

EMS1 INT  
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AN INTRODUCTION TO EMS1.

RS 7308

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THE MOST USED COMPUTER PROGRAM AT EMS IS EMS-1, WHICH IS A PROGRAM THAT PRIMARILY WAS MEANT TO BE A REPLACEMENT FOR THE MANUAL WORK IN THE EMS STUDIO, WORDS AND STATEMENTS REPLACING MANUAL COMMANDS IN ORDER TO GET THE STUDIO SOUND AFTER ONE'S INTENTIONS.

FROM A PROGRAMMERS AND / OR FROM A PEDAGOGICAL POINT OF VIEW THERE EXIST FOUR DISTINCT LEVELS OF COMPLEXITY IN EMS-1 PROGRAMMING.

THE FIRST ONE GENTLY INTERFACES THE COMPOSER TO THE USAGE OF COMPUTERS FOR COMPOSING.

BEFORE THE COMPOSER STARTS USING EMS-1 HE HAS LEARNT HOW TO CONTROL THE EMS STUDIO MANUALLY. THE FIRST STEP OR LEVEL JUST CONSISTS OF WRITING DOWN THE STUDIOSETTINGS INTERACTIVELY INSTEAD OF SETTING THE PARAMETERS MANUALLY, LISTENING TO THEM BY GIVING THE COMMAND PLAY AND THEN IF THE COMPOSER IS NOT SATISFIED CHANGING SOME PARAMETERS. WHEN THE COMPOSER IS SATISFIED WITH A SOUND HE MIXES IT TOGETHER WITH OTHER ACCEPTED SOUNDS. WITH THESE SOUNDS, STEP BY STEP, THE COMPOSER CONSTRUCTS MUSICAL OBJECTS. A SET OF THESE OBJECTS WILL EVENTUALLY MAKE UP A PIECE OF MUSICAL STRUCTURE.

THE SECOND LEVEL CONSISTS OF ABBREVIATING EMS-1 STATEMENTS BY DEFINING MACROS AND OF CALLING AND MIXING SOUND OBJECTS THAT THE COMPOSER HAS CREATED IN A PREVIOUS RUN AND RESIDE ON MAGNETIC TAPE OR DISK.

THE THIRD LEVEL CONSISTS OF USING THE WHOLE REPERTOIRE OF CONDITIONALS, MACROS (RECURSIVE MACROS DEFINITION IS ALLOWED) AND FILEHANDLING CAPABILITY THAT ARE INCLUDED IN THE MACRO-PHASE OF EMS-1.

THE FOURTH LEVEL OF COMPLEXITY IS FOR THE COMPOSER WHO IS SKILFUL IN PROGRAMMING AND CONSISTS OF USING THE LINKAGE-FACILITIES THAT EXIST BETWEEN EMS-1 AND FORTRAN.

WE ARE GOING TO GIVE YOU SOME EXAMPLES OF EMS-1 PROGRAMS BUT BEFORE THAT I WILL SAY SOME WORDS ABOUT THE EMS-1 SOURCE TEXT.

EMS-1 SOURCE TEXT CONSISTS OF BLOCKS WHICH BEGIN WITH THE WORD PART AND END WITH END. THE MUSICAL COUNTERPART TO A PART IS A PIECE OR A PART OF A MUSICAL STRUCTURE.

PARTS ARE DIVIDED INTO OBJECTS. EACH OBJECT IS PLACED INTO ITS PLACE IN A PART WITH THE HELP OF A MIX COMMAND.

EACH OBJECT CONSISTS OF SOUNDS AND SOUNDS CONSIST OF DEVICE

TERMS ENVELOPE- AND / OR GLISSANDI- TERMS AND CONNECTION TERMS.

FOR EXAMPLE:

```
FG(2,440,50,3)>ENV(50,89,2000,-5)>GLIS(440,900,2500,2,5,)>CHA(3,90);
```

THIS MEANS THAT FREQUENCY GENERATOR NUMBER 2 GETS THE FREQUENCY 440 HERTZ AND GETS A LEVEL OF 50 DECIBELS AND WAVE SHAPE THREE THAT IS SQUARE WAVE IS USED. THEN AN ENVELOPE IS SPECIFIED. THE ENVELOPE TERM WILL CHANGE THE LEVEL OF FREQUENCY GENERATOR NUMBER 2 ACCORDING TO THE GIVEN PARAMETERS. IN THIS CASE THE LEVEL WILL CHANGE FROM 50 DECIBELS TO 89 DECIBELS IN 2000 MILLISECONDS AND THE ENVELOPE WILL FOLLOW CURVE FORM NUMBER -5. THE CURVE FORM SPECIFIES THE RELATIVE SPEED OF THE CHANGES IN THE BEGINNING AND IN THE END OF THE ENVELOPE. THEN THE FREQUENCY OF FREQUENCY GENERATOR NUMBER 2 WILL CHANGE ACCORDING TO THE PARAMETERS IN THE GLISSANDO TERM. THAT MEANS THAT THE FREQUENCY WILL START ON 440 HERTZ GO UP TO 900 HERTZ IN 2500 MILLISECONDS FOLLOWING CURVE FORM NO 2 AND THE FREQUENCY STEPS EACH 5 MILLISECONDS.

PARAMETERS CAN BE MANIPULATED WITH THE HELP OF ARITHMETICAL STATEMENTS.

