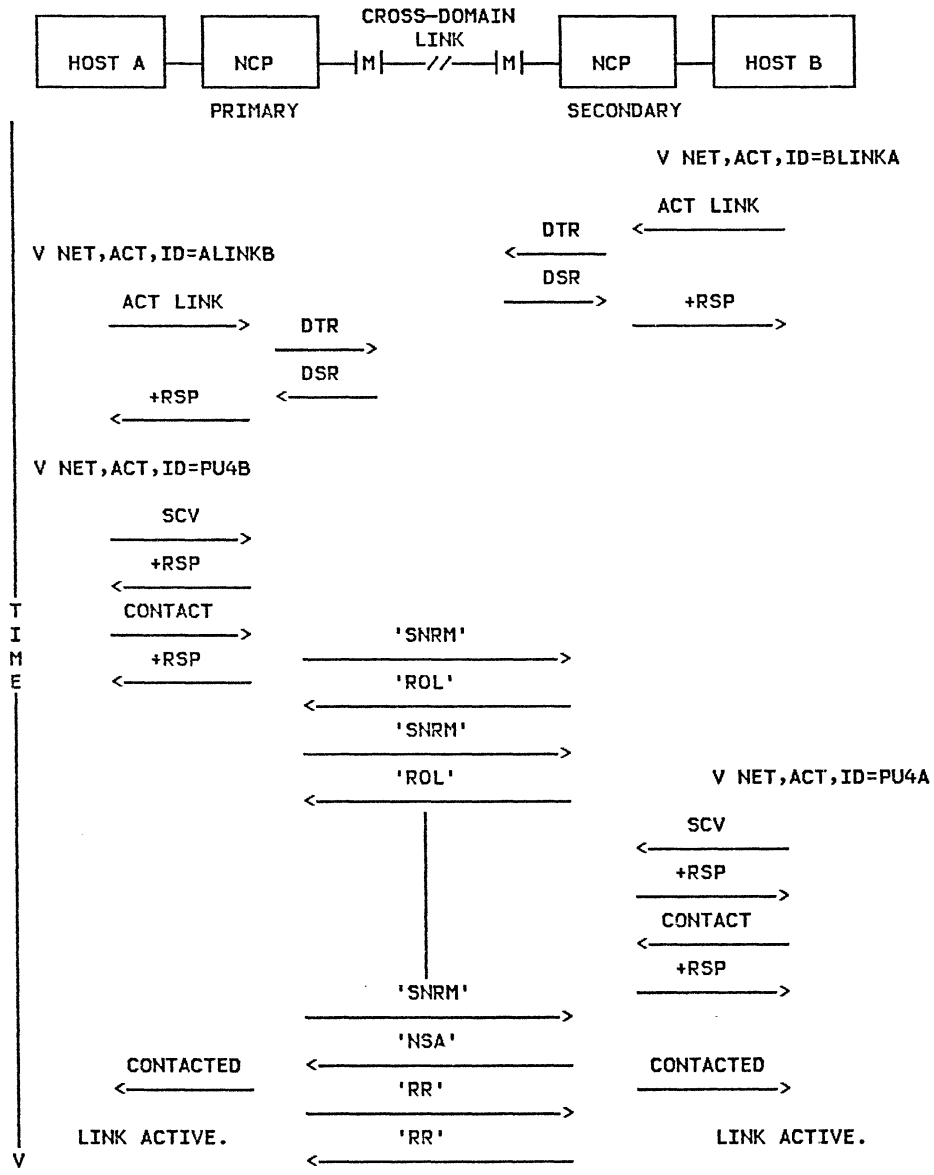
FLOW FOR COMBINATION 3



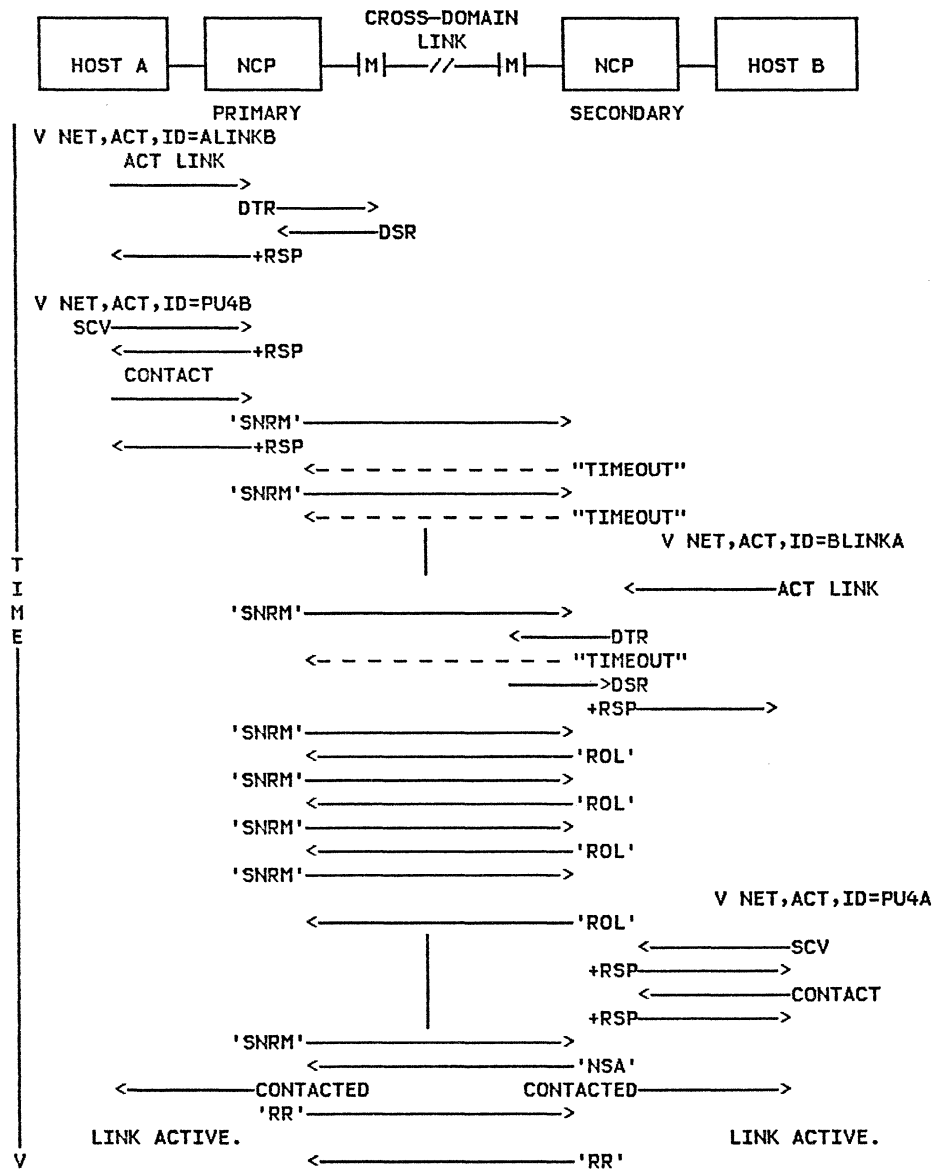
FLOW FOR COMBINATION 4



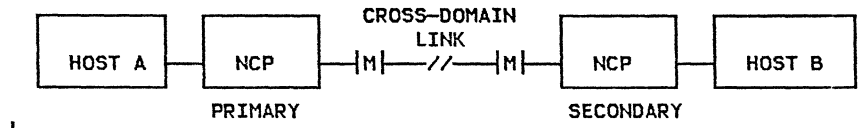
FLOW FOR COMBINATION 5



FLOW FOR COMBINATION 6



FLOW EXAMPLE FOR R3 NCP'S



V NET,ACT,ID=BLINKA

V NET,ACT,ID=PU4A (already completed)

V NET,ACT,ID=ALINKB

ACT LINK →

DTR →

DSR ←

+RSP ←

V NET,ACT,ID=PU4B

SCV →

+RSP ←

CONTACT →

'XID (TG1,SA11,PRI/SEC)' →

+RSP ←

'XID (TG1,SA12,PRI/SEC)' ←

'XID (TG1,SA11,SEC)' →

'SNRM' ←

'UA' →

'RR' ←

CONTACTED ←

LINK ACTIVE.

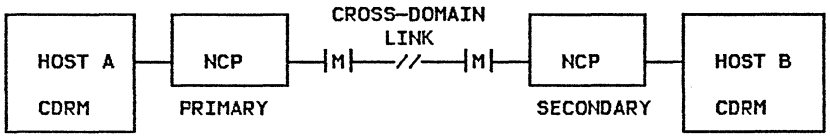
CONTACTED →

LINK ACTIVE.

TIME ↓

6.8 : ACTIVATION OF CDRM

The following flow diagram shows the activation of a Cross-Domain Resource Manager.



V NET,ACT,ID=CDRM

ACTCDRM ——————————————————————————————>

FID 1 OR 4 FID 1 OR 4

+RSP <——————————————————————————————

CONSOLE MESSAGE:

CDRM ACTIVATION
CAUSED BY REMOTE
ACTCDRM.

SDT (START DATA TRAFFIC) ——————————————————————————————>

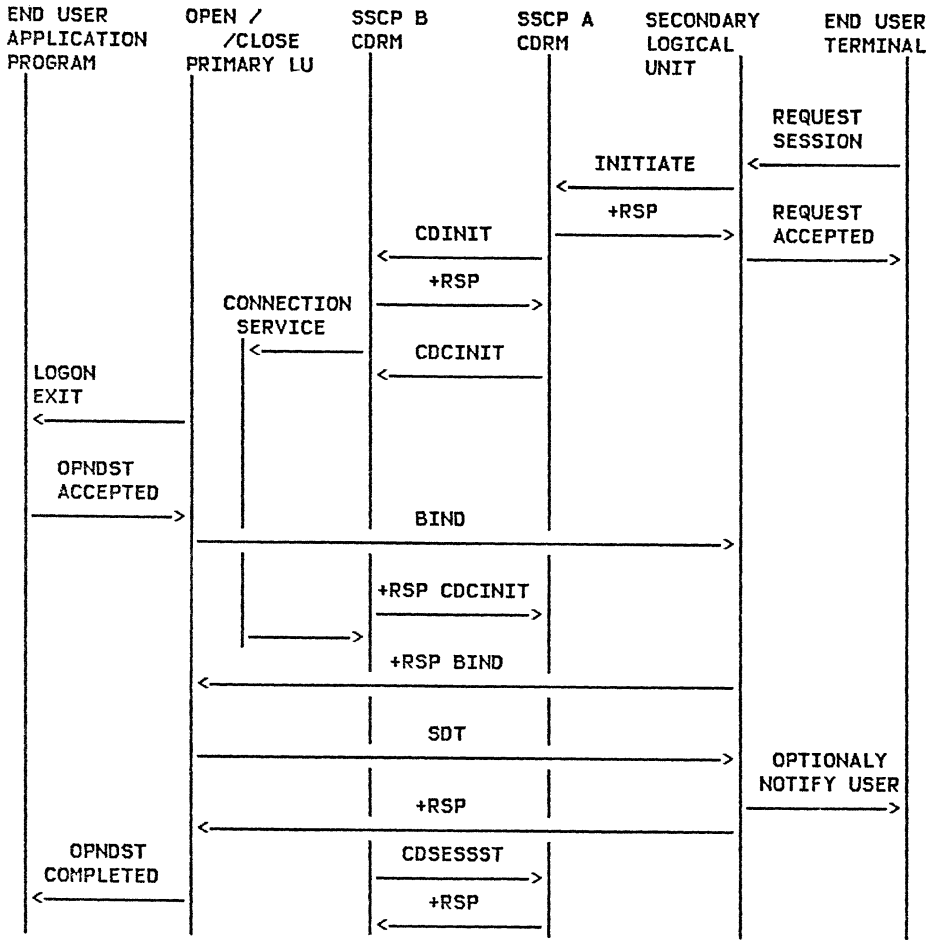
+RSP <——————————————————————————————

CONSOLE MESSAGE:
CDRM ACTIVE.

CONSOLE MESSAGE:
CDRM ACTIVE.

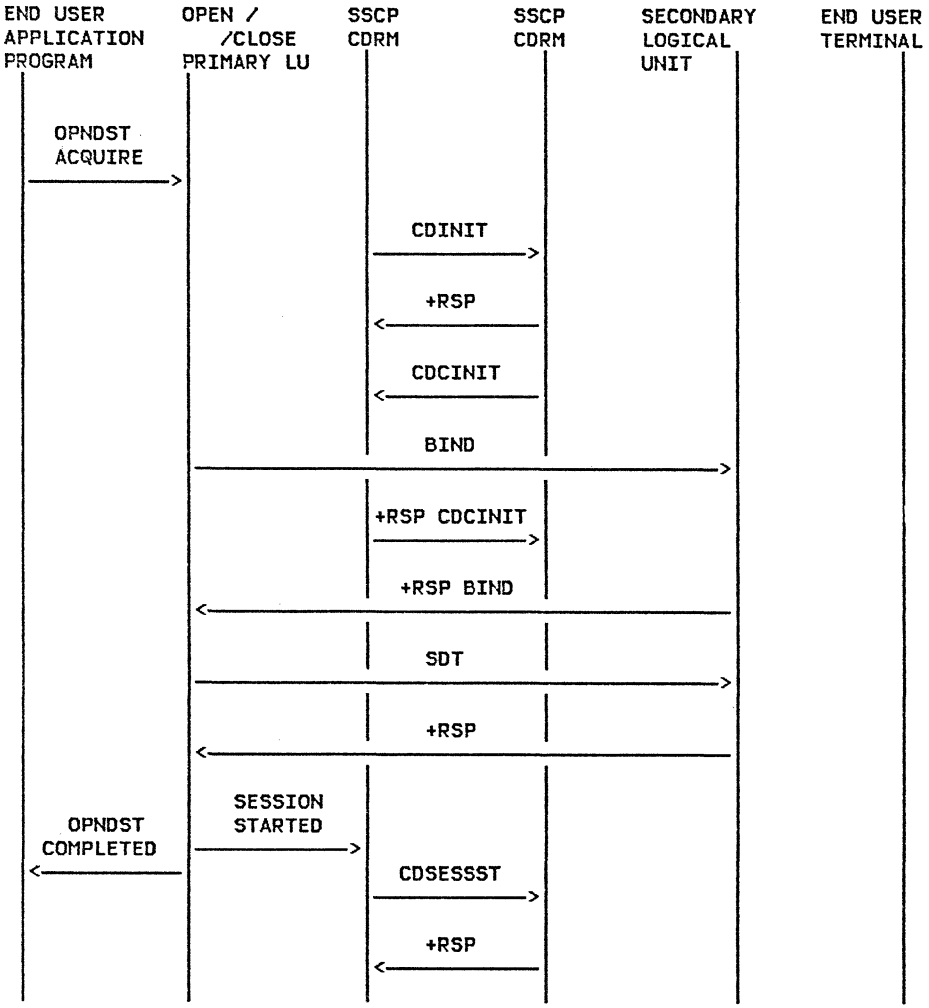
6.9.4 SECONDARY LU LOGON TO AN APPL

This section shows the flow associated with a cross-domain logon from a terminal to an application program (OPNDST Accept). An example of this form of LU to LU logon is the logon to a TSO session in a cross-domain.



6.9.4 APPL (PRIMARY LU) ACQUIRES A TERMINAL

This section shows the flow associated with a primary LU (application program) acquiring a secondary LU (terminal) in a cross-domain (OPNDST Acquire). An example of this form of LU to LU logon is the initiation of a session at a terminal by CICS residing in a cross-domain.



CHAPTER 7 : TERMINAL TESTS AND ERROR LOGS

This section of the guide describes the tests and error logs that are available in the terminals and processors that are in widespread use on BSC and SDLC lines. The terminals and processors discussed in this chapter include 3270, 3600, 3650, 3660, 3767, 3770, System/34, System/36, System/38, 8100, 5280, Series/1, and the Personal Computer.

The online tests described here are available using TOLTEP (VTAM). For information on using TOLTEP, refer to the section describing it.

Each section includes the following information:

1. Customer problem determination procedures (PD/IPs) to do problem determination on a subsystem level.

2. Maintenance analysis procedures (MAPs) for the customer engineer to use to repair the terminal subsystem.

3. OFFLINE tests to allow the operator or customer engineer to test the subsystem prior to putting it online.

4. ONLINE tests to operate the terminal ONLINE with link level tests or T3700SNA.

5. Error logs which contain information on terminal hardware, software, and line errors.

CONTENTS

7.1 : 3270 SYSTEMS

7.1.1 : SDLC SYSTEMS

REMOTE ATTACHMENT USING SDLC PROTOCOL

Control units that can be remotely attached are:

- 3271 Control Unit Models 11 and 12
- 3274 Control Unit Models 1C, 21C, 31C, and 51C
- 3275 Display Station Model 12
- 3276 Control Unit Display Station Models 11, 12, 13 and 14
- 3276 Control Unit Display Station Models 1, 2, 3, and 4 (equipped with SDLC/BSC Switch feature)

SDLC MAINTENANCE PACKAGE

The maintenance package for the 3270 SDLC systems consists of:

1. PROBLEM DETERMINATION PROCEDURES

   The customer is supplied with an Operator's Guide (GA27-2750) which contains problem isolation procedures. These charts will enable the customer to perform subsystem problem determination.

2. MAINTENANCE ANALYSIS PROCEDURES (MAP)

   MAPs are used by the CE to analyze problems with the 3270 system. These MAPs should always be located with the machine to which it corresponds.

3. OFFLINE TESTS

   The following FE tools are available to service the 3270 system offline:

   a. Switch Indicator Unit (SIU)

   b. Pre-recorded cassette tapes

   c. Cassette Record Adapter Unit

4. ONLINE TESTS

   a. R3270D

      The 3271 (MOD. 11/12) SDLC OLT tests and patterns can be invoked from the host CPU or via a test request message from a remote keyboard. The OLTs operate concurrently with a customer program. The 3270 Operator's Guide has a description of how to request tests from the terminal.

