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THIS FILE CONTAINS BASIC INFORMATION FOR USING THE
INTERACTIVE SOUND TESTING-PROGRAM FMT FOR FREQUENCY MODULATED
SOUNDS.

FMT IS A PROGRAM FOR INTERACTIVE TESTING OF FREQUENCY MODULATED
SOUNDS. AN FM-GENERATOR IS ACTUALLY TWO SINE-WAVEGENERATORS
WERE THE FREQUENCY OF THE ONE CONTROL THE SPEED OF
CHANGE OF THE FREQUENCY OF THE OTHER GENERATOR. THE PARAMETERS
THAT AT EMS DETERMINE THE OUTPUT OF A FREQUENCY MODULATED GENERATOR
ARE:

NR   FREGUENCY GENERATOR NUMBER
MODFR   MODULATION FREQUENCY
INDEX   MODULATION INDEX
FREQ   CARRIER FREQUENCY
INT   AMPLITUDE IN DB

WITH P-O STROMBERGS VERSION OF FM THE VARIABLES ARE THE SAME
BUT THE LIMITATIONS A LITTLE DIFFERENT

NR   (1-8)
MODFR   (0-15999)
INDEX   (0-10000)
FREQ   (0-15999)
INT   (0-120)

THIS PROGRAM CONTROLS MODFR,INDEX,FREQ AND INT WITH
FOUR ENVELOPE-CHAINS THAT ARE DESCIBED GRAPHICALLY
IN THE ADDED PAPER.

THE 24 PARAMETERS THAT DETERMINE THE SOUND CAN BE LISTED,
CHANGED ETC. IN GROUPS OR ONE BY ONE.
AT ANY TIME DURING THE SETTING OF PARAMETERS THE PLAY-ROUTINE CAN
BE CALLED AND THE SOUND DEFINED BY THE ACTUAL PARAMETERS WILL
BE PLAYED. WHEN A SATISFYING SOUND IS REACHED, THE VALUES
CAN BE STORED IN A FILE THAT IS EASILY USED IN EMS1-PROGRAMS.
ANY OF THESE STORED SOUNDS CAN BE READ INTO THE FMT-PROGRAM AND
IMMEDIATELY PLAYED, COMPARED WITH OTHER SOUNDS, AND BE USED AS
STARTING POINT IN THE BUILDING OF A NEW SOUND. TWO PREVIOUSLY
PRODUCED SOUNDS CAN BE MIXED TOGETHER IN PROPORPTIONS TO FORM
A NEW SOUND INBETWEEN THE TWO. AN OPTION FOR RANDOMLY CHANGING
THE VALUES OF THE VARIABLES (IN GROUPS OR ONE BY ONE.)
IS ALSO AVAILABLE FROM THE PROGRAM.

THE STARTING OF THE PROGRAM IS EASILY DONE WITH
        AN 'E FMT'COMMAND AFTER THE MONITOR'S $-SIGN
        IF THIS DOESN'T START THE PROGRAM ANY PERSON WHO KNOWS
SOMETHING ABOUT THE COMPUTER CAN LOCATE THE FILE FMT XCT (&XCU)
ON THE DISK WITH THE PIP PROGRAM AND DO THE CORRECT

SPECIALITIES FOR THE ADVANCED USER:

THREE MODES:
FM,FMR,FMS

FM   NORMALLY ALL VARIABLES CAN BE REACHED DIRECTLY FOR CHANGING ETC.
          THIS MODE OF WORKING IS THE FM-MODE.
          FOR SPECIAL PURPOSES WHERE A MORE SOPHISTICATED CONTROL OVER THE
          INTERVALLS IN THE OVERTONESERIES PRODUCED BY THE FM TECHNIQUE
          IS WANTED TWO ALTERNATIVE WAYS OF DETERMINING CF1,CF2 & MF1,MF2
          ARE AVAILABLE.

FMR   THE COMMAND >FMR   ('FM-RATIO')
'CHOWNING'   GIVES YOU A MODE WHEREIN THE VARIABLES REACHABLE FOR
          LISTING, CHANGING ETC. ARE CF1,CF2 & R1,R2
          R1 & R2 EXPRESS THE POLYNOM ((CF/MF)*100)
          R1=100   GIVES CF1=MF1 ETC.
          R1>100   GIVES CF1>MF1
          R1<100   GIVES CF1<MF1
          N.B.! FOR COMPATIBILITY WITH EMS-1 THE CHANGING OF RATIO IS
          NON-LINEAR WHEN A MODULATIONFREQUENCY-GLISSANDO IS USED
          THE MODULATIONFREQUENCYCHANGE IS THOUGH ALWAYS LINEAR!

FMS   THE COMMAND >FMS   ('FM-SIDEBAND')
'DACHOV'   GIVES YOU A MODE WHEREIN THE VARIABLES REACHABLE ARE
          FL1,FL2 &FU1,FU2
          (FIRST AND SECOND SIDEBAND FREQUENCIES, LOWER AND UPPER)
          THE COMPUTER AUTOMATICALLY ASKS FOR TWO SIDEBANDNUMBERS THAT CAN
          BE POSITIVE OR NEGATIVE OR ZERO (INTEGERS).
          THOUGH CF1,CF2(IN FMS) AND MF1,MF2 (IN FMR,FMS) CANNOT BE
          REACHED FOR CHANGING, THESE VALUES ARE CALCULATED AND SET
          TO THE CORRESPONDING VALUES IF THEY DO NOT EXCEED THEIR LIMITS.
N.B.!   CF1,CF2 & MF1,MF2 ARE ALWAYS THE VALUES STORED IN THE OUTPUT FILE!

FM   THE COMMAND >FM   ('NORMAL FM')
          WILL RETURN TO THE MODE OF NORMAL SETTING OF VARIABLEVALUES.
          YOU CAN ALTERNATE BETWEEN THE DIFFERENT MODES OF VALUESETTING
          IN ANY WAY YOU WANT DURING THE RUN.
NB!   THE CHANGING OF SIDEBANDNUMBERS DEMAND A NEW >FMS COMMAND,
          THOUGH YOU ARE IN FMS-MODE ALREADY!

LIMITATION
NB!   THE AUTOMATIC LIMITATION CAN IN CERTAIN EXTREME CASES GET AS A
          RESULT THAT THE FREQUENCY VALUES CHANGE WHEN GOING FROM ONE MODE
          TO ANOTHER AND/OR THAT THE ACTUAL VALUES OF FL1,FL2 ETC
          DO NOT CORRESPOND WITH THE VALUES SET. THIS EFFECT CAN BE OVERCOME
          BY CHANGING SIDEBAND-NUMBERS OR SETTING CF1,CF2 &MF1,MF2
          DIRECTLY IN FM-MODE.

THE VARIABLES REACHABLE IN THE PROGRAM:

          L0   LEVEL IN DB
          L1   D:0
          L2   D:0
          L3   D:0
          L4   D:0

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            TL1             TIME L0 TO L1 IN MS
            TL2             D:O L1 TO L2
            TL3             D:O L2 TO L3
            TL4             D:O L3 TO L4
            MI0             INDEX
            MI1             D:O
            MI2             D:O
            MI3             D:O
            MI4             D:O
            TI1             TIME MI0 TO MI1 IN MS
            TI2             D:O MI1 TO MI2
            TI3             D:O MI2 TO MI3
            TI4             D:O MI3 TO MI4
            CF1             CARRIER FREQUENCY AT THE BEGINNING HZ
            CF2             D:O AT THE END
            TCF             TIME CF1 TO CF2 IN MS
            MF1             MODULATION FREQUENCY AT THE BEGINNING HZ
            MF2             D:O AT THE END
            TMF             TIME MF1 TO MF2
            WCF             WAVEFORM FOR CARRIERGENERATOR (POS)
            WMF             WAVEFORM FOR MODULATIONFREQUENCY GENERATOR (POS)
            TOT             TOTAL TIME
-----------------------------------------------------------------------
FMR     IN FMR MODE MF1,MF2 ARE EXCHANGED FOR
        R1,R2           RATIO  (DESCRIPTION ABOVE)
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FMS     IN FMS MODE CF1,CF2 & MF1,MF2 ARE EXCHANGED FOR
        FL1,FL2         LOWER SIDEBANDFREQUENCY (TWO VALUES)
        FU1,FU2         UPPER SIDEBANDFREQUENCY (TWO VALUES)


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LIMITS THAT ARE AUTOMATICALLY SET BY THE PROGRAM

        L0,L1,L2,L3,L4          0-120 DB
        MI0,MI1,MI2,MI3,MI4     0-10000
        CF1,CF2,MF1,MF2         0-16383 HZ
        TL1,TL2,TL3,TL4
        TI1,TI2,TI3,TI4
        TCF,TMF                 5-99999 MS

FMS     FL1,FL2,FU1,FU2         -99999-99999 HZ
FMR     R1,R2                   0-99999
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LISTING OF VARIABLES
>L

        THE LISTING OR LOOK COMMAND >L IS USED TO PRINT OUT THE VALUES
        OF THE VARIABLES. A SIMPLE >L (CARRIAGE RETURN)
        IS UNDERSTOOD AS IF ALL 24 VALUES ARE WANTED
        FOR JUST LOOKING AT A FEW OR ONLY ONE OF THE VARIABLES THE INITIAL
        LETTERS OF THE VARIABLES WANTED ARE PRINTED AFTER
        >L
        EXAMPLE:

        >L TL
        PRINTS OUT ALL VARIABLES THAT BEGIN WITH THE LETTERS TL

        IF THE LETTERS STATED DO NOT BEGIN ANY VARIABLE REACHABLE
        NO VARIABLE IS PRINTED OUT OF COURSE.
        NB! NO ERROR MESSAGE OCCUR IN THIS CASE!

CHANGING OF VALUES: >N   >C

>N   THE COMMAND >N SETS A VALUE SPECIFIED AFTER THE N TO ALL
          THE VARIABLES.
          EXAMPLE :
          >N   100   SETS 100 TO ALL VARIABLES REACHABLE (N.B. TWO SPACES!)
          >N TL 100 SETS 100 TO ALL VARIABLES THAT BEGIN WITH TL
          THE OTHER VARIABLES ARE UNCHANGED.

>C
          THE >C COMMAND IS USED TO PRINT OUT THE VALUE OF THE VARIABLES
          STATED (NO NAME MEANS ALL VARIABLES) AND ASK FOR A NEW
          VALUE. IF CARRIAGE RETURN IS GIVEN OLD VALUE IS KEPT.
          THE SPECIFICATION OF VARIABLE NAMES IS PERFORMED AS DESCRIBED
          ABOVE UNDER >L.

SPEED CHANGED IN PERCENTAGE
>S
>S 55
>S MI 55

          THE SPEED COMMAND IS USED TO CHANGE VARIABLE VALUES WITH
          INVERTED PERCENTAGE. (LOW PERCENTAGE GIVES HIGHER VALUE AND
          REVERSED. IF NO VALUE-NAME IS GIVEN, TIME-VALUES ARE CHANGED.
          THE REVERSED PERCENTAGE GIVES ADEQUATE VALUES FOR SPEED:
          HIGH TIMEVALUES MEANS LOW SPEED!)
          NB! ALL PARAMETERS, EVEN NON-TIME PARAMETERS CAN BE CHANGED
          WITH THIS COMMAND IF WANTED IF THEY ARE STATED EXPLICITLY!

PITCHES CHANGED IN PERCENTAGE
>PI
>PI 55
          THE PITCH COMMAND IS USED TO CHANGE PITCHVALUES WITH
          A NON-INVERTED PERCENTAGE (HIGH PERCENTAGE GIVES HIGH VALUE)
          ONLY PITCHVALUES ARE CHANGED.NO POSSIBILITY TO SPECIFY
          OTHER VARIABLES EXPLICITLY EXIST WITH THIS COMMAND.

CHANGE VALUES RANDOMLY
>R
>R 500
          THE RANDOM COMMAND SETS THE VARIABLES TO A NEW VALUE +-RDEV % (500%
          IN THIS EXAMPLE) AROUND THE LAST VALUE GIVEN. THE RANDOM DISTRIBUTION
          IS RECTANGULAR.
SETTING OF RANDOM DEVIATION
>RDEV   THE DEVIATION OF THE RANDOM SEQUENCE CAN BE SET WITH THIS COMMAND:
          >RDEV 25 MEANS THAT RDEV IS 25 % IF NOT STATED   TO ANOTHER
          VALUE IN >R COMMAND.

SAVING OF A SOUND FILE
>SAVE
>SAVE XXX
          THE >SAVE COMMAND PRINTS OUT A FILE CONTAINING THE ACTUAL
          VALUES IN A FILE NAMED XXX SRC ON UNIT 6 (NORMALLY DK <AAA>)
          FROM WHICH IT CAN ALSO BE FETCHED FOR USE IN THIS OR OTHER PROGRAMS
          IF NO NAME IS GIVEN THE COMPUTER AUTOMATICALLY ASKS FOR NAME.
          IF FILE ALREADY EXISTS A WARNING QUESTION IS OUTPUT.

INPUT OF A SOUND-FILE
>I

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>I XXX
        THE INPUT COMMAND PUTS A PREVIOUSLY DEFINED SOUNDFILE INTO
        THE TABLE OF THE PROGRAM FOR FURTHER WORK ON IT.
        IF NO NAME IS GIVEN THE COMPUTER AUTOMATICALLY ASKS FOR NAME.

DELETION OF A SOUND FILE
>D
>D XXX
        THE DELETION COMMAND DELETES A NAMED FILE IF EXISTENT, OTHERWISE AN
        ERROR MESSAGE OCCURS.

MIXING OF TWO SOUND FILES
>M XXX,YYY,5,4
>M XXX,YYY
>M
        THE MIXING COMMAND PRODUCES VALUES TO THE TABLE FROM
        TWO PREVIOUSLY PRODUCED SOUNDFILES XXX,YYY.
        THE FIGURES 5 & 4 ARE FACTORS OF PROPORPTIONALITY FOR THE MIXING.
        IF THEY ARE NOT STATED THE FACTORS 1:1 ARE ASSUMED.
        IF NO NAMES ARE GIVEN THE COMPUTER AUTOMATICALLY ASKS
        FOR NAMES AND FACTORS.

