



5ESS Electronic Switching System

Introduction

Welcome to the world of the 5ESS. In this file I will be covering the switch topology, hardware, software, and how to program the switch. I am sure this file will make a few people pissed off <grin> over at BellCORE.

Anyways, the 5ESS switch is the best (I think) all around switch. Far better then an NT. NT has spent too much time with SONET and their S/DMS TransportNode OC48. Not enough time with ISDN, like AT&T has done. Not only that, but DMS 100s are slow, slow, slow! Though I must hand it to NT, their DMS-1 is far better then AT&T's SLC-96.

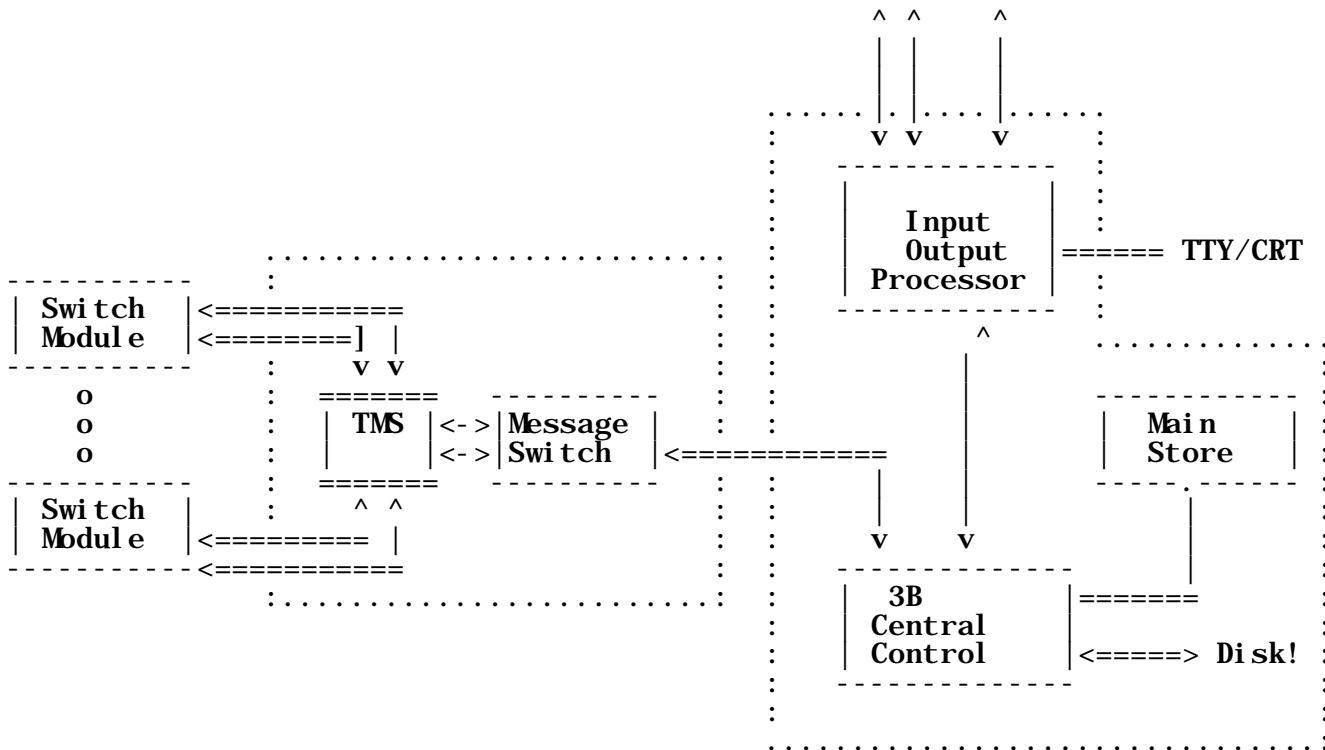
What is the 5ESS

The 5ESS is a switch. The first No. 5ESS in service was cut over in Seneca, Illinois (815) in the early 1982. This test ran into a few problem, but all and all was a success. The 5ESS is a digital switching system, this advantage was realized in No. 4 ESS in 1976. The 5ESS network is a TST (Time Space Time) topology, the TSIs (Time Slot Interchangers) each have their own processor, this makes the 5ESS one of the faster switches. Though I hear some ATM switches are getting up there.

5ESS System Architecture & Hardware

5ESS SYSTEM ARCHITECTURE

OSS Data Links



COMMUNICATIONS MODULE ADMINISTRATIVE MODULE

The 5 ESS is a digital SPC switching system which utilizes distributed control, a TST switching network and modular hardware and software design.

The major components are:

ADMINISTRATIVE MODULE

Two 3B20S Processors (Which equal a 3B20D)

- Central control and main storage
- Disk storage for infrequently used programs and data, and main storage regeneration.
- The two 3B20S processors are always comparing data, and when one fails the other acts in its place.

Two Input/Output Processors (IOP)

- Provides TTY and data-link interfaces to the 3B20D Processor, 5ESS Network, Master Control Center (MCC), and various Operational Support Systems (OSS). Here is a list of the default TTY (also called "channels")

tty Channel Name

ttyA	Master control console (MCC) terminal.
ttyB	Master control console (MCC) terminal.
ttyC	Traffic report printer
ttyJ	supplementary trunk and line work station (STLWS) terminals
ttyK	supplementary trunk and line work station (STLWS) terminals
ttyL	supplementary trunk and line work station (STLWS) terminals
ttyM	supplementary trunk and line work station (STLWS) terminals
ttyN	supplementary trunk and line work station (STLWS) terminals
ttyO	supplementary trunk and line work station (STLWS) terminals
ttyP	Repair service bureau - Recent change and verify (RSB-RCV)
ttyR	Office records printer
ttyQ	Switching control center-recent change and verify (SCC-RCV) terminals
ttyR	Repair service bureau-automatic line insulation testing (RSB-ALIT) terminal.
ttyS	Switching control center-recent change and verify (SCC-RCV) terminals
ttyT	Switching control center-recent change and verify (SCC-RCV) terminals
ttyU	Belt line B
ttyV	Local recent change and verify (RCV) terminal
ttyW	Remote recent change and verify (RCV) terminal.
ttyY	Network administration center (NAC) terminal.
ttyZ	The switching control center (SCC) terminal.
ttyi	SLC(R) carrier maintenance
ttyj	STLWS - fifth of six
ttyk	STLWS - sixth of six
ttyl	STLWS - first of six
ttym	STLWS - second of six
ttyn	STLWS - third of six
ttyo	STLWS - fourth of six
ttyp	RCV/Repair Service Bureau
ttyq	RCV/Network Administration Center
ttyr	ALIT/Repair Service Bureau
ttyS	Maintenance
ttyt	Maintenance
ttyu	Belt line A
ttyv	Local RC/V
ttyw	Remote RC/V
ttyx	Maintenance Control Center/Switching Control Center System (MCC/SCCS)
ttyy	Maintenance Control Center/Switching Control Center System (MCC/SCCS)
ttyz	Maintenance Control Center/Switching Control Center System (MCC/SCCS)
FILE	Destination file name in /rclog partition
mt00	High-density tape device, rewind after I/O
mt04	High-density tape device, does not rewind after I/O
mt08	Low-density tape device, rewind after I/O
mt0c	Low-density tape device, does not rewind after I/O
mt18	Low-density tape device, rewind after I/O
mt1c	Low-density tape device, does not rewind after I/O
mttypc0	Special tape device, IOP 0, rewind after I/O
mttypc1	Special tape device, IOP 1, rewind after I/O.

