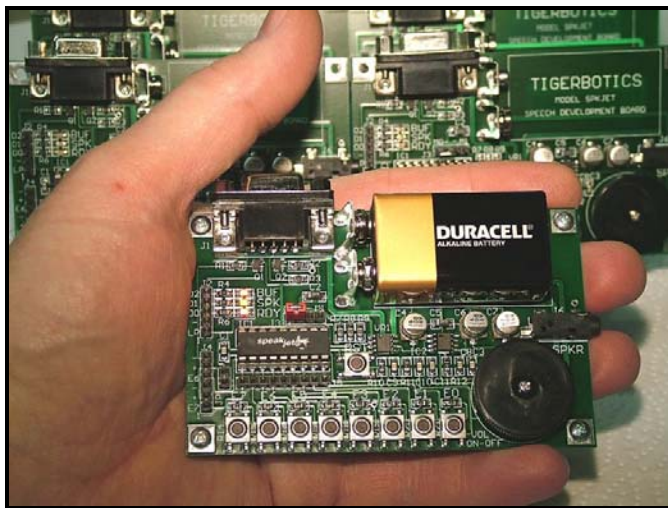


“SPKJET” Speech Development Board

Installation and Operation



- INTRODUCTION -

The Tigerbotics Speech Development Board is specially designed to support the Magnevation “SpeakJet” Speech and Complex Sound Synthesizer chip. The board provides a quick and easy means of getting the chip operational for both experimentation and development of advanced applications. The board is a “stand-alone” and complete solution to SpeakJet development. Its on-board circuitry allows the user to exercise the chip both manually using push-button switches and LEDs as well as remotely by connecting the chips ports to external controls or a microprocessor. All the features of the SpeakJet chip are brought out to external terminals to provide total flexibility and convenience in any application. The board comes completely assembled and tested and employs the latest in Surface Mount Technology (SMT). The compact size afforded by SMT construction provides a very compact unit that is suitable for both development and installation in your final application. The board is robotically assembled to provide the ultimate in performance, reliability, and value. Like all Tigerbotics products, this product is completely manufactured “In-House” on our own “State Of The Art” equipment to assure the highest possible level of quality control. We appreciate your placing your confidence in our products and hope that you will be very pleased with your purchase.

- THINGS YOU WILL NEED -

Before you get started, here is a list of things you will need to have on hand during installation. Check the “Resources” listing at the end of the manual if you are not sure where to get some of these items.

- 1) A PC compatible computer running Windows '98 or later operating system.
- 2) The most current version of the “PhraseALator” software (v1.4 or later) for exercising the chip.
- 3) You may need MSCOMM32.OCX or other drivers to make the PhraseALator software operate. See the section on “Loading The Software” for details.
- 4) You will find it very helpful to download the latest SpeakJet Users Manual from the Magnevation website. Configuration and operation of the SpeakJet chip itself is beyond the scope of this manual and not supported by Tigerbotics.
- 5) A standard PC serial cable with DB-9 male connector on one end and a DB-9 female on the other.
- 6) A standard 9 volt transistor battery to power the development board. An alkaline battery like the Duracell MN1604 (or equiv.) is recommended.
- 7) A small speaker with 8 or 16 ohm impedance and a 3.5mm (1/8”) audio plug attached. (See the section on speaker selection for important considerations.)

- A FEW WORDS OF CAUTION -

MODIFICATIONS: In designing the Development Board we tried to anticipate your every need. We made provisions for some very unusual applications by placing traces on the circuit board that can be “cut” or “jumpered” to provide a feature. These kinds of board modifications are rarely needed but we do mention them in this manual to give you every possible option. However... If you choose to make one of these kinds of board modifications, you can no longer return the board for *EXCHANGE* or *REFUND* because it cannot be re-sold. Soldering or modification of the board does not necessarily void the warranty, unless it causes damage to the board. Remember that if you make modifications, you do so *AT YOUR OWN RISK*.