      An example of running the tests from a system console would be:

      R 01, termname/R3270D/NFE,MI,EXT=PAT/
      (for BSC devices)

      R 01, termname(BIND)/R3270D/NFE,MI,EXT=PAT/
      (for SDLC devices)

      termname The name of the terminal under test.

      (BIND) The bind name or bind parameters for SDLC devices.

      R3270D The name of the 3270 diagnostic to be run.

      EXT=PAT The option field and is requesting the pattern test.

The valid options that can be requested by the EXT= option are;

CHK Check test (functional checkout), this is the default option.

MAN Manual test (includes both KEY and MAG).

KEY Keyboard tests.

MAG Magnetic card reader.

PAT Patterns for displays or buffered printers.

PAT,DPRT Patterns for non-buffered printers.

NOTE: The MAN, KEY, MAG, PAT, and PAT,DPRT entries must also specify NFE,MI in the option field.

b. API Echo (T3700SNA)

API Echo tests run on SDLC 3271 (MOD. 11/12s) and BSC 3270s if the BSC 3270s save their CDS records configured the same as SDLC CDS records. Test data in the form of characters or patterns is entered via the remote keyboard. The operator (customer or CE) specifies the number of times the test data will be repeated. The host system sends the test data to the remote display or printer specified the number of times indicated in the Echo Test message. The Echo Test is invoked from any remote keyboard and requires the dedication of the remote control unit under test. This test requires the installation of TOLTEP.

c. SDLC Link Level 2 (LL2) Test

The SDLC LL2 test is provided for installation verification and for definition and isolation of link problems. The LL2 Test is invokable from the host CPU.

7.1.2 : BSC SYSTEMS

REMOTE ATTACHMENT USING BSC PROTOCOL

Control units that can be remotely attached are:

- 3271 Control Unit Models 1 and 2
- 3274 Control Unit Models 1C, 21C, 31C, and 51C
- 3275 Display Station Model 2
- 3276 Control Unit Display Station Models 1, 2, 3, and 4

BSC MAINTENANCE PACKAGE

The maintenance package for the 3270 BSC systems consists of:

1. PROBLEM DETERMINATION PROCEDURES

   The customer is supplied with an Operator's Guide (GA27-2750) which contains problem isolation procedures. These charts will enable the customer to perform subsystem problem determination.

2. MAINTENANCE ANALYSIS PROCEDURES (MAP)

   MAPs are used by the CE to analyze problems with the 3270 system and these are located with the machine.

3. OFFLINE TESTS

   The following FE tools are available to service the 3270 system offline:

   a. Switch Indicator Unit (SIU)

   b. Pre-recorded cassette tapes

   c. Cassette Record Adapter Unit

4. ONLINE TESTS

   a. R3270B

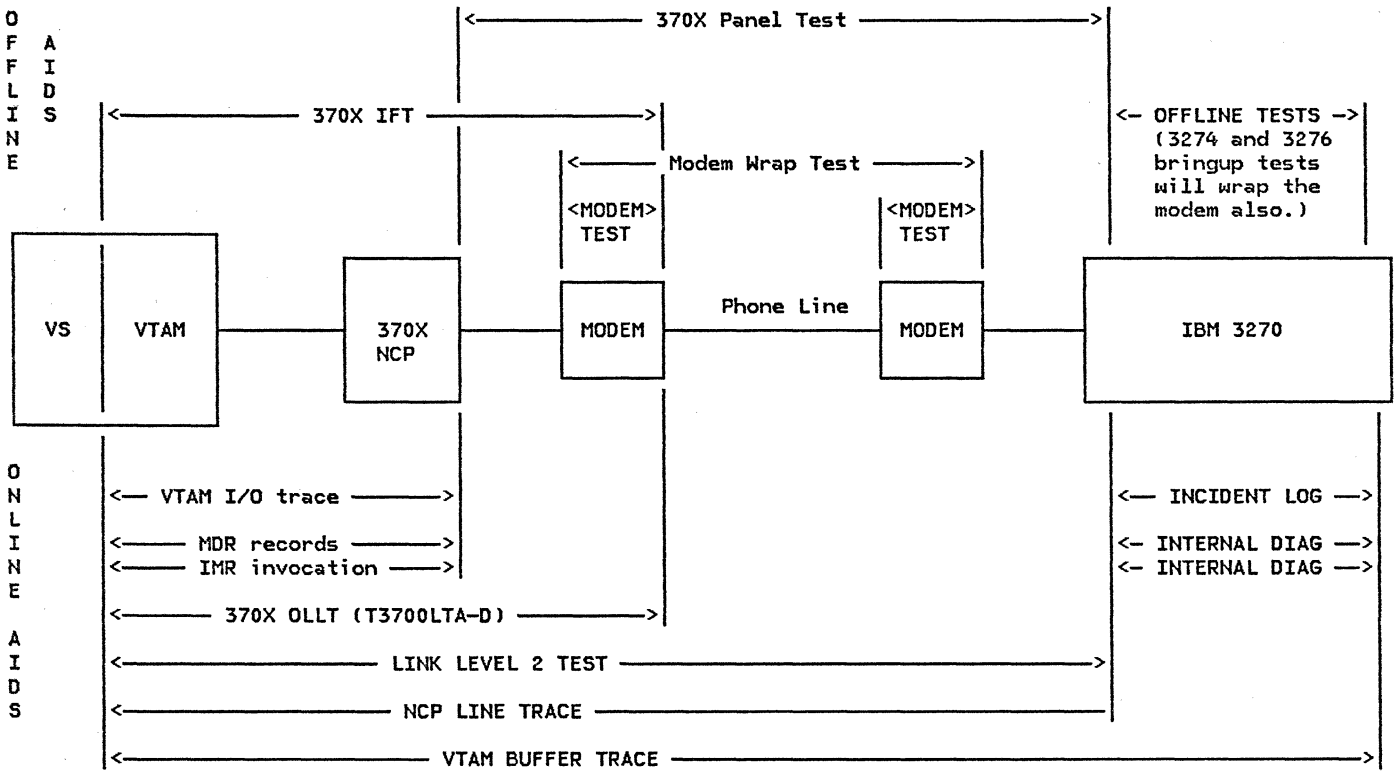
      The BSC tests have the same patterns and use the same options as the SDLC tests. If you have both BSC and SDLC 3271 (MOD. 11/12) terminals in your system, the BSC terminals can use R3270D if they are defined as SDLC on the CDS records. The advantages of using R3270D over R3270B are:

      - A simpler CDS is used.
      - Improved performance for the same OLT functions.
      - No performance degradation to other devices on the same line.
      - OLT=YES is not required on the NCP generation statements for R3270D.

   b. IBMTEST

      VTAM provides an IBMTEST command that allows the terminal operator to test the physical path between the terminal and ACF/VTAM. IBMTEST causes ACF/VTAM to return test data to the terminal a spefified number of times. Specific data can be provided or a defaulted message will be generated.

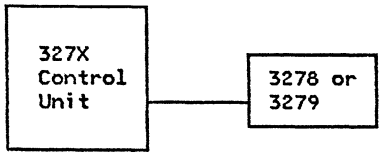
7.1.3 : SERVICE AIDS FOR A NETWORK



The block diagram represents the major components in a 3270 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.1.4 : ON LINE TESTING OF 3278/3279 TERMINALS

Online testing in this case refers to testing a terminal (3278/3279) that is connected to a 327X control unit. That is:



The 3278 and 3279 terminals allow the user to check various components of the system without logging onto the host. This is done by pressing the ALT key and the TEST key simultaneously. This will clear the screen and set the word TEST in the lower left corner. The cursor will be in the upper left corner and from this point commands can be entered. Commands have the following format:

a/b

where:

a = the port address of any terminal on the same control unit or if left blank the default is the address of the terminal on which the command is entered.

b = a number from zero to nine specifying which test is to be performed.

For further information on any of these commands see:

SY27-2512 3274 Control Unit - Maintenance Concepts

TEST 0

Entering /0 will diplay on the first line the type of control unit and the port address to which the terminal is attached.

e.g., TEST: 3274;03

TEST 1

Entering /1 will display all errors sensed by the control unit since the last time it was powered on.

```
e.g., 03/1
      0400 0000
      0000 0002 0000
```

For a further description of the previous two tests refer to:

SY27-2510 3278 Display Station-Maintenance Information which should be located under the keyboard of any 3278/3279 type of display station.

TEST 2

Entering /2 will display four lines of hexadecimals with each byte corresponding to some configuration information.

```
e.g., E243 4340 0800 0000 0000 0000 0000 0404
      0004 0402 0000 1102 0608 1820 0000 0199
      1820 0009 1803 0100 2027 D716 9752 0F01
      2004 4000 4B42 FFFE FFFE A55A 0000 0000
```

TEST 3

Entering /3 will display the status of all configured terminals and display control unit summary counters.

```
e.g., 01234567890123456789012345678901
      00111110000-000000001000 00000000
      ddddddd__d_d_dd_____d___ ________   TYP
      .........:.:............ ........   COAX
      ........................ ........   DEV


     0000 0006 0006 0000 0000

line 1 : coax port address
line 2 : status of each device, where;
```

```
       1 = device powered on
       0 = device recognized as powered off
       - = device recognized as powered off because
           of control unit detected errors.
line 3 : shows the type of device attached, where;
       d = display
       p = printer
       i = other
       - = never initialized
line 4 : shows a summary of coax errors, where;
       . = no errors
       : = 1-9 errors
       | = 10-19 errors
       * = 20 or more errors
line 5 : shows a summary of device errors, where .,:,|,
         and * are as they were in line 4.
line 6 : shows a summary of sessions bound
         (SNA attachments only)
             + = session bound
         blank = not session bound
line 8 : displays statistical counter information
         in summary form of control unit detected
         machine checks, communication checks, program
         checks, and SDLC test commands. Display is in
         hexadecimal.
```

TEST 4

Test 4 provides the capability of resetting any device adapter, device, host adapter, or control logic log displayed by test 1.

e.g., 00 to 31/4 - resets the device log for the device specified to all zeros.

TEST 6

Entering /6 will display the device control block (DCB) which contains common subsystem information pertaining to all terminals, device and host adapter information, and limited device feature information.

```
e.g.,  913E 650C 0110 4000 4094 0008 0000 0000
       0800 0000 0052 0001 0000 0050 0A4F 0000
       0000 0000 102F 5050 2A60 0A4F 0000 4604
       2300 0000 0000 7800 0000 0000 0000 0005
```

TEST 7

Entering /7 on a 3279 color display station only allows the adjusting of color convergence. The pattern displayed in the center of the screen should be yellow. If the pattern shows traces of green or red use the cursor positioning keys to move the green pattern towards the red until they coincide and a yellow pattern is displayed. Pressing the space bar changes the color to pink with blue or red showing if the convergence is not correct. Pressing the space bar a second time moves the convergence pattern to another position on the screen where the above process can be repeated. When this has been done for the entire screen the pattern will appear in all the locations tested and each should be white with no other colors showing. The pattern appears as follows:

```
      -|-|-
```

TEST 8

Entering /8 will display whether highlighting is available and for 3279 type terminals, what colors are available.

7.2 : 3600/4700 SUBSYSTEMS

The maintenance package for the 3600/4700 consists of:

1. PROBLEM DETERMINATION PROCEDURES (PD/IP)

   PD/IPs are available to the customer and are located in the Operating Guide for the IBM 3600/4700 Finance Communication System, GA27-2776. Use of the PD/IPs will enable the customer to direct the CE to the problem area of the 3600/4700 after system problem determination procedures have determinated the problem is a 3600/4700 problem.

2. MAINTENANCE ANALYSIS PROCEDURES (MAP)

   MAPs are used by the CE to analyze problems with the controller and the connected terminals and are included in the Maintenance Information Manual.

3. Controller LOG

   The controller log is a file located on the diskette. The system monitor places messages in this log that relate to maintenance and engineering. The user's programs also have the ability to place messages in this log. In addition to recording errors in the log, the controller maintains device statistical counters for each of the following components of the system:

   - Controller host communication link
   - Controller diskette
   - Controller disk file
   - Controller loop control (for each loop)
   - 3604 keyboard
   - 3604 display
   - 3604 magnetic stripe encoder
   - 3606 or 3608 keyboard, display, and magnetic stripe reader
   - 3608 printer
   - 3610 document printer
   - 3611 passbook printer
   - 3612 document printer
   - 3612 passbook printer
   - 3614/3624 consumer transaction facility
   - 3615/3619 administrative terminal printer
   - 3618 printer
   - RPQ devices

   Keyboard commands are available to display or print the contents of device statistics counters. NOTE: Device statistics counts are located in functional storage and are lost each time there is a startup (warm or cold). In contrast, the controller log is located on the diskette. Thus, this log is lost only on a cold start.

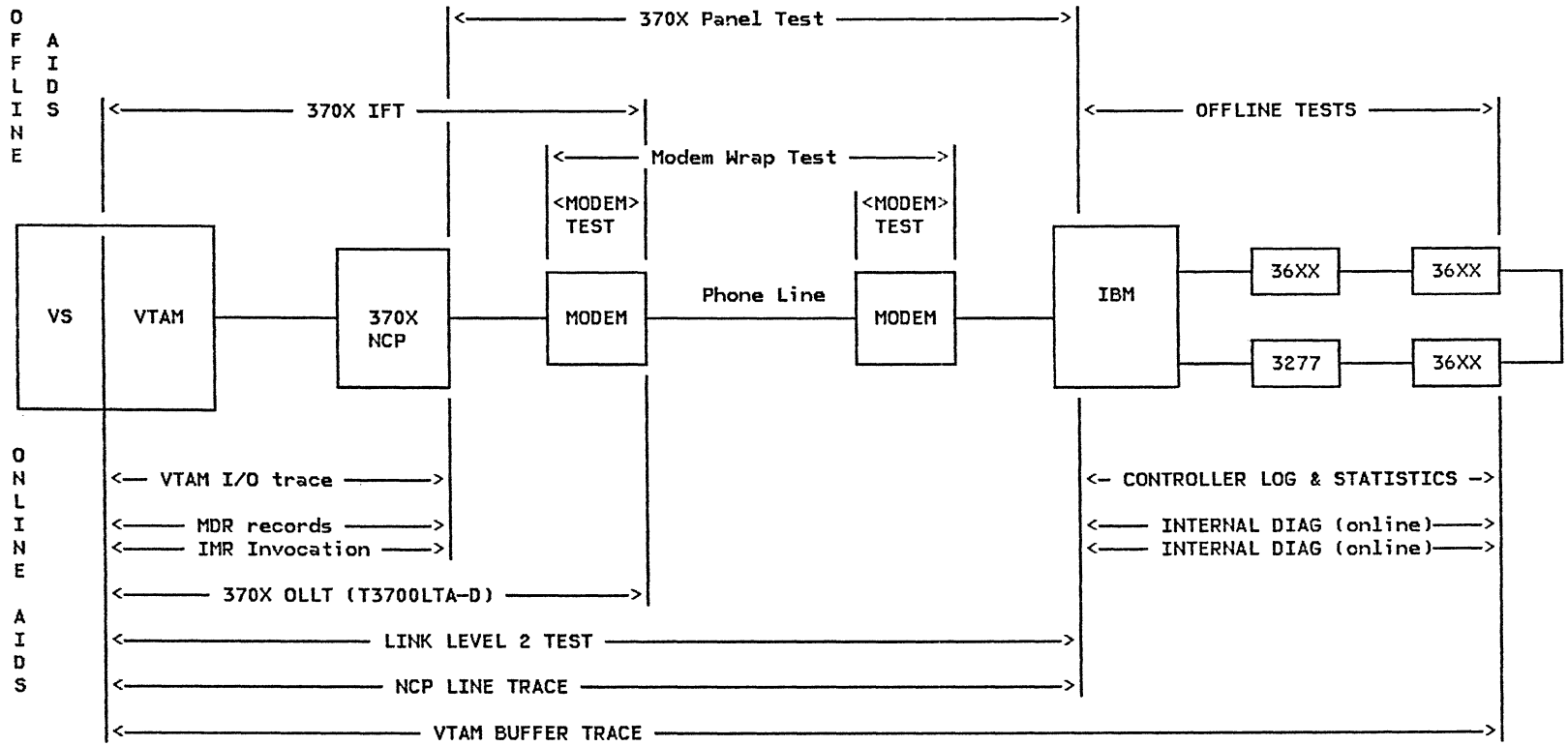
4. The HOST LINK STATISTICS COUNTERS

COUNTER	STEPPED BY
1	Receipt of a valid set response mode command from host. If BSC, receipt of a valid poll.
2	Receipt of a test message from host.
3	Write retry - Used when the controller has to resend a message.
4	Timeout - The line has been inactive for a period specified by user. This timeout will cause an autowrap of the adapter.
5	Overrun - 3601 problem.
6	Underrun - 3601 problem.
7	Connection problem - If a complete message has to be resent 20 times this counter is incremented (3 counts each time resent).
8	Invalid controller data - Indicates a failure in 3601.
9	Block check count (BCC) - Indicates a probable line problem.
10	The 3601 detected a non-normal termination of a message by the host. Indicates a network problem.
11	Data communication equipment (DCE) error - A modem problem.
12	3601 busy because of no available receive buffers.
13	Command reject condition - Messages received out of sequence.
14	Machine check - 3601 problem.
15	Command reject condition - Data in frame when no data should be. If BSC, receipt of a valid selection sequence.
16	Command reject condition - Received an invalid command.

5. ONLINE TESTS

SDLC Link Level 2 (LL2) test is provided for installation verification and for definition and isolation of link problems. The LL2 test is invokable from the host CPU.

SERVICE AIDS FOR A SNA NETWORK WITH 3600/4700 TERMINALS



The block diagram represents the major components in a 3600/4700 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.3 : 3650 SUBSYSTEMS

The maintenance package for the 3650 consists of:

1. PROBLEM DETERMINATION PROCEDURES

   Problem determination procedures are included in the IBM 3650 Retail System Problem Determination Procedures and Operator Messages, GA27-3109. These procedures tell the user how to determine fault responsibility between IBM and other equipment manufacturers. In some cases the CE may have to use these procedures during trouble analysis. They are included in the MAPs for CE use.

