

EMSDEV
PDP-15
KLAUS APPEL
MATS S ANDERSSON
02/02-71

MACRO-15 PROGRAM CALLED FROM FORTRAN

EMSDEV IS AN UPDATED VERSION OF THE OLDER PROGRAMS EMSTOT AND EMSALL. THE NOTATIONS ARE MODERNISED, REVERBATION DISTRIBUTORS FOR MOVING SOUND ARE MADE CONTROLLABLE AND THE NUMBERING OF CONNECTION POINTS REVISED. LIKE IN EMS1, THE ARGUMENT ORDER IN FG TERMS, THE FORTRAN CALL IS NOW CALL FG(NR,IFREQ,INTENS,IWAVE)
(EMSENT IS SIMILAR TO EMSDEV BUT IT WAS REALISED THAT THE DEVICE NUMBERING SHOULD START FROM 1 AS IN EMSDEV, NOT FROM 0 AS IN EMENT AND EMSTOT.)

ZH 741028

ZH 750314 SWTAPE INTRODUCED

PURPOSE:

TO WRITE MAGNETIC TAPES WITH EMS INFORMATION WHICH CAN BE PLAYED EITHER ON EMS' OWN TAPE TRANSPORTS (A1-FORMAT) OR THROUGH PDP-15 (A1 OR A2 FORMAT)
USE THE SUBROUTINE WREMA1 TO WRITE A1-TAPE (UNBLOCKED) AND THE SUBROUTINE WREMA2 TO WRITE A2-TAPE (BLOCKED)
EMSDEV PERMITS PROGRAM CONTROL OF ALL ADDRESSABLE FUNCTIONS IN EMS

USE:

- 1 THE PROGRAM IS INITIALIZED BY
CALL TAPE (LUN) WHERE LUN (7 OR 10)
IS THE UNIT ON WHICH THE INFORMATION
IS WRITTEN
THE WHOLE STUDIO IS CLEARED AND A RECORD
CONTAINING 5 SECONDS OF SILENCE IS OUTPUT
- 2 EACH FOLLOWING RECORD ON THE TAPE
IS MADE WITH AN ARBITRARY NUMBER OF CALLS
TO THE SUBROUTINES
FG,FG0,FF,FFQ,AMPL,AMPLQ,CONNEC,DISCON AND REVTIM
THE RECORD IS OUTPUT WITH AN ENDING CALL TO THE
ROUTINE TIME
IMMEDIATLY BEFORE 'CALL TIME' THE ROUTINE ENDMRK
CAN BE CALLED
- 3 THE PROGRAM IS CLOSED WITH
CALL ENDPLY WHICH CLEARS THE STUDIO AND WRITES
ONE RECORD WITH 5 SECONDS OF SILENCE
THE GENERATION OF TAPES CAN CONTINUE
THE RECORD NUMBER IS CLEARED ONLY IF 'TAPE'
IS CALLED AGAIN

NOTE

THE FREQUENCY GENERATOR INTENSITIES ARE CLEARED EACH TIME A RECORD HAS BEEN WRITTEN, WHILE ALL THE OTHER PARAMETERS ARE UNCHANGED UNTIL THEY ARE AFFECTED BY SOME SUBROUTINE CALL. NORMALLY THE RECORD CONTAINS ONLY THE CHANGES FROM LATEST RECORD AND ALL THE FREQUENCY GENERATORS INTENSITY EXCEPT IN THE FOLLOWING CASES

- A RECORDNUMBER EQUALS 1
- B RECORDNUMBER EQUALS 20,40,60,80,,,,
- C THE NUMBER OF CHANGES CAUSES A RECORD LONGER THAN A RECORD CONTAINING ALL THE EMS PARAMETERS

NOTE

WHEN LISTENING FROM A POINT OTHER THAN THE

BEGINNING OF THE PIECE ONE MUST BEGIN WITH
A RECORD THE NUMBER OF WHICH IS 20,40,60,80,,,,,
TO BE SURE THAT ALL EMS ADDRESSES GET THEIR
RIGHT VALUE
IN THE FOLLOWING DISCUSSION ALL PARAMETERS ARE INTEGERS