Two Automatic Message Accounting (AMA) units

- Uses data links to transport calling information to central revenue accounting office and AMA tape. Here is the basic structure AMA structure for the OSPS model.
 - Called customer's telephone number, either a seven- or ten-digit number
 - Calling customer's telephone number, seven digits
 - Date
 - Time of day
 - Duration of conversation.

COMMUNICATIONS MODULE

Message Switch (MSGs)

- Provides for control message transfer between the 3B20D Processor and Interface Modules (IM's)
- Contains the clock for synchronizing the network.

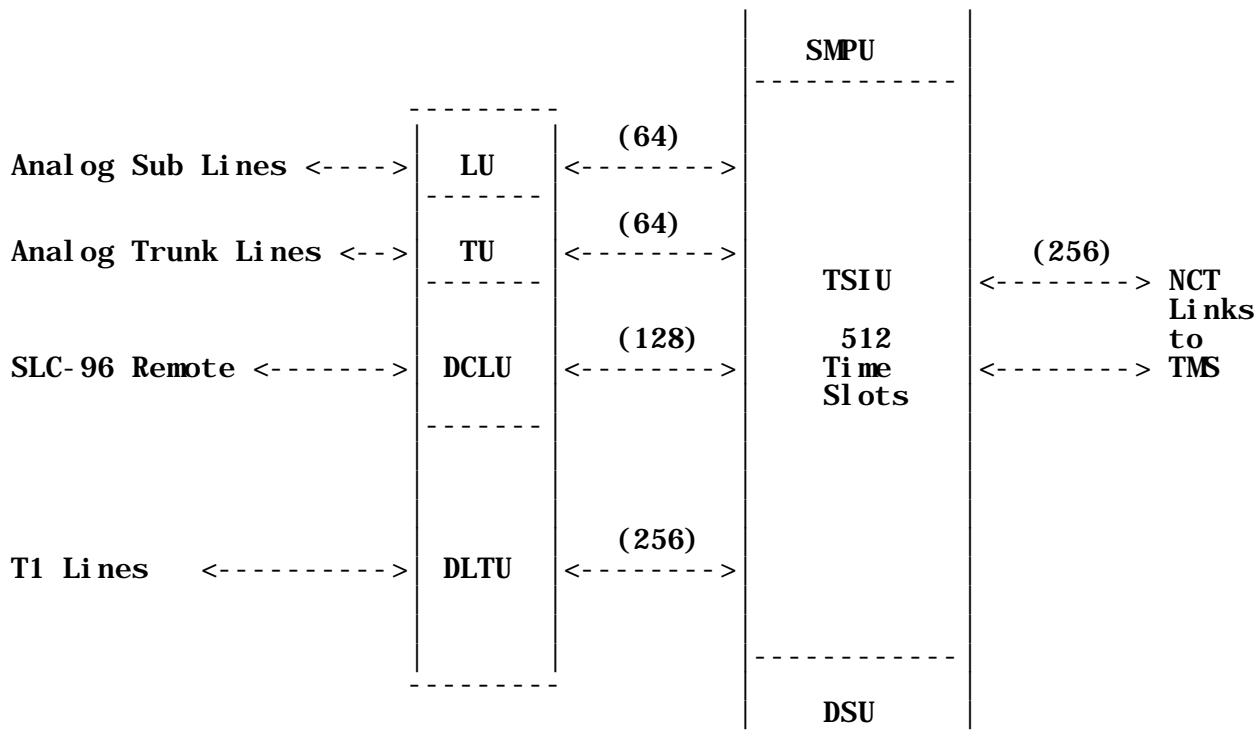
Time Multiplexed Switch (TMS)

- Performs space division switching between SM's
- Provides permanent time slot paths between each SM and the MSGS for control messages between the Processor and SM's (or between SM's)

Switching Module (SM)

- Terminates line and trunks
- Performs time division switching
- Contains a microprocessor which performs call processing function for the SM

5ESS - SWITCH MODULE



COMMON COMPONENTS OF THE SWITCH MODULE (SM)

Switch Module Processor Unit (SMPU)

- Contains microprocessors which perform many of the call processing functions for trunks and links terminated on the SM.

Time Slot Interchange Unit (TSIU)

- 512 time slot capacity
- Connects to the TMS over two 256-time slot Network Control and Timing (NCT) links.
- Switches time slots from Interface Units to one of the NCT links (for intermodule calls).
- Switches time slots from one Interface Unit to another within the SM (for intramodule calls).

Digital Service Unit (DSU)

- Local DSU provides high usage service circuits, such as tone decoders and generators, for lines and trunks terminated on the SM.
- Global DSU provides low usage service circuits, such as 3-port conference circuits and the Transmission Test Facility, for all lines and trunks in the office (requires 64 time slots).

The SM may be equipped with four types of Interface Units:

Line Unit (LU)

- For terminating analog lines.
- Contains a solid-state two-stage analog concentrator that provides access to 64 output channels. The concentrator can be fully equipped to provide 8:1 concentration or can be fully equipped to provide 6:1 or 4:1 concentration.

- Each TU requires 64 time slots.

Trunk Unit (TU)

- For terminating analog trunks.
- Each TU requires 64 time slots.

Digital Line Trunk Unit (DLTU)

- For terminating digital trunks and RSM's.
- Each fully equipped DLTU requires 256 time slots.
- A maximum of 10 DSIs maybe terminated on one DLTU.

The SM may be equipped with any combination of LU's, TU's, DCLU's and DLTU's totaling 512 time slots.

5ESS System Software

The 5ESS is a UNIX based switch. UNIX has played a large part in switching systems since 1973 when UNIX was use in the Switching Control Center System (SCCS). The first SCCS was a 16 bit microcomputer. The use of UNIX for SCCS allowed development in C code, pseudo code, load test, structure and thought. This led the development of the other switching systems which AT&T produces today (such at System 75, 85, 1AESS AP, and 5ESS). NOTE: You may hear SCCS called the "mini" sometimes

The 5ESS's /etc/getty is not set up for the normal login that one would expect to see on a UNIX System. This is due to the different channels that the 5ESS has. The some channels are the TEST Channel, Maintenance Channel, and RC Channel (which will be the point of focus). Once you are on one channel you can not change the channel, as someone has said " it is not a TV!" You are physically on the channel you are on.

