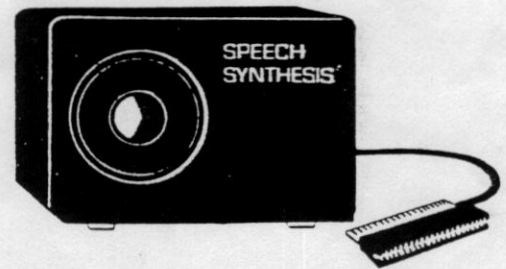


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USER DOCUMENTATION

10 26
11 26
12 11
1 Introduction

"Chatterbox" is a self-contained Speech Synthesiser, including amplifier speaker and bidirectional computer interface. "Chatterbox" plugs directly into Sinclair ZX81 and Spectrum computers using the standard bus connector.

"Chatterbox" does not contain a fixed vocabulary, but uses phonemes, or individual speech sounds, to build up complete words under programme control. The quality of phoneme-synthesised speech is not usually as good as pre-programmed speech, but the flexibility is infinite. With care your "Chatterbox" can be made to produce words, phrases or sentences for any application.

2 Use of Phonemes

A complete list of phonemes, together with examples of their use and their code numbers used to command "Chatterbox", is given in Appendix B. Note that phonemes have been given mnemonics (normally two or three capital letters) in order to assist identification.

It is worth noting the following guidelines:

- . The letters which form an English word do not necessarily identify the sounds required from "Chatterbox". Example: "enough" would be spoken using phonemes EH-NN2-UX-FF.
- . Some letters require slightly different sounds, depending on whether they start or terminate a word. Example: d in "do" uses phoneme DD2, d in "could" uses phoneme DD1, which is less pronounced.
- . Most of the vowel sounds can be stressed, or lengthened, by repeating the phoneme. Example: "extent" using EH-KK1-SS-TT2-EH-EH-NN1-TT2
- . Some phonemes exist already in long and short versions: Example: "letter" uses short phoneme ER, "fir" uses long phoneme ERR.
- . Pauses (silence) may be used between words, and must be used to terminate speech, otherwise "Chatterbox" is liable to carry on repeating the last phoneme.
- . Appendix A gives examples of words and their phonemes.

3 Programming for "Chatterbox"

"Chatterbox" is controlled as an output device, address 127 on Sinclair computers. Data in the form of phoneme codes is transferred under programme control, and "Chatterbox" can be interrogated to check that it is ready for the next command. Since output devices are difficult to handle in Sinclair Basic, we have provided a short machine-code routine.

The total number and length of the strings to be stored can be changed by altering lines 8 and 9, but the previously stored strings must then be ERASEd.

Remember: for best results some experimentation will be needed, to arrive at the best phoneme sequence for new words. Start by entering and listening to some of the examples in Appendix A.

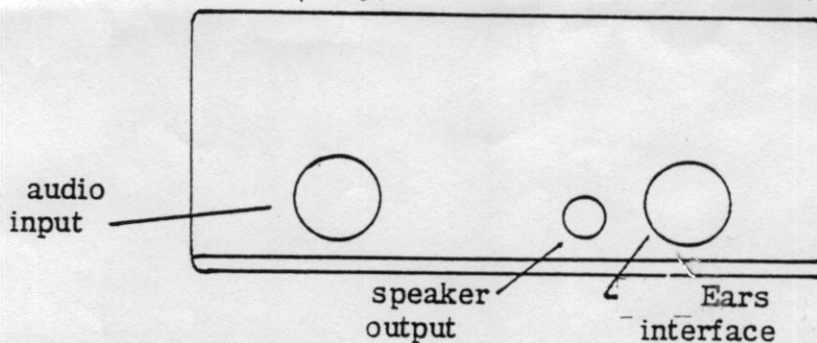
4 Extending your CHATTERBOX

You have purchased more than just a Speech Synthesiser.

"Chatterbox" contains a complete interface for the well-known "Big Ears" Speech Recognition System, an audio input for amplifying sound from the Music Synthesiser, and finally an audio output for an external speaker, amplifier or tape recorder.

We hope that "Chatterbox" will give you many hours of enjoyment.

