

COGNIVOX™

**SPEECH RECOGNITION AND VOICE RESPONSE PERIPHERAL FOR
THE EXIDY SORCERER**

VIO-132

USER'S MANUAL

VOICETEK

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INTRODUCTION

COGNIVOX, model VIO-132 is a voice input (speech recognition) and voice output peripheral for the Exidy Sorcerer computer. It has a 32 word recognition vocabulary and it can talk back with up to 32 words or short phrases. The size of the voice response vocabulary depends on both the length of the words used and the size of the memory of your Sorcerer. 32K of RAM are required to use COGNIVOX with a full 32 word vocabulary voice response. However, COGNIVOX is perfectly usable with a 16K Sorcerer, the only limitation being that the voice response vocabulary will be restricted to 12 to 16 short words. The recognition vocabulary in any case is the full 32 words. All application programs supplied with COGNIVOX will run fully on a 16K Sorcerer.

COGNIVOX comes completely assembled and tested and ready to plug into the parallel I/O port of your Sorcerer. A number of programs are provided to be used with COGNIVOX so that user programming is not necessary to enjoy COGNIVOX. However, applications programs can be very easily written in BASIC if the user so desires and full instructions are given later on how to do it.

The arrangement of this manual follows a logical learning sequence, starting with an overview of speech I/O to give you some background in the theory behind COGNIVOX. Instructions on how to connect COGNIVOX to your Sorcerer and on how to get a demonstration going follow. Then you learn how to play the two voice operated games that come with COGNIVOX, VOICETRAP and VOTH. Then information is provided on how to write your applications programs for COGNIVOX. Finally, in the end, you will find service and warranty information in case you ever need it.

Please read this manual carefully and go through the examples presented. COGNIVOX has many capabilities that can be unlocked by a good understanding of its operational requirements and after you get some practice speaking to it.

AN OVERVIEW OF SPEECH I/O

The concept of speech input to machines is a very old one. Everybody is familiar with the mythical voice operated door of the arabian tales that opened in response to the spoken command "open sesame". Various mechanical speaking machines have appeared since the 16th century AD, operated via a keyboard like a piano.

Although machine voice I/O has been desired for a long time, the tools for serious research on the subject appeared only much later, after WW II. From 1950 to 1980, a great deal of research has been directed in understanding speech and building usable speech I/O devices. In the beginning there was great optimism that speech recognizers and voice response units will be easy to construct. Unfortunately, the problem of speech I/O has proven to be an extremely difficult problem. It seems that many more decades of research will be required for its complete solution, with pessimists talking of centuries.

Around 1975 though, spurred by the advent of the microprocessor, a new approach to speech I/O became popular. Its basic tenet is that we can now build speech I/O units which, even though they are far from perfect, they are quite usable in constrained environments and they are reasonably priced. As result of this approach, a number of companies are offering either speech input or output units ranging in price from \$149 (Voicetek) to over \$100,000 (Dialog Systems). While these price vary widely, all systems currently in the market have some basic similarities, derived from the limitations of the present day technology.

For example, commercially available speech recognizers are all "isolated word speech recognizers" meaning that they recognize only words spoken with a silence gap between them. In human-to-human speech, most words in a sentence are run together and they are not separated.

Another characteristic of today's recognizers is that they have a limited vocabulary from which the words can be drawn, from 16 to 40 words (larger vocabularies are possible by switching between small subvocabularies using key words). Even the top priced Dialog Systems machine has a quite limited (but perhaps the most useful) vocabulary consisting of the digits 0-9 and "yes" and "no".

Still another characteristic of today's machines is their "speaker dependence". All commercially available recognizers (except for the Dialog machine) must be trained to the voice of the user before they can operate. In the more expensive machine training can take up to an hour, while COGNIVOX requires only pronouncing the vocabulary three times.

Voice response units can be classified in three categories: Phoneme driven speech synthesizers (such as the Computalker and the Votrax), fixed vocabulary synthesizers (like the Texas Instruments Speak and Spell toy) and digital speech recordings.

