

## Retrochallenge 2021 -- Paleoferrosaurus

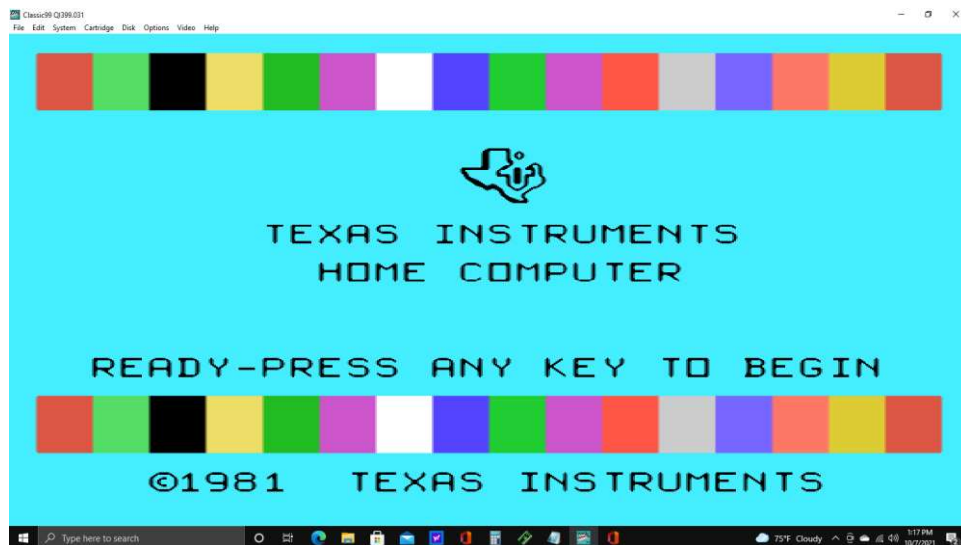
October 7, 2021

Yesterday's exercise in Retrocomputing was to program the TI-99/4A to generate the MF (Multifrequency) tones used to communicate the called number between switching systems on a long-distance trunk line. While interesting to listen to, from an historical and technical viewpoint, I don't actually have an MF decoder to check the output, nor do I have a CO trunk line to play with. That prompted me to modify the program to generate the slightly-more useful (and interesting) DTMF tones for regular dialing on a POTS CO line. Whereas MF was used from around 1949 to the end of electromechanical switching in the early 1990's (or later, in some rural areas.) DTMF made its appearance in 1962 and is still commonly used today, even on VOIP circuits and radio links.

DTMF differs from the earlier MF system in terms of tone frequencies and timing. Although the timing specifications were pretty strict for MF, since it was typically generated automatically by the switching equipment, DTMF has no timing specifications since it is sent manually by end-user. Many pieces of switch gear needed at least 50 msec to correctly interpret the tones, but an average sending speed ranged from 100 msec (10 digits per second) to 500 msec. This program sends the tones at the lower end.

Yes, I'm using the Classic-99 emulator to write and test my programs, but an actual TI-99/4A is going to be wired into the switchboard for actual use. I'll get to that somewhat later when I get some actual switching elements assembled.

In the meantime, enjoy!



## Retrochallenge 2021 -- Paleoferrosaurus

```
100 REM MICHEAL MCCABE
110 REM RETROCHALLENGE 2021
120 REM DTMF TONE GENERATOR
130 CALL CLEAR
135 OPTION BASE 0
140 DIM F(16,3)
150 RESTORE
160 DATA 941,1336,100
170 DATA 697,1209,100
180 DATA 697,1336,100
190 DATA 697,1477,100
200 DATA 770,1209,100
210 DATA 770,1336,100
220 DATA 770,1477,100
230 DATA 852,1209,100
240 DATA 852,1336,100
250 DATA 852,1477,100
260 DATA 941,1209,100
270 DATA 941,1477,100
272 DATA 697,1633,100
274 DATA 770,1633,100
276 DATA 852,1633,100
278 DATA 941,1633,100
280 FOR I=0 TO 15
290 READ F(I,1),F(I,2),F(I,3)
300 NEXT I
310 PRINT "DTMF TONE GENERATOR FOR"
320 PRINT "CO 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
418 PRINT "SENDING DIGITS..."
420 FOR I=1 TO LEN(D$)
430 LET E$=SEG$(D$,I,1)
440 GOSUB 550
443 CALL SOUND(F(D,3),F(D,1),7,F(D,2),7)
450 NEXT I
460 PRINT
500 PRINT "TONE SEQUENCE COMPLETE."
```

## Retrochallenge 2021 -- Paleoferrosaurus

```
510 PRINT
520 INPUT "RUN AGAIN?":Q$
530 IF (Q$="Y")+(Q$="YES") THEN 330
540 END
550 REM  PARSE THE DIGIT
560 LET A=ASC(E$)
570 IF (A>=48)*(A<=57) THEN 650
580 IF (A>=65)*(A<=68) THEN 680
590 IF A=35 THEN 710
600 IF A=42 THEN 740
610 PRINT "PARSE ERROR."
620 STOP
650 REM  CASE 1
660 LET D=A-48
670 RETURN
680 REM  CASE 2
690 LET D=A-53
700 RETURN
710 REM  CASE 3
720 LET D=11
730 RETURN
740 REM  CASE 4
750 LET D=10
760 RETURN
```