CALL FG (NR,IFREQ,INTENS,IWAVE)
NR FREQUENCY GENERATOR NUMBER (1-24)
IFREQ FREQUENCY (0-15999)
INTENS AMPLITUDE IN DB (0-120)
IWAVE WAVEFORM (0-7)

CALL FGO (NR,IFREQ,INTENS,IWAVE)
NR FREQUENCY GENERATOR NUMBER (1-24)
IFREQ FREQUENCY (0-15999)
INTENS AMPLITUDE IN QUARTER OF DB (0-480)
IWAVE WAVEFORM (0-7)

CALL FF (NR,ICH,INTENS)
NR FILTER NUMBER (1-2)
ICH CHANNEL NUMBER (1-28)
INTENS AMPLITUDE IN DB (0-120)

CALL FFO (NR,ICH,INTENS)
NR NUMBER (1-2)
ICH CHANNEL NUMBER (1-28)
INTENS AMPLITUDE IN QUARTER OF DB (0-480)

CALL AMPL (NR,INTENS)
NR AMPLIFIER NUMBER (1-30) ACCORDING TO TABLE 1
INTENS AMPLITUDE IN DB (0-120)

CALL AMPLQ (NR,INTENS)
NR AMPLIFIER NUMBER (1-30) ACCORDING TO TABLE 1
INTENS AMPLITUDE IN QUARTER OF DB (0-480)

CALL CONNec (FROM,TO)
SET CONNECTION BIT BETWEEN 'FROM' AND 'TO'

CALL DISCON (FROM,TO)
CLEAR CONNECTION BIT BETWEEN 'FROM' AND 'TO'

FROM AND TO CAN TAKE VALUES FROM TABLE 1 AND 2 BELOW

NOTICE THAT THE SETTING OF NOISE COLOURS IS PERFORMED
IN EMSDEV AS A CONNECTION (SEE ALSO CONNECTION LIST, TABLE 2).
TO CHANGE COLOUR FROM PINK TO WHITE, DO

CALL CONNec(NG1,WHITE)

CALL DISCON(NG1,PINK)

NG1, WHITE AND PINK ARE INTEGERS WITH VALUES AS IN TABLE 1

CALL REVTIM (NR,K)
NR REVERBATION UNIT NUMBER (1-2)
K REVERBATION TIME (1-15) APPROXIMATELY $K \times 0.35$ SEC,
BUT AT LEAST APPR. 2 SEC.S

CALL ENDMRK
MAY BE CALLED IMMEDIATLY BEFORE TIME
THE RECORD WRITTEN AT NEXT 'CALL TIME' CONTAINS
A STOP MARK INSTEAD OF JUST AN END OF RECORD MARK
THIS CONDITION WILL LAST ONLY FOR ONE RECORD

CALL SWTAPE

MAY BE CALLED BEFORE TIME. THE RECORD WRITTEN AT NEXT CALL TIME CONTAINS A 'SWITCH TAPE' MARK. THE NEXT RECORD WILL BE WRITTEN ON THE OTHER MT UNIT (DAT SLOT 10 AFTER 7, 7 AFTER 10). MT0 AND MT1 MUST BE ASSIGNED TO ONE EACH OF THESE DAT SLOTS. TIME AND RECORD NUMBER ARE RESET TO AVOID OVERFLOW FOR LONG COMPOSITIONS.