2. MAINTENANCE ANALYSIS PROCEDURES

   Maintenance analysis procedures (MAPs) are used by the CE to analyze problems with the 3650 Retail Store System. The MAPs are arranged in frames, with each frame representing one item of information or a task to be performed. The CE should begin a service action by starting at the first frame and proceeding as directed by the MAPs.

3. DIAGNOSTIC TESTS

   Diagnostic tests are to be used only as directed by the MAPs and/or problem determination procedure. When the MAPs or problem determination procedures require a diagnostic test, they will give the instructions for executing the test. There are two groups of diagnostic tests, offline and online. When offline diagnostic tests are operating, the system is not available for normal store support operations. When the online diagnostic tests are operating, store operations are normal, except for the device being tested. The MAPs or problem determination procedures dictate which tests are to be run.

4. 3650 ERROR LOG DISPLAY

   The error log is a reserved area on the 3651 disk used to store system error information. When an error is detected by the system, an entry is written in the log area. The entry is made even if the system recovers from the error. The 3650 log contains for each error entry, a sequence number for this entry, the date this entry was made, the time this entry was made, the device type, the device address, and the error data. The 3650 log contains entries for the following components:

   - 3651 Disk
   - 3651 Controller
   - 3651 Store loops
   - 3651 Host interface adapter
   - 3651 Terminals

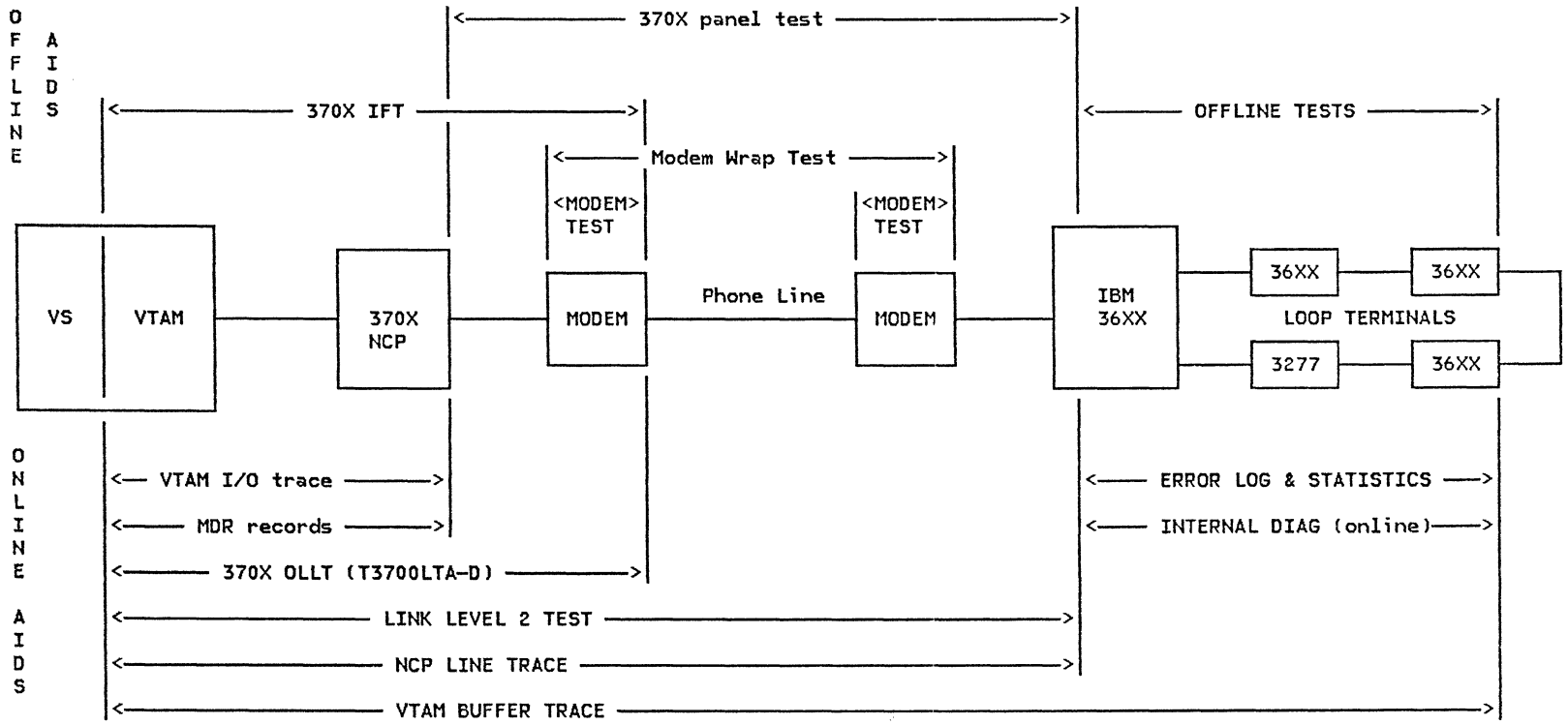
   There are entries in the HOST INTERFACE LOG for the following items:

   SXRM received, Disconnect received, Write retry, Idle timeout, Overrun, Underrun, Connection problem, Dump message, Invalid BSTAT, BCC error, DCE error, Write timeout, Machine check, Primary abort, Read timeout, NR sequence error, Count exceeded, Data with invalid command, and invalid command.

5. ONLINE TESTS

   SDLC Link Level 2 (LL2) test is provided for installation verification and for definition and isolation of link problems. The LL2 test is invokable from the host CPU.

SERVICE AIDS FOR AN SNA NETWORK WITH 3650 TERMINALS



The block diagram represents the major components in a 3650 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.4 : 3660 SUBSYSTEMS

The maintenance package for the 3660 system consists of:

1. PROBLEM DETERMINATION PROCEDURES

   Problem determination procedures are included in the IBM 3660 Supermarket System Administrative Operations guide. These procedures tell the user how to determine fault responsibility between IBM and other equipment manufacturers. In some cases the CE may have to use these procedures during trouble analysis. They are included in the MAPs for CE use.

2. MAINTENANCE ANALYSIS PROCEDURES

   Maintenance analysis procedures (MAPs) are used by the CE to analyze problems with the 3660 Supermarket System. The MAPs are arranged in frames, with each frame representing one item of information or a task to be performed. The CE should begin a service action by starting at the first frame and proceeding as directed by the MAPs.

3. DIAGNOSTIC TESTS

   Diagnostic tests are to be used only as directed by the MAPs and/or problem determination procedure. When the MAPs or problem determination procedures require a diagnostic test, they will give the instructions for executing the test. There are two groups of diagnostic tests, offline and online. When offline diagnostic tests are operating, the system is not available for normal store support operations. When the online diagnostic tests are operating, store operations are normal, except for the device being tested. The MAPs or problem determination procedures dictate which tests are to be run.

4. 3660 ERROR LOG

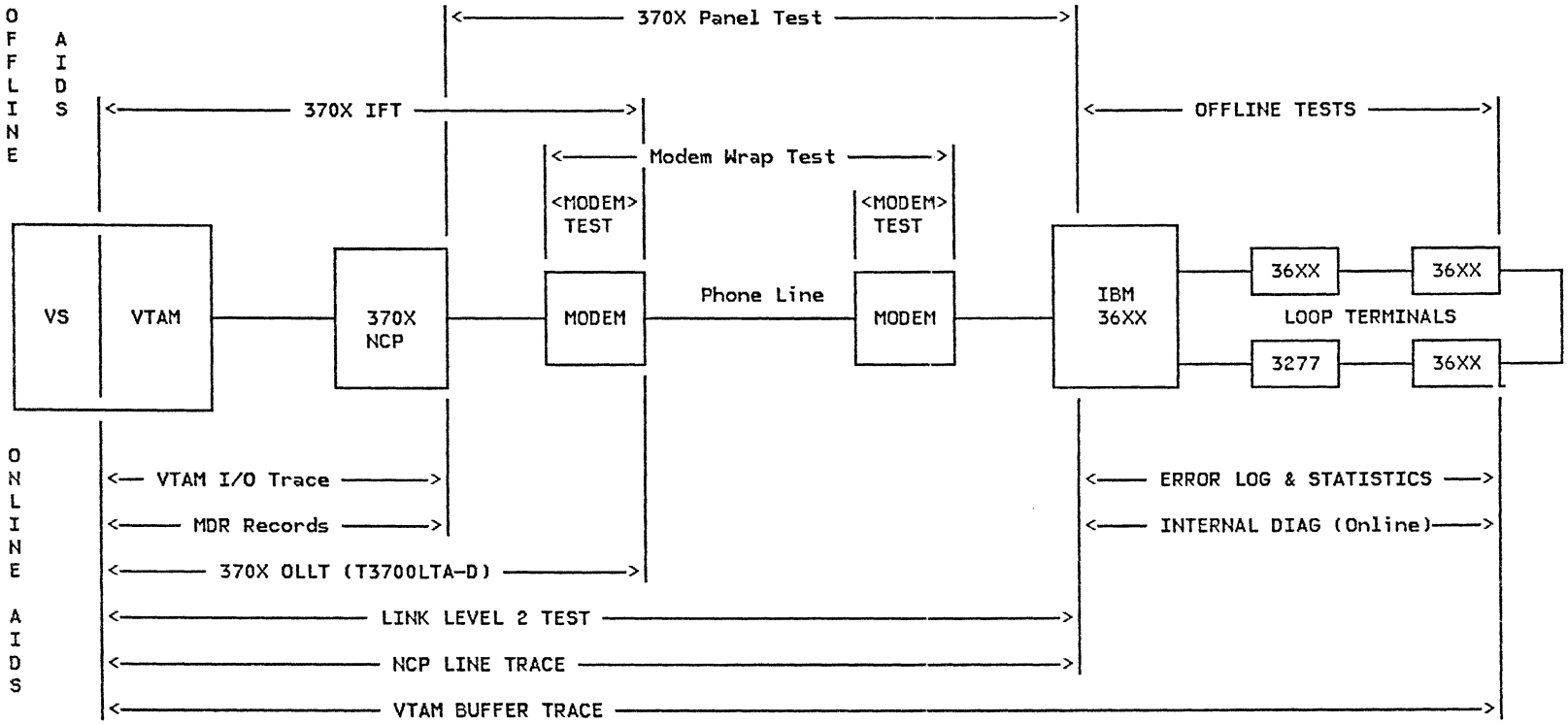
   The error log is a group of four areas on the store controller disk used to store error information. Each device in the supermarket system is assigned to a specific area. The four error log areas are:

   - 3651 hardware error log.
   - Disk operational log.
   - Communications error log.
   - Terminal hardware error log.

5. ONLINE TESTS

   SDLC Link Level 2 (LL2) test is provided for installation verification and for definition and isolation of link problems. The LL2 test is invokable from the host CPU.

SERVICE AIDS FOR AN SNA NETWORK WITH 3660 TERMINALS



The block diagram represents the major components in a 3660 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.5 : 3767 TERMINALS

The maintenance package for the 3767 consists of:

1. PROBLEM DETERMINATION PROCEDURES

   Problem determination procedures are included in the IBM 3767 Communications Terminal Operations Guide, GA18-2000 and the Problem Determination Guide GA18-2012. These procedures tell the user how to determine fault responsibility between IBM and other equipment manufacturers. In some cases the CE may have to use these procedures during trouble analysis. They are included in the MAPs for CE use.

2. MAINTENANCE ANALYSIS PROCEDURES

   Maintenance analysis procedures (MAPs) are used by the CE to analyze problems with the 3767 terminal. The MAPs are arranged in frames, with each frame representing one item of information or a task to be performed. The CE should begin a service action by starting at the first frame and proceeding as directed by the MAPs.

3. OFFLINE TESTS

   The 3767 has built-in Basic Assurance Tests (BAT) that run whenever the power is turned on. The BAT test checks the internal logic of the 3767 and will display a failure number in the ANR lights if any test fails.

   If the terminal is already powered up, the tests can be run manually by doing the following steps:

   a. Turn the Comm/Local switch to Local.

   b. If performing Terminal/indepth or Loop test, perform the modem wrap procedure.

   c. Press and hold Test switch.

   d. Press appropriate key as follows to select test:

      1) Terminal/indepth test = only test switch needed.

      2) BAT section 0 = test switch and 0 key.

      3) Terminal loop test = test switch and 1 key.

   e. Release test switch.

      All indicator lights turn off except test.

      Alarm sounds once.

   f. The test selected will execute. If an error is detected, the type of error is displayed in the indicator lights at the end of the test.

4. ONLINE TESTS

   The following tests can support the 3767 in SDLC mode:

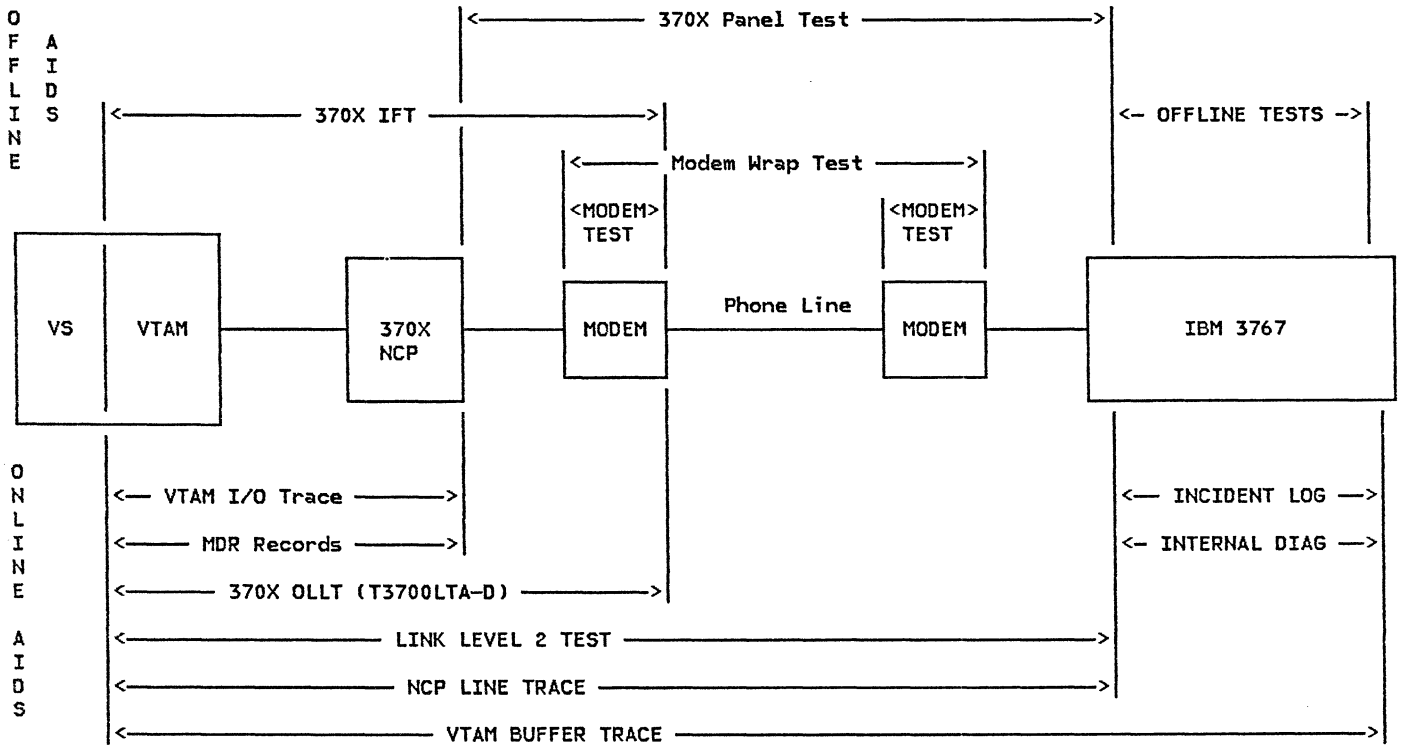
   a. LINK LEVEL 2 TEST

      SDLC Link Level 2 (LL2) test is provided for installation verification and for definition and isolation of link problems. The LL2 test is invokable from the host CPU.

   b. IBMTEST

      VTAM provides an IBMTEST command that allows the terminal operator to test the physical path between the terminal and ACF/VTAM. IBMTEST causes ACF/VTAM to return test data to the terminal a specified number of times. Specific data can be provided or a defaulted message will be generated.

SERVICE AIDS FOR A NETWORK WITH 3767 TERMINALS



The block diagram represents the major components in a 3767 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.6 : 3770 SUBSYSTEM

The maintenance package for the 3770 system consists of:

1. PROBLEM RECOVERY PROCEDURES (PRP)

   The customer is supplied with an Operator Guide GA27-3114 containing the PRPs. These charts will enable the customer to isolate the problem to the IBM subsystem, OEM, or common-carrier equipment.

2. MAINTENANCE ANALYSIS PROCEDURES

   MAPs are used by the CE to analyze problems with the 3770 system and are located with the terminal.

3. OFFLINE TESTS

   a. BRING-UP DIAGNOSTIC TEST

      This test runs following any power on reset or system reset. The following areas are tested; Controller, ROS, RAM, System Card, Keyboard Adapter, and Operator Panel. Successful completion or an error condition will be indicated by the operator panel lights and NPR.

   b. COMMUNICATION TESTS

      This series of tests assists in determining whether the 3770, local modem, line, or remote modem is causing the problem. These tests include the following:

      TEST 0 Terminal Communication Test (test controller).

      TEST 2 Modem Wrap Test (Modem T2 test).

      TEST 3 Modem transmit test (Modem T3 test).

      TEST 4 Modem receive test (Modem T4 test).

   c. CE DIAGNOSTIC TESTS

      Located on the CE cassette tape supplied with the terminal, these tests are read into the terminal RAM using the cassette tape player. If an error is detected during a selected test, an error code is displayed in the keyboard NPRs or the operator panel lights if no keyboard. This error code acts as a key entry point into the MAPs.