FOR EXAMPLE:

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A=A+20-10*B;
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CONDITIONAL STATEMENTS ARE ALLOWED.

FOR EXAMPLE:

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IFPOS(A)A=A-1; < WHICH MEANS THAT IF A IS GREATER THAN ZERO A WILL BE DECREASED BY ONE.
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SOUNDS OR SOUND COMPLEXES CAN BE MANIPULATED WITH THE HELP OF MACROS:

FOR EXAMPLE:

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MACRO1="ENV(50,89,2000,-5)>GLIS(440,900,2,5)"
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```
MRECMAC="A=A-1;IFPOS(A)FG(2)>MACRO1;RECMAC;"
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IF WE WRITE:

```
FG(2)>MACRO1
```

THIS WILL BE INTERPRETED AS EQUIVALENT TO:

```
FG(2)>ENV(50,89,2000,-5)>GLIS(440,900,2,5)
```

BY THE COMPUTER.

IF WE WRITE:

```
A=3;
RECMAC;
```

THE COMPUTER WILL PRODUCE THE FOLLOWING STUDIO TERMS:

FOR A=3: FG(3)>ENV(50,89,2000,-5)>GLIS(440,900,2500,2,5)

FOR A=2: FG(2)>ENV(50,89,2000,-5)>GLIS(440,900,2500,2,5)

AND FOR A=1: FG(1)>ENV(50,89,2000,-5)>GLIS(440,900,2500,2,9)

NOTHING WILL HAPPEN FOR A=0 BECAUSE A HAS TO BE GREATER THAN ZERO IN ORDER TO SATISFY THE CONDITIONAL.

IN EMS-1 EVENTS CAN BE SEQUENCED IN TIME WITH THE HELP OF A SO CALLED LOCAL TIME STATEMENT:

LT(320)FG(1,440); THIS STATEMENT MEANS THAT FREQUENCY GENERATOR NUMBER ONE WILL BE GIVEN A FREQUENCY OF 440 HERTZ 320 MILLISECONDS AFTER THE BEGINNING OF THE LATEST PART.

LT TERMS NEED NOT COME IN TIME ORDER. THE LOCAL TIME TAGGED SOUNDS ARE SORTED BEFORE THE OBJECT TIME RUN OR BEFORE THE CODEGENERATION STARTS.

THE COMPOSER HAS THE POSSIBILITY OF USING COMMANDS FOR PLAYING, FILEHANDLING AND OBJECT CREATION.

THE COMMAND PLAY PLAYS THE STATEMENTS WRITTEN SINCE THE LAST MIX COMMAND WAS GIVEN.

THE COMMAND MIX(TIME) MIXES THE NEW OBJECT INTO THE SET OF ALREADY PREPARED OBJECTS, THE ARGUMENT DEFINES THE STARTINGPOINT IN TIME FROM THE BEGINNING OF THE PART FOR THE OBJECT TO MIX.

THE COMMAND PLAY(MIX) PLAYS THE OBJECTS DEFINED IN THE LAST PART.

IF YOU ARE NOT SURE WETHER YOU WANT TO MIX THE LATEST WRITTEN OBJECT TOGETHER WITH THE READY ONES OR IF YOU ARE NOT SURE OF WHEN THE OBJECTS SHALL START YOU CAN TRY DIFFERENT SOUND CONFIGURATIONS WITH THE HELP OF THE TRY COMMAND. TRY(TIME) FUNCTIONS IN THE SAME WAY AS MIX(TIME) BUT THE RESULTING MIX IS NOT PERMANENT.

IF YOU WANT TO KEEP THE SOURCE TEXT OF AN OBJECT THIS FACILITY IS PROVIDED BY THE SAVE COMAND WHICH SAVES THE SOURCE TEXT ONTO MAGNETIC TAPE.

IF THE COMPOSER WANTS THE SOURCE TEXT OF OLD OBJECTS THAT RECIDE ON MAGNETIC TAPE HE CAN GET THEM WITH A CALL(FILENAME) COMMAND.

AN EMS-1 RUN CONSISTS OF THE FOLLOWING PHASES:

1. A MACROPHASE DURING WHICH CONDITIONALS AND / OR ARITHMETICAL STATEMENTS ARE EVALUATED, MACROS EXPANDED ACCORDING TO THE VALUES IN CONDITIONALS - IF THERE ARE ANY - ALL STATEMENTS ARE CHECKED FOR SYNTAX ERRORS AND IF AN ERROR IS DISCOVERED THERE IS A FACILITY FOR THE COMPOSER TO CORRECT IT INTERACTIVELY.
2. TERMS THAT CHANGE CONNECTIONS OR PARAMETERS IN THE STUDIO ARE TRANSLATED OR ASSEMBLED INTO (TIMETAGGED) RECORDS.

3. THESE RECORDS ARE SORTED IN TIME ORDER.
4. DURING THE OBJECT TIME RUN THESE RECORDS ARE TRANSLATED INTO STUDIOCODE (IF THE COMPOSER HAS LINKED FORTRAN TO EMS-1 THESE FORTRAN PROGRAMS ARE EXECUTED IN THE OBJECT TIME PHASE) THE EMS1 FORTRAN LINKAGE WILL BE DISCUSSED GREATER DETAIL SOON. THE STUDIOCODE IS THEN REGISTERED ON MAGNETIC TAPE.