THE FORMAT MUST BE A1 (OFF-LINE FORMAT).
PLAYBACK MUST BE OFF-LINE FOR TAPE SWITCHING TO TAKE PLACE. IT MUST BE FORESEEN WHEN THE TAPE APPROACHES THE END AND A CALL SWTAPE SHOULD BE ISSUED. THE COMPOSER IS REMINDED OF ANOTHER METHOD OF SWITCHING TAPES AS WELL!
JUST PUSH RESET ON THE MT AND THE COMPUTER WILL SAY IOPSA (BATCH CAN NOT BE USED). REWIND AND MOUNT A NEW TAPE ON THE SAME MT UNIT. PUSH REMOTE ON THE MT AND CTRL R ON THE TELETYPE. LATER, A SWITCH TAPE COMMAND CAN BE EDITED IN OFF-LINE, LAST ON THE TAPE. THIS METHOD WORKS ALSO IF ONLY ONE ONE OF THE MT STATIONS WORKS WELL.

CALL CLEMS
THIS ROUTINE CLEARS EMSDEV'S INTERNAL TABLES CONTAINING THE PRESENT STATE OF EMS, I.E., ALL PARAMETER VALUES ARE SET TO ZERO AND ALL CONNECTIONS ARE CLEARED

CALL TIME (MS)
MS RECORDTIME IN MILLISECONDS
TIME IS THE LAST SUBROUTINE CALLED TO PRODUCE A RECORD. THE SAMPLED INFORMATION FROM ALL SUBROUTINE CALLS SINCE LAST 'CALL TIME' AND ALL UNCHANGED INFORMATION SINCE EARLIER RECORDS (EXCEPT FREQUENCY GENERATORS INTENSITY) IS WRITTEN ON TAPE WITH TIME MS AND RECORDNUMBER ONE MORE THAN LATEST RECORD (THE RECORD GENERATED BY 'CALL TAPE' HAS NUMBER 1) SINCE ALL THE FREQUENCY GENERATORS INTENSITIES ARE CLEARED A MS MILLISECONDS PAUSE IS GENERATED IF ANOTHER 'CALL TIME' IS MADE IMMEDIATLY (IF NOISE GENERATOR IS USED ITS AMPLITUDE HAS TO BE SET TO ZERO BY CALL AMPL (2,0))

CALL ENDPLY (NREC, ISEC, MSEC)
NREC NUMBER OF RECORDS GENERATED IN THIS COMPOSITION
ISEC SECOND PART OF MUSICTIME
MSEC MILLISECOND PART OF MUSICTIME
THE VALUES OF NREC, ISEC AND MSEC ARE CALCULATED AND SET BY THE EMSDEV PROGRAM
THIS SUBROUTINE ENDS EACH COMCHANNEL DISTRIBUTOR AND THE RECORD GENERATED (5 SECONDS OF SILENCE) CONTAINS A STOP MARK.

EMSDEV WILL CHECK ALL PARAMETERS AND GIVE ERROR MESSAGES ON LISTING UNIT =12
THE ERROR MESSAGE WILL BE OF FORM

*****ERROR CALLED FROM XXXXX
**ILLEGAL YYYYY AC= ZZZZZZ RN=UUUUU SEC=VVVVV MS=WWWWW

XXXXX ADDRESS OF LATEST EMSDEV CALL
YYYYY ERROR TYPE MNEMONIC ACCORDING TO TABLE 4
ZZZZZ ACCUMULATOR CONTENTS IN OCTAL.
IN ALL CASES BUT 'CONNEX' AND 'DISCON'
THIS WILL BE THE ERRONEOUS PARAMETER VALUE
IN 'CONNEX' AND 'DISCON' CASES THE LEFTMOST THREE FIGURES WILL BE THE OCTAL VALUE OF THE

'FROM' PARAMETER AND THE RIGHTMOST THREE FIGURES
 THE OCTAL VALUE OF THE 'TO' PARAMETER
 UUUUU CURRENT RECORDNUMBER IN OCTAL
 VVVVV CURRENT SECOND PART OF MUSICTIME IN OCTAL
 WWWW CURRENT MILLISECOND PART OF MUSICTIME IN OCTAL