4. ONLINE TESTS

   a. IBMTEST

      VTAM provides an IBMTEST command that allows the terminal operator to test the physical path between the terminal and ACF/VTAM. IBMTEST causes ACF/VTAM to return test data to the terminal a specified number of times. Specific data can be provided or a defaulted message will be generated.

   b. SDLC Link Level 2 Test

      SDLC Link Level 2 (LL2) test is provided for installation verification and for definition and isolation of link problems. The LL2 test is invokable from the host CPU.

5. ERROR LOG

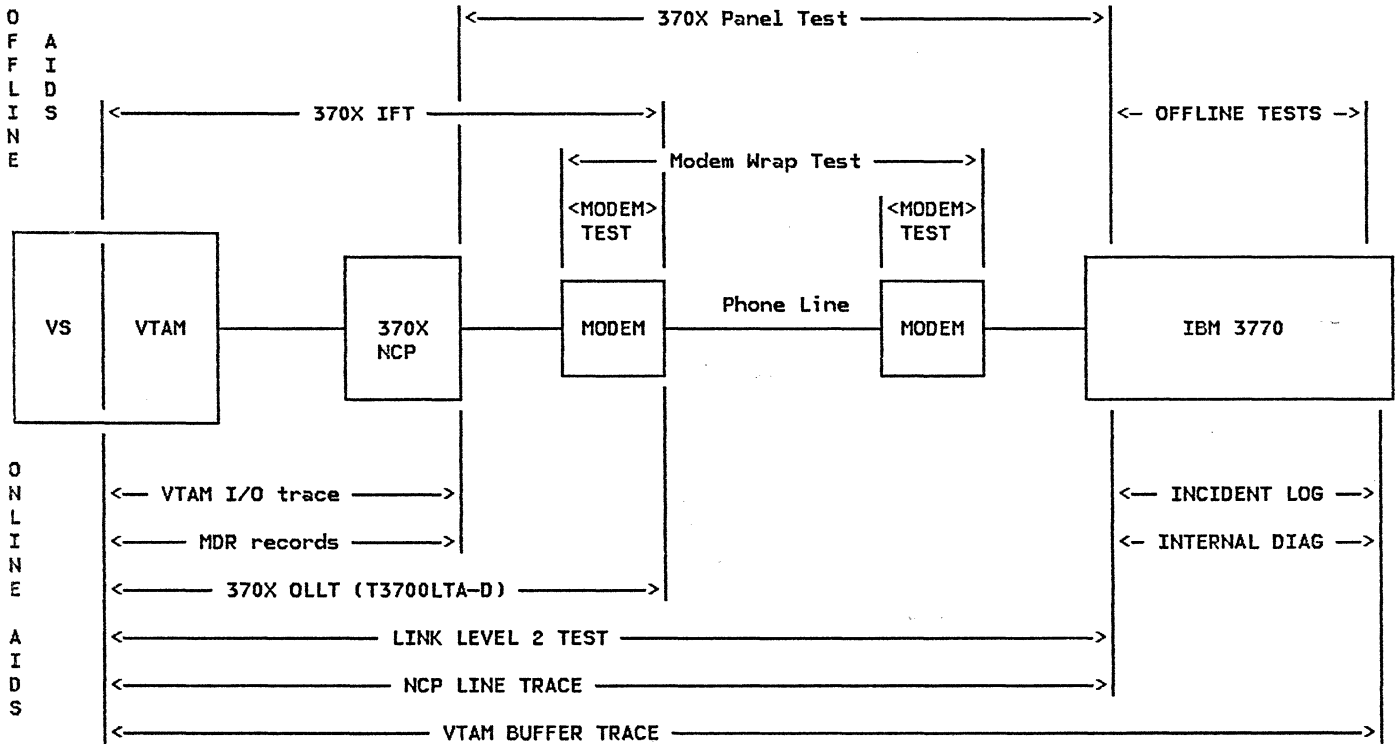
The 3770 has an error log which contains detailed hardware, software, and machine check information. To print this error log, depress the 'code' key and press the numeric 2 key. This information is destroyed with power-on-reset. The operator must print this error log before powering the machine off and save the printout if there is a failure.

EXAMPLE 3770 ERROR LOG

ERROR CODE	01	02	03	04	05	06	07	08	09	10	11	12
ID reader	000											
Keyboard	000											
console prntr	000	000	000	000	000							
Card Reader	000	000	000	000	000	000	000	000				
Diskette #1	000	000	000	000	000	000	000					
Diskette #2	000	000	000	000	000	000	000					
Card Punch	000	000	000	000	000	000	000	000				
Machine check	000	000	000	000	000	000	000	000				
BSC or SDLC	617	618	619	620	621	622	623	623	625	626	627	628
Last error NPR	000											
Next to last	000											
3rd from last	000											
4th from last	000											
5th from last	000											

The entries in the BSC or SDLC line will correspond to NPR error displays and provide the operator an explanation of what has happened and provide the CE with an entry point into the MAPs.

SERVICE AIDS FOR A NETWORK WITH 3770 TERMINALS



The block diagram represents the major components in a 3770 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.7 : SYSTEM/34

The maintenance package for the System/34 consists of:

1. PRIMARY SDLC ERROR RETRY COUNTS (SETRETRY)

   The SETRETRY procedure displays the configured Primary SDLC error retry count values for each communications line and allows the values to be changed. The value is the number of multiples of seven retries that Primary SDLC uses to attempt to contact a secondary station. If the secondary station does not respond during the specified number of retries, a permanent timeout error is reported.

   Some modems such as the IBM 3865 require more time to equalize than the default error retry count allows. Thus, a permanent timeout error may be reported when the modems are equalizing (not a permanent error situation). Increasing the error retry count value from the default (a value of 1 that equals 7 retries) prevents a permanent timeout error in this situation.

2. ERAP Procedure

   The ERAP procedure displays or prints data that was logged for the devices on the system. Depending on the device, the logged data is contained in one or more of the following tables:

   - An 'I/O counter table' that contains accumulated statistics reflecting the amount of activity for the device.
   - An 'error counter table' that contains accumulated totals of specific types of errors for the device.
   - An 'error history table' that contains a series of fixed-length fields, with each field representing an error on the device. The first entry in the table represents the most recent entry. The oldest entry is dropped from the table each time a new entry is added.

3. SDLC STATION TEST

   The SDLC Station Test can be used to determine whether a communications line is operational, and whether remote System/34s, remote 3601 finance controllers, and remote workstation controllers are operational.

   The test can be run on either a switched or nonswitched connection. On a multipoint line, up to seven secondary remote stations can be tested with a single test. The autocall feature cannot be used for this test.

   The system being used will send out a TEST command to the remote location specified. If the remote stations respond with a TEST response, the transmission is classified as successful. If the remote stations respond in any other form, or do not respond at all, the transmission is classified as successful.

4. TRACE Procedure

   The TRACE procedure keeps a history of events that occur in the system. Selected system functions are recorded in a variable-length, wraparound table in main storage as they occur. Optionally, system functions can also be recorded in a separate trace table. In addition to recording events in main storage, the table can also be written to a system file on disk prior to being reused.

   Communications line activity is one of the options that may be selected when the trace begins executing. Extended trace tables and files can be selected for one or more communications lines.

5. APAR Procedure

   The APAR procedure collects diagnostic information that helps the service personnel isolate and correct programming problems that might occur in the system. APAR creates one or more diskette files that contain, among other things, I/O controller storage dump areas.

6. MAINTENANCE ANALYSIS PROCEDURES (MAPS)

   MAPs are used by the CE to analyze problems with the System/34 and connected devices. They should be readily accessible should the CE require them.

7. 4800 BPS INTEGRATED MODEM MANUAL TESTS

Manual tests for the 4800 bps integrated modem require operator intervention at either the modem attached to the System/34, the remote modem, or both modems. For some of these tests, the operator at the remote location will have to be contacted to verify the status of the remote modem.

The SELF TEST checks the modem operation by wrapping a test pattern from the transmit section to the receive section of the modem, and then checking for errors. A communications line is not required for this test. This test can be run on a non-switched multipoint tributary network without interfering with the normal operation of the rest of the network. If the self test is run on a switched line, however, the switched line connection must be terminated.

The TRANSMIT/RECEIVE test checks the transmit section of the modem, the switched communications line, and the receive section of the remote modem. The modem transmits a test pattern over the switched communications line to the remote modem where it is checked for error.

The LOOP/TRANSMIT test can only be run from the System/34 if the System/34 is a multipoint control station or a point-to-point primary station. The test checks the modem operation, the communications line, and the remote modem operation. The modem transmits a test pattern over the communications line to the remote modem. The remote modem loops the received test pattern back to the System/34, which compares this pattern with the pattern transmitted.

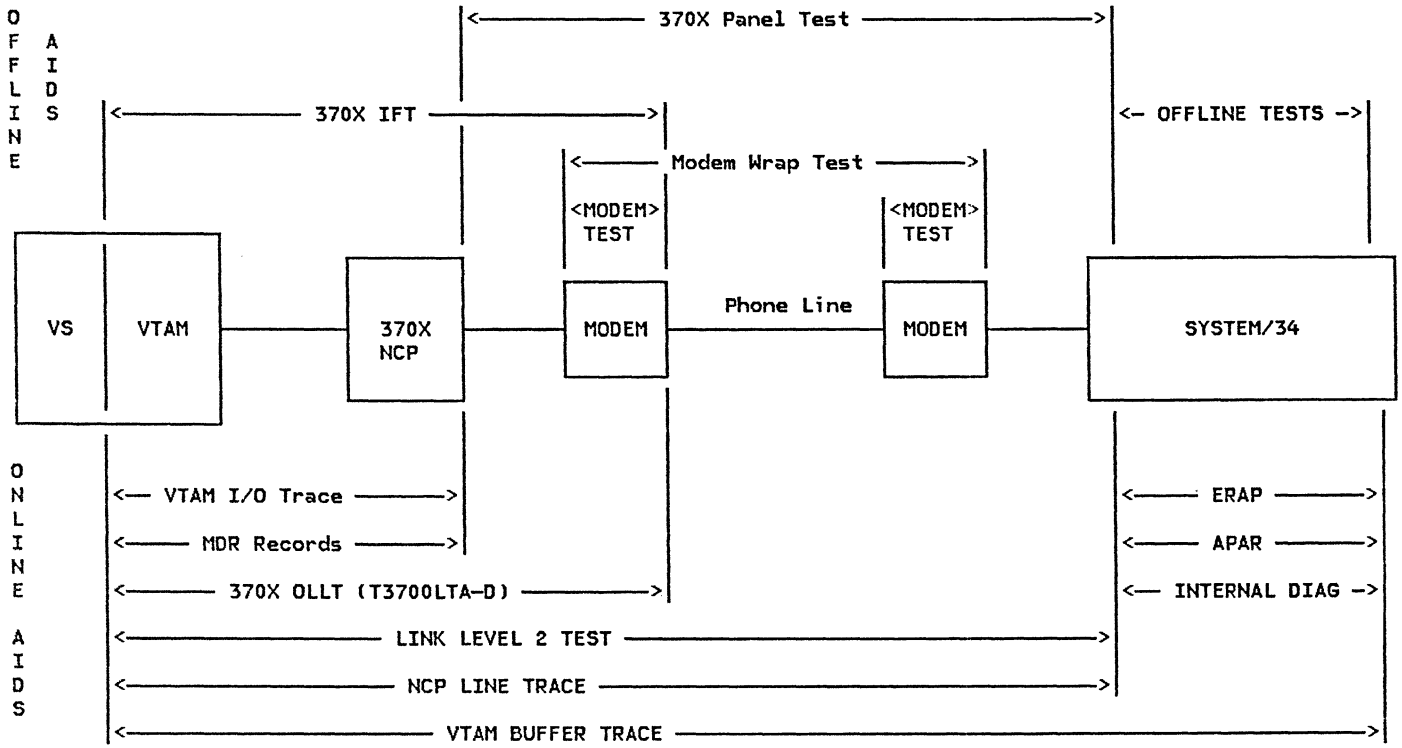
8. NETWORK PROBLEM DETERMINATION AID (NPDA)

NPDA can be a powerful tool in network problem determination. It collects device dependent records of errors as well as the usual general communications network error records. For further information on NPDA refer to section 4.2.3. (Volume I) in this guide.

REFERENCE MANUALS

- IBM System/34 Data Communications Reference Manual (SC21-7703)
- IBM System/34 Operator's Guide (SC21-5158)
- IBM Synchronous Data Link Control General Information (GA27-3039)

SERVICE AIDS FOR A NETWORK WITH SYSTEM/34



The block diagram represents the major components in a System/34 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.8 : SYSTEM/36

The maintenance package for the System/36 consists of:

1. ENHANCED HELP

   The Enhanced Help interface for the System/36 assists the CE or customer in obtaining more information about the service problem. The Enhanced Help Service Aid Procedure menu can be invoked through the SERVICE procedure or from the Problem Determination and Correction menu of the Enhanced Help using any local or remote workstation attached to the System/36. The Enhanced Help also provides valuable online information about the System/36 service aids.

   The various options allow the CE or customer to:

   - Display a menu of service aids needed to collect APAR data.
   - Diagnose problems with display stations and printers.
   - Diagnose problems with communications devices and the interactive communications feature (ICF).
   - Display a menu of options to assist the user in applying PTFs to the system.
   - Display a menu of options to enable access of the system service log.

2. ERAP Procedure

   The ERAP procedure displays or prints data that was logged for the devices on the system. Depending on the device, the logged data is contained in one or more of the following tables:

   - An 'I/O counter table' that contains accumulated statistics reflecting the amount of activity for the device.
   - An 'error counter table' that contains accumulated totals of specific types of errors for the device.
   - An 'error history table' that contains a series of fixed-length fields, with each field representing an error on the device. The first entry in the table represents the most recent entry. The oldest entry is dropped from the table each time a new entry is added.

   In addition to printing or displaying the logged data, ERAP also:

   - formats the data
   - retrieves the data
   - controls data flow

3. ALTER/DISPLAY

   The alter/display function provides a method of displaying and/or altering (as well as printing) the following areas:

   - main storage
   - control storage
   - disk storage
   - I/O controller storage
   - most system areas

   Alter/display also allows main storage processor instructions to be traced to the printer, main storage processor and I/O controllers to be stepped or stopped, viewing of system status, and selection of system dumps.

4. COMMTEST

   The communications test procedure (COMMTEST) will allow you to run a variety of communications tests providing workstations on the line are operational. This procedure may be run by entering COMMTEST from the keyboard or through Enhanced Help. (Refer to the Data Communications Maintenance Information Manual (SY31-9007) for detailed information.)

5. APAR Procedure

   The APAR procedure collects diagnostic information that helps the service personnel isolate and cor-

rect programming problems that might occur in the system. APAR creates one or more diskette files that contain, amongst other things, I/O controller storage dump areas.

6. MAINTENANCE ANALYSIS PROCEDURES (MAPS)

   MAPs are used by the CE to analyze problems with the System/36 and connected devices. They should be readily accessible should the CE require to use them.

7. SDLC STATION TEST

   The SDLC station test procedure (STATEST) will determine whether a line and the secondary SDLC station on that line are operational. This procedure can be run from any display station. (Refer to the Data Communications Maintenance Information Manual, SY31-9007, for more information.)

8. MLCA MICROCODE TRACE

   Two types of concurrent traces are provided within the MLCA controller : MLCA microcode data trace and MLCA microcode command queue trace. A third trace, X.21 microcode trace, provides input to MLCA storage.

   MLCA controller check and status information is also provided when an MLCA controller check occurs during normal operation and the MLCA controller wrap test runs successfully.

   These traces are moved to disk storage when one of the following occurs:

   - The BSC or SDLC programs run either a line wrap test or controller wrap test as a result of a permanent error.
   - The operator or CE runs one of the above two tests under the COMMTEST program.

   Both of these disk trace areas may be printed by means of a COMMTEST option.

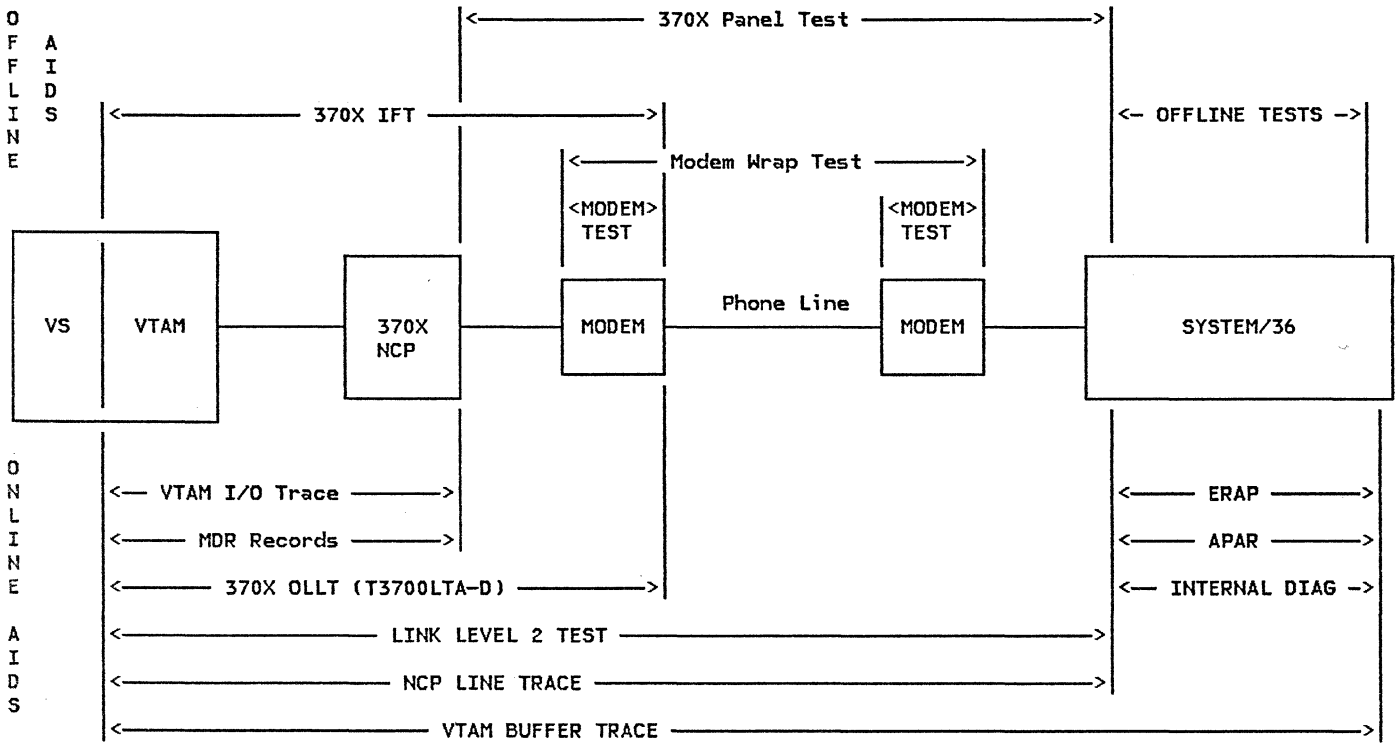
9. NETWORK PROBLEM DETERMINATION AID (NPDA)

   NPDA can be a powerful tool in network problem determination. It collects device dependent records of errors as well as the usual general communications network error records. For further information on NPDA refer to section 4.2.3. (Volume I) in this guide.