The advantage of the phoneme synthesizers is that in theory any sentence can be spoken by the synthesizer. In practice however, intelligibility and quality suffers unless the synthesizer is carefully programmed by an experienced user. Fixed vocabulary synthesizers generate good quality speech (usually) but their vocabulary is limited and restricted to whatever the manufacturer provides. Finally, digital speech recordings are very easy to use (just record your voice) and the vocabulary can be anything that can be pronounced. Quality can be perfect. Their major disadvantage is that they use up large amounts of memory to store the speech data (for telephone quality unencoded speech they typically need 8 kilobytes/second of speech).

COGNIVOX uses a digital recording technique that sacrifices speech quality for memory storage efficiency and simplicity. However, the intelligibility of the resultant speech is not reduced.

As a last remark, it should be noted that while the COGNIVOX is the lowest priced speech I/O peripheral in the market today (and likely to remain so in the future), its performance is not necessarily inferior compared to other units in the market. For example, a \$10,000 unit might have only 5% higher recognition rate in an actual application compared to COGNIVOX. We say "may have" because objective evaluation of speech recognizers is very difficult. Indicative of this is the fact that there is only one published technical paper dealing with methods of recognizer evaluation. (The obvious test of running the recognizers to be compared simultaneously seems to be difficult to arrange in any given instance).

We are confident that, in the great majority of speech I/O applications for personal computers COGNIVOX will do just as good a job as any other unit, at far less cost.

If you would like additional information on speech recognition, please see the article "Give an Ear to your Computer, a Speech Recognition Primer for Computer Experimenters" in the June 1978 issue of BYTE magazine.

CONNECTING COGNIVOX TO SORCERER

COGNIVOX is a self-contained unit, powered and controlled via the parallel I/O port of your Sorcerer. Thus to use it, all you have to do is plug it into the parallel I/O port and connect the microphone that came with it as shown in Fig. 1.

Make sure that the connector is seated properly in the parallel I/O port. The top part of the cover of the Sorcerer might partially obstruct the connector area for the parallel I/O port as shown in Fig. 2. If that happens, the edge of the connector from COGNIVOX will touch the tab and will not be inserted properly. This is a manufacturing tolerance problem with some Sorcerers and if that happens, you have two options: One, open up the Sorcerer, loosen the screws holding the PC board in place and slide it if possible so as to increase clearance. If that is not possible, your second option is to trim the tab a little using a file or a sharp knife.

Once COGNIVOX is properly connected to your Sorcerer, you are ready to load the software and go. Normally you will not have to worry about the connection any further. COGNIVOX will be powered up and down as you turn the Sorcerer switch on and off and thus it has no on-off switch.

MICROPHONE JACK

VOLUME CONTROL
(Works during speech output only.
Does not affect speech input)

PARALLEL I/O PORT

BACK SIDE OF SORCERER

Figure 1: Connecting COGNIVOX

TAB

CLEARANCE

PARALLEL I/O PORT CONNECTOR

Figure 2: Make sure you have sufficient clearance as shown

COGNIVOX software is divided into two major parts: System conditioning programs and applications programs. There are two system conditioning programs, BOOT and VOX. BOOT relocates the BASIC stack and creates a protected memory area in which COGNIVOX programs can run and store speech data. VOX is a machine language speech recognition and voice response program. The application programs are written in BASIC and they call VOX via machine language subroutine calls (USR function).

Before any applications programs can run, BOOT must be executed and VOX must be loaded in memory (VOX loads into the protected memory space and is not affected by subsequent loads of BASIC programs).

System conditioning must take place always after power-up or after the system is reset via the RESET keys on the keyboard. Going through the BOOT-VOX sequence will destroy any programs previously in memory, so it is good practice before going through system conditioning to reset your SORCERER. You need go through the conditioning sequence only once during a session of using the COGNIVOX programs. After conditioning you can load the applications programs just like any other BASIC program. However, do not use NEW to clear the previous program before loading another one. Instead use ESC RESET to warm start the system (ESC RESET does not destroy protected memory).

IMPORTANT: All programs shipped by VOICETEK are recorded on 300 baud to insure reliable loading. This however results in slow loading, so if you wish you may make a copy at 1200 baud for your own use only. ALL programs by VOICETEK are copyrighted and their reproduction or use by others than the original owner is illegal and strictly prohibited.

SYSTEM CONDITIONING SEQUENCE

1. Turn power ON or hit both RESET keys simultaneously if power is already ON.
2. Type BYE followed by RETURN. You will get the monitor prompt . Type SE T=1 and then RETURN. Then type PP and then RETURN. This procedure will set the cassette baud rate at 300 baud.
3. Place the cassette containing BOOT in your cassette recorder, type CLOAD and then RETURN and push the PLAY button on the cassette recorder. When BOOT is loaded stop the cassette right away so as not to go past the start of the next program.
4. Type RUN and hit RETURN. Hit RETURN to continue after reading the message that will appear on the screen. Then type RUN 100 followed by a RETURN. This will relocate the stack and create the protected memory space needed by the VOX program.
5. Type BYE and then RETURN. After the monitor prompt appears type SE T=1 and then RETURN. Then type LO and then RETURN and push the PLAY button of the cassette recorder. When VOX is loaded stop the cassette. Type PP and then RETURN. This completes system conditioning and you are ready to load any one of the applications programs. If this is the first time you are using COGNIVOX we suggest that you load and try PROG1 next.

USING PROG2

PROG2 is a speech recognition and voice response demonstration program written in BASIC. It is loaded after the system has been conditioned. PROG2 offers a menu of six options. The first option must be used once after system conditioning to load the vocabulary you want to use. In addition, you use option 1 every time you wish to change the vocabulary.

Option 1 works as follows: The computer asks you how many words will be in the vocabulary. These are the words COGNIVOX will recognize or play back upon command. The vocabulary can have from 1 to 32 words. However, if you have a 16K Sorcerer, you will not be able to fit more than about 12 to 16 words in the available memory space. Generally, with a 16K Sorcerer you will have to pronounce the words curtly if you have more than 11 or so words in your vocabulary. If you run out of memory space you will get a message to that effect and the words that did not fit will be cut off without affecting anything else. Note that your vocabulary does not have to be limited to single words. Short phrases can also be used instead of words, for example, "My name is", "Good morning" etc. Make sure that when you say a sentence the words run together (with less than 150 ms gap between them) or else they will be input as separate words and not as a sentence.

Once you have entered the vocabulary size, hit RETURN and the computer will prompt you to enter word #1. Hold the microphone close to your lips (almost touching) and speak loud and clear. You do not have to shout but you should not whisper either. Try various loudness levels to see what works best. Speak naturally and enunciate carefully.

Remember that the volume control on COGNIVOX does not affect speech input. It is used only during playback. Also the ON-OFF switch in the microphone is not connected.

The computer will keep prompting you until all the vocabulary has been input or until it has enough data. It uses the data it collects during this phase to adapt itself to the characteristics of your vocal tract. It is trained to your vocabulary during two subsequent training passes.

The training phase is very important to the successful operation of any speech recognizer and especially of COGNIVOX. Thus it is important to be very careful during training and to avoid extraneous noises getting in the microphone. If you get a bad set of training (also called reference) patterns, redo the training. The effect of poor reference patterns is reduced recognition accuracy. If performance of your COGNIVOX seems to vary from day to day, training variations may be the reason (also remember that human voice changes on a day to day basis which can give you a small variation in performance).

After the first training pass (the second time you pronounce the vocabulary) the Sorcerer has a complete version of your vocabulary in its memory and it will prompt you this time by speaking to you. During the second training pass, set the volume control of COGNIVOX at about 3/4 full volume (volume increases clockwise) and then hit return. After a few seconds COGNIVOX will repeat the first word in the vocabulary. Be ready to adjust the volume to a comfortable level. You will find that voice response works best at quite low volumes. This is because the particular technique used for playback increases the penetrating power of speech to its maximum (a nice side effect).

Repeat each word into the microphone after the Sorcerer until all the vocabulary has been entered again. At that point the Sorcerer will be trained to your voice and you can try some of the other options in PROG2.

COGNIVOX will work well only with the voice of the person that trained it. In technical terms, it is not speaker independent. Speaker Independent Speech Recognition is, by the way, a major unsolved problem today. However, speaker dependency is a major advantage if only you yourself is to use the system. In that case, the voices of other people will be rejected and will not interfere with recognition. An example of beneficial speaker dependency is voice controlled lock (you sure don't want burglars talking their way into your home !).

Now let us try option 2 in PROG2. The vocabulary will be played back as entered. Option 3 will play the vocabulary back in reverse order. Try that with a musical vocabulary, the notes of an octave sung "do", "re", "mi" etc.

Options 4 and 5 are self explanatory. Option 6 allows you to retrain individual words. This is very useful if your COGNIVOX has problems with a few words in your vocabulary. Using option 6 you can retrain the troublesome words to improve performance.

VOICETRAP

VOICETRAP is a voice operated version of the popular video game Trap. It is a self contained program in that it contains its own training routines. It is also an example of using speech input for controlling a real time process. It is a difficult game to play successfully because while the Sorcerer computes its next move it does not listen to COGNIVOX. As result, it may lose portions of the spoken command and make recognition mistakes. Timing of the pronouncement is important. Watch the screen carefully and try.

It might be encouraging to note that skilled players can win the Sorcerer consistently in this game but it takes practice. You must not only try to say the word in a repeatable fashion but you also have to time it right and think strategy simultaneously. If you get good, try going faster. At full speed you will find the game almost unbeatable. By the same token, slow it down if you are just starting in the game.

USING COGNIVOX WITH 32K OR 48K SORCERERS

The software provided with COGNIVOX is configured to work with Sorcerers that have 16 of RAM memory, and it will also work without modification with 32K or 48K Sorcerers.

If, however, you have a Sorcerer with more than 16K of memory, we recommend that you perform the following simple modifications. Doing so will give you more space to store large voice response vocabularies. It will also give you 500 more byte of memory for your BASIC applications programs and the program loading procedure will be simplified.

The modification consists of omitting the BOOT step (which will leave the stack at its original position) and of altering a constant in VOX2. Here is how it is done, starting from the tapes supplied with COGNIVOX.

1. Turn power ON. If Sorcerer is ON, turn power OFF , wait 10 seconds and then turn power ON.
2. Type BYE (RETURN) and then SE T=1 (RETURN)
3. Put the COGNIVOX tape in the cassette player and press Play after typing LO VOX2 (RETURN).
4. Stop the tape player as soon as VOX2 loads.
5. Type EN 121B (RETURN). Your Sorcerer will respond with 121B:. Type 70/ (RETURN).

Your VOX2 is now modified. Save it on a new tape at 1200 baud. The save locations are 1200 to 15FF. Don't forget it is a machine language program.

From this point on, your loading sequence will be: 1. RESET System. 2. Load the modified VOX2. 3. Load any application program.

CAUTION: The new loading procedure does not relocate the stack. Therefore, if your BASIC program gets too long, it will crash VOX2 without warning. The variables of your BASIC program are stored under the stack below the top of the memory. In a 32K machine you have approximately 4K bytes for storing of BASIC variables which should be sufficient for most applications.

MUSIC AND SOUND EFFECTS GENERATION

In order to generate music sounds with your COGNIVOX, a short machine language program must be placed in the memory of your Sorcerer in locations 224 to 254 (decimal). This can be easily accomplished by running the following BASIC program:

```

100 REM TONE GENERATOR FOR COGNIVOX
110 DATA 33,252,0,78,17,255,255,253,42,253
120 DATA 0,211,255,13,194,249,0,47,78,253,25
130 DATA 218,235,0,201,195,243,0,255,1
140 FOR I=1 TO 30: READ A: POKE 223+I,A: NEXT
150 END

```

This program can also be placed at the beginning of all your BASIC applications programs that must generate sound. This way, when your program runs, the Tone Generator is automatically put in memory.

The Tone Generator is a subroutine that produces a burst of audio frequency every time it is called. The frequency and duration of the audio burst are easily set by POKEing two numbers in the memory of the Sorcerer as follows:

1. To set the frequency: POKE 252,X
2. To set the duration : POKE 254,Y

where X and Y are two decimal integers in the range from 1 to 255.

Here is an example of a BASIC program that produces an audio burst:

```

200 POKE 252,40
210 POKE 254,20
220 POKE 260,224: POKE 261,0: A=USR(0)
230 END

```

In the above program, line 220 calls the Tone Generator subroutine that generates the audio burst. To try another frequency for the burst, change line 200 to lets say:

```
200 POKE 252,20
```

The smaller the number POKEd, the higher the pitch. To change the duration of the burst, change the number in location 254. For example, in the above program the following will give a shorter burst:

```
210 POKE 254,10
```

If you would like finer control of duration, you can also change location 253 by POKEing into it. The duration

constant is computed as follows:

contents of loc 253 + 256 * (contents of loc 254)
 Thus changing location 253 will have only a minimal effect on duration unless loc 254 contains a very small number.

In order to generate more complex sounds, you will have to call the tone generator subroutine a number of times, perhaps each time with a different constant. Lets hear what happens when you execute the above program continuously. To do that, change line 230 to:

```
230 GOTO 200
```

To exit the endless loop thus created press CTRL C and continue preessing until you geet a READY.

Interesting complex sounds are usually generated by one of two methods:

1. Algorithmically
2. By table lookup

Algorithmic sound generation is easy to program, however it is hard to find an algorithm to produce any given complex sound. It can, however, give some really interesting sound effects. Try for example this program:

```
300 POKE 260,224: POKE 261,0
310 POKE 254,20
320 FOR I=1 TO 10
330 POKE 252,I*10: A=USR(0)
340 NEXT I: END
```

Or you may want to try this one:

```
400 POKE 260,224: POKE 261,0
410 POKE 254,5
420 FOR I=1 TO 10: POKE 252,20+I*5: A=USR(0): NEXT I
430 FOR I=1 TO 10: POKE 252,70-I*5: A=USR(0): NEXT I
440 END
```

Now change statement 410 to:

```
410 POKE 254,15
```

How would you like to swing musically? Try our swing program below:

```
500 POKE 260,224: POKE 261,0
510 POKE 254,4
520 FOR I=1 TO 50: POKE 252,I: A=USR(0): NEXT I
530 POKE 254,80: POKE 252,10: A=USR(0)
540 POKE 254,4
550 FOR I=1 TO 50: POKE 252,51-I: A=USR(0): NEXT I
```

```

560 POKE 254,80: POKE 252,20: A=USR(0)
570 GOTO 510

```

By using the RND function of the BASIC you can generate algorithmically true computer music of the early 60's. Here is a program that will generate enchanting everlasting music to please even HAL:

```

600 POKE 260,224: POKE 261,0
610 POKE 254,10
620 F=INT(RND(2)*255)
630 POKE 252,F: A=USR(0)
640 GOTO 620

```

If you like your music higher pitched, just change line 620 to:

```

620 F=INT(RND(2)*128)

```

Finally, as an example of the table lookup sound generator, try this;:

```

700 POKE 260,224: POKE 261,0
710 POKE 254,10
720 DATA 10,20,30,10,50,10,5,25,50,75
730 FOR I=1 TO 10: READ K
740 POKE 252,K: A=USR(0): NEXT I
750 END

```

For your convenience in generating music, here are the constants for one octave of notes in the modern music system:

NOTE	FREQ(Hz)	Const	NOTE	FREQ(Hz)	Const
C	261.62	268	F#	369.99	190
C#	277.18	253	G	391.99	179
D	293.66	239	G#	415.30	169
D#	311.13	226	A	440.00	160
E	329.63	213	A#	466.16	151
F	349.23	201	B	493.88	142

The constants for higher octaves can be obtained by halving the values given above (keep only the integer portion of the half).

The above examples are a very small sample of the sound generation capabilities of COGNIVOX. Using the Tone Generator you may very easily create your own sounds with small BASIC programs and hopefully you will do so. Please let us know if you write any programs that generate really unusual sounds.

WRITING YOUR OWN APPLICATIONS PROGRAMS

1. Introduction

COGNIVOX software are configured so that a user can easily write his own applications programs in BASIC. Speech Recognition and output are performed by calling the appropriate machine language subroutines that are part of the VOX2 program. This section will explain how this is done. Please note that this section is not tutorial at the novice level. Some experience in programming in BASIC and an understanding of PEEK, POKE, and USR are required before the information supplied here can be properly utilized.

2. System Initialization

The heart of the COGNIVOX software is a machine language program called VOX2. VOX2 is not a position independent program and must be placed in memory locations 1200 - 15FF (Hex). When the Sorcerer powers up however, all memory (except for the first 256 bytes) is allocated to BASIC. Thus the first step in using COGNIVOX is to load and run the program BOOT as previously outlined. This relocates the BASIC stack as well as the monitor stack so that the memory the Sorcerer software sees extends from 100 - 11FF (Hex) and the Sorcerer cannot interfere with VOX2. Then VOX2 must be loaded and it is automatically placed in the proper location. The memory map at this point looks as follows:

Free Space	:	0000 - 00FF
BASIC Space	:	0100 - 11FF
VOX Tables	:	1600 - 1CFF
VOX Program	:	1200 - 15FF
Speech Data	:	1D00 - 3FFF (16K Sorcerer)
"	:	1D00 - 7000 (32K Sorcerer)

To summarize the above, before you can write or run your own BASIC applications programs, you must:

1. Turn Power off, wait 10 seconds, then turn power on.
2. Load BOOT and run it to relocate the stacks.
3. Load VOX2

You now can write or run your BASIC program. Note that:

1. The space allotted to BASIC is only about 4K. Write compact programs and avoid excessive REM statements.
2. Step 1 above, the power on-off sequence is the only way to make sure that the Sorcerer is cleared. Using the RESET keys does not always give you a clean slate, apparently due to some bug in the Sorcerer.
3. Before saving any of your BASIC programs, press ESC and while you hold it down press RESET. This is absolutely necessary. If you don't follow this procedure your Sorcerer will give you a CRC error

when you try to load the program you saved. Again, this is due to problems in the Sorcerer software.

3. System Training

In order to train the recognizer to your vocabulary you must:

1. Cold start the recognizer
2. Do speaker adaptation pass
3. Do the first training pass
4. Do the second training pass

If you are only interested in voice response, steps #2 and #4 above can be omitted. The following programs perform the above steps:

1. Cold Start:

```
100 POKE 260,0: POKE 261,18: A=USR(0)
```

2. Speaker Adaptation Pass

```
150 FOR I=0 TO N-1
160 POKE 260,37: POKE 261,18: A=USR(0)
170 IF PEEK(5853)=3 GOTO 190
180 NEXT I
190 POKE 260,41: A=USR(0)
195 END
```

3. First Training Pass

```
200 For I=0 TO N-1
210 POKE 260,53: POKE 261,18: A=USR(0)
220 IF PEEK(5853)=2 GOTO 280
230 NEXT I
240 END
280 PRINT"MEMORY OVERFLOW"
290 END
```

4. Second Training Pass

```
300 FOR I=0 TO N-1
310 FOR K=1 TO 400: NEXT K
320 POKE 5852,I: POKE 5854,I
330 POKE 260,45: POKE 261,18: A=USR(0)
340 POKE 260,148: A=USR(0)
350 IF PEEK(5853)=2 GOTO 380
360 NEXT I
370 END
380 PRINT "MEMORY OVERFLOW"
390 END
```

NOTE: In the above programs N is the number of words in the vocabulary.

4. Playback and Recognition

For playback of any word use the following program. WN is the number of the word in the order entered. For example to play back the first word use WN=0.

```
400 POKE 5852,WN
410 POKE 260,45: POKE 261,18: A=USR(0)
420 END
```

To perform recognition, use the following program. RE is the number of the word recognized (RE goes from 0 to N-1). If no word was recognized, then RE has the value of 255.

```
500 POKE 260,49: POKE 261,18: A=USR(0)
510 RE=PEEK(5852)
520 IF RE=255 GOTO 500
530 IF PEEK(5853)=2 GOTO 550
540 PRINT RE: GOTO 500
550 END
```

Statement 500 is calling the recognition subroutine. The rest of the statements print the result of the recognition and loop the program.

The listing of PROG2 is a good example of a BASIC applications program using the above information. You may want to consult it for ideas when writing your own programs.

SERVICE INFORMATION

COGNIVOX is constructed with quality components conservatively rated to insure a long and trouble free life. In the event you suspect a malfunction, first run the diagnostic tests outlined later in this section. If the tests indicate a malfunction, please write to us indicating the results of your tests and any other information you think might be of help. It is important that you write first instead of sending the unit to us directly because we do not accept unauthorized returns and because we may be able to tell you how to correct the problem by mail saving both of us a lot of trouble. In addition, if your unit is out of warranty, we will be able to give you an estimate of the repair cost.

There are no user serviceable parts inside COGNIVOX (The circuits are encapsulated in epoxy) and we recommend that you do not attempt to open its case because you may damage the finish. Also keep in mind that attempted repairs void the warranty.

There are however certain procedures you can follow to ascertain that your COGNIVOX is operating properly. In the event of a malfunction these procedures will help you to isolate the problem.

Please perform the following tests every time you would like to verify operation of your COGNIVOX and before writing to us. If you write about a problem, please be sure to enclose the results of the following tests:

TEST 1: Make sure that the COGNIVOX plug is properly inserted and seated in the parallel I/O connector of your Sorcerer. Make sure the microphone plug is properly inserted all the way in the corresponding jack.

TEST 2: Turn power off and after 10 seconds turn it on. Load the MUSIC program, run it and select option 1 (random music). Rotate the volume control throughout its range. You should be able to get from a silence to full volume. This test checks the playback circuits, audio amplifier and speaker.

TEST 3: Turn power off and after 10 seconds turn it on again. Enter the following BASIC program:

```
10 IF INP(255) <128 GOTO 30
20 PRINT CHR$(176);: GOTO 10
30 PRINT CHR$(177);: GOTO 10
```

If COGNIVOX is working properly, you should get a thin line when there is no sound and a thick line when you speak to the microphone.

This test checks the word detection hardware. The length of the thick line represents the duration of the word. If COGNIVOX fails this test, go to test 5.

TEST 4: This program tests the feature extraction hardware. It may also be used to generate an acoustically driven real time abstract drawing that can decorate your living room.

```
50 IF(INP(255) AND 127)>63 GOTO 70
60 PRINT CHR$(176);: GOTO 50
70 PRINT CHR$(177);: GOTO 50
```

If COGNIVOX is working properly, you will get a randomly alternating pattern of thin and thick lines giving the impression of a brick wall. Speaking into the microphone may not alter these patterns appreciably.

TEST 5: If you suspect the microphone may be defective, use it to record some speech on a tape recorder. If it works there, you can assume it is operating properly.

If your COGNIVOX passes all these tests and you are still having problems, please write to us indicating the results of the tests and what you think the problem might be.

WARNING: COGNIVOX may suffer internal damage if dropped on a hard floor or if coffee or other liquids are spilled on it. The microphone is a dynamic microphone and it is also subject to damage if dropped or banged on hard surfaces.

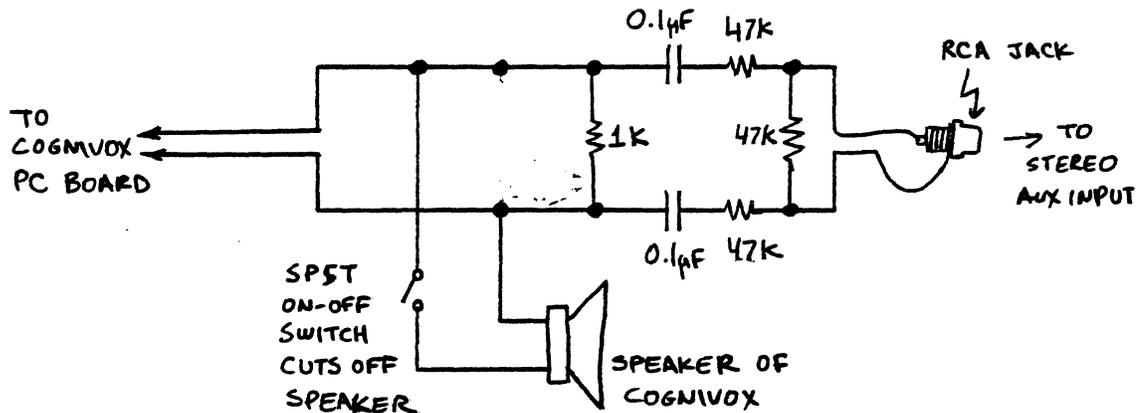
To clean COGNIVOX use a damp soft cloth to wipe external surfaces clean.

EXTERNAL AMPLIFIER WIRING

If you wish to use your stereo to output the sound of the COGNIVOX, you must wire in some modifications. If you are not perfectly sure how to do it, have a friend that knows electronics do it for you. We are not responsible for any damages that may result to your equipment due to improper connections. We do not recommend opening the case of your COGNIVOX unless you are qualified to service electronic equipment.

NOTE: Performing the following modification voids all warranties offered by VOICETEK. This information is offered as a suggestion to qualified personnel and does not constitute instructions to the user of COGNIVOX. From this point on you proceed at your own risk !

1. Remove the 4 Philips screws and remove the top of the case.
2. Disconnect one of the speaker leads (anyone) and make connections as shown below:



With this circuit and careful adjustment of the tone controls of your stereo you should get a significant improvement in sound quality.

4. The ON-OFF switch and an RCA type Jack can be mounted on the side of COGNIVOX opposite to the pot by drilling two holes in the case. NOTE: the case is made of very soft plastic, be careful not to overcut or mar its finish.

We will perform the above modification for \$20 including shipping anywhere in the continental US if you ship the unit prepaid to us and enclose a check for the amount. If we perform the modification, the original warranty of COGNIVOX will not be affected.

LIMITED WARRANTY

VOICETEK warrants COGNIVOX hardware to be free from defects for a period of 90 days following purchase. If within that period your COGNIVOX fails, write to us first indicating the symptoms. If the remedy we suggest in reply does not work or if we outright ask you to send it back, do so. As long as the problem is due to manufacturing or materials defects, we will repair or replace COGNIVOX at no charge. We pay shipping from our location to you and there is no service charge.

If COGNIVOX fails past the warranty period or due to abuse or misuse, we will quote you a service charge which must be prepaid before we will fix your unit. Also in this case customer pays all shipping. No handling charges are imposed.

This warranty is void if an attempt is made to repair without written authorization from VOICETEK.

Software for COGNIVOX is sold as is, without warranty. However if you cannot get the cassettes to load, send them back and we will replace them with others that will have a higher chance of loading. We will not replace cassettes after 90 days from purchase.

TRADEMARKS

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