STATIC: The SpeakJet chip and some of the other components on the Development Board are “Static Sensitive”. This means that they can be damaged by improper handling. If you are not familiar with static handling procedures, you should look it up on the Internet or ask a knowledgeable friend for advice.

BATTERY INSTALLATION: As is the case with all battery powered products, you should always *TURN OFF* the *POWER SWITCH* before installing the battery! If you accidentally touch the battery to the terminals with the wrong orientation (polarity) it could damage the board or SpeakJet chip. Turn the Volume/On-Off control fully counter-clockwise until it clicks to turn OFF the power before installing or removing the battery.

- SELECTING A SPEAKER -

Just as you can't get good sound quality while talking through a “straw”, you can't get good sound quality out of a “peanut sized” speaker! Furthermore, a speaker operated without an appropriate enclosure will *never* work very well. The speaker you select for your project is of utmost importance if you want speech that is loud enough and easily understood. While “bigger” is usually “better”, we realize it's often not practical to use something large. Best performance comes from a speaker at least 2” in diameter that is housed in a well designed enclosure. The *worst* choice you can make is something tiny like those found on a discarded modem! Try to find a “communications quality” speaker rather than something Hi-Fi if your application involves speech. One reasonably good option is the Radio Shack Model 19-318A. Another good source for “communications quality” speakers would be a Ham or CB Radio store. If you find that the output volume from the board is inadequate or the sound is of poor quality, you should start looking for another speaker. Even a small speaker like the Radio Shack model just mentioned, will give you more sound than you can probably use!

- LETS GET STARTED -

If you purchased your SpeakJet chip from Tigerbotics, it will be in the board and already be loaded with a few words and sound effects to let you do a basic operational test. The only thing you will need to do to get those “first words” from the chip is install the battery and connect the speaker to jack J6.

If you wish to make this functional test, turn ON the board by rotating the Volume/On-Off control clockwise about a half turn. You will hear the switch click and the READY LED will light. Pressing any of the eight “Event” buttons (E0-E7) should trigger a pre-recorded sound. If you purchased your chip from some other source than Tigerbotics, it may have a blank memory so this test will not work. In that event, you will need to complete the full setup procedure before this test will work.

- CONNECTING THE COMPUTER -

The board will communicate with your computer and the PhraseALator software through the computers “Serial” port. This port is sometimes called a “COM” port. Most computers have one or two such ports. There are some newer computers, especially laptops, that only have USB ports. You can still use these computers but you will need to purchase a “USB to Serial Adapter”. These are inexpensive and all that we have tested have worked well with the SpeakJet software. We have seen many of these being sold (new) on Ebay for about \$10.

Computers specify which Serial port they are sending data to by assigning them names. The most common names are “COM1” and “COM2”. The correct name for the port on your computer can be found in your computer manual or it may be written next to the connector itself on the back of the computer. You will need to know the correct serial port number when you setup the PhraseALator software. Determine which serial (COM) port is available on your computer and connect the serial cable between it and connector J1 on the SpeakJet board.

- INSTALLING THE SOFTWARE -

To communicate between the SpeakJet board and a PC, you will need to download the PhraseALator v1.40 (or later) software. Note that all versions of this software were named the same so be sure you don't download one of the earlier versions which did not function properly and may cause your computer to “hang”.

At the time of this writing, Magnevation had still not posted the PharaseALator software to their website. Worse yet, they have never provided an “Install Program” for the software. The only thing that is currently available from them is the executable file (phrasealator.exe) and that is only available from the “Files” section of the SpeakJet Forum on Yahoo (<http://groups.yahoo.com/group/speakjet/>).

In order to provide easier access to the all the latest software, Tigerbotics has provided a SpeakJet support page at: www.tigerbotics.com/support/speakjet/ On this page you will find not only the latest PhraseALator software, but also a new “Installation Program” which was compiled by Tigerbotics. This program installs not only the main PhraseALator program, but also any support files that your PC might need for operation.