PLAYING OF A SOUND
>P
>(SI)
        TO PLAY THE SOUND DENOTED BY THE CURRENT 24 VALUES IN THE PROGRAM TAP'E
        ANY OF THESE COMMANDS CAN BE USED. PRESSING OF THE (CR) KEY
        ON THE TW  WILL IMMEDIATELY RESTART THE ENVELOPE FROM
        THE BEGINNING. THE (NUL) KEY WILL PAUSE THE ENVELOPE UNTIL ANY
        OTHER KEY IS PRESSED.THE (CR) KEY
        WILL RETURN CONTROL TO PROGRAM.

KEYBOARD:
        WITH THE KEYS TO THE LEFT ON THE TW THE
        FREQUENCIES, LEVELS, INDEXES CAN BE CHANGED INTERACTIVELY DURING
        PLAYING.

        DESCRIPTION OF THE FUNCTION OF THE KEYS OF THE KEYBOARD
        OF THE TEXTRONIX TW TERMINAL IN FMT PLAY PROGRAM
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KEY NR (SEE ADDED PAPER)	FUNCTION	ASCII
1	PAUSE	0,16
2	TRIGGING OF ENVELOPE	15,31
3	CHANGE GENERATOR TYPE	14,30
4	JUMP OUT OF PLAYPROGRAM	13,29
5	CLEAN TW	1,7,17,23
6	CHANGE INDEX (4%)	47,63
7	CHANGE MODFR	46,62
8	CHANGE CARRIERFR	44,60
9	SET (+/-)-SWITCH TO +	88,120
10	SET (+/-)-SWITCH TO -	90,122
11	RAISE LEVEL	83,115
12	LOWER LEVEL	65,97
13	GO UP ONE OCTAVE	81,113
14	GO DOWN ONE OCTAVE	94,126
15	RAISE TIMES	33,49
16	LOWER TIMES	34,50
17	CHANGE ENV-TIMES MF	93
18	CHANGE ENV-TIMES CF	91
19	CHANGE ENV-TIMES MI	45,61
20	CHANGE ENV-TIMES LEV	48
21	1/2 TONE-STEP	87,119
22	1 TONE-STEP	69,101

23	1 1/2 TONE-STEP	82,114
24	2 TONE-STEPS	84,116
25	2 1/2 TONE-STEPS	89,121
26	3 TONE-STEPS	85,117
27	3 1/2 TONE-STEPS	73,105
28	4 TONE-STEPS	79,111
29	4 1/2 TONE-STEPS	80,112
30	5 TONE-STEPS	64,96
31	5 1/2 TONE-STEPS	39
32	6 TONE-STEPS	95
33	IRRELEVANT	ALL OTHERS
34	CHANGE TRIGFLAG (A/NA)	3,19
35	CHANGE CF-WAVEFORM	11,27
36	CHANGE MF-WAVEFORM	10,26
37	CHANGE SCALE-FLAG (INTERVAL/NORMAL) 9,25	

PAUSE BETWEEN THE ENVELOPES PLAYED

THE ENVELOPE IS IMMEDIATELY REPEATED WHEN THE END IS REACHED
UNTIL (CR) IS PRESSED AND PROGRAM IS GIVEN THE CONTROL AGAIN.
TO ALTER THE PAUSE BETWEEN THE ENVELOPES PLAYED YOU WRITE:

>P 400

GIVES A STEADY NEW PAUSE THAT IS 400 MILLISECONDS.

TRY-DISK OPTION

>TD XXX

A SOUND PREVIOUSLY PRODUCED (RESISTENT ON UNIT 6, NORMALLY DK <AAA>)
CAN BE PLAYED WITHOUT INTERFERING WITH THE CURRENT TABLE
VALUES. OF COURSE THIS SOUND CAN NOT BE CHANGED BUT IT CAN
BE PRACTICAL TO COMPARE A NEWLY PRODUCED SOUND WITH AN OLD ONE
WITHOUT PRODUCING NEW OUTPUT FILES ALL THE TIME.

OPTION LISTING

>O

GIVES A PRINTOUT OF THE SYNTAX OF THE COMMANDS AVAILABLE IN THE
FMT PROGRAM WITHOUT EXPLANATION.

>EX

EXITS FROM FMT PROGRAM TO MONITOR.

ANY QUESTIONS ABOUT THIS PROGRAM CAN BE PUT TO THOMAS SJOLAND
OR THE TEACHERS AT EMS TAMAS UNGVARY AND MIKLOS MAROS.