//////////////////////////////////////
 FOR MOVING SOUND ONE CD11-CD14 AND RD11-RD14 ARE USED,
 FOR MOVING SOUND TWO CHA1-CHA4 AND RD21-RD24,
 THE REVERBATION UNITS ARE THEN TO BE CONNECTED DIRECTLY
 TO THE STUDIO OUTPUTS, WITH NO PROGRAMMED CONNECTION,
 THOUGH NOT PART OF THE EMSDEV PACKAGE A FORTRAN ROUTINE
 NAMED SPACEE IS AVAILABLE TO CALCULATE THE EIGHT LEVELS
 NEEDED TO SIMULATE A POSITION IN SPACE AND A DOPPLER
 FACTOR.
 IT CAN BE USED LIKE:

DIMENSION LEVELS(9)

 CALL SPACEE(7 INARGUMENTS ,LEVELS)
 CALL AMPLQ(CD11,LEVELS(1))

 CALL AMPLQ(RD14,LEVELS(8))
 OR DO 1 I=CD11,CD14
 1 CALL AMPLQ(I,LEVELS(I-14))
 DO 2 I=RD11,RD14
 2 CALL AMPLQ(I,LEVELS(I-18))

SAVE DOPPLER FACTOR
 DOPFC1=FLOAT(LEVELS(9)/20000.
 CALL SPACEE FOR MOVING SOUND TWO
 CALL SPACEE()
 CALL AMPLQ(CHA1,LEVELS(1))

 CALL AMPLQ(RD24,LEVELS(9))

OR DO 3 I=CHA1,CHA4
 3 CALL AMPLQ(I,LEVELS(I-18))
 DO 4 I=RD21,RD24
 4 CALL AMPLQ(I,LEVELS(I-22))
 DOPFC2=FLOAT(LEVELS(9)/20000.

THE DETAILED USE OF ARGUMENTS :

SUBROUTINE SPACEE(LEVELD,LEVELR,IDOPCN,LAstra,ICURR,ICURA,
 1 ITIMSI,LEVELS)
 MODIFIED 740604 ZH FOR USE IN EMS1
 QUADRAPHONIC LOCATOR WITH REVERBERATION AND DOPPLER DISPLACEMENT

INARGUMENTS:

ICURR = RADIUS IN 1/1000:S OF CENTER TO SPEAKER DISTANCE
 ICURA = ANGLE IN DEGREES CLOCKWISE FROM CENTER OF
 CHANNELS #1 AND #2 , BECOMES NORMALISED (-180,180) IF OUTSIDE TH
 LEVELD = EFFECTIVE OVERALL POWER IN 1/4 DB
 LEVELR = OVERALL REVERBERATION POWER IN 1/4 DB
 IDOPCN = DOPPLER CONSTANT , NORMALLY 1000, 2000 YIELDS DOUBLE EFFECT
 LAstra = LAST RADIUS IN 1/1000:S
 ITIMSI = TIME SINCE LAST CALL IN MILLISECONDS

OUTARGUMENTS:

LEVELS(1) = CHANNEL 1 LEFT FRONT LEVEL IN 1/4 DB
 2 = " 2 RIGHT FRONT

```

3 = " 3 RIGHT REAR
4 = " 4 LEFT REAR
5 = " 1 REVERBERATION
6 = " 2 "
7 = " 3 "
8 = " 4 "

```

LEVELS(9)=IDOPFC = DOPPLER FREQUENCY FACTOR, SCALED BY 20000

THERE ARE ALSO TWO SMALL ROUTINES AVAILABLE TO CONVERT BETWEEN X-Y AND RADIUS-ANGLE REPRESENTATION:

```

CALL XYRA1(IXR,IYA)          IXR IS X, BECOMES RADIUS
                              IYA IS Y, BECOMES ANGLE

CALL RAXY1(IRX,IAY)          IRX IS RADIUS, BECOMES X
                              IAY IS ANGLE, BECOMES Y

```

////////////////////////////////////

IF ALL ENTRIES EXCEPT ENDMRK AND ENDPLY ARE USED AS INTEGER FUNCTIONS, EMSDEV WILL RETURN AN ERROR CODE AS FUNCTION VALUE. IF NO ERROR, VALUE WILL BE ZERO OTHERWISE, A NEGATIVE VALUE ACCORDING TO TABLE 4

BY INCLUDING THE FOLLOWING INTEGER AND DATA DECLARATIONS IN THE CALLING PROGRAM, THE AMPLIFIERS IN AMPL AND AMPLQ ROUTINES AND THE CONNECTION POINTS IN CONNOC AND DISCON ROUTINES COULD BE SYMBOLIC NAMES.