If you choose to download only the executable program (phrasealator.exe), you may find your computer asking for some driver files like MSCOMM32.OCX after installation. Although we also provide this file for you on our website, most users will find it much easier to use our new Installation Program and avoid such complications.

- SOFTWARE CONFIGURATION -

Although Tigerbotics really has no role in the support of the PhraseALator software, we will pass along a few tips to help you get started off on the right foot! You will still need to download and study the relevant documentation from Magnevation, but this will get you started.

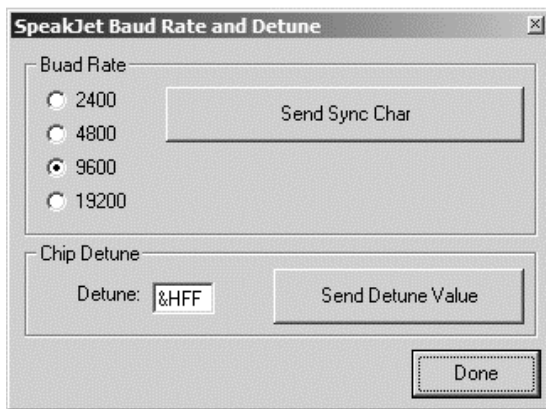
Before you attempt to communicate with the SpeakJet, you will need to do some basic configuration of the software. Rather than try to explain all the options available on every screen, we'll just tell you how to set it up so that it works. Later on, you should explore all the various options explained in the SpeakJet Users Manual. Our mission now is just to get you and your new board "up and running"!

When you start your PhraseALator software, the opening screen should look something like this:



On this screen, make sure that the "Use Flow Control" box is NOT checked and the Serial Port number is set correctly. If your computer is going to use "COM1" then there should be the number "1" in the "Serial Port" window.

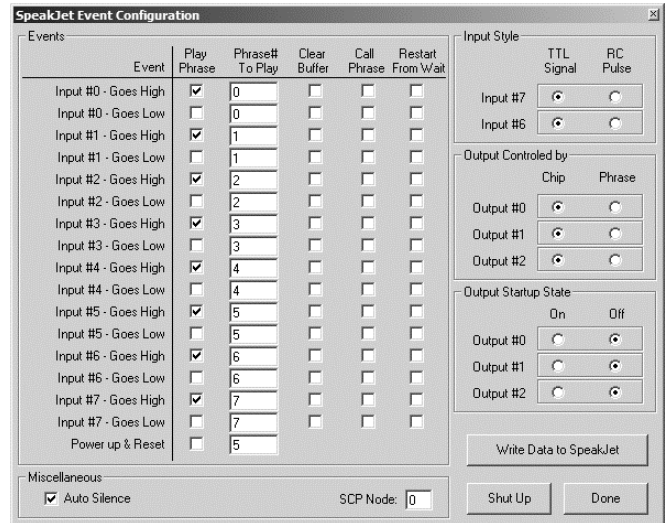
Assuming you have the computer connected, battery installed, and speaker connected, turn ON the board by rotating the On-Off/Volume control about half rotation clockwise. You may see some LED activity, but that's not important right now. Next click the "Baud Rate and Detune" button on the main menu. Select "9600" as shown in the next picture if it's not already selected.



Next we will verify communication between the computer and the SpeakJet. We'll do that by placing the SpeakJet chip in Baud Rate Configuration Mode. To enter that mode, momentarily remove the J3 board jumper that is on "M0" and place it on "M1". You will probably hear the SpeakJet

enter "Demo" mode while you're doing that. Next press the "RESET" (RST) switch once. You should hear "Sonar Pinging" in the speaker which indicates that you have entered Baud Rate Configuration Mode. Before proceeding, place the jumper back on "M0" where it was to start with. The "Sonar Pinging" will continue. Now on your computer screen click on "Send Sync Char" and the Sonar Ping should stop indicating that the computer and SpeakJet are fully synchronized. Once the pinging stops, the PhraseALator software will be fully functional. Click the "Done" button to return to the main menu. If the Ping didn't stop, try clicking the button again. If it still doesn't stop, you have probably selected the wrong Serial (COM) port number on the main menu or have a cable problem of some sort.