REFERENCE MANUALS

- IBM System/36 Data Communications Maintenance Information Manual (SY31-9007)
- IBM System/36 Program Problem Diagnosis and Diagnostics Guide (LY21-0593)
- IBM System/36 General Maintenance Information Manual (SY31-8999)

SERVICE AIDS FOR A NETWORK WITH SYSTEM/36



The block diagram represents the major components in a System/36 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.9 : SYSTEM/38

The maintenance package for the System/38 consists of:

1. PROBLEM DETERMINATION PROCEDURES

   The IBM System/38 Problem Determination Guide (SC21-7876) helps the operator solve the following problems:

   - System loops and waits
   - Problems shown by the colored lights on the operator/service panel on the system unit
   - Remote equipment problems
   - Communication problems
   - Job problems
   - Workstation problems
   - Device problems
   - Diskette and/or tape problems

   The guide also explains how to get service logs and stand-alone dumps, and how to use CSNAP (Communications Statistical Network Analysis Program). CSNAP collects statistics on the activities of the System/38 communications lines and control units. It can be used to monitor communications activities and to isolate errors.

2. SNA ALERTS

   An alert is an SNA architected error message that the System/38 sends to the System Services Control Point (SSCP) at the host system. The SSCP in turn sends the message to NPDA. NPDA displays the message and also saves it for future reference by the host system operator.

   The System/38 sends an alert message to the SSCP when a message with an Alert ID other than NONE arrives at the System/38 history log (QHST). These messages can be associated with the System/38 local devices and control units; remote lines, control units, and devices; software errors or user applications.

   The CHGMSGD (Change Message Description) command can be used to specify whether a particular System/38 message is to generate an Alert. New Alert messages can also be defined.

3. MAJOR/MINOR RETURN CODES

   The completion status for the last I/O operation is contained in this field. It is the user's responsibility to check the major and minor return codes after each I/O operation, if applicable.

4. MAINTENANCE ANALYSIS PROCEDURES (MAPS)

   MAPs are used by the CE to analyze problems with the System/38 and connected devices. They should be readily accessible should the CE require them.

5. LINK AND LINE TESTS

   The Link Test is run to check:

   - the telephone connection between the System/38 and the remote control unit.
   - the ability to send data between the System/38 and the remote control unit.

   The specific test used depends on the values used in the line and control unit descriptions.

   The System/38 Problem Determination Guide (SC21-7876) explains how to run the Line Test using the STRPDP command.

   Having completed the line or link test, the guide helps interpret the result and then suggests lines of action.

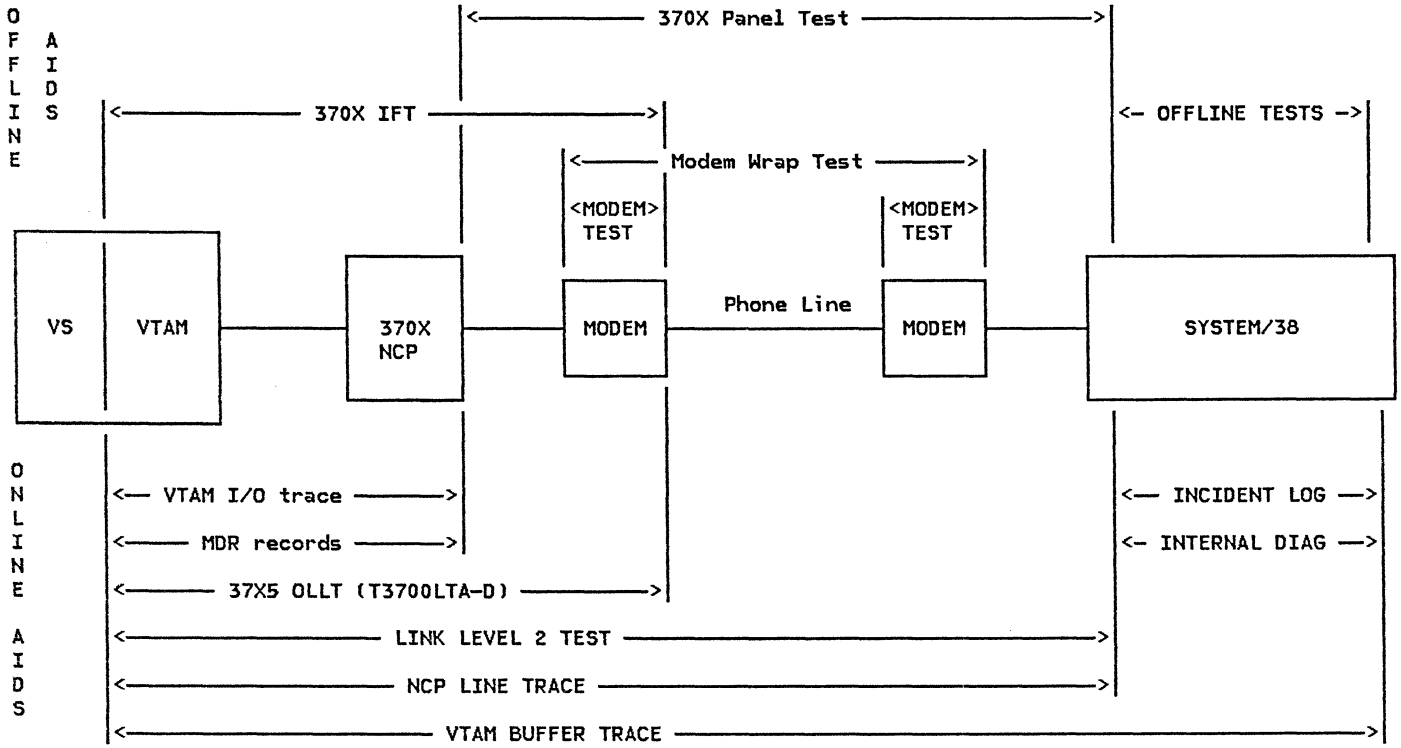
6. NETWORK PROBLEM DETERMINATION AID (NPDA)

   NPDA can be a powerful tool in network problem determination. It collects device dependent records of errors as well as the usual general communications network error records. For further information on NPDA refer to section 4.2.3. (Volume I) in this guide.

REFERENCE MANUALS

- IBM System/38 Problem Determination Guide (SC21-7876)
- IBM System/38 Data Communications Programmer's Guide (SC21-7825)
- IBM System/38 Data Link Control General Information (GA27-3093)

SERVICE AIDS FOR A NETWORK WITH SYSTEM/38



The block diagram represents the major components in a System/38 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.10 : 8100

The maintenance package for the 8100 consists of:

1. DISTRIBUTED SYSTEMS EXECUTIVE (DSX)

   The IBM Distributed Systems Executive (DSX) is a set of System/370 programs and files for use by the network managers, system programmers, and others to store, manage, and distribute programs and data in a distributed data processing network. DSX is particularly useful as a problem management tool for analyzing problems at remote locations. It provides host access to storage dumps and other types of information related to user-noted problems.

   Problem tracking can be simplified with DSX as well. User help desk personnel can obtain complete and current information on a specific cluster, data library contents, scheduled transmission sessions, abend dumps, or other recorded problems.

   Some of the DSX tasks that support central problem management are:

   - Scheduling and receiving data from clusters.
   - Initiating user functions at 8100/DPPX processors.
   - Using DSX for predictive analysis which include:
     - Cluster Master Report
     - Cluster Incident Report
     - Session Schedule Report
     - Session Statistics Report

   For more information on DSX, refer to the IBM 8100 Information System Problem Management Guide (GC27-0435).

2. HOST COMMAND FACILITY (HCF)

   Specific functions available to a System/370 terminal operator using Host Command Facility (HCF) in the 8100 include:

   - Central control and operation of a DPPX and DPCX 8100 Information System selected by the network operator.
   - Central access to DPPX 8100 system and user data sets, including the dump data sets, the error log and the trace data set.
   - Central problem diagnosis for a DPPX 8100 system including:
     - Interactive examination of the error log.
     - Operation of the online diagnostic programs.
     - Verification of the logical path between the System/370 terminal and DPPX.
     - Initiation and examination of dumps and traces.
   - Central problem diagnosis for a DPCX 8100 system, including:
     - Initiation of tests and traces.
     - Operation of the online diagnostic programs.
     - Display of distributed system status information, the incident log, and attached devices' error log.
   - Central access to the Program Execution Monitor for debugging DPCX application programs.
   - Central system performance control for DPCX 8100 systems, including system performance data collection.

   For additional information, refer to the Host Command Facility: Installation and Users' Guide (SC27-0455).

3. SUBSYSTEM INFORMATION RETRIEVAL FACILITY (SYSINFOREF)

   Subsystem Information Retrieval Facility (SYSINFOREF) can be used (with DPCX only) to initiate or terminate a data link adapter (DLA) trace. Infor-

mation can be retrieved for a specific control unit, or for all the DLA devices.

The facility can also be used to retrieve the 3276 error log. Retrieved data consists of a choice of SDLC link statistics, summary counts, communications adapter error counts, and engineering change release levels.

Refer to DPCX/3790 Host Support: Subsystem Information Retrieval Facility Guide and Reference (GC22-9085) for additional information.

4. SNA ALERTS

An alert is an SNA architected error message that the System/38 sends to the System Services Control Point (SSCP) at the host system. The SSCP in turn sends the message to NPDA. NPDA displays the message and also saves it for future reference by the host system operator.

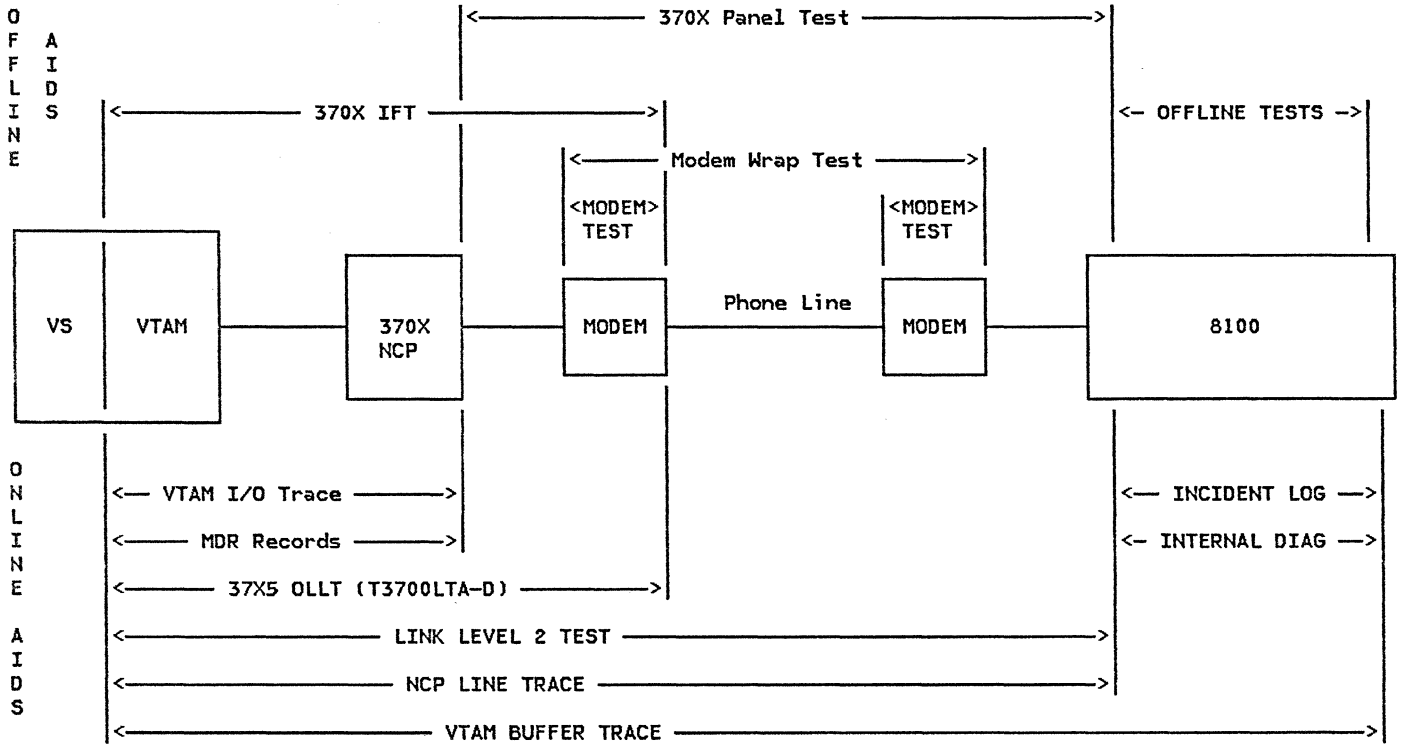
5. NETWORK PROBLEM DETERMINATION AID (NPDA)

NPDA can be a powerful tool in network problem determination. It collects device dependent records of errors as well as the usual general communications network error records. For further information on NPDA refer to section 4.2.3. (Volume I) in this guide.

REFERENCE MANUALS

- Host Command Facility: Installation and Users' Guide (SC27-0455)
- DPCX/3790 Host Support: Subsystem Information Retrieval Facility Guide and Reference (GC22-9085)
- IBM 8100 Information System Problem Management Guide (GC27-0619).

SERVICE AIDS FOR A NETWORK WITH 8100



The block diagram represents the major components in an 8100 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.11 : 5280

The maintenance package for the 5280 consists of:

1. TRACE TABLE

   The communications trace table captures the critical portion of data in each record sent or received. This information is stored in the CAM partition. This portion of main storage can be dumped to inspect the contents of the table.

   The trace table can be allocated when executing any BSC or SNA/SDLC communications program. The Communications Configuration Utility is used to specify if a trace table should be allocated and, if so, the number of entries in the table. The table wraps around after each entry is used one time; thus newer events overlay older ones. An entry in the table is made each time an input buffer is taken from the input queue and each time an output buffer is placed on the output queue.

   The SNA BUFFER TRACE records pertinent buffer information as the buffers pass between the CAM and the SDLC feature. Most SDLC link commands (such as RECEIVE, READY, TEST, etc.) are not recorded because no information is passed between the CAM and the SDLC feature. Received XID commands are recorded in the trace. Buffer information from all sessions is intermixed in the trace entries.

2. SNA TRACE TABLE FORMAT UTILITY (SYSSTTFU)

   The SNA Trace Table Format Utility (SYSSTTFU) formats and prints the trace table built by one of the IBM 5280 Communications Access Methods (CAMs). The utility serves as an aid in detecting and/or correcting SNA protocol problems.

   When running this utility, you have two options. One option is to print trace table entries that have already been built. A CAM does not have to be currently in storage for this option. The second option is for SYSSTTFU to monitor the CAM partition and print trace table entries as they are built by the CAM.

   SYSSTTFU must run during or after the operation of one of the SNA CAMs. It requires a partition size of at least 13K, either foreground or background, and a printer.

3. BSC Online Test Utility (SYSBOLT)

   The BSC Online Test Utility (SYSBOLT) tests the proper operation and integrity of the communications link, namely the line and modems. It serves as an aid in detecting and/or correcting malfunctions and should be run when it is suspected that a problem exists in the communications link. This utility can be run with any BSC system or host with which the IBM 5280 can communicate, provided it supports at least one of the types of tests that the IBM 5280 supports. The IBM 5280 can be used to initiate or to respond to a request for test.

   SYSBOLT requires a dedicated display station. While the test is running, the utility provides interim data on how the test is progressing on the display. When the test is completed, the results of the test (whether it executed successfully or failed) and statistics are displayed.

   As a requester (of the online test), the IBM 5280 can perform 12 different types of tests. As a responder, it supports 3 types of tests. (Refer to the Communications Reference Manual SC34-0247 for more details.)

4. ERROR RECOVERY PROCEDURES

   Sense codes are returned by a negative response or a logical unit status. Suggested recovery procedures are indicated for each error code (refer to IBM 5280 Distributed Data System 5280/3270 Emulation Reference Manual SC34-0384). Each recovery procedure must be evaluated for the needs of each user.