INTEGER AND DATA DECLARATIONS FOR EMSDEV

```

INTEGER REV1,REV2,REV3,REV4,NG1,AT1,AT2,AT3,AT4,RM1,RM2,RM3
INTEGER AM1,AM2,AMP1,AMP2,CD1,CD11,CD12,CD13,CD14,CHA1,CHA2
INTEGER CHA3,CHA4,FG3,FG6,FG9,FG12,FG15,FG18,FG21,FG24
INTEGER FGNR19,FGNR20,FGNR21,FGNR22,FGNR23,FGNR24
INTEGER FF1,FF2,RM1A,RM1B,RM2A,RM2B
INTEGER AM1A,AM1B,AM2A,AM2B,WHITE,PINK
INTEGER FS
INTEGER RD11,RD12,RD13,RD14,RD21,RD22,RD23,RD24

```

```

-----
DATA REV1,REV2,REV3,REV4/1,2,13,14/
DATA NG1,AT1,AT2,AT3,AT4/3,4,5,6,7/
DATA RM1,RM2,RM3,AM1,AM2,AMP1,AMP2,CD1/8,9,10,11,12,13,14,15/
DATA CD11,CD12,CD13,CD14,CHA1,CHA2,CHA3/15,16,17,18,19,20,21/
DATA CHA4,FG3,FG6,FG9,FG12,FG15,FG18/22,71,72,73,74,75,76/
DATA RD11,RD12,RD13,RD14/23,24,25,26/
DATA RD21,RD22,RD23,RD24/27,28,29,30/
DATA FG21,FG24,FGNR19,FGNR20/77,78,77,79/
DATA FGNR21,FGNR22,FGNR23,FGNR24,FF1/80,81,82,83,84/
DATA FF2,RM1A,RM1B,RM2A,RM2B,AM1A,AM1B/85,86,87,88,89,90,91/
DATA AM2A,AM2B,WHITE/92,93,94/
DATA PINK,FS/95,96/
-----

```

BE INSERTED IN TOP OF THE USER'S FORTRAN PROGRAM.

EXAMPLE

```
CALL CONNec (FG3,CHA1)
CALL AMPL (CHA1,100)
```

THESE TWO LINES WILL CONNECT FREQUENCY GENERATORS GROUP 1-3 TO CHANNEL 1 AND SET THE CHANNEL 1 OUTPUT AMPLITUDE TO 100 DB