Now that we are communicating with the board, we need to make sure the chip is setup for normal operation. Click on the button labeled "Event Config" and configure your screen as shown below. When you are finished, click on the "Write Data to SpeakJet" button to send the configuration to the chip. Once that's done, click on the "Done" button to return to the main screen.



With the chip communicating and properly setup, we can now take the last step in the installation process. We need to activate the "Flow Control" signal between the chip and computer. "Flow Control" is a "handshake" line from the chip that tells the computer not to send data when the chip is too busy to receive it. This line prevents data loss during long downloads. Activate "Flow Control" by checking the box on the main screen as shown below.



- CONNECTOR WIRING -

There are connector locations on the board to bring out all of the SpeakJet lines for external control and monitoring. These connector locations are labeled J2, J4, and J5 on the board. Note that we have not installed any connectors on the board because we realize that many customers would rather wire directly to the board and avoid the cost or inconvenience of the connectors. If you would rather have connectors on your board, you can purchase them at very low cost from any electronic parts supplier. We have listed some good parts suppliers in the "Resources" listing at the end of this manual. The signals available at the connector locations are as follows:

J2 – Digital Output Connector

Pin #1	"LP"	LED Power (see notes)
Pin #2	"-"	Power Ground
Pin #3	"D0"	Data Output "0" / READY
Pin #4	"D1"	Data Output "1" / SPEAKING
Pin #5	"D2"	Data Output "2" / BUF FULL

J2 Notes: The "LP" pin (#1) on J2 is connected to Ground (Pin #2) on the bottom of the board. If in some unusual application you would like to disable the on-board LED lights to reduce power or loading on a signal line, you can cut the trace between Pins #1 and #2 on the bottom of the board. In the event you wish to re-connect the lines later, you can easily jumper them on the connector (Pins #1-#2). Pins #3 thru #5 are dual function and configurable by software. See the SpeakJet User Manual for details.

J4 – Servo Pulse Inputs

Pin #1	"E7"	Event #7 / RC1
Pin #2	"+"	Opt. +5v (see notes)
Pin #3	"-"	Power Ground
Pin #4	"E6"	Event #6 / RC0
Pin #5	"+"	Opt. +5v (see notes)
Pin #6	"-"	Power Ground

J4 Notes: Connector J4 provides access to the chips two "Pulse Inputs". The connector is configured in three pin groups with the same layout as a standard servo connector. This allows normal RC servo cables to be attached. Pins #2 and #5 can optionally be connected to the regulated +5 volt supply by installing a jumper at JP1. Power consumption from these pins must be limited to 25ma (total). These pins are intended for "signal" use rather than a source of operating power for external devices. **WARNING:** Never activate the +5 volts with JP1 if you are using this port with any radio control receiver or other device that might also supply power to this pin!

J5 – Event Trigger Inputs

Pin #1	"E7"	Event #7 / RC1
Pin #2	"E6"	Event #6 / RC0
Pin #3	"E5"	Event #5
Pin #4	"E4"	Event #4
Pin #5	"-"	Power Ground
Pin #6	"E3"	Event #3
Pin #7	"E2"	Event #2

Pin #8	"E1"	Event #1
Pin #9	"E0"	Event #0

J5 Notes: The Event lines are in parallel with the Event Switches E0-E7 so the lines can be used simultaneously with the switches installed. The Event inputs are tied internally to +5 volts through a 10K resistor so the lines only need to be grounded to trigger the event. Ground is available on connector (Pin #5) for this purpose.