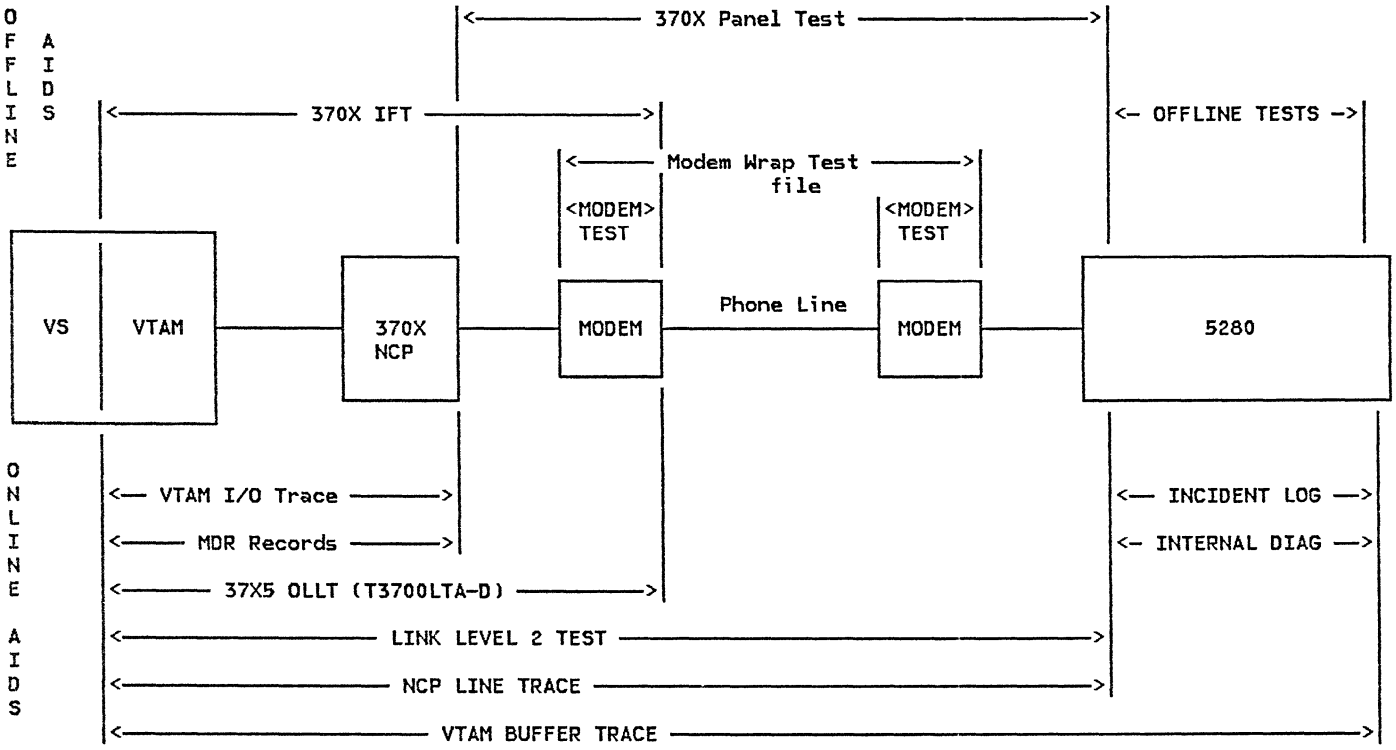
5. NETWORK PROBLEM DETERMINATION AID (NPDA)

   NPDA can be a powerful tool in network problem determination. It collects device dependent records of errors as well as the usual general communications network error records. For further information on NPDA refer to section 4.2.3. (Volume I) in this guide.

REFERENCE MANUALS

- IBM 5280 Communications Reference Manual (SC34-0247)
- IBM 5280 Distributed Data System 5280/3270 Emulation Reference Manual (SC34-0384)

SERVICE AIDS FOR A NETWORK WITH 5280



The block diagram represents the major components in a 5280 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.12 : SERIES/1

The maintenance package for the Series/1 consists of:

1. ERROR LOGS

   The error log can reside on disk or in storage and records processor, device, and software errors as well as selected informational records. The error log can be activated by the LOG DEF operator command or the DEFLOG macro. Error logging can:

   - Record certain hardware status indicators.
   - Build a printable error record.
   - Print the error record at the operator station.
   - Write the error record to the error log.

2. COMMUNICATION TROUBLESHOOTING TOOLS

   You can request that communications traces and online terminal tests be included in the communications support during system generation.

   When an SDLC termination condition occurs, SDLC places a termination buffer onto the READ queue. It has a return code indicating the reason for terminating. This return code is saved in the LOG dataset. The log can then be printed with the return code.

3. NETWORK ACTIVATION CHECKLIST

   A network activation checklist is included in the IBM Series/1 Realtime Programming System SNA Support Programming Guide, SC34-0370. This checklist discusses hardware and software considerations that should be checked before activating a network.

   ACF/VTAM considerations and sense codes are two other sections within the manual that may prove helpful in SNA problem determination.

4. ONLINE TESTS (BSC only)

   Online terminal testing is an optional facility that permits you to verify proper operation of terminals and communication lines and to aid in diagnosing line or terminal trouble. Online testing is performed during normal Series/1 operation. Only the communications line and terminals specified are involved; data transmission proceeds as usual on other lines.

   In order to have the online testing facility available, you must have selected it during SYSGEN and have specified it on the DSD defining the communications line.

5. ALERT FACILITIES

   The Series/1 supports alert facilities in conjunction with the Network Problem Determination Application (NPDA). The Alert manager in the remote S/1 will transmit an alert - formatted error notification - to NPDA for every permanent error logged into the S/1 error log. NPDA will record the Alert into the NPDA database and will present it to the NPDA operator.

6. HOST OPERATOR FACILITY

   An operator at a 3270 display connected to the host system may act as the S/1 console operator and perform all the functions available to the local S/1 operator. This capability is provided through the Host Command Facility (HCF) and the Host Operator Facility function of RM in the S/1.

7. PROBLEM DETERMINATION PROCEDURES

   Problem determination procedures are included in IBM Series/1 Realtime Programming System Version 6: Problem Determination, SC34-0470. This manual:

   - Recommends checklist actions that will help isolate the cause of the problem.
   - Offers help in the selection and use of the available tools and techniques.
   - Contains reference material.
   - Contains material to increase your problem determination skills.

   The procedures in this manual deal mainly with problems within the Series/1 (e.g. programming) rather than network problems.

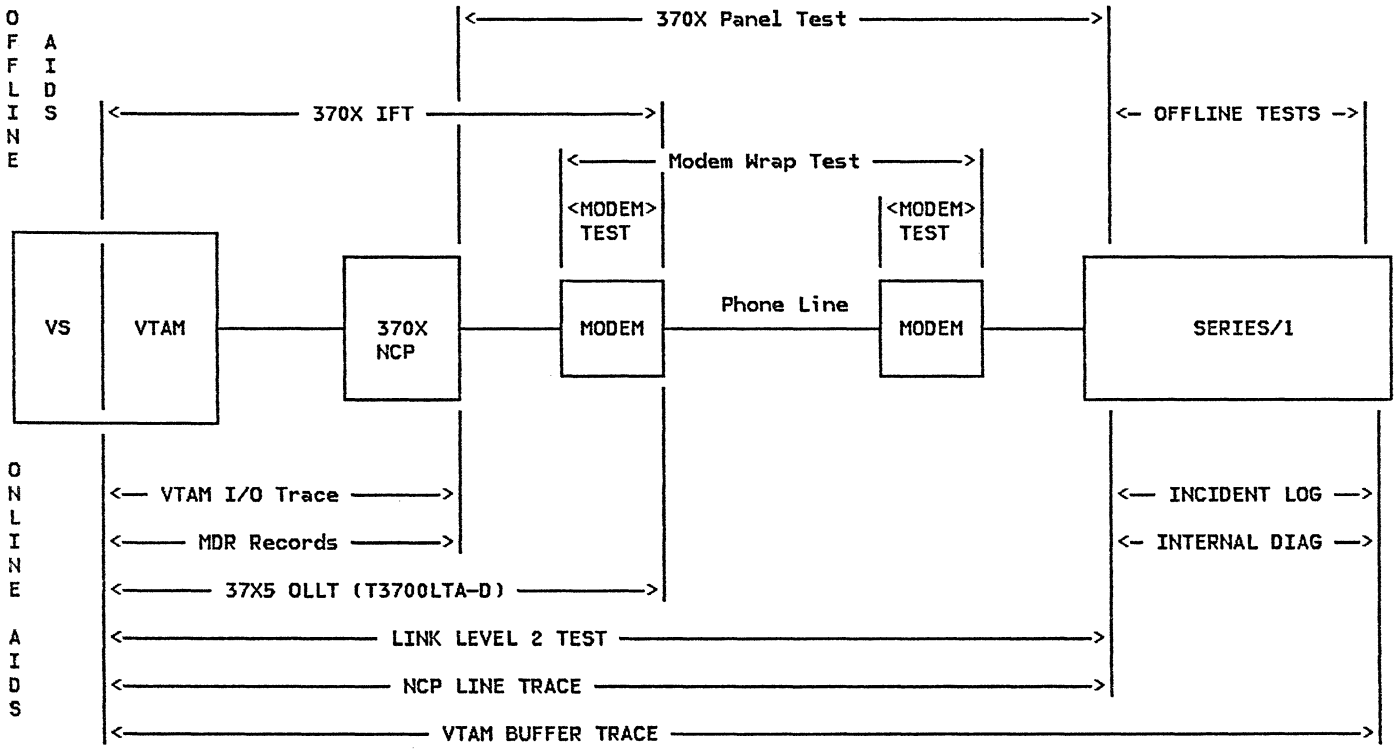
8. NETWORK PROBLEM DETERMINATION AID (NPDA)

NPDA can be a powerful tool in network problem determination. It collects device dependent records of errors as well as the usual general communications network error records. For further information on NPDA refer to section 4.2.3. (Volume I) in this guide.

REFERENCE MANUALS

- IBM Series/1 Realtime Programming System : SNA Support Programming Guide (SC34-0370)
- IBM Series/1 Realtime Programming System : Problem Determination (SC34-0470)
- IBM Series/1 Realtime Programming System : SNA Support Programming Installation Guide (SC34-0371)

SERVICE AIDS FOR A NETWORK WITH SERIES/1



The block diagram represents the major components in a Series/1 network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

7.13 : PERSONAL COMPUTER

The three main resources for performing problem determination on the IBM PC include:

- The IBM Personal Computer Guide to Operations that shows how to run several diagnostic tests
- Error messages, system analysis, and symptom analysis
- Internal trace programs

1. DIAGNOSTIC TESTING

   A diagnostics diskette can be used to run diagnostic routines as well as certain utilities (e.g., copy diskette). The tests are menu driven and provide tests on the various devices attached to your system. Should the test prove unsuccessful for a device (e.g., the expansion unit), an error message is returned.

2. FORMATTED COMMUNICATIONS TRACE

   The SNA communications code saves information about request and response units and SDLC commands that have occurred with your communication sessions in trace tables for the following:

   - SNA protocol
   - SDLC protocol

   Whenever difficult problems are encountered, these tables can be printed and used to aid in error analysis. The program to print the formatted trace table is resident at all times.

3. FORMATTED COMMUNICATIONS BIND

   The data in the Bind is kept in a special control table. If more than one Bind is received, only the data from the last Bind is saved; therefore, the formatted trace print-out will display the last Bind data for all the Binds.

   The format and parameters of the Bind Request Unit (RU) as accepted by the IBM PC (acting as an RJE device) are given in the PC SNA 3270 Emulation and RJE Support Manual.

   Information regarding the Bind parameters sent to the IBM PC acting as an LU Type 1 RJE device and an LU Type 2 3270 device, and the formatted SNA Trace Table Bind Error Messages are also included in the manual.

4. SDLC FORMATTED TRACE

   SDLC Formatted Trace formats and prints the contents of the SDLC trace table, the error log, and the RAS counters to the printer.

   The SDLC Trace Table is a wraparound table. Once the table has been filled, the earliest data is overlaid with the latest data. Whether the table is filled (wraparound has occurred), or only partially filled, the data is printed in chronological order (oldest data first).

   The printing of SNA trace is suspended during the printing of the SDLC trace. It is continued after the SDLC trace printing is completed. In addition, once the contents of the table have been printed, the entire table is filled with hexadecimal zeros and the entry pointer is restored to the start of the trace table.

   The SDLC Error Log is also a wraparound table. Each entry is 2 bytes in length and the table has sufficient space for 32 entries. The records are printed in chronological order. The SDLC Formatted Print Trace program does not zero the error log once the contents have been printed.

   SDLC maintains 14 RAS counters:

   - Total I-frames transmitted
   - Total I-frames retransmitted
   - Valid I-frames FCS (frame check sequence)
   - Frames with FCS error
   - Invalid commands/responses received
   - DSR dropouts
   - CTS dropouts
   - CD dropouts

- Transmit failure timeouts
- Inactivity timeouts
- False interrupts
- Procedural errors
- SDLC adapter errors
- Valid test commands received

The counters are 4 byte binary counters. The maximum number printed on the counter dump is 99,999,999. The counters are not reset to zero by the RAS dump program.

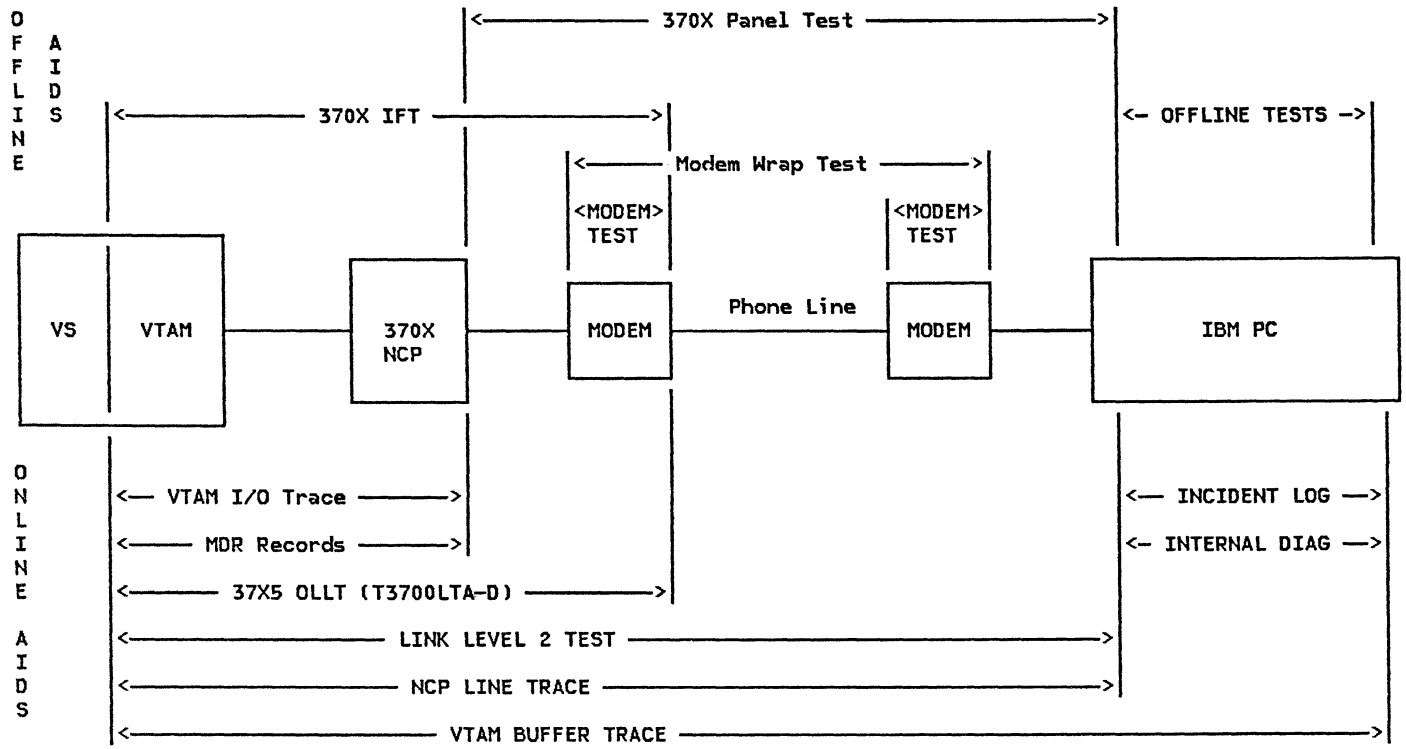
5. NETWORK PROBLEM DETERMINATION AID (NPDA)

   NPDA can be a powerful tool in network problem determination. It collects device dependent records of errors as well as the usual general communications network error records. For further information on NPDA refer to section 4.2.3. (Volume I) in this guide.

REFERENCE MANUALS

- Hardware Maintenance and Service (6025072)
- SNA 3270 Emulation and RJE Support (6024032)
- Technical Reference (6936808)

SERVICE AIDS FOR A NETWORK WITH IBM PC



The block diagram represents the major components in an IBM PC network. The lines between the arrows indicate from what point to what point a service aid covers. The service aids above the block diagram only run when that portion of the network covered is offline. The service aids below the block diagram are service aids that run concurrently with customer operations.

ENTER USER NOTES HERE:

CHAPTER 8 : ACF/VTAM BUFFERS AND STATISTICS

This section describes the various ACF/VTAM buffers, ACF/VTAM statistics, methods of observing and resolving buffering problems, and general ACF/VTAM-to-NCP tuning.

CONTENTS

8.1 : INTRODUCTION

ACF/VTAM buffer utilization should be monitored continuously in order to provide the most positive management of ACF/VTAM resources.

One needs to keep in mind two facts:

1. ACF/VTAM's storage requirements are dependent on:
   - Network size
   - Number of ACF/VTAM application programs
   - Number of sessions
   - Message sizes
   - Transaction rates
   - Amount of ACF/VTAM command and trace activity
   - Amount of OPNDST/CLSDST activity
   - Number of dial ports
   - NCP parameters
2. A shortage of ACF/VTAM buffers can be a very serious condition. If dynamic buffer allocation is being used without any thought given to tuning, system performance can suffer or, worse still, ACF/VTAM can hang.

8.2 : ACF/VTAM BUFFERING INSIGHTS

ACF/VTAM has buffer pools to control the buffering of data. ACF/VTAM dynamically allocates and deallocates space in these buffer pools for the ACF/VTAM control blocks, I/O buffers, and channel programs that control the transmitting of this data. It is interesting to note, however, that the implementation of the buffer pool functions are changing. As a result, many of the buffer pools that were used in previous releases have been dropped (e.g., UECBUF).

ACF/VTAM provides two types of buffer pool storage allocations. One type, basic allocation, is made for each buffer pool when ACF/VTAM is started. The other type, dynamic allocation, is a process by which ACF/VTAM temporarily increases the size of a buffer pool when there are heavy demands for space in that pool.