TABLE 1

AMPLIFIER AND CONNECTION POINT NUMBERS

NUMBER AMPLIFIER

1	REV1	REVERBATION UNIT ONE	
2	REV2	REVERBATION UNIT TWO	
3	NG1	NOISE GENERATOR ONE	
4	AT1	TAPE RECORDER INPUT CHANNEL ONE	
5	AT2	TAPE RECORDER INPUT CHANNEL TWO	
6	AT3	TAPE RECORDER INPUT CHANNEL THREE	
7	AT4	TAPE RECORDER INPUT CHANNEL FOUR	
8	RM1	RING MODULATOR ONE	
9	RM2	RING MODULATOR TWO	
10	RM3	RING MODULATOR THREE	
11	AM1	AMPLITUDE MODULATOR ONE	
12	AM2	AMPLITUDE MODULATOR TWO	
13	REV3	REVERBATION UNIT THREE IF THE STUDIO IS ORGANISED FOR FOUR REV UNITS	
14	REV4	REVERBATION UNIT FOUR	" "
13	AMP1	AMPLIFIER ONE	IF THE STUDIO IS ORGANISED IN THE OLD FASHION
14	AMP2	AMPLIFIER TWO	" "
15	CD11=CD1	CHANNEL DISTRIBUTOR ONE	CHANNEL ONE
16	CD12	CHANNEL DISTRIBUTOR ONE	CHANNEL TWO
17	CD13	CHANNEL DISTRIBUTOR ONE	CHANNEL THREE
18	CD14	CHANNEL DISTRIBUTOR ONE	CHANNEL FOUR
19	CHA1	OUTPUT CHANNEL ONE	
20	CHA2	OUTPUT CHANNEL TWO	
21	CHA3	OUTPUT CHANNEL THREE	
22	CHA4	OUTPUT CHANNEL FOUR	
23	RD11	REVERBATION DISTRIBUTOR ONE	CHANNEL ONE
24	RD12		ONE TWO
25	RD13		ONE THREE
26	RD14		ONE FOUR
27	RD21		TWO ONE
28	RD22		TWO TWO
29	RD23		TWO THREE
30	RD24		TWO FOUR

TABLE 2

CONNECTION POINT NUMBERS

NUMBER POINT

71	FG3	FREQUENCY GENERATORS GROUP 1-3
72	FG6	FREQUENCY GENERATORS GROUP 4-6
73	FG9	FREQUENCY GENERATORS GROUP 7-9
74	FG12	FREQUENCY GENERATORS GROUP 10-12

75	FG15	FREQUENCY GENERATORS GROUP 13-15
76	FG18	FREQUENCY GENERATORS GROUP 16-18
77	FG21	FREQUENCY GENERATORS GROUP 19-21
78	FG24	FREQUENCY GENERATORS GROUP 22-24
77	FGNR19	FREQUENCY GENERATOR 19 (= GROUP 19-21)
79	FGNR20	FREQUENCY GENERATOR 20
80	FGNR21	FREQUENCY GENERATOR 21
81	FGNR22	FREQUENCY GENERATOR 22
82	FGNR23	FREQUENCY GENERATOR 23
83	FGNR24	FREQUENCY GENERATOR 24
84	FF1	FILTER NUMBER ONE
85	FF2	FILTER NUMBER TWO
86	RM1A	RING MODULATOR ONE INPUT A
87	RM1B	RING MODULATOR ONE INPUT B
88	RM2A	RING MODULATOR TWO INPUT A
89	RM2B	RING MODULATOR TWO INPUT B
90	AM1A	AMPLITUDE MODULATOR ONE INPUT A
91	AM1B	AMPLITUDE MODULATOR ONE INPUT B
92	AM2A	AMPLITUDE MODULATOR TWO INPUT A
93	AM2B	AMPLITUDE MODULATOR TWO INPUT B
94	WHITE	SET NOISE COLOUR TO WHITE
95	PINK	SET NOISE COLOUR TO PINK
96	FS	FREQUENCY SHIFTER

TABLE 3

LEGAL CONNECTIONS

FROM	TO
FG3	CHA1 CHA2 CHA3 CHA4 CD1 FG6
FG6	FF1 FF2 RM1A RM1B RM2B REV1 REV2 AM1B CHA1 CHA2 CHA3 CHA4 CD1 FG9
FG9	CHA1 CHA2 CHA3 CHA4 CD1 FG12
FG12	FF1 FF2 RM1A RM1B