- EXTERNAL POWER SOURCES -

While it was intended that the board be powered from a 9 volt battery, it is possible to power it from an external power supply. The external supply must provide a voltage between +6 and +12 volts (MAX). Power can easily be attached to the battery "Snap" connectors using the snap plate off a discarded battery or by using a 9v battery connector purchased from a parts store. **WARNING:** If you use a battery connector that already has the wires installed (usually RED and BLACK indicating polarity), **THE POLARITY WILL BE WRONG!** This is because the connector is marked for connecting to a battery rather than another piece of equipment. You are actually attaching the connector backwards when you attach it on anything other than a battery. Make sure you know the polarity is correct before applying power or you might **DESTROY THE BOARD OR SPEAKJET CHIP.**

- RESOURCES -

Product Support: Always check the Tigerbotics website at www.tigerbotics.com for product information and updates. Our site is also an excellent source for the latest SpeakJet software and documentation. We update the site with new information frequently so bookmark it and check back frequently to see what's new.

SpeakJet Manuals and Information: Available from the Magnevation website at www.speakjet.com

Technical Information: A wealth of technical information, great ideas, and general discussion are exchanged daily on the SpeakJet related forums on Yahoo. Currently the most active forum is at <http://groups.yahoo.com/group/speakjet/> You can also log into Yahoo at www.yahoo.com and do a search for other SpeakJet groups.

Connectors and Other Parts: Most parts you might need for SpeakJet development will be available at your local parts supplier or Radio Shack. Two great on-line sources for electronic parts are: DigiKey (www.digikey.com) and Mouser Electronics (www.mouser.com).

- TECHNICAL SUPPORT -

Most technical issues are best resolved by posting to the various SpeakJet related forums on Yahoo. One of the best can be found at: <http://groups.yahoo.com/group/speakjet/>. Most common questions and problems related to the SpeakJet chip have already been discussed there and are available by searching the archives. Tigerbotics monitors the forums daily and will provide support as needed for its products. We do not provide support for the SpeakJet chip or any of the related software.

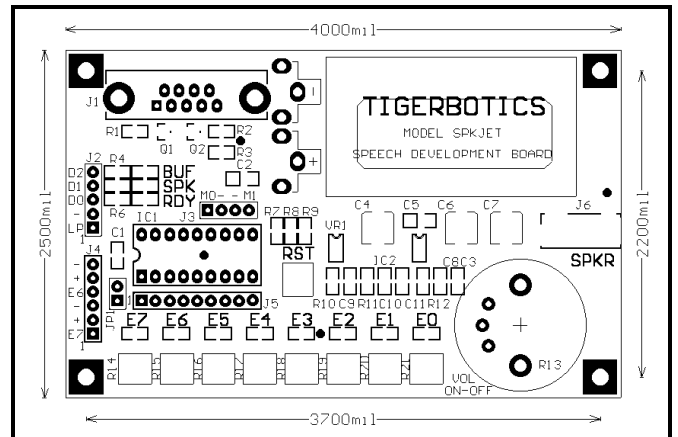
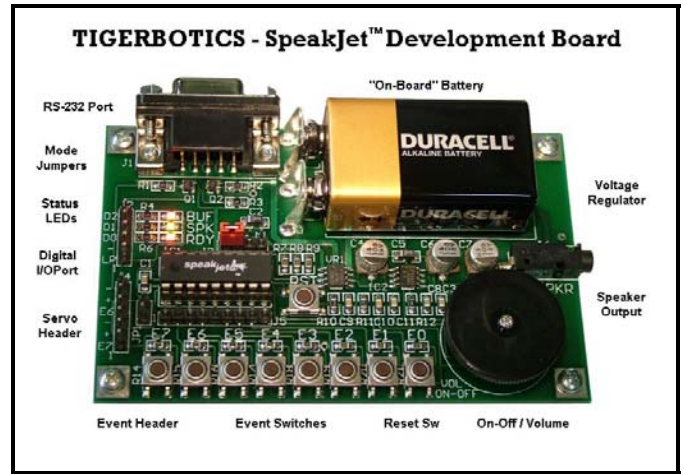
- RETURN POLICY -