8.3 : PURPOSE OF DYNAMIC EXPANSION

Without dynamic expansion of a pool, you would have to specify basic allocation parameters large enough to meet the greatest possible demands on the pool. With dynamic expansion, smaller basic allocation values can be specified and the peak demands on the pool can be met with dynamic expansion.

Dynamic expansion is not intended to be used frequently; it is intended only to meet peak demands on the pool. For example, if a user experiences peak demands at certain times of the day, dynamic expansion could be used to meet these periods of peak demand. The basic allocation parameter would be specified to provide enough buffers for the periods of normal activity.

The user should consider carefully whether dynamic expansion is appropriate for the type of demands the system makes on each pool. A large basic allocation for the pool means that pool processing is more efficient, but more storage is tied up for that pool. Dynamic expansion provides more efficient use of storage, but reduces processing efficiency.

Consider an example of a typical use of dynamic expansion. Heavy VTAM buffer requirements during network startup and shutdown can occur if all the PUs and LUs are coded as ISTATUS=ACTIVE. Then an activate/deactivate for the NCP could cause a large amount of concurrent OPNDST/CLSDST and VTAM VARY-ACT/VARY-INACT activity. Dynamic buffering could be considered as a solution to the problem of startup, shutdown and unusual peak conditions.

The following is a list and description of ACF/VTAM buffer pools:

APBUF - (OS/VS1) Activate and inactivate connection pool in Pageable storage. Contains control blocks which associate an ACF/VTAM application with a terminal.

LPBUF - Large Pageable storage pool for ACF/VTAM's process scheduling and internal audit trail. LPBUF contains Component Recovery Areas (CRAs); each CRA roughly represents a "macro's worth" of work, though in some cases multiple CRAs are required. LPBUF is generally used for "working storage".

SPBUF - Small Pageable storage pool for processing purge, close, or deactivate requests.

WPBUF - Working-set session characteristics pool in Pageable storage. Contains FMCBs for SSCP-to-LU session dependent processing.

CRPLBUF - (OS/VS) Copied Request Parameter List in pageable storage, for ACF/VTAM macro processing at the VTAM Application Program Interface (API).

LFBUF - (VSE) Input/Output fixed storage pool. Used for all I/O (both directions) across the I/O channels. (OS/VS) Large Fixed storage pool for LUCB and LUCB directory.

SFBUF - Small Fixed storage pool to hold control blocks which are ACF/VTAM's representation of PUs and LUs.

IOBUF - (OS/VS) Input/Output fixed storage pool. Used for all I/O (both directions) across the I/O channels.

VPBUF - (VSE) Variable-length Pageable storage pool for ACF/VTAM Resource Definition Tables (RDTs), the NCP Symbol Resolution Table (SRT) from the the NCP generation, processing scheduling control blocks, etc. Also, used for dynamic buffer building and pageable I/O.

VFBUF - (VSE) Variable-length Fixed storage pool for the Symbolic Name Table (SNT) containing the network names, and control blocks representing 37X5s, the NCPs and local devices.

NOTE:
References throughout this chapter to IOBUF, which is the OS/VS I/O Fixed Storage pool, also refer to LFBUF, which is the VSE I/O Fixed Storage pool.

8.4 : EFFECTS OF THE SLOWDOWN POINT

When the number of buffers remaining available in a pool is equal to or less than the slowdown point (slowpt), the pool enters slowdown processing. During slowdown processing, buffers are allocated only for priority requests. (Priority requests are those requests for storage that must be satisfied to prevent system interlocking.) Nonpriority requests are not honored if doing so would cause the pool to enter slowdown processing. Nonpriority requests are queued or are rejected with a return code. Slowdown processing ends as soon as the number of available buffers becomes equal to or greater than slowpt, and there are no queued requests for storage.

8.5 : ACF/VTAM BUFFER POOLS

The ACF/VTAM buffer pools used to control the buffering of data are defined by:

poolname (baseno,bufsize,slowpt,F,xpanno,xpanpt)

where:

baseno - Indicates the initial number of buffers provided in the buffer pool. After ACF/VTAM is started, the pool always contains at least this number of buffers.

bufsize - Indicates the size in bytes of each buffer in the buffer pool. It is not specifiable by the user except for IOBUF (OS/VS) and LFBUF (VSE).

slowpt - Indicates the point at which the buffer pool is to enter slowdown processing. The pool enters slowdown processing whenever the number of buffers currently not in use in the pool is less than or equal to slowpt.

F - (OS/VS) indicates that a buffer pool that is normally in pageable storage is to be put in fixed storage.

xpanno - Indicates the number of buffers to be added to the buffer pool whenever dynamic allocation is needed. Whenever the buffer pool is to be expanded, ACF/VTAM acquires the smallest number of whole pages of storage that are sufficient to provide the number of buffers specified in xpanno. (For example, if 5 buffers will fit on one page of storage, and if xpanno is specified as 6, ACF/VTAM acquires two pages of storage whenever the buffer pool must be expanded, and expands the pool by 10 buffers.)

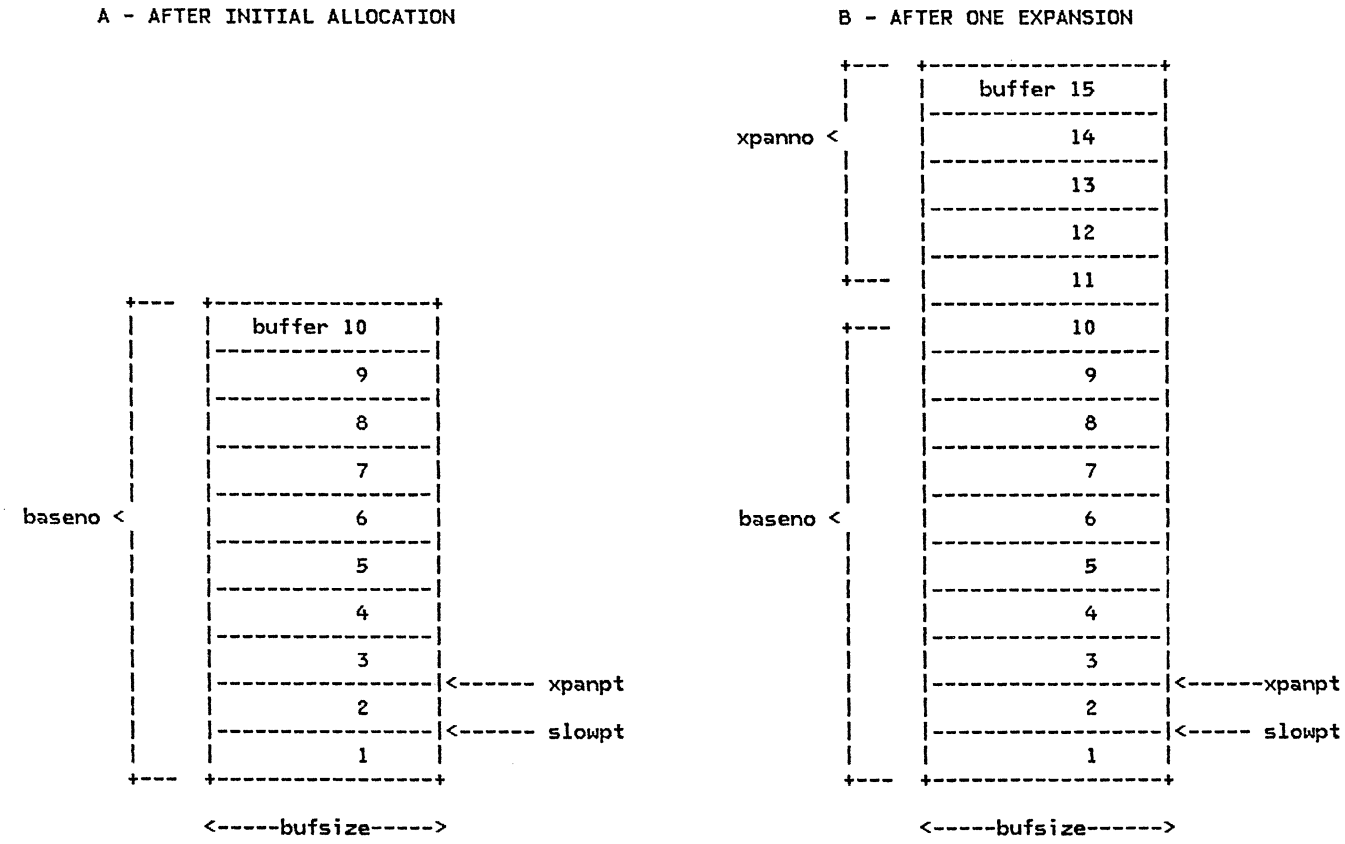
xpanpt - is a decimal integer that specifies the expansion point for this buffer pool. When the number of buffers not in use in the buffer pool falls to a value that is equal to or less than xpanpt, ACF/VTAM schedules an asynchronous routine to expand the buffer pool by the number of buffers specified by xpanno. The value of xpanpt must be greater than the value of slowpt, but less than the value of baseno minus adjval, where adjval is an adjustment value for this buffer pool. Adjval is a non-specifiable component. If xpanpt is specified, then baseno minus xpanpt must be greater than or equal to adjval. If slowpt is specified, then baseno minus slowpt must be greater than or equal to adjval.

NOTE:

Dynamic expansion takes place only when the user specifies a nonzero value for the xpanno parameter for the pool or allows it to default. If xpanno is specified as 0, the pool always remains the size specified by the baseno and bufsize parameters.

The buffers acquired by dynamic expansion are functionally the same as the buffers provided by the base allocation.

The following example shows the structure of a pool (A) after basic allocation, and (B) after one dynamic expansion of the pool.



A This example shows a buffer pool for which the start options were specified as poolname=(10,bufsize,1,,5,2). After initial allocation, the pool contains 10 buffers (baseno=10), the length in bytes of each buffer is "bufsize", the slowdown point is 1, the expansion size is 5 buffers (assume that 5 buffers fill one page of storage), and the expansion point is 2.

B After one expansion, there are 15 buffers in the pool. Each of the 5 additional buffers has a length of "bufsize" and the same expansion point and slowdown point as before.

DISPLAY BFRUSE Command

The operator can display useful information regarding ACF/VTAM buffer utilization by using the command:

DISPLAY NET,BFRUSE

The resulting display will indicate the degree of ACF/VTAM buffer utilization which can assist with identifying buffer problems and in tuning buffers.

Take a look at the sample MVS output that follows. For the buffer pool with ID IO00, each buffer has 206 bytes, 134 buffers are currently in the pool, and 46 buffers are currently available. The largest number of buffers the pool has ever contained is 206, and the maximum ever used at one time is 175. The buffer pool has been expanded 116 times, which may be a cause for concern. If the number of available buffers drops to 28 (this is the expansion threshold in this example), ACF/VTAM will expand the pool by adding 18 buffers (the expansion increment). If the number of available buffers reaches 64 (this is the contraction threshold in this example), ACF/VTAM will free buffers (in pages) until there are fewer than 64 available buffers in the pool.

An N/A (not applicable) in the expansion/contraction column indicates that the user did not specify an expansion increment. If dashes (----) appear in place of the contraction threshold, the buffer pool is not currently expanded (although it might have been expanded previously).

Note that if this display is issued while an SMS trace is running, the fields MAX TOTAL, MAX USED, and TIMES EXP will reflect buffer usage only since the last trace record was written, because the SMS trace resets these fields.

EXAMPLE OF THE D NET,BFRUSE COMMAND OUTPUT (MVS)

```
IST350I  VTAM DISPLAY - DOMAIN TYPE= BUFFER POOL DATA
IST632I  BUFF    BUFF  CURR   CURR   MAX    MAX  TIMES   EXP/CONT    EXP
IST633I   ID     SIZE TOTAL  AVAIL  TOTAL  USED   EXP   THRESHOLD   INCR
IST356I  IO00  00206 00134  00046  00206 00175  00116 00028/00064 00018
IST356I  LP00  01016 00016  00013  00016 00010  00001 00004/00012 00004
IST356I  WP00  00160 00054  00028  00054 00030  00001 00001/00049 00024
IST356I  LF00  00120 00002  00002  00002 00000  00000 00001/----- 00032
IST356I  CRPL  00116 00032  00012  00032 00026  00000 00004/----- 00032
IST356I  SF00  00072 00051  00032  00051 00022  00000 00001/----- 00051
IST356I  SP00  00096 00002  00002  00002 00001  00000 00001/----- 00039
IST449I  CSALIMIT = 000500K ,CURRENT = 000210K ,MAXIMUM = 000214K
IST595I  IRNLIMIT = NOLIMIT, CURRENT = 000000K, MAXIMUM = 000000K
IST314I  END
```

MVS: ACF/VTAM's CSA usage limit, current usage, and maximum usage are also provided in the display.

EXAMPLE OF THE D NET,BFRUSE COMMAND OUTPUT (VSE)

```
F3 018 5D50I VTAM DISPLAY - DOMAIN TYPE = BUFFER POOL DATA
F3 018 5G32I BUFF    BUFF  CURR    CURR    MAX     MAX  TIMES    EXP/CONT     EXP
F3 018 5G33I  ID     SIZE TOTAL   AVAIL   TOTAL   USED   EXP    THRESHOLD    INCR
F3 018 5D56I VF     02048 00024P 00010P  N/A   00014P  N/A       N/A        N/A
F3 018 5D56I VP     02048 00250P 00184P  N/A   00091P  N/A       N/A        N/A
F3 018 5D56I SF     00356 00015  00007   00015 00008   00001 00003/00013 00005
F3 018 5D56I LF     00187 00180  00180   00180 00092   00000 00025/-----  00010
F3 018 5D56I SP     00112 00036  00036   00036 00000   00000 00003/-----  00017
F3 018 5D56I LP     01016 00016  00012   00016 00007   00000 00001/-----  00002
F3 018 5D56I WP     00160 00024  00017   00024 00007   00000 00003/-----  00012
F3 018 5F95I IRNLIMIT = NOLIMIT, CURRENT = 000000K, MAXIMUM = 000000K
F3 018 5D14I END
```

VSE: Numbers suffixed by a P indicate that the value represents the number of pages, rather than buffers. Note also that for VFBUF and VPBUF, dynamic buffer expansion does not apply (displayed as N/A).

For each buffer pool, this information includes:

- Buffer pool ID
- Flags (Q or F): Q shows a request is queued for this pool, F shows dynamic buffering has failed for this pool
- Size of each buffer in this pool
- Current total number of buffers in this pool
- Current count of buffers that are available (the number not in use)
- Largest number of buffers that this pool has expanded to at any time
- Largest number of buffers in use at any time
- Cumulative count of the number of times each buffer pool has expanded
- Expansion and contraction thresholds
- The expansion increment (the number of buffers to be added to a buffer pool during dynamic expansion)

8.6 : ACF/VTAM-TO-NCP BUFFER TUNING

Each channel program used by ACF/VTAM to write data to an SNA controller consists of a write channel program followed by a read channel program. If the controller has data ready to go to ACF/VTAM when it finishes a write operation, ACF/VTAM immediately begins to read data without any prompting from the controller. (For NCP V1R2.1 or earlier, STADMOD=YES must be specified to achieve the same result.) If, however, the SNA controller has data to send to ACF/VTAM, and ACF/VTAM has not attempted to write or read during a specified interval, or if the controller has reached a predefined buffer limit, the controller sends an attention to ACF/VTAM requesting that it start a read operation. If ACF/VTAM is able to accept the data, ACF/VTAM starts a read channel program to satisfy the request.

Therefore, ACF/VTAM can read data in one of two ways: as an immediate sequel to a write operation (which is fast and efficient) or as a separate operation initiated by an attention interruption from the SNA controller (which is less efficient).

The amount of data that ACF/VTAM can read from the NCP in one operation depends on the number of buffers used by a read channel program and on the size of each buffer.

The basic objectives of tuning ACF/VTAM data-transfer operations are:

- To read data from the controller as often as possible as an immediate sequel to an ACF/VTAM write operation, thereby reducing the number of attention interruptions that ACF/VTAM must process.
- To read more than one path information unit (PIU) on each read operation.

These objectives can be met by adjusting parameters in the ACF/VTAM and the NCP macro instructions.

ACF/VTAM TNSTAT Option

To assist the user in adjusting parameters in the ACF/VTAM and the NCP HOST macro instructions, in order to tune the ACF/VTAM data-transfer operations, ACF/VTAM provides tuning statistics. (Tuning statistics are not gathered for communications adapter lines.) Tuning statistics can be specified with the TNSTAT start option, and the specification can be changed with the MODIFY network operator command. Among the items that can be regulated are how often the records are to be written, and whether the records are to be written only to the System Management Facility (SMF) file (in OS/VS) or to the trace file (in VSE), or to that file as well as the network operator's console.

Each tuning statistics record contains information about the state of the data-transfer operations between ACF/VTAM and one channel-attached SNA controller, or between channel-to-channel attached processors. Each record contains statistics that cover the time period since the last tuning statistics record was written for that controller or channel-to-channel connection.

If tuning statistics are not specified by the TNSTAT parameter at startup time, it can be activated and deactivated by the network operator with the following commands:

To start collecting tuning statistics -

```
F NET,TNSTAT,CNSL,TIME=n   where n is the number of minutes that should
                           elapse between each record (1-1440).
```

To end collecting tuning statistics -

```
F NET,NOTNSTAT
```

This is the format of the tuning statistics report that appears (if requested) at the network operator's console:

```
IST440I  TIME=12402308  DATE=83240  LOCAL PC NAME=NCPLOC
IST441I  DLRMAX=1       CHWR= 14    CHRD=15
IST442I  ATTN=15        RDATN=0     IPIU=15
IST443I  OPIU=14        RDBUF=15    SLODN=0
```

TIME - indicates the time (in hours, minutes, seconds, and hundredths of seconds) at which the record was recorded.

DATE - is the date on which the tuning statistics were recorded.

LOCAL PC NAME - is the name of the local SNA controller for which the statistics were gathered.

DLRMAX - a decimal value that indicates the maximum number of dump-load-restart requests that were awaiting processing or were being processed at one time during the interval. This number refers to the entire domain, not only to the SNA controller named in the report.

ATTN - total number of attentions received from the controller.

