

October 6, 2021

While studying some of the minutia of telephone switching systems, I ran across a brief article on the use of MF (multi-frequency) tone signaling on trunk lines between telephone exchanges. These are the very same frequencies used in the legendary Blue Box encoders to re-route long distance calls after seizing the trunk with a 2600 Hz tone and forcing a disconnect on the distant end.

In the normal operation of a long-distance call, the originating telephone exchange seizes a trunk line by going off-hook and waits for the destination office to “wink” (going momentarily off-hook) to signal that it’s ready to accept the destination telephone number. The originating switch then sends the “KP” tone to begin the tone sequence. It then sends the destination phone number using MF tone signaling. Although the principle is the same as DTMF, the tones are actually different and predate the use of DTMF by more than a decade. Finally, to signal the end of the destination phone number, the originating switch sends the “START” tone and the destination switch begin processing the call.

Before direct distance dialing was common, the long-distance operator in the originating office would manually key the tones needed to complete the call in a semi-automatic fashion. MF tone signaling was a common right up until the end of electromechanical switching systems and could often be heard immediately after dialing a long-distance call but before the destination number began ringing.

I didn’t have a blue-box handy when I was writing this, so I wrote a quick-and-dirty BASIC program for the TI 99/4A to generate the tones. I chose the 99/4A because it’s a classic microcomputer and accepts discrete frequencies as arguments to the “CALL SOUND” subprogram.

```
MF TONE GENERATOR FOR
TRUNK DIALING

ENTER A STRING OF DIGITS
FOR THE DESTINATION PHONE
NUMBER:

? 18147564764

THANK YOU.

SENDING KP TONE:
SENDING DIGITS...
SENDING ST TONE:
TONE SEQUENCE COMPLETE.
RUN AGAIN?NO

** DONE **

>
```

Figure 1 - TI 99/4A Screenshot of the MFTONE Dialer

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Source code for the MFTONE generator program follows. This was written in plain-vanilla BASIC for the original TI 99/4A computer without expansion.

```
100 REM MICHEAL MCCABE
110 REM RETROCHALLENGE 2021
120 REM MF TONE GENERATOR
130 CALL CLEAR
140 DIM F(12,3)
150 RESTORE
160 DATA 1300,1500,55
170 DATA 700,900,55
180 DATA 700,1100,55
190 DATA 900,1100,55
200 DATA 700,1300,55
210 DATA 900,1300,55
220 DATA 1100,1300,55
230 DATA 700,1500,55
240 DATA 900,1500,55
250 DATA 1100,1500,55
260 DATA 1100,1700,110
270 DATA 1500,1700,55
280 FOR I=0 TO 11
290 READ F(I,1),F(I,2),F(I,3)
300 NEXT I
310 PRINT "MF TONE GENERATOR FOR"
320 PRINT "TRUNK DIALING"
330 PRINT
340 PRINT "ENTER A STRING OF DIGITS"
350 PRINT "FOR THE DESTINATION PHONE"
360 PRINT "NUMBER:"
370 PRINT
380 INPUT D$
390 PRINT
400 PRINT "THANK YOU."
410 PRINT
414 REM SEND KP TONE
415 PRINT "SENDING KP TONE:"
416 CALL SOUND(F(10,3),F(10,1),7,F(10,2),7)
417 PRINT
418 PRINT "SENDING DIGITS..."
420 FOR I=1 TO LEN(D$)
430 LET D=VAL(SEG$(D$,I,1))
440 CALL SOUND(F(D,3),F(D,1),7,F(D,2),7)
450 NEXT I
```

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```
460 PRINT
470 PRINT "SENDING ST TONE:"
480 CALL SOUND(F(11,3),F(11,1),7,F(11,2),7)
490 PRINT
500 PRINT "TONE SEQUENCE COMPLETE."
510 PRINT
520 INPUT "RUN AGAIN?":Q$
530 IF (Q$="Y")+(Q$="YES") THEN 330
540 END
```

-- *Paleoferrosaurus*