A Return Material Authorization Number (RMA#) must be obtained from the factory before any product will be accepted for return or repair. Items received at the factory without an RMA# clearly marked on the OUTSIDE of the package WILL NOT BE ACCEPTED. Items being returned must be sent prepaid. Returned items should have a tag attached showing the RMA#, customer name, return address, phone number, and action requested. Units being returned for warranty repair must be accompanied by a copy of the original sales invoice showing the date of purchase.

Customers wishing to return a product for refund, for any reason, must receive an RMA# within 15 days from the shipping date shown on the original sales invoice. Customers returning products for refund will be charged a Restocking Fee equal to 20% of the purchase price, to cover the cost of re-testing and re-stocking. Products which have been damaged or modified in any way, may not be returned. This includes any possible modifications that may be described in the Users Manual. Please contact us at support@tigerbotics.com for an RMA# or any questions regarding these issues.

- LIMITED WARRANTY -

Tigerbotics warrants this product to be free of defects in material and workmanship for a period of 90 days from the date of shipment. Tigerbotics will repair or replace, at its option, any parts found to be defective during the warranty period. This warranty does not include any unit which has been subject to misuse, neglect, improper installation or operation. This warranty is in lieu of all others, express or implied, and no person or representative is authorized to assume for Tigerbotics any other liability in connection with the sale or use of this product. Tigerbotics will not be responsible for any expense or loss of revenue or property incurred by the user due to operation or malfunction of this equipment. Tigerbotics reserves the right to make circuit or component changes, or to incorporate new features, at any time, without obligation.



J1 – RS-232 Connector

- Pin #3 RS-232 Data Input
- Pin #5 Ground
- Pin #8 Handshake Out (CTS)

J3 – Mode Jumper Connector

- Pin #1 M0 (Chip Pin #13)
- Pin #2 Ground
- Pin #3 Ground
- Pin #4 M1 (Chip Pin #12)

J6 – Speaker Output Connector

- Tip Amplifier Output
- Sleeve Ground

LED Indicators

- BUF Buffer Half Full / D2 (Chip Pin #15)
- SPK Speaking / D1 (Chip Pin #16)
- RDY Ready / D0 (Chip Pin #17)

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Communicating with a BASIC Stamp

The following code and schematic demonstrate how to interface the Parallax BASIC Stamp to the SpeakJet Demo Board's DB-9 for serially-controlled speech and sound effects. The example works with any of the 24-pin Parallax BASIC Stamp modules (BS2, BS2e, BS2p and BS2SX) and automatically corrects for their different baud rates. The circuit requires connecting two BASIC Stamp I/O pins and ground to the SpeakJet's DB-9. This code is available for download on the Parallax web site www.parallax.com where the Tigerbotics SpeakJet products are featured.

```

' =====
'
' File..... SpeakJet_Demo.BS2
' Purpose... Serial Control of TIGERBOTICS SpeakJet Board
' Author.... Parallax, Inc.
' E-mail.... support@parallax.com
' Started...
' Updated... 30 JUL 2004
'
' {$STAMP BS2}
' {$PBASIC 2.5}
' =====

' -----[ Program Description ]-----
'
' Connections:
'
' P15 ----> DB9.2
' P14 <---- DB9.8
' Vss ----- DB9.5

' -----[ Revision History ]-----

' -----[ I/O Definitions ]-----

Tx          PIN    15          ' serial out to SpeakJet
Rdy         PIN    14          ' Ready in from SpeakJet

' -----[ Constants ]-----

#SELECT $stamp
#CASE BS2, BS2E, BS2PE
  T2400      CON     396
  T4800      CON     188
  T9600      CON     84
  T19K2      CON     32
#CASE BS2SX, BS2P
  T2400      CON    1021
  T4800      CON     500
  T9600      CON     240
  T19K2      CON     110
#ENDSELECT

Inverted     CON     $4000
Baud         CON     T9600 + Inverted

Sync        CON     $55

' -----[ SpeakJet Control Codes ]-----

PA0         CON     0          ' pauses