SLODN - total number of times controller went into slowdown mode.

RDATN - total number of times the attention was included in the ending status on a read channel program.

IPIU - total number of inbound PIUs received from the controller.

OPIU - total number of outbound PIUs sent to the controller.

RDBUF - total number of ACF/VTAM buffers used for read operations.

CHWR - total number of write channel programs issued.

CHRD - total number of read channel programs issued.

8.7 : DELAY, MAXBFRU, AND VPACING

The DELAY operand, in the NCP BUILD macro, controls the length of time a 3705 communications controller holds data before it requests ACF/VTAM to read the data.

The tuning characteristics of the DELAY operand are:

- If the DELAY time is too long, the response time can be poor.
- If the DELAY time is too short, ACF/VTAM must process too many requests.

Begin by setting DELAY equal to .2. A .2 second delay has little effect on response time, but if the traffic speed is approximately one transaction/second or greater, coat-tailing will occur (i.e., more than one PIU will be transferred in or out of the host than the number of read or write channel programs issued).

Note that if Delay is not coded in the NCP BUILD macro, it will default to zero.

For ACF/VTAM, MAXBFRU specifies the maximum number of buffers that can be used in one read operation when reading data from a controller. For the controller, MAXBFRU specifies how many buffers the controller must reserve for holding data awaiting transmission into ACF/VTAM.

ACF/VTAM operates more efficiently if MAXBFRU is set to a higher value because more buffers are available for each read operation. The controller, however, must be able to buffer both the current read channel program and the last read channel program. Therefore, the higher the MAXBFRU value, the greater the demand on the controller's buffer resources.

The tuning characteristics of the MAXBFRU operand are:

- If MAXBFRU is too low, many more ACF/VTAM read operations are required and, consequently, the number of attentions occurring on a read operation is higher.
- If MAXBFRU is very large relative to the total buffer storage, the NCP may enter slowdown mode frequently.

Note that MAXBFRU x UNITSZ must be greater than the largest PIU that will flow in the network.

The IOBUF/LFBUF "bufsize" parameter affects the number of buffers that ACF/VTAM must use for each PIU to be transmitted.

If the "bufsize" is much larger than the average size of a PIU, storage is wasted because ACF/VTAM puts only one PIU into each buffer. On the other hand, if "bufsize" is smaller than the average PIU, ACF/VTAM breaks the PIU into blocks just large enough to fill one buffer and chains the buffers together. Therefore, when "bufsize" is too small, ACF/VTAM must do extra processing to handle the chaining, and ACF/VTAM's I/O operations become less efficient.

The best results are obtained when "bufsize" is such that, on the average, slightly more than one buffer is used for each inbound PIU. If the average number of buffers used for each inbound PIU (found by dividing RDBUF by IPIU) is exactly one, the "bufsize" value is too large, and if it is greater than two, the "bufsize" value is too small.

VPACING controls the amount of data that ACF/VTAM can send to a controller in one write operation. Indirectly, it influences the frequency with which ACF/VTAM can read data at the end of a write operation.

VPACING should be specified for LU1 type printers and LUs involved in batch data transfer. LU3 type printers will ignore pacing values because they use definite responses. VDUs also do not require pacing. The primary LU (PLU) may override the VPACING value in the BIND.

In terms of ACF/VTAM tuning statistics, the effects of the VPACING operand are:

- If the VPACING value is low, there will be a slight increase in CPU utilization. Also, ACF/VTAM write operations may occur less frequently, and hence, ACF/VTAM may issue reads more frequently due to attentions from the NCP.
- If the VPACING value is too high, there tends to be a greater demand on the controller's buffer resources, and the controller tends to enter slowdown processing more frequently.

In summary, tuning is a process of adjusting variables until processing meets the requirements of the users and the network. The following chart which shows some of the symptoms and causes of tuning imbalances, can help in the tuning process.

SYMPTOMS	Possible Causes			
	DELAY time	MAXBFRU value	VPACING value	IOBUF bufsize
Too many attentions (ATTN is high)	Too low		Too low	
Poor response time at low data rate	Too high			
Too many NCP slowdowns (SLODN is high)		Too high	Too high	
Too many attentions for read (RDATN is high)		Too low		Too small
ACF/VTAM's inbound data rate is poor (IPIU LOW)			Too high	
ACF/VTAM's outbound data rate is poor (OPIU LOW)			Too low	
RDBUF about the same as IPIU				Too large
IPIU much less than RDBUF				Too small
OPIU much less than CHWR			Too low	
RDBUF less than (MAXBFRU x CHRD)		Too high		

Other considerations for using the tuning statistics output are:

The value of SLODN should be low, if not zero. If the controller never goes into slowdown mode, it indicates there are no controller resource problems. In growing networks, however, the value of SLODN could be set as high as 25 to 40 percent. When SLODN is encountered, it may be time to start planning to increase the 37X5 controller's storage.

The RDATN value should be as small as possible. A large RDATN value indicates there are not enough ACF/VTAM read buffers.

The ATTN value should usually be less than the CHRD value. The smaller the ATTN value is in proportion to CHRD, the greater the proportion of reads that were done as part of a write operation. If ATTN is about the same as CHRD, the DELAY value is too low.

The following points provide additional information as to the configuration of data flow between ACF/VTAM and the NCP:

1. A PIU is: TH + RH + RU.

2. Between ACF/VTAM and the NCP: the TH is 26 bytes long, the RH is 3 bytes long, (FID 4 format).

3. ACF/VTAM has page-fixed I/O buffers (IOBUFs in OS/VS, LFBUFs in DOS/VSE).

4. The NCP allocates and manages buffers (IOBUFs in OS/VS, LFBUFs in DOS/VSE).

5. A System/370 channel program transfers data:

   - FROM one or more IOBUFs.
   - TO one or more BFRS, or vice versa.

6. ACF/VTAM and the NCP will not allow a PIU to be split across multiple System/370 channel programs (SIOs).

7. BFRPAD is the padding that the NCP adds to the front of inbound (NCP to ACF/VTAM) data. For ACF/VTAM the length of this BFRPAD is 0.

8. "UNITSZ" is NCP's term for the size of ACF/VTAM's channel program I/O buffers (IOBUF in OS/VS, LFBUF in DOS/VSE).

9. "MAXBFRU" is NCP's term for the maximum number of ACF/VTAM IOBUFs (LFBUFs in DOS/VSE) that will be used in one SIO data transfer from the NCP to ACF/VTAM. ACF/VTAM will set up MAXBFRU READ CCW's (each one for UNITSZ bytes) and read buffers (IOBUFs or LFBUFs), for each inbound (NCP to ACF/VTAM) channel operation.

10. The five previous points say the largest inbound PIU must be less than or equal to (MAXBFRU x UNITSZ) - BFRPAD bytes, and that MAXBFR must be less than the total number of IOBUFs (LFBUFs in DOS/VSE) defined to ACF/VTAM. The NCP will transfer both segmented and unsegmented PIUs to ACF/VTAM.

11. Outbound (ACF/VTAM TO NCP), "MAXDATA" (on the ACF/VTAM-only PCCU macro in the NCP gen) is the term for the maximum amount of data that ACF/VTAM will transfer to the NCP in one SIO. The size of the largest outbound PIU must be less than or equal to MAXDATA bytes.

12. Under some error conditions, the NCP will send outbound data BACK to ACF/VTAM. From a buffering point of view, this is the same as the inbound (NCP to ACF/VTAM) case, and point number 10 still applies: MAXDATA must be less than or equal to (MAXBRU x UNITSZ) - BFRPAD.

13. Points 10 and 12 say the size of the largest PIU (inbound or outbound) must be less than or equal to (MAXBFRU x UNITSZ) - BFRPAD bytes.

14. "INBFRS" is the NCP's term for the number of 37X5 BFRS that the NCP reserves for data transfers from ACF/VTAM to the NCP. If, during a data transfer, the INBFRS number of BFRS are filled, System/370 channel operation is temporarily suspended until another INBFRS number of BFRS are reserved by the NCP. This suspension is very temporary - the System/370 channel program is still active. If there are reserved, but unused, 37X5 BFRS remaining at the end of the channel operation, they remain reserved, and are used as the initial allocation for the next ACF/VTAM-to-NCP channel operation.

    A reasonable choice for INBFRS is:

$$\frac{\text{12 byte NCP "ECB" + 26 byte TH + 3 byte RH + RU size}}{\text{BFRS}}$$

$$= \frac{\text{RU size + 41}}{\text{BFRS}} \text{ , rounded up to an integer.}$$

15. NCP starts each PIU on a new BFRS boundary. SNA responses, like DR1's and DR2's, are short, and can comprise a significant percentage of the network traffic.

    For example, a typical SNA response consists of:

    BFRPAD (28 bytes max) + 26 byte TH + 3 byte RH
    = 41 bytes max.

    ACF/VTAM Network Control PIUs consist of:

    12 byte NCP ECB + 26 byte TH + 3 byte RH + 3 byte RU
    = 44 bytes total.

    Each of these will occupy an individual NCP buffer. Unless another value is determined to be better, BFRS=128 should be specified. This will also result in optimum segmenting on SDLC links.

8.8 : ACF/VTAM BUFFER TUNING HINTS

You can use the D NET,BFRUSE command to adjust the ACF/VTAM pool values to accurately represent your requirements (such as network configuration and maximum transaction rate). One procedure for doing this is:

1. initially operate ACF/VTAM using the IBM supplied or the user calculated pool values;
2. fix additional and optional pageable pools (if any) in storage;
3. use the D NET,BFRUSE command; and
4. adjust the pool values as indicated by the displayed data.

When analyzing the D NET,BFRUSE command display and adjusting the buffer pool values for initial allocation, consider these guidelines:

> ACF/VTAM should be operated using the users' requirements for application programs and workload, for the network configuration, and for the maximum transaction rate.
>
> If a specific pool often goes into slowdown mode or runs out of buffers, that pool's slowpt value should be decreased or its baseno value should be increased.
>
> If a pool has a low number of requests, storage can be saved by reducing its baseno value.

The following points will help in buffer pool definitions:

1. PLAN to pay a lot of attention to ACF/VTAM buffer monitoring and tuning in the early stages. This important step may save much work and aggravation later.
2. The IBM Systems Engineer can run the STORVTAM HONE AID, to obtain the initial estimate of the proper ACF/VTAM buffer pool parameters. The formulae are all documented in the SRLs, but STORVTAM is quicker, less prone to clerical errors, produces comprehensive, nicely formatted output, and may be more current. At any rate, whether you do the computations manually or with STORVTAM, the resulting ACF/VTAM buffer parameters should be used as initial values only. Fine tuning is necessary! - using ACF/VTAM's D NET,BFRUSE command.
3. The formulae documented in the SRLs and used by STORVTAM request information such as the number of terminals, transaction rate, number of ACBs, etc.

   If you are uncertain about whether you have a certain subsystem (e.g., CICS/VS), include it for initial estimating purposes.

   Number of non-SNA terminals locally attached (NTERM); count each printer and display station, plus the number of remotely attached terminals on BSC and start-stop lines.

   Number of local non-SNA devices (NBSCCLUS) in the network.

   Number of logical units (NLU) - refers only to the number of (concurrently active) SNA logical units. These are only the ones defined via LU statements in an NCP generation or local SNA major node definition. Do not count any BSC or S/S terminals/control units, or any local channel attached 3270s. DO count LUs defined for 3274-1As, and local channel attached 3790s.

   Number of SDLC "Cluster Controllers" (LOCSNA) - means the number of IBM SDLC:

   ```
   3271/5 MODELS 11 or 12
   3274/6's
   3601/2's
   3651's
   3661's
   3791's
   ...NOT 3767s, 3770s, remote 37X5s,
      or 3271/5 Models 1/2.
   ```

   Number of locally attached record-mode cluster controllers (NPU), plus the number of remotely attached SNA cluster controllers on SDLC lines.

   Number of dial-up switched lines (NPORT).

   Number of concurrent TOLTEP users (NTOLTEP) - If you do not know, use 2.

   Number of concurrent operator commands (NCOMMAND) - THIS IS AN IMPORTANT ONE. Use a starting value of

100 or more. These "operator commands" are NOT just commands entered by the ACF/VTAM operator. ACF/VTAM generates "operator commands" internally as well. For example, a 'V NET,INACT,R' issued to the NCP results in ACF/VTAM generating internal VARY INACT commands for every active LU and PU.

Number of concurrent ACF/VTAM buffer (TYPE=BUFF) traces (NTRACE) - If you are not sure, use 4.

"MAXBFRU" specified on the NCP HOST macro - If you are not sure, use 20.

"UNITSZ" specified on the NCP HOST macro - If you are not sure, use 152. If you have more than, say, 30 CONCURRENT ACTIVE local channel attached displays and printers, use 336. The value specified for the ACF/VTAM IOBUF (LFBUF in DOS/VSE) block size must match the UNITSZ value

"IOBUF" ("LFBUF" in DOS/VSE) block size - Same considerations/values as for UNITSZ, above.

4. Run ACF/VTAM's D NET,BFRUSE command often.

5. "CURR AVAIL", the number of available buffers in a pool at the instant the display record was created is not that meaningful/important, compared to MAX USED ,TIMES EXP and the flags (i.e., Q and F). CURR AVAIL is interesting if the display is taken frequently during normal system utilization.

6. "TIMES EXP" gives the number of times dynamic expansion occurred and if this number is "large", one should possibly increase initial buffer allocations.

7. TRY TO BE VERY SURE that, prior to decreasing any ACF/VTAM buffer pool parameters, the D NET BFRUSE displays (which would be the basis for the decision) have included the startup and shutdown of the full network, as well as peak load transaction rates.

8. Use the default allocations for SFBUF, WPBUF, CRPLBUF, and APBUF (OS/VS1).

9. In an IMS/VS or CICS/VS environment, CRPLBUF usage will increase due to the RECEIVE ANY macro usage in the subsystems. If excessive expansion and contraction is occurring for CRPLBUF, increase xpanno.

10. In a BSC 3270 environment, watch LFBUF.

11. For VSE, initially use the IBM supplied values for VFBUF and VPBUF. Then use D NET,BFRUSE to set the size to approximately 10 to 20 percent above the MAX USED value. If VPBUF is specified too large, storage problems may be encountered.

12. For VSE, specify:

    - EXEC ISTINCVT,SIZE=900K for V1R3 VTAM
    - EXEC ISTINCVT,SIZE=1130K for V2R1 VTAM

    Do NOT specify SIZE=AUTO.

13. Choose baseno for IOBUF/LFBUF so it is greater than the average number of buffers in use during steady state operation. The steady state operation can be determined by using the D NET,BFRUSE command. CURR TOTAL minus CURR AVAIL gives the number of buffers in use. The requirements for IOBUF/LFBUF over the steady state requirements can be obtained using dynamic expansion. If the buffer pool expands and contracts excessively, increase the xpanno value.

14. ACF/VTAM requires one entry in SPBUF for each local 3270 logged on the system. However, the supplied values should suffice.

15. Local 3270s are represented by Local Device Node Control Blocks (LDNCBs). In MVS, LDNCBs are GETMAINed by ACF/VTAM out of CSA; they do not reside in an ACF/VTAM buffer pool.

16. One technique for lowering ACF/VTAM buffer requirements during network startup is to code all the PUs as ISTATUS=INACTIVE and all the LUs as ISTATUS=ACTIVE. Then 'VARY NET,ACT' commands for the PUs can be entered, spaced apart in time. The ACF/VTAM Programmed Operator Facility and the MVS OCCF Facility can be used to minimize operator intervention and still bring a network up in phases.

17. Be aware that ACF/VTAM operator commands can place a significant demand on ACF/VTAM storage. If ACF/VTAM is in a short-on-storage condition, then entering, say, the DISPLAY command, to help diagnose the situation may aggravate the condition considerably. In MVS, for example, operator commands

require buffers from CRPLBUF and LPBUF. CRPLBUF is transaction-rate sensitive, and LPBUF contains control blocks which are essential for ACF/VTAM's process scheduling (RPHs and CRAs).

Because of the above, one technique for determining that ACF/VTAM is hung due to a buffer shortage, is to simply enter a DISPLAY command at the ACF/VTAM Network Operator's console. If the system does not even respond with "DISPLAY ACCEPTED" (much less the actual status display), then the odds are good that ACF/VTAM has depleted (or hit) the threshold on one or more buffer pools. (If ACF/VTAM is busy recovering a major node, such as an NCP, the same delay may be encountered.)

18. Experience has shown that if logons are done from the terminals rather than OPNDST ACQUIREs issued from the ACF/VTAM applications, a major potential source of ACF/VTAM buffer problems can be avoided. This is due to the more staggered logon sequence that occurs when people are entering the request, which places less of a concurrent load on ACF/VTAM.

19. CICS/VS limits the number of concurrent OPNDSTs or CLSDSTs to ten (default).

20. The "xpanpt" value for IOBUF (OS/VS) or LFBUF (DOS/VSE) must be greater than the largest MAXBFRU plus the "slowpt" value.

In summary,

- Use the D NET,BFRUSE command to tune the buffers.
- MAXBFRU - use 20 to start with. If BSC 3270 devices are being used, MAXBFRU must be large enough to handle the largest PIU.
- UNITSZ - use 152 to start with. If there will be more than say, 30 concurrent active local channel attached terminals, use 336.
- IOBUF (LFBUF in VSE) - same value as for UNITSZ.
- BFRS - 128 should be a good starting value.
- INBFRS should be set to approximately

$$\frac{\text{RU size} + 41}{\text{BFRS}}$$

- DELAY - use .2 to start with.
- Use the default value allocations for SFBUF, WPBUF, CRPLBUF, SPBUF, and APBUF (OS/VS1) to start with.
- For VSE, the default values for VFBUF and VPBUF may not be large enough. Neither of these two buffer pools are expandable and therefore must be large enough to contain the various buffers. Try the default values and over-write them if unsuccessful. Then use the D NET,BFRUSE command to tune them.
- VPACING
  - pacing values for LU3 printers are ignored
  - VDUs should not be paced
- OS systems using NJE without pacing may cause SLOWDOWNs to occur frequently.

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