Test Channel

The TEST channel is where one can test lines, and test the switch itself. This is where operating support systems (such as LMOS) operate from. This channel allows one to monitor lines via the number test trunk aka adding a third trunk), voltage test and line seizure. Here is a list of OSSs which access the test channels on the 5ESS.

Group Operating Support Systems

Special Service Center

SMAS via N0-Test
SARTS (IPS)
N0- TEST trunk (from the switch)
TIRKS
17B and 17E test boards (CCSA net using X-Bar)
RTS

BLV
POVT
DTAC
etc. . .

Repair Service Bureau

#16LTD
#14LTD
LMDS (IPS)
MLT- 2
ADTS
TI RKS
TFTP
TRCO
DAMF
ATICS
etc. . .

SCC Channel

The SCC channel is where the SCC looks and watches the switch 24 hours a day, seven days a week! From this channel one can input RC messages if necessary. A lot of people have scanned these out, and though they were AMATs. Well this is in short, WRONG! Here is a sample buffering of what they are finding.

S570-67 92-12-21 16:16:48 086901 MDIIMON BOZOVILL DS0

A REPT MDII WSN SIGTYPE DP TKGMN 779-16 SZ 21 00S 0
SUPRVSN RB TIME 22: 16: 48 TEN=14-0-1-3-1 TRIAL 1 CARRFLAG NC ID
OGT NORMAL CALL CALLED- NO CALLING- NO DISCARD 0

S4C0-148963487 92-12-21 16:17:03 086902 MAIPR BOZOVILL DS0

OP:CFGSTAT,SM=1&&192,OOS,NOPRINT; PF

S570-67 92-12-21 16:17:13 086903 S0 BOZOVILL DS0M OP CFGSTAT SM 5 FIRST RECORD

UNIT	MTCE STATE	ACTIVITY	HDWCHK	DGN	RESULT
LUCHAN=5-0-0-3-4	00S, AUTO, FE	BUSY	I NH		CATP
LUCHAN=5-0-0-2-5	00S, AUTO, FE	BUSY	I NH		ATP
LUCHAN=5-0-0-0-3	00S, AUTO, FE	BUSY	I NH		ATP
LUCHAN=5-0-0-3-5	00S, AUTO, FE	BUSY	I NH		ATP
LUHLSC=5-0-0-1	00S, AUTO, FE	BUSY	I NH		ATP
LUCHAN=5-0-0-0-2	00S, AUTO, FE	BUSY	I NH		CATP
LUCHAN=5-0-0-3-6	00S, AUTO, FE	BUSY	I NH		ATP
LUCHAN=5-0-0-1-4	00S, AUTO, FE	BUSY	I NH		ATP

S570-983110 92-12-21 17:09:53 144471 TRCE WCDS0A TRC IPCT EVENT 2991

DN 6102330000 DIALED DN 6102220001
TIME 17: 09: 52

This has nothing to do with AMA, this is switch output on say the SCC channel. This is used by the SCCS for logging, and monitoring of alarms. The whole point of this channel is to make sure the switch is doing what it should do, and to log all activity on the switch. NOTHING MORE!

To go into these messages and say what they are would take far too long, order the OM manuals for the 5ESS, watch out, they are about 5 times the size of the IM (input manual) set. On average it takes someone three years of training to be able to understand all this stuff, there is no way anyone can write a little file in Phrack and hope all who read it understand everything about the **5ESS. RTFM!**

RC Channel

The RC/V (Recent Change/Verify) Channel is where new features can be added or taken away from phone lines. This is the main channel you may come in contact with, if you come in contact with any at all. When one connects to a 5ESS RC/V channel one may be dumped to a CRAFT shell if the login has not been activated. Access to the switch when the login is active is controlled by lognames and passwords to restrict unwanted entry to the system. In addition, the SCC (Switching Control Center) sets permission modes in the 5ESS switch which control the RC (recent change) security function.

The RC security function determines whether recent changes may be made and what types of changes are allowed. If a situation arises where the RC security function denies the user access to recent change via RMAS or RC channels, the SCC must be contacted so that the permission modes can be modified. (Hint Hint)

The RC security function enables the operating telephone company to decide which of its terminals are to be allowed access to which set of RC abilities. NOTE that all verify input messages are always allowed and cannot be restricted, which does not help too much.

The RC security data is not part of the ODD (office dependent data). Instead, the RC security data is stored in relatively safe DMERT operating system files which are only modifiable using the following message:

SET:RCACCESS,TTY="aaaaa",ACCESS=H'bbbbbb;

where: aaaaa = Symbolic name of terminal in double quotes

H' = Hexadecimal number indicator in MM
bbbbbb = 5-character hexadecimal field in 5E4 constructed from binary bits corresponding to RC ability.
The field range in hexadecimal is from 00000 to FFFFF.

This message must be entered for each type terminal (i.e. "aaaaa"="rmas1", "rmas2", etc., as noted above in TTY explanations).

NOTE: Order IM-5D000-01 (5ESS input manual) or OM-5D000-01 (5ESS output manual) for more information on this and other messages from the CIC at 1-800-432-6600. You have the money, they have the manuals, do not ask, just order. I think they take AMEX!

When the message is typed in, a DMERT operating system file is created for a particular terminal. The content of these files, one for each terminal, is a binary field with each bit position representing a unique set of RC abilities. Conversion of this hexadecimal field to binary is accomplished by converting each hexadecimal character to its equivalent 4-bit binary string.

HEX	BINARY	HEX	BINARY	HEX	BINARY	HEX	BINARY
0	0000	4	0100	8	1000	C	1100
1	0001	5	0101	9	1001	D	1101
2	0010	6	0110	A	1010	E	1110
3	0011	7	0111	B	1011	F	1111

Each bit position corresponds to a recent change functional area. A hexadecimal value of FFFF indicates that all bit positions are set to 1 indicating that a particular terminal has total RC access. Also, verify operations as well as lettered classes are not included in the terminals security scheme since all terminals have access to verify views and lettered classes.

In addition, maintenance personnel are able to verify the security code for any terminal by typing the following message from either the MCC (Master Control Center) or SCCS (Switching Control Center System) Mini terminal:

OP:RCACCESS,TTY="xxxxx";

where: xxxx = symbolic name of terminal in double quotes.

Each bit position corresponds to a recent change functional area.

To ensure redundancy, DMERT operating system files are backed up immediately on disk by the SCC. The input message that defines the password and CLERK-ID (another name for username) is in the Global RC feature. This input message defines a clerk-id and associated password or deletes an existing one. (Recall that CLERK-ID and PASSWORD are required fields on the Global RC Schedule view 28.1 in RCV:MENU:APPRC, but more on this later)

This new input message is as follows:

GRC:PASSWORD,CLERKID=xxxxxxxx,[PASSWD=xxxxxxxx|DELETE]

Note: CLERKID can be from 1 to 10 alphanumeric characters and

PASSWORD from 1 to 8 alphanumeric characters.