© 1982



NOT
HARDWARE
TO
HARDWARE
A

Interfacing "Chatterbox" to other computers

Hardware Connection (to data bus or PIA)

cable colour	signal	<u>RIBBON CODE</u>
mauve	D7-YELLOW	
blue	D6-BLACK	
green	D5-WHITE	
yellow	D4-MAUVE	
orange	D3-GREY	
red	D2-BROWN	
brown	D1-RED	
black	D0-ORANGE	
white	CS1-YELLOW	
grey	CS2-ORANGE	
pink	RD READ	
pale blue	WR BROWN	
red/yellow	+5v - BLUE	
screen	0v - GREEN	

Note: CS1 and CS2 are both low for unit select.

On Sinclair computers

CS1=A7

CS2=IORQ

CONVERT YOUR
CODE
TO RIBBON

TO READ

14
43210
XXXXX000

1=OUT

DDRB9122
DATA9120

7 data bits 0

Programme Model

Write

0 0 x x x x x x

←phoneme code

DATA9121
APRA 9123

Wait for Load Request

=0 before writing
next phoneme.

Read

x x 1 1 1 1 x x
Ears

Load Request
Idle

To enter this routine, type in the following:

ZX81

```
1 REM 123456789012345
2 LET MEM=16514
3 LET TALK=MEM+1
POKE 16515,219
POKE 16516,127
POKE 16517,230
POKE 16518,1
POKE 16519,32
POKE 16520,250
POKE 16521,58
POKE 16522,130
POKE 16523,64
POKE 16524,211
POKE 16525,127
POKE 16526,201
```

Now SAVE on tape .

You can now test your "Chatterbox" by adding

```
10 POKE MEM,60
11 LET X=USR TALK
20 POKE MEM,0
21 LET X=USR TALK
RUN
```

"Chatterbox" should say "ear" (phoneme no.60). Note that lines 20 and 21 command silence, needed to prevent "Chatterbox" from repeating the sound indefinitely.

Now add

```
8 POKE MEM,63
9 LET X=USR TALK
RUN
```

"Chatterbox" should say "beer" (phonemes 63 and 60)

Clearly the above method of programming will be somewhat tedious, and a Speech Edit Programme is given in Appendix C. This allows you to compose, play and save 50 words or phrases of up to 20 phonemes each, including the silences. Each set of phonemes is stored in a "string", and is composed by entering the phoneme codes in sequence, using code 64 to terminate. A string may be examined by entering NEWLINEs instead of phoneme codes, and the compose mode is terminated by typing an X.

****NB** The first time you run Speech Editor you must answer "y" to the question "ERASE DATA?"

Once the words or phrases have been set up they may be tested by selecting Play.

To cause your own programmes (which you can add to the Speech Editor) to speak, use the following instructions:

```
.. LET WN=string number
.. GOSUB 300
```

Appendix A - Example Words

DD2-AO-TT2-ER (33-23-13-51)	"daughter"
KK3-UX-LL-AY-DD1	"collide"
SS-SS-IH-SS-TT2-ER	"sister"
KK1-LL-OW-NN1	"clown"
SS-KK3-WW-AIR	"square"
UX-NG-KK3-EL	"uncle"
KK1-UX-MM-PP-YY1-UW1-TT2-ER	"computer"
TT2-UW2	"two"
UX-LL-AR-MM	"alarm"
SS-KK3-OR	"score"

`LDA A $FF > PIA B`
`STA A $9122`
`LDA $10 > READ`
`STA A $9120`
`LDA $00 > PIA A`
`STA $9123 > INPUTS`
`CHECK LDA $01 STATUS BIT A9 01`
`CHECK AND $9121`
`BEG CHECK`
`LDA $04 > WRITE`
`STA $9120`
`LDA $FF > PIA A`
`STA 9123 > OUTPUTS`
`LDA 033C MEM`
`STA 9121`
`RET`

`A9 FF`
`8D 2291`
`A9 10`
`8D 2091`
`A9 00`
`8D 2391`
`2D 2191`
`F0 F9`
`A9 04`
`8D 2091`
`A9 FF`
`8D 2391`
`AD 30 03`
`8D 2191`
`60`

169, 255, 141, 34, 145, 169, 16, 141
 32, 145, 169, 0, 141, 35, 145, 169, 1
 45, 33, 145, 240, 249, 169, 4
 141, 32, 145, 169, 255, 141, 35
 145, 173, 60, 3, 141, 33, 145
 96