RM2B
REV1
REV2
AM1B
CHA1
CHA2
CHA3
CHA4
CD1
FG15

FG15 CHA1
CHA2
CHA3
CHA3
CD1
FG18

FG18 FF1
FF2
RM1B
RM2B
REV1
REV2
AM1B
AM2B
CHA1
CHA2
CHA3
CHA4
CD1
FG21

FG21 CHA1
=FGNR19 CHA2
CHA3
CHA4
CD1
FG24

FG24 FF1
FF2
RM1B
RM2B
REV1
REV2
AM1B
AM2B
CHA1
CHA2
CHA3
CHA4
CD1

FGNR20 FS
FG21

FGNR21 RM1A
FG21

FGNR22 RM2A
FG24

FGNR23 AM1A
FG24

FGNR24 AM2A
FG24

NG1 FF1
FF2
RM2B
REV1
AM2B
CHA1
CHA2
CHA3
CHA4
CD1
PINK
WHITE

FF1 FF2
RM1A
RM1B
RM2B
REV2
AM1A
AM2B
REV3=AMP1
REV4=AMP2
CHA2
CHA3
CHA4
CD1

FF2 RM2B
REV2
AM1B
AM2A
REV3=AMP1
REV4=AMP2
CHA1
CHA2
CHA3
CHA4
CD1

REV1 AM1B
AM2B
REV3=AMP1
REV4=AMP2
CHA1
CHA2
CHA3
CHA4
CD1

REV2 AM1B
AM2B
REV3=AMP1
REV4=AMP2
CHA1
CHA2
CHA3

	CHA1
	CHA2
	CHA3
	CHA4
	CD1
RM3	FF1
	FF2
	REV2
	AM2B
	REV3=AMP1
	REV4=AMP2
	CHA1
	CHA2
	CHA3
	CHA4
	CD1
AM1	CHA1
	CHA2
	CHA3
	CHA4
	CD1
AM2	CHA1
	CHA2
	CHA3
	CHA4
	CD1
REV3 =AMP1	FF1
	FF2
	RM1B
	RM2B
	REV2
	AM1B
	AM2B
REV4 =AMP2	FF1
	FF2
	RM1B
	RM2B
	REV2
	AM1B
	AM2B

TABLE 4

ERRGR CODES

MNEMONIC

-11	ILLEGAL LOGIC UNIT	LUN
-21	ILLEGAL FREQUENCY GENERATOR NUMBER	FGNR
-22	ILLEGAL FREQUENCY GENERATOR FREQUENCY	FREQ
-23	ILLEGAL FREQUENCY GENERATOR WAVEFORM	WAVEF
-24	ILLEGAL FREQUENCY GENERATOR INTENSITY	FGINT
-31	ILLEGAL FILTER NUMBER	FFNR
-32	ILLEGAL FILTER CHANNEL	CHANR
-33	ILLEGAL FILTER INTENSITY	FFINT
-41	ILLEGAL AMPLIFIER NUMBER	AMPNR
-42	ILLEGAL AMPLIFIER INTENSITY	AMPIN
-51	ILLEGAL CONNECTION (DISCONNECTION)	CONNEC
-61	ILLEGAL REVERBERATION UNIT NUMBER	REVNUR
-62	ILLEGAL REVERBERATION TIME	REVTM

	CHA4			
	CD1			
AT1	CHA1			
(FF1			
	FF2			
	RM1B			
	RM2B			
	REV1			
	REV2			
	AM1B			
	AM2B)	PRESENTLY NOT IMPLEMENTED IN HARDWARE	
AT2	CHA2			
(FF1			
	FF2			
	RM1B			
	RM2B			
	REV1			
	REV2			
	AM1B			
	AM2B)	"	"
AT3	CHA3			
(FF1			
	FF2			
	RM1B			
	RM2B			
	REV1			
	REV2			
	AM1B			
	AM2B)	"	"
AT4	CHA4			
(FF1			
	FF2			
	RM1B			
	RM2B			
	REV1			
	REV2			
	AM1B			
	AM2B)	"	"
RM1	FF1			
	FF2			
	REV2			
	AM1A			
	AM2B			
	REV3=AMP1			
	REV4=AMP2			
	CHA1			
	CHA2			
	CHA3			
	CHA4			
	CD1			
RM2	FF1			
	FF2			
	REV2			
	AM1B			
	AM2A			
	REV3=AMP1			
	REV4=AMP2			

-71

ILLEGAL TIME

TIME