This input message can only be executed from the MCC or SCCS terminals, and only one password is allowed per CLERK-ID. To change a clerk-id's password, this message is used with the same CLERK-ID but with a different password.

Global RC Schedule View 28.1 from the RC/V Recent Change Menu System

5ESS SWITCH WCDSO
RECENT CHANGE 28.1
GLOBAL RECENT CHANGE SCHEDULING

*1. GRC NAME _____

*2. SECTION _____

#3. CLERK ID _____

#4. PASSWORD _____

5. MODE _____
6. RDATE _____
7. RTIME _____

8. SPLIT

9. SPLIT SIZE _____

10. MAX ERRORS _____

11. VERBOSE _____

When the security is set up on the RC/V channel, one will see:

5ESS login

15 WCDS0 5E6(1) tsn-cdN TTYW

Account name:

There are no defaults, since the CLERK-ID and the password are set by craft, but common password would be the name of the town, CLLI, MANAGER, SYSTEM, 5ESS, SCCS1, SCC, RCMAC, RCMAxx, etc,...

If one sees just a " < " prompt you are at the 'craft' shell of the RC/V channel, the 5E login has not been set. The Craft shell is running on the DMERT (which is a UNIX environment development operating system, a System V hack). The Craft shell prompt is a "<". From this shell one will see several error messages. Here is a list and what they mean:

Error Message Meaning

?A	Action field contains an error
?D	Data field contains an error
?E	Error exists in the message but can not be resolved to the proper field (this is the "you have no idea" message)
?I	Identification field contains an error
?T	Time-out has occurred on channel
?W	Warning exists in input line

Other output message meanings, from the RC/V craft menu.

OK	Good
PF	Printout follows
RL	Retry later
NG	No good, typically hardware failure (i.e: SM does not exist)
IP	In progress
NA	The message was not received by the backup control process

When inputting RC messages it is best to do it in the middle of the day since RC messages are sent to each channel! The SCC is watching and if there are RC messages running across at 3 in the morning, the SCC is going to wonder what the hell RCMAC (Recent Change Memory Administration Center) is doing at three in the morning! However, one may be hidden by MARCH's soaking, and the night shift at the SCC are overloaded and may miss what is going on while correcting other major problems. So it is up to you.

DMERT

The DMERT (Duplex Multiple Environment Real Time) uses the Western Electric (another name for AT&T!) 3B20D Duplex processor (or 2 3B20S Simplex processors). The DMERT software totals nearly nine thousand source files, one million lines of non-blank source code, and was developed by approximately 200 programmers. There are eight main releases of this software, they are referred to as generics (like 5E4.1, 5E4.2, to 5E8.1 also seen as 5E4(1), 5E4(2) to 5E8(1), this can be thought of as DOS version). DMERT is similar to regular UNIX but can be best described as a custom UNIX system based on the 3B20D, the DMERT OS can be ported to PDP-11/70s or a large IBM Mainframe. The DMERT operating system is split both logically and physically. Physically, the software is evenly divided across the five (there were seven Software Development systems all running a 3B20S where the DMERT code was written) Software Development systems. Logical, the software is divided into twenty-four different subsystems. To access this from the "craft" shell of the RC/V channel, type:

RCV:MENU:SH!

NOTE:

This will dump one to a root shell, from which VaxBuster's (Who knows nothing about VAXen, always wondered about him) file on how to redirect a TTY may come in useful.

Programing the 5ESS

When programing the 5ESS there are things one should know, the first is that one has a lot of power (just keep 911 in mind, it would be foolish to even think of disrupting anyones service. 911 is there for a reason, it should STAY that way). And anything one does is logged, and can be watched from the SCC. Note that the night SCC crew is a lot more lax on how things are done then the day shift, so it would be best to do this at night. I could tell you how to crash the switch in two seconds, but that is not the point here. Destroying something is easy, anyone can do that, there is no point to it. All that taking down a switch will do is get one into jail, and get sued if someone needed 911 etc,... (I think SRI is wishing they had talked to me now).

RC from Craft Shell on RC/V Channel

RC and VFY is complex from the craft shell on the RC/V channel. This is called the input text option. It is accessed by using the

RCV:APPTEXT:

This gets a little complex to follow, but the best thing to do is to order the Manual 235-118-215 Recent Change Procedures Text Interface [5E4] it is \$346.87, another good one to get is 235-118-242, for \$413 even and last, but the best is 235-118-243, this beast is only \$1344.63 what a deal. When calling the CIC they will transfer you to a rep. from your area. Gets to be kind of a pain in the ass, but.. Anyways, back on track:

RCV:APPTEXT:DATA[,SUMMARY|,NSUMMARY|[,VFYIMMED|,VFYEND|[,VFYNMVAL|,VFYSCIMG|

[,DEVICE={STDOUT|ROP|ROP0|FILE|TTYx}],FORM=...,DATA,FORM=...,END;

DATA - This is for more then one RC operation in the same command

FORM - The format that is to be used

SUMMARY - Turns on one line summaries on the read only printer (ROP) (DEFULT) NSUMMARY - Turns off one line summary logging by the ROP

VFYIMMED - Prints out verifies (VFYs) immediately, does not wait for

session end.

VFYEND - Prints out all VFYs at session end, this is the DEFULT.

VFYNMVAL - Print verify output in name-value pair format, this must be

directed into a file (see DEVICE). VFYSCIMG - Makes output into screen size image (DEFULT).

DEVICE - Redirect verify output to a device other than ones screen.

ROP/ROP0 - Send verify output to the ROP

STDOUT - Send verify output to ones screen (DEFULT)

- | | |
|-------------|---|
| TTYx | - Send verify output to any valid tty (such as ttya and ttyv) that exists in "/dev." You must use the tty name, not tty number. |
| FILE | - Send verify output to a file in "/rclog". The file will be prefixed with "RCTX", and the user will be given the name of the file at the beginning and end of the APPTEXT session. |

END - END of message.

If the parameter is not entered on the command line, it may be entered after the APPTEXT process begins, but must be entered prior to the first "FORM=" statement. Here is a example of a MML RCV:APPTEXT.

rcv:apptext:data,form=2v1&vfy,set="oe.entype"&lset="oe.len"&xxxxxxxx,pty=i,vfy!

The 2V1 may look strange at first, it may help getting use to the basics first. To just VFY telephone numbers, just do a:

RCV:APPTEXT:DATA,FORM=1V6-VFY,TN=5551212,VFY,END!

Though I can not really explain this any more then I have just due to time and space. These input messages may look complex at first, but are really simple, and much better then dealing with the menu system, but you will need to learn RC yourself! No one can explain it to you.

Pulling AMA from the RC/V channel Craft Shell

Pulling AMA up is done with one command. The command is:

OP:AMA:SESSION[ST1|ST2];

This command will request a report of the current or most recent automatic message accounting (AMA)

tape. ST1 and ST2 are the data streams.

Pulling up out of Service Lines, Trunks or Trunk Groups

One may want to pull up all the out of service lines, trunks, or trunk groups for many reasons. These reasons i will not go into, but from which lines can be set up. The command to do this from the craft shell is a PDS command, this command is with a 'ball bat' (a `` !).

OP:LIST,LINES[,FULL][,PRINT][;[a][,b][,c][,d][,e]]!

OP:LIST,TRUNKS[,FULL][,PRINT][;[a][,b][,c][,d][,e]]!

OP:LIST,TG [,FULL][,PRINT][;[a][,b][,c][,d][,e]]!

FULL - All (primary and pending) are printed. Note FULL is not the default when inputting this command.

PRINT - Print to the ROP in the CO. (Not a good idea)

a-e - This is port status to match against the subset of trunks, lines or trunk groups that are specified. (This is required input for FULL)

The 5ESS RC/V Menu Shell

To access this shell from the RC/V channel craft shell, type:

RCV:MENU:APPRC

at the `` < " prompt.

To access the 5ESS RC/V menu system from the MCC, STLWS, and TLWS channel/terminals, one uses what are called pokes. The poke that is used here to access the RC/V Menu system on the 5ESS is 196.

Type 196 at the `` CMD<" prompt, and you are on the RC/V menu system of the 5ESS switch. This will cause ``RC/V 196 STARTING" and ``RC/V 196 COMPLETED" to be printed out on the ROP.

Either way, this will toss you into a menu system. The main menu looks like this:

5ESS SWITCH WCDSO		
RECENT CHANGE AND VERIFY CLASSES		
H RCV HELP	9 DIGIT ANALYSIS	20 SM PACK & SUBPACK
A ADMINISTRATION	10 ROUTING & CHARGING	21 OSPS FEATURE DEFINITION
B BATCH INPUT PARMS	11 CUTOVER STATUS	22 ISDN -- EQUIPMENT
1 LINES	12 BRCS FEATURE DEFINITION	23 ISDN
2 LINES -- OE	13 TRAFFIC MEASUREMENTS	24 APPLICATIONS PROCESSOR
3 LINES -- MLHG	14 LINE & TRUNK TEST	25 LARGE DATA MOVEMENT
4 LINES -- MISC.	15 COMMON NTWK INTERFACE	26 OSPS TOLL & ASSIST/ISP
5 TRUNKS17 CM MODULE	18 SM & REMOTE TERMINALS	27 OSPS TOLL & ASSIST
7 TRUNKS - MISC.		28 GLOBAL RC - LINES

8 OFFICE MISC. & ALARMS 19 SM UNIT

Menu Commands:

The help menus for the 5ESS switch are lame, but I thought that it would be good to show them to you just for the hell of it, because it does explain a little about the switch.

SCREEN 1 OF 7 5ESS SWITCH
RECENT CHANGE VIEW H. 1
COMMANDS FOR MENU PAGES

H - Explains commands for MENU or views. If you enter H again, then it

will display next HELP page.

H# - Select HELP page. (# - help page number) Q - Quit Recent Change and Verify. R - Change mode to RECENT CHANGE

V - Change mode to VERIFY

< - Go to CLASS MENU page.

- If on CLASS MENU page Go to a VIEW MENU page #. # - If on VIEW MENU page Go to a RECENT CHANGE or VERIFY VIEW #. #.# - Go to a RECENT CHANGE or VERIFY VIEW. (CLASS#.VIEW#)

SCREEN 2 OF 7 5ESS SWITCH
RECENT CHANGE VIEW H. 1
COMMANDS FOR MENU PAGES

#R - Go to Recent Change view for read. #I - Go to Recent Change view for insert. #D - Go to Recent Change view for delete (only print Key fields). #DV - Go to Recent Change view for delete with verify (print all fields). #U - Go to Recent Change view for update. #UI - Go to Recent Change view for update in insert mode (user can change

each field sequentially without typing field number). #V - Go to Verify view.

#N - Go to next menu page. Back to the 1st page if there's no next page.

SCREEN 3 OF 7 5ESS SWITCH

RECENT CHANGE VIEW H. 1 COMMANDS FOR BATCH

BMI - Delayed Activation Mode. Choose time or demand release (for time

release add service information). Select view number for Recent Change. BMD - Display Status of Delayed Activation Recent Changes. BMR - Release a file of Recent Changes stored for Delayed Activation. IM - Immediate Release Mode.

SCREEN 4 OF 7 5ESS SWITCH RECENT CHANGE VIEW H. 1 COMMANDS FOR VIEWS

< - In first field: Leave this view and return to select view number.
< - Not in first field: Return to first field.
^ - In first field: Select new operation for this view.
^ - Not in first field: Return to previous field.
> or ; - Go to end of view or stop at next required field.
* - Execute the operation or go to next required field.
? - Toggle help messages on and off.
Q - Abort this view and start over.
V - Validate input for errors or warnings.

SCREEN 5 OF 7 5ESS SWITCH RECENT CHANGE VIEW H. 1 COMMANDS FOR VIEWS

R - Review view from Data Base.

I - Insert this view into Data Base. U - Update this view into Data Base. D - Delete this view from Data Base (only print Key fields). C - CHANGE: Change a field - All fields may be changed except key fields

when in the update mode only.

C - CHANGE-INSERT: Allowed in the review mode only - Allows you to review C - CHANGE-INSERT: Allowed in the review mode only - Allows you to review

a view and then insert a new view with similar field. You must change the key fields to use this facility. You may change other fields as required by the new view.

P - Print hard copy of screen image (must have RC/V printer attached).

SCREEN 6 OF 7 5ESS SWITCH RECENT CHANGE VIEW H. 1 COMMANDS FOR VIEWS

The following are used only on views containing LISTS.

' - Blank entire row.
- Sets this field to its default value.
: - Sets this row to its default value.
[- Go backward to previous row.
] - Go forward to next row.
; - Go to end of view or stop at next required field.
- Go to end of list and stop at next non-list field.
{ - Delete current row and move next row to current row.
} - Move current row to next row and allow insert of row.
= - Copy previous row to current row.

* - Execute the operation or stop at next required field.

SCREEN 7 OF 7 5ESS SWITCH
RECENT CHANGE VIEW H. 1
COMMANDS FOR AUTOMATIC FORMS PRESENTATION

If RC/V is in automatic forms presentation and "Q" or "q" is entered for the operation, the following commands are available.

- A - Abort form fields. RC/V stays in the current form.
 - B - Bypass form Go to next form using automatic forms presentation.
 - C - Cancel automatic forms presentation. The previous menu will be displayed.
 - H - Display automatic forms presentation help messages.
 - < - Bypass form Go to next form using automatic forms presentation.
-

When accessing the databases, here is a list of database access selections:

I (insert) - Insert new data

R (review) - Review existing data

U (update) - Update or change existing data D (delete) - Delete (remove) unwanted data from the data base V (verify) - Verify the data in the data base.

These are to be entered when one sees the prompt:

Enter Database Operation

I=Insert R=Review U=Update D=Delete : _

When using the RC/V menu system of the 5ESS, you may go and just keep going into sub-menus, and fall off the end of the Earth. Here are the navigational commands that are used to move around the menu system. As seen from the RC/V menu system help, you see "SCREEN X out of X." This means that there are so many screens to go and to move between the screens you use the `` < '' to move back (toward main menu) and `` > '' to move to the last menu. I know it is shown in the help menu, but it is not explained like it needs to be.

Batch Input

The Batch Input feature for the 5ESS switch allows recent changes (RC) to be entered at any date and time when the RC update would be performed. This allows RC input to be entered quickly, and for a large number of inputs. The large numbers of RC input can be released quickly in batch mode. The RC input can then be entered at any time, stored until needed, and then released for use by the system whenever needed, at any specific date and/or time. First and second level error correction is done during batch input. There are several different modes of batch input. These are:

- BMI** - batch mode input - TIMEREL and DEMAND
- BMD** - batch mode display
- BMR** - batch mode release

BMI - Batch Mode Input - TIMEREL and DEMAND

Entering BMI (Batch Mode Input), one types `` BMI '' at the RC/V menu prompt. Once entering, you will be prompted with whether the input is DEMAND (demand) or TIMEREL (Time Release). DEMAND input allows one to manual have the batch update the database, TIMEREL is automatic. TIMEREL has one enter a time and date. When using DEMAND, you will be prompted for the file name. The file will be in `` /rclog '' in the DMERT OS. In TIMEREL, you will be prompted with the CLERK-ID, which in this case is the file name for the file in the `` /rclog '' . Then for VERBOSE options, the RC SRVOR (Recent Change Service Order) is displayed on the screen.

-RC SRVOR View in the BMI TIMEREL Batch Option-

5ESS SWTCH RECENT CHANGE B. 1 SERVICE ORDER NUMBER VIEW

*1. **ORDNO** _____
*2. **ITNO** _____
*3. **MSGNO** _____

#4. **RDATE** _____
#5. **RTIME** _____

Enter Insert, Change, Validate, or Print:

ORDNO = Service Order Number

ITNO = Item Number

MSGNO = Message Number

RDATE = Release Date (Update database Date) RTIME = Release Time (Update database Time)

BMD - batch mode display

BMD is a "mask" of RC/V done from the RC/V channel craft shell, by using the REPT:RCHIST or a pseudo menu system. All transactions are displayed on the ROP, though the data could also be sent to a file in the `` /rclog '' in DMERT.

The Pseudo menu system looks like:

1. Summary of clerk activity
2. Activity by service order number
3. Activity by clerk ID
4. Return to view or class menu.

1 allows one to view the "DELAYED RELEASE SUMMARY REPORT." 2 produces a "DELAYED RELEASE REPORT BY SERVICE ORDER." 3 produces the "DELAYED RELEASE REPORT BY CLERK ID." 4 Return to view or class menu, self-explanatory.

REPT:RCHIST - BMD

The REPT:RCHIST BMD (Text) command is done from the RC/V channel craft shell. The command synopsis is:

5E2 - 5E5 (Generics)

REPT:RCHIST,CLERK=[,FORMAT={SUMMARY|DETAIL}][[,ALL]][[,PENDING][,COMPLETE][,ERROR]]

5E6 - 5E8 (Generics)

REPT:RCHIST,CLERK=a[,FORMAT={SUMMARY|DETAIL}] {,ALL|,b}{,DEST={c|FILE}}
[,TIME=XXXXXXXXXX];

SUMMARY	- Report selection, format by key.
DETAIL	- Report selection for Recent Change entire.
ALL	- Report all recent changes.
PENDING	- Report pending recent change input.
COMPLETE	- Report released recent changes that was successful when completed.
FILE	- Name for file in /rclog
ERROR	- Report recent changes released with error.
DEMAND	- Report demand recent changes.

TIME=XXXXXXXXXX - XX - mounth, XX - day, XX - hour, XX minute, XX - Second

BMR - batch mode release

This is the manual release (updating) of the 5ESS database. This is done from the RC/V channel craft shell. The command that is used is the EXC:RCRLS input message. There is no real need to go into this message.

Adding RCF (Remote Call Forward) on a 5ESS

1. At the "MENU COMMANDS" commands prompt of the 5ESS main menu in the RC/V APPRC menu system of the 5ESS, enter '12' for the "BRCS FEATURE DEFINITION". Then access screen '1.11', this is the BRCS screen. When it asks you to 'ENTER DATABASE OPERATION' enter "U" for Update and hit return.

NOTE: When at menu '12,' you will NOT see '1.11' listed in the menu options. By just accessing menu '1' you will not be able to add features. This is a problem with the 5ESS menu system.

2. Type in the Telephone Number. It should look like this:
-

Mon Feb 31 09:09:09 2001 RFA_TN

5ESS SWITCH WCDSO
SCREEN 1 OF 2 RECENT CHANGE 1.11
BRCS FEATURE ASSIGNMENT (LINE ASSIGNMENT)

*1. TN 5551212 * 2. OE _____ 3. LCC ___ 4. PIC 288*5. PTY _ * 6. MLHG ___ 7. MEMB ___ 8.
BFGN _____

FEATURE LIST (FEATLIST)ROW 11. FEATURE A P 15. FEATURE A P 19. FEATURE A P 23.
FEATURE A P

1. /CFV N _____
2. _____
3. _____
4. _____

and will prompt you with:

Enter Insert, Change, Validate, screen#, or Print: _ form operation prompt

I - to insert a form
C - to change a field on a form
V - to validate the form
A - to display the desired screen number
P - to print the current screen
U - to update the form

Enter `` C " to change, access filed 11 and row 1 (goto the /CFV wherever it may be) or add /CFR if it is not there. If it does though, leave the "A" (Active) field "N" (Yes or No). Change the P (Presentation) column to "U" (Update). Then Hit Return.

NOTE: Different Generics have other fields, one of them being a AC (Access Code) field. This field is a logical field, that mean only accepts a "Y" for yes and "N" for no. Also when adding the feature to the switch, the row and field numbers may not be shown, but will always follow this pattern. Also note that the /CFV (Call forwarding variable) feature may not be there, there maybe no features on the line. These examples are from Generic 4 (2). Here is a example of 5E8 (which is not used too many places, but this is what menu 1.11 in the BRCS Feature Definition looks like:

5ESS SWITCH
SCREEN 1 OF 2 RECENT CHANGE 1.11
(5112, 5113) BRCS FEATURE ASSIGNMENT (LINE)

(*)1. TN _____ (*)2. OE _____ 3. LCC _____ 4. PID _____

(*)6. MLHG _____ 8. BFGN _____ -
(*)5. PTY _____ 7. MEMB _____

ROW	FEATURE	11. FEATURE LIST (FEATLIST)				ROW	FEATURE	11. FEATURE LIST (FEATLIST)						
		A	P	AC	R			ROW	FEATURE	A	P	AC	R	
1	_____	-	-	-	8	_____	-	-	-	15	_____	-	-	-
2	_____	-	-	-	9	_____	-	-	-	16	_____	-	-	-
3	_____	-	-	-	10	_____	-	-	-	4	_____	-	-	11
18	_____	-	-	-	5	_____	-	-	-	12	_____	-	-	19
13	_____	-	-	-	20	_____	-	-	-	7	_____	-	-	14
-														21

Enter Insert, Change, Validate, screen#, or Print: _

Hit Return twice to get back to "ENTER UPDATE, CHANGE, SCREEN #, OR PRINT:". Enter a "U" for update and hit Return. It will say "FORM UPDATE".

3. Next access screen 1.22, call forwarding (line parameters) or it will

just come up automatically if you set the "P" to "U".

Mon Feb 31 09:09:09 2001 RCFLNTN

5ESS SWITCH WCDS0
RECENT CHANGE 1.22
CALL FORWARDING (LINE PARAMETERS)

*1. TN	5551212		
*6. FEATURE	CFR		
9. FWDTODN			
10. BILLAFTX	0	16. SIMINTER	99
11. TIMEOUT	0	17. SIMINTRA	99
12. BSTNINTVL	0	18. CFMAX	32
13. CPTNINTVL	0	19. BSRING	N

4. If you used the automatic forms presentation, it will have the telephone number already on LINE1. If not retype the telephone number you want forwarded. The bottom of the screen will say "ENTER UPDATE, CHANGE, VALIDATE OR PRINT:", type "C" for change and hit return.
5. When it says CHANGE FIELD type "9" and enter your forward to DN (Destination Number) including NPA if necessary. This will put you back to the "CHANGE FIELD" prompt. Hit return again for the "ENTER UPDATE, CHANGE, VALIDATE OR PRINT:". Hit "U" for Update form and wait for "FORM UPDATED".
6. Lastly, access screen 1.12, BRCS FEATURE ACTIVATION (LINE ASSIGNMENT). At the prompt enter a "U" for Update, and on ROW 11 Line 1 (or wherever), change the "N" in column "A" to a "Y" for Yes, and you are done.

Adding other features

To add other features onto a line, follow the same format for adding the /CFR, but you may not need to access 1.22. Some other features are:

Feature Code: Feature Name:

/LIDLXA	- CLID
/CFR	- Remote Call Forward
/CWC1	- Call Waiting
/CFBLL0	- call forward busy line i/o
/CFDAI0	- call forward don't answer i/o
/CFV	- call forwarding variable
/CPU0	- call pick up o !used in the selq1 field!
/CPUT	- call pick up t !used in the tpredq field!
/CWC1D	- Premiere call waiting
/DRIC	- Dist. ring
/IDCT10	- Inter room ID
/IDCTX2	- 1digit SC
/IDCTX2	- Interoom ID 2
/IDCTX2	- Premiere 7/30, convenience dialing
/IDCTX3	- Premiere 7/30, no cd
/IDMWP1	- Premiere 2/6, no convenience dialing
/IDMWP2	- Premiere 2/6, CD, not control sta.

- | | |
|---|--|
| /IDMVP3
/MMCH1
/MMCTIA2
/TGUUT | <ul style="list-style-type: none"> - Premiere 2/6, CD, control station - Call hold - Call transfer 2 - Terminal group ID number with TG view (1.29). |
|---|--|

ANI/F the whole switch

Automatic Number Identification failure (also called "dark calls") are caused by variety of different things. To understand this better, here are the technical names and causes, note this is not in stone and the causes are not the only causes for a ANI-F to occur.

ANF -- Failure to receive automatic number identification

- (ANI) digits on incoming local access and transport area (LATA) trunk.
- ANF2** -- Automatic number identification (ANI) collected by an operator following a failure to receive ANI digits on an incoming centralized automatic message accounting (CAMA) trunk from the DTMF decoder.
- ANI** -- Time-out waiting for far off-hook from Traffic Service Position System (TSPS) before sending ANI digits.

Though, I have always wondered how to set one up myself in a safe way. One way nice way to get ANI/F through a 5ESS to use a inhibit command.

INH:CAMAONI;

The command will inhibits centralized automatic message accounting (CAMA) operator number identification (ONI) processing. This is done from the DTMF decoder (going over later). This message will cause a minor alarm too occur. If in the CO when the alarm occurs, you will here this bell all the time, because something is always going out. In this case, this alarm is a level 1 (max to five) and the bell will ring once. Once this message is inputed, all calls through CAMA operator will be free of charge. So just dial the operator and you will have free calls.

To place this back on the switch, just type:

ALW:CAMAONI;

and the minor alarm will stop, and things will go back to normal.

Setting up your own BLV on the 5ESS from the Craft shell RC/V Channel

Well, we have come to the fun part, how to access the No-Test trunk on the 5ESS (this is also called adding the third trunk). I will not be too specific on how to do this. You will need to figure out just how to do this. The first thing you want to do is to request a seizure of a line for interactive trunk and line

testing. One must assign a test position (TP).

SET:WSPHONE,TP=a,DN=b
SET:WSPOS,TP=a,DN=b

a = A number between 1 and 8
b = The number you wish assigned to the test position

This will chose a number to be the test number on the switch. Now using the CONN:WSLINE one can set up a BLV.

CONN:WSLINE,TP=a,DN=b;

a = TP that you set from the SET: WSPOS
b = The number you want to BLV

To set this up on a MLHG (can come in real useful for those peksy

public packet switched networks), do a:

CONN:WSLINE,TP=a,MLHG=x-y;

x = MLHG number, y = MLHG member number

To take set things back to normal and disconnect the BLV do a:

DISC:WSPHONE,TP=z

z = TP 1 through 8

NOTE:

One may need to do a ALW:CALLMON before entering the CONN commands

BIG NOTE:

If you set your home telephone number as the test position, and you have only one phone line, you are stupid.

Comments about the Underground

There are a few people out there who have no idea what they are doing, and go on thinking they know it all (i.e. No Name Brand). It pisses me off when these people just go off and make shit up about things they have no idea what they are talking about.

This file is to all the lazy people out there that just keep bitching and moaning about not knowing where to find information.