```

PA1	CON	1	
PA2	CON	2	
PA3	CON	3	
PA4	CON	4	
PA5	CON	5	
PA6	CON	6	
Fast	CON	7	
Slow	CON	8	
Stress	CON	14	
Relax	CON	15	
Wait	CON	16	' note underscore
Soft	CON	18	
Volume	CON	20	
Speed	CON	21	
Pitch	CON	22	
Bend	CON	23	
PortCtr	CON	24	
Port	CON	25	
Repeat	CON	26	
CallPhr	CON	28	
GotoPhr	CON	29	
Delay	CON	30	
Reset	CON	31	
IY	CON	128	
IH	CON	129	
EY	CON	130	
EH	CON	131	
AY	CON	132	
AX	CON	133	
UX	CON	134	
OH	CON	135	
AW	CON	136	
OW	CON	137	
UH	CON	138	
UW	CON	139	
MM	CON	140	
NE	CON	141	
NO	CON	142	
NGE	CON	143	
NGO	CON	144	
LE	CON	145	
LO	CON	146	
WW	CON	147	
RR	CON	148	
IYRR	CON	149	
EYRR	CON	150	
AXRR	CON	151	
AWRR	CON	152	
OWRR	CON	153	
EYIY	CON	154	
OHIY	CON	155	
OWIY	CON	156	
OHIH	CON	157	
IYEH	CON	158	
EHLL	CON	159	
IYUW	CON	160	
AXUW	CON	161	
IHWW	CON	162	
AYWW	CON	163	
OWWW	CON	164	
JH	CON	165	
VV	CON	166	
ZZ	CON	167	
ZH	CON	168	
DH	CON	169	
BE	CON	170	
BO	CON	171	
EB	CON	172	
OB	CON	173	
DE	CON	174	
DO	CON	175	' note underscore
ED	CON	176	
OD	CON	177	

GE	CON	178
GO	CON	179
EG	CON	180
OG	CON	181
CH	CON	182
HE	CON	183
HO	CON	184
WH	CON	185
FF	CON	186
SE	CON	187
SO	CON	188
SH	CON	189
TH	CON	190
TT	CON	191
TU	CON	192
TS	CON	193
KE	CON	194
KO	CON	195
EK	CON	196
OK	CON	197
PE	CON	198
PO	CON	199

RO	CON	200
R1	CON	201
R2	CON	202
R3	CON	203
R4	CON	204
R5	CON	205
R6	CON	206
R7	CON	207
R8	CON	208
R9	CON	209

A0	CON	210
A1	CON	211
A2	CON	212
A3	CON	213
A4	CON	214
A5	CON	215
A6	CON	216
A7	CON	217
A8	CON	218
A9	CON	219

_B0	CON	220
_B1	CON	221
_B2	CON	222
_B3	CON	223
_B4	CON	224
_B5	CON	225
_B6	CON	226
_B7	CON	227
_B8	CON	228
_B9	CON	229

' note underscore

C0	CON	230
C1	CON	231
C2	CON	232
C3	CON	233
C4	CON	234
C5	CON	235
C6	CON	236
C7	CON	237
C8	CON	238
C9	CON	239

' DTMF tones

D0	CON	240
D1	CON	241
D2	CON	242
D3	CON	243
D4	CON	244
D5	CON	245
D6	CON	246
D7	CON	247


```

D8          CON      248
D9          CON      249
D10         CON      250
D11         CON      251

M0          CON      252          ' sonar pin
M1          CON      253          ' pistol shot
M2          CON      254          ' WOW
EOS         CON      255          ' end of string