Appendix B - Phonemes for CHATTERBOX

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letter	mnemonic	example	code	letter	mnemonic	example	code
a	AA	ma	24	o	AA	hot	24
	AE	hat	26		OH	low	53
	AO	aught	23		AO	aught	23
	EY	page	20		UX	come	15
	AR	arm	59		OR	store	58
	UX	above	15		UH	book	30
	AIR	air	47		UW2	food	31
b	BB2	rib	63	OW	out	32	
	BB	builder	28	OY	boy	5	
c	KK1	can	42	UW1	to	22	
	KK2	sky	41	p	PP	pig	9
	KK3	comb	8		qu	KK3-WW square	8, 46
ch	CH	chuch	50	r	RR1	real	14
d	DD2	do	33		RR2	brain	39
	DD1	could	21	s	SS	test	55
e	EH	end	7		ZH	pause	38
	EE	see	19	sh	SH	ship	37
	EAR	ear	60	t	TT1	part	17
	ER	letter	51		TT2	two	13
	ERR	err	52	th	TH	thin	29
	AY	eye	6	DH1	this	18	
f	FF	food	40	DH2	this	54	
g	GG2	got	36	u	UW1	put	22
	GG1	guest	61		UX	up	15
	GG3	wig	34		UH	full	30
h	HH2	hoe	57	UW2	rude	31	
	HH1	he	27	v	VV	vest	35
i	IH	sit	12		w	WW	wool
	AY	size	6	WH	which	48	
	ERR	fir	52	x	KK1-SS	expert	42, 55
j	JH	dodge	10		y	YY1	yes
	k	KK3	comb	8	YY2	yes	25
KK2		sky	41	AY	sky	6	
KK1		can	42	z	ZZ	zoo	43
l	LL	lake	45		ZH	azure	38
	EL	paddle	62	Silence		10ms	0
m	MM	milk	16			30ms	1
	n	NN1	thin		11		50ms
NN2		no	56			100ms	3
NG		anchor	44			200ms	4

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Appendix C - SPEECH EDI

NB Lines 1, 2 & 3 must be e
detailed in Chapter 3.

ZX81

```

1 REM RND<=NEW 4 IF ULRNDP
EEK 1 TAN 45
2 LET MEM=16514
3 LET TALK=16515
4 PRINT "ERASE DATA? (Y/N) "
5 INPUT A$
7 IF A$<>"Y" THEN GOTO 20
8 LET LW=20
9 DIM U$(50,LW)
12 PRINT "ALL GONE"
13 GOTO 21
20 CLS
21 PRINT "COMPOSE SAVE OR PLAY
? (C/S/P) "
22 INPUT A$
23 IF A$="C" THEN GOTO 50
24 IF A$="S" THEN GOTO 6000
25 GOTO 200
49 REM
50 REM COMPOSE
51 REM
52 CLS
53 PRINT "COMPOSE/EXAMINE ";
55 PRINT "STRING NO: ";
56 INPUT UN
57 IF UN=0 THEN GOTO 20
58 PRINT UN
60 LET CN=0
62 PRINT
64 LET CN=CN+1
66 PRINT CODE U$(UN,CN); ">>";
68 INPUT C$
70 IF C$="" THEN GOTO 80
72 IF C$="X" THEN GOTO 20
74 LET CC=VAL C$
76 PRINT CC;
78 LET U$(UN,CN)=CHR$ CC
80 IF CN=LW THEN GOTO 20
82 GOTO 62
200 REM
201 REM PLAY
202 REM
205 PRINT "SPEAK STRING NO: ";
207 INPUT UN
208 IF UN=0 THEN GOTO 20
209 PRINT UN
210 GOSUB 300
212 GOTO 20
300 REM WORD OUTPUT
308 LET CN=1
310 POKE MEM, CODE U$(UN,CN)
312 IF PEEK MEM> 63 THEN RETURN
314 LET X=USR TALK
316 LET CN=CN+1
318 IF CN>LW THEN RETURN
319 GOTO 310
6000 CLS
6002 PRINT "TAPE ON, THEN RETURN"
6004 INPUT A$
6006 SAVE "CHATTER"
6007 CLS
6008 PRINT "CHATTERBOX DEMONSTR
TION"
6009 PRINT " (C) 1982 AUDIO VISION S
YSTEMS
6010 PRINT
6015 GOTO 1

```