Other Sources

Here is a list of Manuals that you can order from the CIC (1-800-432-6600). Note that some of these manuals are well over hundreds of dollars.

Manual 234-105-110 System Maintenance Requirements and Tools Manual 235-001-001 Documentation Guide Manual 235-070-100 Switch Administration Guidelines Manual 235-100-125 System Description Manual 235-105-110 System Maintenance Requirements and Tools Manual 235-105-200 Precutover and Cutover Procedures Manual 235-105-210 Routine Operations and Maintenance Manual 235-105-220 Corrective Maintenance Manual 235-105-231 Hardware Change Procedures - Growth Manual 235-105-24x Generic Retrofit Procedures Manual 235-105-250 System Recovery Manual 235-105-250A Craft Terminal Lockout Job Aid Manual 235-105-331 Hardware Change Procedures - Degrowth Manual 235-105-44x Large Terminal Growth Procedures Manual 235-118-200 Recent Change Procedures Menu Mode Generic Program Manual 235-118-210 Recent Change Procedures Menu Mode Manual 235-118-213 Menu Mode 5E4 Software Release Manual 235-118-214 Batch Release 5E4 Software Release Manual 235-118-215 Text Interface 5E4 Software Release Manual 235-118-216 Recent Change Procedures Manual 235-118-217 Recent Change Procedures Batch Release 5E5 Software

Release

Manual 235-118-218 Recent Change Attribute Definitions 5E5 Software Release Manual 235-118-21x Recent Change Procedures - Menu Mode Manual 235-118-224 Recent Change Procedures 5E6 Software Release Manual 235-118-225 Recent Change Reference 5E6 Software Release Manual 235-118-240 Recent Change Procedures Manual 235-118-241 Recent Change Reference Manual 235-118-242 Recent Change Procedures 5E8 Software Release Manual 235-118-24x Recent Change Procedures Manual 235-118-311 Using RMAS 5E4 Software Release Manual 235-118-400 Office Records and Database Query 5E4 Software Release Manual 235-190-101 Business and Residence Modular Features ** Manual 235-190-105 ISDN Features and Applications Manual 235-190-115 Local and Toll System Features Manual 235-190-120 Common Channel Signaling Service Features Manual 235-190-130 Local Area Services Features Manual 235-190-300 Billing Features

Manual 235-600-103 Translations Data

Manual 235-600-30x ECD/SG Data Base

Manual 235-600-400 Audits

Manual 235-600-500 Assert Manual

Manual 235-600-601 Processor Recovery Messages Manual 235-700-300 Peripheral Diagnostic Language Manual 235-900-101 Technical Specification and System Description Manual 235-900-103 Technical Specification Manual 235-900-104 Product Specification Manual 235-900-10x Product Specification Manual 235-900-301 ISDN Basic Rate Interface Specification Manual 250-505-100 OSPS Description and Procedures Manual 363-200-101 DCLU Integrated SLC Carrier System Manual TG-5 Translation Guide

Practice 254-341-100 File System Software Subsystem Description

3B20D Computer

Practice 254-301-110 Input-Output Processor Peripheral Controllers

**Description and Theory of Operation AT&T 3B20D
Model 1 Computer None.**

**Practice 254-341-220 3B20 System Diagnostic Software Subsystem
Description 3B20D Processor**

CIC Select Code 303-001 Craft Interface User's Guide CIC Select Code 303-002 Diagnostics User's Guide CIC Select Code 303-006 AT&T AM UNIX RTR Operating System, System

Audits Guide

IM-5D000-01 Input Manual
OM-5d000-01 Output Manual

OPA-5P670-01 The Administrator User Guide OPA-5P672-01 The Operator User Guide
OPA-5P674-01 The RMAS Generic - Provided User Masks

Trademarks

5ESS - Registered trademark of AT&T.

CLCI - Trademark of Bell Communications Research, Inc. CLLI - Trademark of Bell Communications Research, Inc. ESS - Trademark of AT&T.

SLC - Registered trademark of AT&T.

UNIX - Registered trademark of AT&T.

DMERT - Registered trademark of AT&T.

SCCS - Registered trademark of AT&T

DMS - Registered trademark of Northern Telecom DEC - Registered trademark of Digital Equipment Corporation. VT100 - Trademark of Digital Equipment Corporation.

Acronyms and Abbreviations

ADTS	-	Automatic Data Test System	
ALIT	-	Automatic Line Insulation Testing	AMA - Automatic Message Accounting
Accounting			
AP	-	Attached Processor (1AE55 3B20)	
ATICS	-	Automated Toll Integrity Checking System	
BLV	-	Busy Line Verification	
BMD	-	Batch Mode Display	
BMI	-	Batch Mode Input - TIMEREL and DEMAND	
BMR	-	Batch Mode Release	
BRCS	-	Business Residence Custom Service	
CAMA	-	Centralized Automatic Message Accounting	
CIC	-	Customer Information Center (AT&T)	
DAMT	-	Direct Access Mechanize Testing	
DLTU	-	Digital Line Trunk Unit	
DMERT	-	Duplex Multiple Environment Real Time	
DSU	-	Digital Service Unit	
DTAC	-	Digital Test Access Connector	
GRASP	-	Generic Access Package	
IOP	-	Input/Output Processor	
IPS	-	Integrated Provisioning System	
ISDN	-	Integrated Services Digital Network	ITNO - Item Number
LMOS	-	Loop Maintenance Operations System	
LU	-	Line Unit	
MCC	-	Master Control Center	
MLT-2	-	Mechanized Loop Testing - The Second Generation of Equipment	
MML	-	Man Machine Language	

MSGNO	- Message Number
MSGS	- Message Switch
NCT	- Network Control and Timing
ODD	- Office Dependent Data
OE	- Office Equipment
ONI	- Operator Number Identification
ORDNO	- Service Order Number
OSPS	- Operator Service Position System
OSS	- Operations Support System
POVT	- Provisioning On-site Verification Testing
RC	- Recent Change
RC/V	- Recent Change and Verify
RDATE	- Release Date (Update Database Date)
RMAS	- Remote Memory Administration
RTIME	- Release Time (Update Database Time)
RTS	- Remote Test Unit
SARTS	- Switched Access Remote Test System
SCCS	- Switching Control Center System
SLC	- Subscriber Loop Carrier
SM	- Switching Module
SMAS	- Switched Maintenance Access System
SMPU	- Switch Module Processor Unit
SONET	- Synchronous Optical Network
SPC	- Stored Program Control
STLWS	- Supplementary Trunk and Line Work Station
TFTP	- Television Facility Test Position
TIMEREL	- Time Release
TIRKS	- Trunk Integrated Record Keeping System
TMS	- Time Multiplexed Switch
TRCO	- Trouble Reporting Control Office
TSI	- Time Slot Interchangers
TSIU	- Time Slot Interchange Unit
TU	- Trunk Unit
VFY	- Verify