```

```
' -----[ Variables ]-----
```

```

eeAddr      VAR      Word          ' address of speech element
element     VAR      Byte          ' speech element / code
idx         VAR      Word

```

```
' -----[ EEPROM Data ]-----
```

```
' SCP strings
```

```

NoPuMsg     DATA    "\0237J32H80NX", EOS
ClearBuf    DATA    "\0RX", EOS
ClearAll    DATA    "\08J0N1J0N11J0N2J0N12J0N3J0N13J0NX", EOS
AllOff      DATA    "\08J0N11J0N12J0N13J0NX", EOS
DialTone    DATA    "\08J0N1J350N2J440N11J18N12J18NX", EOS

```

```
' allophone strings
```

```

Defaults    DATA    Reset, Volume, 127, EOS
Welcome     DATA    WW, EH, LE, PA4, KO, AW, MM, PA5, EOS
SpeakJet    DATA    SE, PE, IY, PA4, KE, PA5, JH, EY, TT, PA5, EOS
Demo        DATA    DE, EH, MM, OWWW, PA5, EOS
Parallax    DATA    PE, Fast, EYRR, UX, LE, AY, AY, KE, SE, PA5, EOS
Basic       DATA    BE, EYIY, SE, IH, Fast, PA4, OK, PA5, EOS
Stamp       DATA    SE, TU, AY, EH, MM, PE, PA5, EOS
RobotSad    DATA    Reset, Bend, 0, Speed, 61, _B8, PA1, C9, PA1,
Reset, EOS

ParaPhone   DATA    Slow, D9, PA5, Slow, D1, PA5, Slow, D6, PA5,
Slow, D6, PA5, Slow, D2, PA5, Slow, D4, PA5,
Slow, D8, PA5, Slow, D3, PA5, Slow, D3, PA5,
Slow, D3, EOS

```

```
' -----[ Initialization ]-----
```

```

Setup:
  GOSUB No_PwrUp_Msg          ' no "Ready" prompt

```

```
' -----[ Program Code ]-----
```

```

Main:
  FOR idx = 0 TO 1
    LOOKUP idx, [Defaults, Welcome], eeAddr
    GOSUB Play_String
  NEXT
  PAUSE 1500

  FOR idx = 0 TO 1
    LOOKUP idx, [SpeakJet, Demo], eeAddr
    GOSUB Play_String
  NEXT
  PAUSE 750
  eeAddr = RobotSad
  GOSUB Play_String
  PAUSE 3000

  FOR idx = 0 TO 2
    LOOKUP idx, [Parallax, Basic, Stamp], eeAddr
    GOSUB Play_String
  NEXT
  PAUSE 3000

```

```

FOR idx = 15 TO 127 STEP 16
  SEROUT Tx\Rdy, Baud, [Volume, idx]      ' set volume level
  eeAddr = Parallax                        ' say "Parallax"
  GOSUB Play_String
  PAUSE 500
NEXT
PAUSE 3000

eeAddr = DialTone                          ' simulate dial tone
GOSUB Play_String
PAUSE 4000
eeAddr = ParaPhone                        ' dial Parallax number
GOSUB Play_String
PAUSE 4000

GOTO Main
END

' -----[ Subroutines ]-----

' Play a string of SpeakJet sound elements from EE.  This subroutine
' uses flow-control to prevent sending elements when the SpeakJet
' buffer is full.
'
' -- put start of string in 'eeAddr'

Play_String:
DO
  READ eeAddr, element                    ' get element from EE
  eeAddr = eeAddr + 1                    ' point to next
  IF (element = EOS) THEN EXIT            ' end? if yes we're done
  SEROUT Tx\Rdy, Baud, [element]         ' send element to SpeakJet
LOOP
RETURN

No_PwrUp_Msg:                             ' clears PU Msg assignment
eeAddr = NoPuMsg
GOSUB Play_String
RETURN

```

Wiring Schematic:

