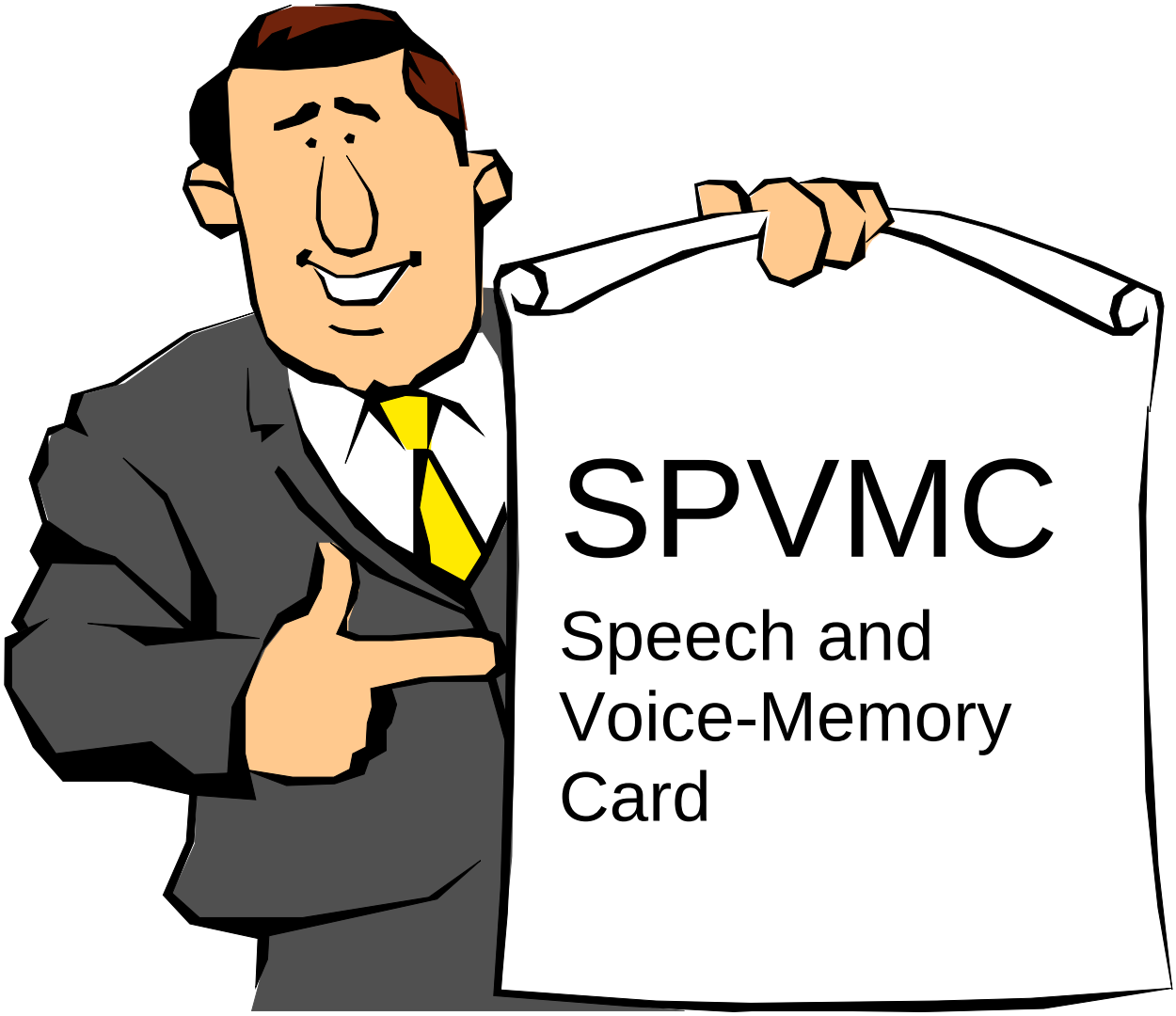


Special thanks go to Jens Fiedler and Winfried Winkler for the release of their Adapter Card/ Speech-Synthesizer Card DSR

system-99 user-group

Last Manual Edit: 2017-10-17
Translation by Bob Carmany
Actual versions at system-99 user-group

Forward

We are often asked what is this new card and why was it developed.

The answers are multiple:

- The first is that the SPEECH-Synthesizer PHP1500 is no longer available or is defective.
- On the other hand, the diagrams of the adapter card from Jens Fiedler and Winfrid Winkler are long out of print. Those who have the SGCPU installed and do not have an I/O-Port, can no longer use the SPEECH-Synthesizer.
- Also the Triple-Tech-Adapter Card is no longer available for purchase.

We have discovered many PHP 1500's in which one or both VSM's (Voice-Memories) were defective. It was also determined that, in these devices, the module and word list from PARSEC still works but CALL SAY from Extended Basic no longer functions.

It was determined that the "high speech routines" for CALL SAY or the Speech Editor reside in the VSM's. Information from the documents that came with the E/A Module allowed a 100% emulation of the VSM's with a small MACH chip and a FLASH-EPROM. In the event that no more of the TMS5220 Chips are obtainable, a complete adaptation of the Speech Synthesizer would be possible.

The DSR with the "SPEECH" and "ALPHON" – routines are, with a slight alteration, of the "Speech-Synthesizer DSR-ROM Cart" planned and built by Jens Fiedler and Winfried Winkler and could result in a new hardware item. Even in the original overview, an "adapter card" is possible. An "adapter card" with an onboard Synthesizer is contemplated.....

The Speech ROM and the words it contains are listed in the Appendix on pages 15 to 18.

Hardware

The Hardware of the SPVMC in more detail:

- CRU-Decoder with MACH “SP436“ and DSR-FLASH (512KB)
- TMS5220-Speech-Synthesizer
- VSM-Emulation with MACH “SP210“ and VSM-FLASH (512KB)
- Voltage input (+ and – 5Volt)

Installation of the CRU-Base

The CRU-Base of the Card can be set with four DIP-Switches to any of the 16 possible CRU-Bases.
The selection of CRU-Base >1800 is best since it is most often free.

	A4	A5	A6	A7	Processor-Addresses
CRU	DIP1	DIP2	DIP3	DIP4	Possible Hardware
>1000	ON	ON	ON	ON	HFDC, HRD’s
>1100	ON	ON	ON	OFF	All Disk Controllers ,HFDC
>1200	ON	ON	OFF	ON	
>1300	ON	ON	OFF	OFF	RS232 Nr.1
>1400	ON	OFF	ON	ON	EVPC 80-Column Cards
>1500	ON	OFF	ON	OFF	RS232 Nr.2
>1600	ON	OFF	OFF	ON	
>1700	ON	OFF	OFF	OFF	PGRAM(+) ASCSI
>1800	OFF	ON	ON	ON	TI-Thermal Printer, SPVMC
>1900	OFF	ON	ON	OFF	
>1A00	OFF	ON	OFF	ON	
>1B00	OFF	ON	OFF	OFF	HSGPL, and no others!
>1C00	OFF	OFF	ON	ON	
>1D00	OFF	OFF	ON	OFF	IEEE8-Controller
>1E00	OFF	OFF	OFF	ON	AMS/AEMS/SGCPU
>1F00	OFF	OFF	OFF	OFF	P-Code-Card

The above jumpers have been confirmed by tests and have been verified.

Address areas

Address	Function
>x9000	SPEECH-Data Read
>x9400	SPEECH-Data Write
>74000->75FFF	DSR-Space

Overview

There are more existing difficulties with the Speech Synthesizer which is home to intermittant short circuits between the TI motherboard and the Expansion box. So why not a new adapter card? All of the other adapter cards are themselves limited (as evidenced by the Triple-Tech Card with its clock and printer spooler) by the Buss - System of the I/O-Ports to the Expansion cards when the Speech Synthesizer is connected. The other Peripheral devices are always controlled and accessed through a special DSR – Routine.

The "Speech-Synthesizer DSR-ROM Card" will be, as its name says, a DSR-ROM along with the Speech Synthesizer, the first full application in a Peripheral device. It is a 100% compatible, and DSR-ROM compliant version of the "Terminal-Emulator II" module that recognizes (in GPL notation) the files "SPEECH" and "ALPHON".

There is no need for additional or special CALL commands or Assembler routines to be sent to the Speech Synthesizer and it recognizes the "normal" file commands (Open, Print, Input, Close). Besides the usual English word list, there is no longer only the standard vocabulary of the built-in Speech Synthesizer Phrase-ROMs for use by the programmer. Previously, this was possible in TI-Basic with the Terminal Emulator II module and in Extended Basic with the installation of the subroutines on diskette ("Text to Speech Assembler routines"). In both cases the use of storage space was lost (in TI Basic ca. 520 Bytes and under Extended Basic ca. 12K program- and almost all Assembler routine space); the use of other program languages was not possible.

With this adapter card installed, it is now possible to use all of the TI program languages (with standard file operations!), and each individual 8K-RAM without losing any storage space. Additional help routines for Assembler-/GPL-Programmers have been implemented.

Hardware:

Jens Fiedler

Software:

Winfried Winkler

Addresses removed for privacy reasons.

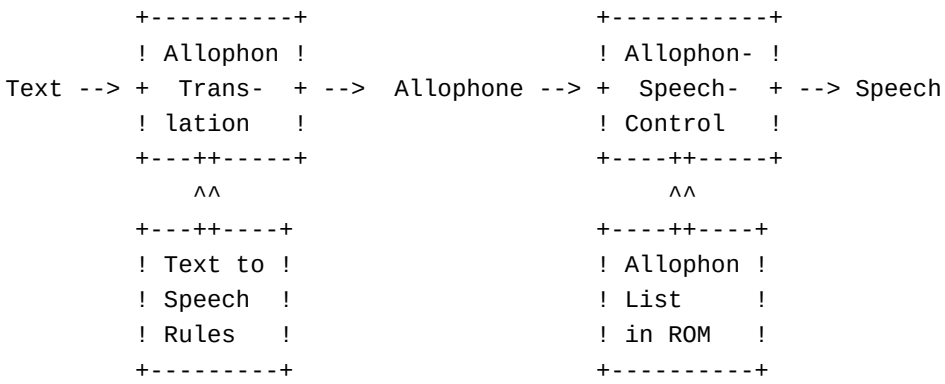
Software Basic Concept

The DSR-Software in the ROM of this card is place for all of the English words to be spoken. The speech output is, we think, about 92% error free. (TI action plan...) For the remaining 8% of usage, see below.

The software uses a concept that English words follow a set of rules for pronunciation with each word being broken into individual parts known as "Allophones". If one understands the Allophone, the various parts of the word become acoustically clear in the form of "Phonems", these small parts are put together to make speech. (For example, "S", as in: "sie" or "ausser")

One does not need to be a linguist. The "SPEECH" DSR-Software takes over this translation work for you. Those who would like to use special effects or other than the English language, or simply to experiment, can refer to Appendix A on page 11. There you will find a list of all the Allophones with their ASCII-Codes, around which the "ALPHON" DSR. These are used by the software accordingly.

"Function scheme":



What if the rules do not work?

- One should experiment with "false" text so one can quickly and easily have the DSR speak the words that you want.
- Example: the DSR says "NINETY" as "nin-e-ti" - Solution: one writes "9TE or NINE-TE"
- If this does not work satisfactorily, there is another way. One can select the individual Allophones by hand from the Allophone-Table (Appendix A), page 11 and concatenate them together to form the selected words . . .

DSR's: "SPEECH" & ALPHON"

Both of these file must be opened, for example in Basic:

OPEN #N: "SPEECH" , DISPLAY, OUTPUT, SEQUENTIAL, VARIABLE ###

OPEN #M: "ALPHON", INTERNAL , UPDATE, SEQUENTIAL, VARIABLE 255

In this case, #N #M are the speech file numbers (1-255), ### stands for the data length (1-254). One must know the specifications and standard file construction that are allowed in Basic / Extended Basic!

The file SPEECH takes over the text and speaks it as it has been written.

The file ALPHON can be read as well! After handover to the SPEECH file, the ALPHON file can be read and the individual data of the spoken Allophone read.

By writing to the ALPHON file a list of the spoken Allophones is transmitted. (See Appendix A: ASCII-Code List, page 11).

The DSRs have "normal" I/O-Error Codes, like all the other Peripheral devices:

I/O Error 0:	Device not there: Card not properly installed or defective
I/O Error 2:	Bad specification for opening a file
I/O Error 3:	Illegal Operation (for example reading from "SPEECH")
I/O Error 4:	Buffer Overrun: Allophone input longer than 254 Codes
I/O Error 6:	Hardware Error: Speech not properly installed or defective

Example program in Extended Basic :

```
100 OPEN #1:"SPEECH"
110 OPEN #2:"ALPHON", INTERNAL
120 LINPUT "Speak Text ?>":T$
130 PRINT #1:T$
140 INPUT #2:A$
150 PRINT
160 FOR I=1 TO LEN(A$)
170 PRINT ASC(SEG$(A$, I, 1));
180 NEXT I
190 PRINT #2:A$
200 CLOSE#1
210 CLOSE#2
```

This example program waits for a key press of of English text (up to 254 characters in length). This text will be written to the" SPEECH" file and spoken. After the translation of the text, the Allophone from the ALPHON" file is read and a list of the individual ASCII-Codes are displayed on the screen. It is by means of this Allophone list written in the "ALPHON" file, that the text is spoken.

The only error message that will be shown in this program is "I/O Error 4". That is only if the text is so long that it uses more than the 254 Allophones. Then the Allophon-DSR in Extended Basic can no longer code the text into one string (INPUT command) and produces an error message. In this case, (only when you really want to), one must break the text into smaller parts and concatenate the text. Then you can speak this "to long" text from the "SPEECH"-DSR!

SPEECH DSR Word Inventory

The "SPEECH" file organizes all of the ASCII-Codes into 5 Groups:

1. Letters:

Words in capital letters are spoken according to the speech rules. Lowercase letters will generally always be spelled.

2. Numbers & Numerical Symbols:

All Numbers are considered individually (!) and spoken as such. The routines can not recognize or say (as with TE-II Software, compatibility!) so "14" is not "fourteen", rather "one four" !!

The following symbols are recognized and spoken only (!) when they are followed by a number:

- "+" : "Plus"
- "-" : "Minus"
- ", " : "Comma"
- ". " : "Point"

3. Inflection Markers:

"^" is the main inflection marker, "_" a marker for the next inflection syllable. These must be at the beginning of the word (!), one can do this with the help of these separation characters. ">" an emphasis on the neighboring syllables. Every ">" applies to the syllable that comes after it.

The main inflection marker "^" should only be used once in a data string. The next inflection symbol "_" should only be used after the main stress symbol, otherwise the speech will be in a monotone.

Example:

"^>OBSCURE!" : emphasizes the second syllable "The _>>GRAVITATION IS ^VERY HIGH" : emphasizes the first syllable of “gravitation“ ^ the third syllable of "Very"

4. Special Characters:

- "%" : "percent"
- "$" : "dollar"
- "@" : "at"
- "(" : "open"
- "=" : "equals"
- "/" : "slash"
- "&" : "and"
- ")" : "close"
- "*" : "asterisk"

5. Pauses, Separation Characters:

Short Pause (2 Time periods): ", "

Lange Pause (9 Time periods): ". " ";" ":" "!" "?"

Word End (0 Time periods): all of the characters in a particular group

Period and comma must be in front of an empty character!

1 Time period: circa 25 Milliseconds

DSR Speech Parameters

When one sends the text "//xx, yyy" to the "SPEECH" file, a new parameter is set. This text will not be spoken!! The xx stands for "Pitch" (0-63) and yyy for "Slope" (0-255). Both words must be given in decimal numbers.

Example: PRINT #N:"//43, 128" is the standard format. (Basic) (N = File number of "SPEECH")

"Pitch" is a division factor, of the tone height of the speech (see the table in Appendix C, page 12)

"Slope" is 32 times the difference between the high tone and the accent.

As a a rule to follow: Tone pitch difference = circa 10 % of the Tone pitch (Attention: 32 times!)

Also for "Pitch" = 20 : "Slope" = 2 * 32 = 64 --> Text: "//20, 64"

In general the words must fall within the following limits:

0 < Pitch < 64

Slope < (Pitch - 1) * 16

Slope < (63 - Pitch) * 16

Appendix A = "ALPHON" Code list

1	AE1	„. A. ddition"
2	AE1N	„. A. nnuity"
3	AH1	„Delt. a.“
4	AH1N	„. O. n time"
5	AW1	„. Au. tonomy"
6	AW1N	„An. o. nimity"
7	E1	„. E. liminate"
8	E1N	„. E. nough"
9	EH1	„Cont. e. xt"
10	EH1N	„Anci. e. nt"
11	ER1N	„West. e. rn"
12	I1	„Synth. e. s. i. s"
13	I1N	„. I. nane"
14	OO1	„T. oo. k on"
15	OW1N	„D. o. nation"
16	U1	„Ann. u. al"
17	U1N	„. U. nique"
18	UH1	„. A. bove"
19	UH1M	„Instr. u. ments"
20	UH1N	„. U. nderneath"
21	Y1	„Ros. e. s"
22	Y1N	„Basem. e. nt"
23	ER1	„Seek. e. r"
24	OW1	„Rati. o.“
25	Y2	„Funn. y.“
26	AE2	„H. a. t"
27	AH2	„H. o. t"
28	AI2	„H. ei. ght"
29	AR2	„C. a. rt"
30	AU2	„H. ou. se"
31	AW2	„S. ou. ght"
32	E2	„H. ea. t"
33	EER2	„P. ie. rce"
34	EH2	„S. e. t"
35	EHR2	„Th. e. rapy"
36	EI2	„T. a. ke"
37	ER2	„H. u. rt"
38	I2	„. I. ssue"
39	OI2	„Ch. oi. ce"
40	OO2	„C. oo. k"
41	OOR2	„P. oor. ly"
42	OR2	„H. or. se"
43	OW2	„B. oa. t"
44	U2	„Sh. oo. t"
45	UH2	„H. u. t"
46	UU2	„B. oo. t"
47	AE3	„H. a. d"
48	AH3	„. O. dd"
49	AI3	„H. i. de"
50	AR3	„C. a. rd"
51	AU3	„L. ou. d"
52	AW3	„S. a. w"
53	E3	„S. ee. d"
54	EELL	„H. eel.“
55	EER3	„H. ear.“
56	EH3	„S. ai. d"
57	EHR3	„Th. ere.“
58	EI3	„D. ay.“
59	ER3	„H. ear. d"
60	I3	„H. i. d"
61	ILL	„H. ill.“
62	ING2	„Th. ink.“
63	OI3	„B. oy.“
64	OO3	„C. ould.“
65	OOR3	„P. oo. r"
66	OR3	„C. ore.“
67	OW3	„L. ow.“
68	U3	„Sh. oe.“
69	UH3	„M. u. d"
70	ULL	„Sk. ull.“
71	UHL	„P. ull.“
72	UU3	„M. oo. n"
73	L	„. L. ike"
74	L-	„Bow. l.“
75	LL	„Awf. ul.“
76	M	„. M. ay"
77	MM	„Hu. m.“
78	N	„. N. ice"
79	NN	„Sa. ne"
80	NG1	„Thi. n. k"
81	NG2	„Thi. ng.“
82	R	„. R. eal"
83	W	„. W. itch"
84	WH	„. Wh. ich"
85	Y	„. Y. ou"
86	B	„. B. ad"
87	BB	„Da. b.“
88	D	„. D. ig"
89	DD	„Bi. d.“
90	G1	„. G. ive"
91	G2	„. G. o"
92	GG	„Ba. g.“
93	J	„. J. ug"
94	JJ	„Bu. dge.“
95	THV	„. Th. is"
96	THV-	„Clo. the.“
97	V	„. V. ine"
98	VV	„Li. ve.“
99	Z	„. Z. oo"
100	ZZ	„Doe. s"
101	ZH	„A. z. ure"
102	ZH-	„Bei. ge.“
103	K2	„S. k. ate"
104	KH	„. C. ase"
105	KH-	„Ma. ke.“
106	KH1	„. K. ey"
107	KH2	„. C. ough"
108	P	„S. p. ace"
109	PH	„. P. ie"
110	PH-	„Na. p.“
111	T	„S. t. ake"
112	TH	„. T. ie"
113	TH-	„La. te.“
114	CH	„. Ch. ur. ch.“
115	F	„. F. at"
116	FF	„Lau. gh"
117	HI	„. H. it"
118	HO	„. H. ome"
119	HUH	„. H. ut"
120	S	„. S. eem"
121	SS	„Mi. ss.“
122	SH	„. Sh. ine"
123	SH-	„Wa. sh.“
124	THF	„. Th. ing"
125	THF-	„Wi. th.“
126		kurze Pause
127		lange Pause

Appendix B = "ALPHON" Control Characters

All ASCII-Codes from 1-240 have a corresponding Allophone (for example: Pauses). Those above are the ones in the range from 1-127 and are used. The range from 241 to 255 is reserved for control information. Also the first 8 codes are not used. All of the control codes can be followed by a 2 byte (X, Y) parameter.

Here is a list of the control codes and their functions:

249	Next accent follows
250 X Y	Now break off, the standard Word for "Pitch", "Slope". X, Y = Number of the next accent(X) & previous(Y) main accent. In the event X = 254 or 255, then: Y = Total of all the vowels.
251 X	Use X as the new "Slope" standard. ("DSR-Speech Parameter)
252 X	Use X as the new "Pitch" standard. ("DSR-Speech Parameter)
253	Main accent Type A follows. From here begins a new rising in tone sentence ("Question").
254	Main accent Type F follows. From here begins a new falling tone sentence ("Statement")
255 X	Use X as up coming "Pitch" word for the next syllable. This control code has a special application, for example, in the singing of songs, for more: see Code #252.

Appendix C = Speech/Tone Table

These are for an internal clock frequency of 8 kHz in speech. These frequencies may show a deviatiom of +/- 5% in the device.

1	571,4 Hz	14	296,2 Hz	27	166,6 Hz	40	98,7 Hz	53	57,5 Hz
2	533,3 Hz	15	285,7 Hz	28	163,2 Hz	41	94,1 Hz	54	55,1 Hz
3	500,4 Hz	16	275,8 Hz	29	156,8 Hz	42	91,9 Hz	55	52,9 Hz
4	470,5 Hz	17	266,6 Hz	30	148,1 Hz	43	88,8 Hz	56	50,9 Hz
5	444,4 Hz	18	258,1 Hz	31	145,4 Hz	44	83,3 Hz	57	48,7 Hz
6	421,1 Hz	19	250,0 Hz	32	140,3 Hz	45	80,8 Hz	58	46,7 Hz
7	400,0 Hz	20	235,2 Hz	33	133,3 Hz	46	77,6 Hz	59	44,9 Hz
8	380,9 Hz	21	222,2 Hz	34	129,0 Hz	47	74,7 Hz	60	43,0 Hz
9	363,6 Hz	22	210,5 Hz	35	125,0 Hz	48	71,4 Hz	61	41,2 Hz
10	347,8 Hz	23	200,0 Hz	36	117,6 Hz	49	68,3 Hz	62	39,6 Hz
11	333,3 Hz	24	195,1 Hz	37	111,1 Hz	50	65,5 Hz	63	37,9 Hz
12	320,0 Hz	25	186,0 Hz	38	108,1 Hz	51	62,9 Hz		
13	307,7 Hz	26	177,7 Hz	39	105,2 Hz	52	60,1 Hz		

Assembler/GPL – ROM-Routines

In the DSR-ROM are a few help routines, that the programmer can call from Assembler or likewise from GPL. In both cases,(ASM/GPL) the programmer must turn on the ROM. (In machine language: "LI R12, CRUBASE" & "SBO 0")

If the CRU-Base of a Peripheral device is not known, then one polls in the following manner: With a standard DSRLNK routine will give you access to the peripheral device (at best: STATUS - Access, PAB-OpCode="9"). One of the nuisances is that, if the access involves an illegal operation error of the device, the specific error will not be tested. In operations like PRINT or INPUT, the data will be destroyed and the pointers altered! Look for the word at @>83D0 of the CRU-Base address or the null value. (In case the device is not installed/ not found).

The individual routines:

Check Speech

ASM: BL @>4010 GPL: XML >51

This routine tests, if the Speech Synthesizer (the Phrase-ROM) has been correctly found by the computer.

Output: @>834A = -1 / 0 (FAC: Yes/No)

@>837C Bit #2 (GPL-Status "Condition Bit": Yes/No)

Search Phrase

ASM: BL @>4014 GPL: XML >53

This routine searches for a Text/String in the resident vocabulary in the Phrase-ROM of the Speech Synthesizer.

Input: @>834C = Count of the text characters (Byte!)

ab @>834D: the searched text (maximum 18 characters!)

Output: @>834A = Address or Null (if not found)

Speak Phrase

ASM: BL @>4018 GPL: XML >55

The routine speaks text from the resident vocabulary of the Speech Synthesizer and waits for the end of the speech output.

Input: @>834A = Address (from Routine#2 search or from Editor/Assembler-Handbook)

Wait, if busy

ASM: BL @>401C GPL: XML >57

This routine waits, until the Speech Synthesizer connects, and the speech output is ended. (This routine will bring an end to "Speak Phrase")

Load Address

ASM: BL @>4020 GPL: XML >59

This routine sets the Speech Synthesizer write/read address.

Input: @>834A = Address

Read PhROM

ASM: BL @>4024 GPL: XML >5B

This routine reads 1 Byte from the Speech Synthesizer Phrase-ROM.

Input : @>834A = Read-Address

Output: @>834C = from the read byte

Wait ca. 12 ms

ASM: BL @>4028 GPL: not necessary / XML >5D

This is a wait state that lasts about 12 Milliseconds.

Wait ca. 42 ms

ASM: BL @>402C GPL: XML >5F nicht nötig ?

This is a wait state of about 42 Milliseconds.

At the least, if the wait time of the two loops is in GPL, and the time period has expired because of the slow GPL interpreter, the next access of Speech (Addresses @>9x00), one must program in GPL using Assembler code - subroutines or through other special tricks.

Words in the Speech Roms

These words can, after execution of CALL VSMx or DELETE „VSMx“ where they reside in the individual Bank, will be spoken with the command CALL SAY (“Text“) under Extended Basic or the Speech Editor module.

VSM0 - Original Speech Synthesizer

This data resides in the Speech Roms of the Speech Synthesizer. This Bank is turned on as standard procedure at start up.

+ (POSITIVE)	- (NEGATIVE)	. (POINT)	0	1
2	3	4	5	6
7	8	9	A (ay)	A1 (uh)
ABOUT	AFTER	AGAIN	ALL	AM
AN	AND	ANSWER	ANY	ARE
AS	ASSUME	AT	B	BACK
BASE	BE	BETWEEN	BLACK	BLUE
BOTH	BOTTOM	BUT	BUY	BY
BYE	C	CAN	CASSETTE	CENTER
CHECK	CHOICE	CLEAR	COLOR	COME
COMES	COMMA	COMMAND	COMPLETE	COMPLETED
COMPUTER	CONNECTED	CONSOLE	CORRECT	COURSE
CYAN	D	DATA	DECIDE	DEVICE
DID	DIFFERENT	DISKETTE	DO	DOES
DOING	DONE	DOUBLE	DOWN	DRAW
DRAWING	E	EACH	EIGHT	EIGHTY
ELEVEN	ELSE	END	ENDS	ENTER
ERROR	EXACTLY	EYE	F	FIFTEEN
FIFTY	FIGURE	FIND	FINE	FINISH
FINISHED	FIRST	FIT	FIVE	FOR
FORTY	FOUR	FOURTEEN	FOURTH	FROM
FRONT	G	GAMES	GET	GETTING
GIVE	GIVES	GO	GOES	GOING
GOOD	#GOOD WORK	GOODBYE	GOT	GRAY
GREEN	GUESS	H	HAD	HAND
#HANDHELD UNIT	HAS	HAVE	HEAD	HEAR
HELLO	HELP	HERE	HIGHER	HIT
HOME	HOW	HUNDRED	HURRY	I
#I WIN	IF	IN	INCH	INCHES
INSTRUCTION	INSTRUCTIONS	IS	IT	J
JOYSTICK	JUST	K	KEY	KEYBOARD
KNOW	L	LARGE	LARGER	LARGEST
LAST	LEARN	LEFT	LESS	LET
LIKE	LIKES	LINE	LOAD	LONG
LOOK	LOOKS	LOWER	M	MADE
MAGENTA	MAKE	ME	MEAN	MEMORY
MESSAGE	MESSAGES	MIDDLE	MIGHT	MODULE
MORE	MOST	MOVE	MUST	N
NAME	NEAR	NEED	NEGATIVE	NEXT
#NICE TRY	NINE	NINETY	NO	NOT
NOW	NUMBER	O	OF	OFF
OH	ON	ONE	ONLY	OR
ORDER	OTHER	OUT	OVER	P
PART	PARTNER	PARTS	PERIOD	PLAY
PLAYS	PLEASE	POINT	POSITION	POSITIVE
PRESS	PRINT	PRINTER	PROBLEM	PROBLEMS
PROGRAM	PUT	PUTTING	Q	R
RANDOMLY	READ (reed)	READ1 (red)	#READY TO START	RECORDER
RED	REFER	REMEMBER	RETURN	REWIND

RIGHT	ROUND	S	SAID	SAVE
SAY	SAYS	SCREEN	SECOND	SEE
SEES	SET	SEVEN	SEVENTY	SHAPE
SHAPES	SHIFT	SHORT	SHORTER	SHOULD
SIDE	SIDES	SIX	SIXTY	SMALL
SMALLER	SMALLEST	SO	SOME	SORRY
SPACE	SPACES	SPELL	SQUARE	START
STEP	STOP	SUM	SUPPOSED	#SUPPOSED TO
SURE	T	TAKE	TEEN	TELL
TEN	#TEXAS INSTRU-MENTS	THAN	THAT	#THAT IS INCOR-RECT
#THAT IS RIGHT	THE (thee)	THE1 (thuh)	THEIR	THEN
THERE	THESE	THEY	THING	THINGS
THINK	THIRD	THIRTEEN	THIRTY	THIS
THREE	THREW	THROUGH	TIME	TO
TOGETHER	TONE	TOO	TOP	TRY
#TRY AGAIN	TURN	TWELVE	TWENTY	TWO
TYPE	U	UHOH	UNDER	UNDERSTAND
UNTIL	UP	UPPER	USE	V
VARY	VERY	W	WAIT	WANT
WANTS	WAY	WE	WEIGH	WEIGHT
WELL	WERE	WHAT	#WHAT WAS THAT	WHEN
WHERE	WHICH	WHITE	WHO	WHY
WILL	WITH	WON	WORD	WORDS
WORK	WORKING	WRITE	X	Y
YELLOW	YES	YET	YOU	#YOU WIN
YOUR	Z	ZERO		

VSM1 – Masculine Voice

(contained as data in VM61003, VM61004 and VM61005)

A	ABEAM	ABORT	ABOUT	ABOVE
ACCELERATED	ACKNOWLEDGE	ACTION	ADJUST	ADVISE
AERIAL	AFFIRMATIVE	AIR	AIRCRAFT	AIRPORT
AIRSPEED	AIR_BRAKES	ALERT	ALL	ALOFT
ALPHA	ALTERNATE	ALTIMETER	ALTITUDE	AMPS
AND	ANSWER	APPROACH	APPROACHES	APU
AREA	ARRIVAL	AS	AT	ATIS
AUTOMATIC	AUTOPILOT	A_M	B	BANK
BASE	BELOW	BETWEEN	BLOWING	BOOST
BRAKE	BRAKING	BRAVO	BREAK	BROKEN
BUTTON	BY	C	CABIN	CALIBRATE
CALL	CALM	CANCEL	CAUTION	CEILING
CELSIUS	CENTER	CHANCEL	CHANGE	CHARLIE
CHECK	CIRCUIT	CLEAR	CLEARANCE	CLEARANCE_DEL
CLIMB	CLOCK	CLOSED	COMPLETE	CONNECT
CONTACT	CONTROL	CONVERGING	COURSE	COWL
CRANE	CROSSWIND	CRYSTALS	CURRENT	CYCLE
CYLINDER	D	DANGER	DAYS	DECREASE
DECREASING	DEGREE	DEGREES	DELTA	DEPARTURE
DEVICE	DIRECTION	DISPLAY	DIVIDED	DOOR
DOORS	DOWN	DOWNWIND	DRIZZLE	DUST
E	EAST	ECHO	EIGHT	EIGHTEEN
EIGHTY	ELECTRICIAN	ELEVATION	ELEVEN	EMERGENCY
ENGINE	ENTER	EQUAL	EQUALS	ERROR
ESTIMATED	ETA	EVACUATE	EVACUATION	EXIT
EXPECT	F	FAIL	FAILURE	FARAD
FARENHEIT	FAST	FEET	FIELD	FIF-
FIFTEEN	FIFTY	FINAL	FIRE	FIVE
FLAME OUT	FLAP LOAD	FLAPS	FLIGHT	FLIGHT_WATCH

FLOW	FOG	FOR	FORTY	FOUR
FOURTEEN	FOXTROT	FREEDOM	FREEZING	FREQUENCY
FROM	FRONT	FSS	FUEL	FULL
G	GALLEY	GALLONS	GATE	GAUGE
GEAR	GET	GLIDE	GO	GOLF
GRAIN	GREAT	GREEN	GREENWICH	GROUND
GUNDISH	GUSTING_TO	H	HAIL	HALF
HAVE	HAZE	HEADING	HEAVY	HENRY
HERTZ	HIGH	HOLD	HOTEL	HOUR
HOURS	HUNDRED	I	ICE	ICING
IDENTIFY	IDLE	IFR	IGNITE	IGNITION
ILS	IMMEDIATELY	IN	INBOUND	INCH
INCREASE	INCREASING	INCREASING_TO	INDIA	INDICATED
INFLIGHT	INFORMATION	INNER	INSPECTOR	INSTRUMENT
INTRUDER	IS	J	JULIET	K
KEY	KILO	KNOTS	L	LAND
LANDING	LANDING GEAR	LAP	LAUNCH	LEAN
LEFT	LEG	LESS_THAN	LEVEL	LEVEL_OFF
LIGHT	LIGHTS	LIMA	LINE	LIST
LOCALIZER	LONG	LOW	LOWER	M
MACHINE	MAGNETOS	MAINTAIN	MANUAL	MARKER
MAYDAY	MEAN	MEASURE	MEASURED	MEGA
METER	MICRO	MIDDLE	MIDPOINT	MIG
MIKE	MILES	MILL	MILLI	MILLION
MINUS	MINUTES	MIST	MIXTURE	MODERATE
MORE_THAN	MOTOR	MOVE	MOVING	MUCH
N	NEAR	NEGATIVE	NEW	NINE
NINER	NINETEEN	NINETY	NO	NORTH
NORTHEAST	NORTHWEST	NOT	NOTAM	NOVEMBER
NO_TURN	NUMBER	O	OBSCURED	OF
OFF	OHMS	OIL	ON	ONE
OPEN	OPERATOR	OSCAR	OTHER	OUT
OUTER	OVER	OVERCAST	OVERSPEED	O_CLOCK
P	PAPA	PARTIALLY	PASS	PASSED
PATH	PAUSE	PELLETS	PER	PERCENT
PICO	PLAN	PLEASE	PLUS	POINT
POSITION	POWER	PRESS	PRESSURE	PROBE
PROPS	PULL	PUMPS	PUSH	P_M
Q	QUEBEC	R	RADAR	RADIAL
RADIO	RADIUS	RAIN	RAISE	RANGE
RATE	READY	REAR	RED	REFUELING
RELEASE	REMARK	REPAIR	REPEAT	RICH
RIGHT	ROGER	ROLLOUT	ROMEO	RUNWAY
RVRS	R_NAV	S	SAFE	SAND
SCATTERED	SEA	SECONDS	SECURITY	SELCAL
SELECT	SEMERNAL	SEQUENCE	SERVICE	SET
SEVEN	SEVENTEEN	SEVENTY	SEVERE	SHORT
SHOWERS	SHUT	SIDE	SIERRA	SIGMET
SIX	SIXTEEN	SIXTY	SLEET	SLOPE
SLOW	SLOWER	SMOKE	SNOW	SOUTH
SOUTHEAST	SOUTHWEST	SPEED	SPOILERS	SQUAWK
SQUAWKING	STABILIZER	STALL	START	STOP
STORM	STRAY	SUN	SWITCH	T
TACAN	TAKE	TANGO	TARGET	TAXI
TEEN	TELEPHONE	TEMPERATURE	TEN	TEST
THE	THE1	THIN	THINLY	THIR-
THIRTEEN	THIRTY	THOUSAND	THREE	THROUGH
THUNDER-STORMS	TIME	TIMER	TIMES	TO
TOLOW	TOOL	TORNADO	TOUCHDOWN	TOWER

TRAFFIC	TRIM	TURBULANCE	TURN	TWELVE
TWENTY	TWO	U	UNDER	UNDERCARRIAGE
UNICOM	UNIFORM	UNIT	UNLIMITED	UP
USE	V	VAKUUM	VALVE	VARIABLE
VECTORS	VERIFY	VFR	VHE	VICTOR
VISIBILITY	VOLTS	VOR	VORTAC	W
WAIT	WAKE	WARNING	WATCH	WATTS
WAY	WEATHER	WEST	WHISKEY	WHITE
WIND	WINDOWS	WISKEY	WRONG	X
XRAY	Y	YANKEE	YELLOW	YOU
Z	ZERO	ZULU		

VSM2 – Feminine Voice

(contained as data in VM71003 (lt. Data page VM71005))

AFTERNOON	A_M	EIGHT	EIGHTEEN	ELEVEN
EVENING	FIFTEEN	FIFTY	FIVE	FORTY
FOUR	FOURTEEN	GOOD	IS	MORNING
NINE	NINETEEN	OH	ONE	O_CLOCK
P_M	SEVEN	SEVENTEEN	SIX	SIXTEEN
TEN	THE	THIRTEEN	THIRTY	THREE
TIME	TWELVE	TWENTY	TWO	

VSM3 - free

VSM4 - free

VSM5 - free

VSM6 - free

VSM7 - free

These banks are not used. One can place 64 KBytes of speech date per bank

CRU-Mapping Write-Access

CRU-Adr.	CRU-Bit	MM 3.0	Name	Use
>xx00	0	>0001	DSR-ENA	DSR enable
>xx02	1	>0002	Free	
>xx04	2	>0004	Free	
>xx06	3	>0008	Free	
>xx08	4	>0010	VSMPG0	Address bits of the VSM - ROM
>xx0A	5	>0020	VSMPG1	
>xx0C	6	>0040	VSMPG2	
>xx0E	7	>0080	PGMENA	Program free area for In-System-Programming
>xx10	8	>0100	PEPR13	Address bits for the DSR - ROM
>xx12	9	>0200	PEPR14	
>xx14	A	>0400	PEPR15	
>xx16	B	>0800	RAMENA	RAM instead of DSR-Rom at >5000 to >5FFF
>xx18	C	>1000	PRAM12	Address bits for the System - RAM
>xx1A	D	>2000	PRAM13	
>xx1C	E	>4000	PRAM14	
>xx1E	F	>8000	Free	

CRU-Mapping Read-Access

Without the CRU-ID and VSN-ID no CRU output bits are seen

Banking DSR-ROM

Bank	PEPR13	PEPR14	PEPR15	MM 3.0	Address in ROM	Use
0	0	0	0	>x0xx	>0000 - >1FFF	DSR
1	1	0	0	>x1xx	>2000 - >3FFF	Free
2	0	1	0	>x2xx	>4000 - >5FFF	Data for SPEECH and ALPHON
3	1	1	0	>x3xx	>6000 - >7FFF	Data for SPEECH and ALPHON
4	0	0	1	>x4xx	>8000 - >9FFF	Free
5	1	0	1	>x5xx	>A000 - >BFFF	Free
6	0	1	1	>x6xx	>C000 - >DFFF	Free
7	1	1	1	>x7xx	>E000 - >FFFF	Free

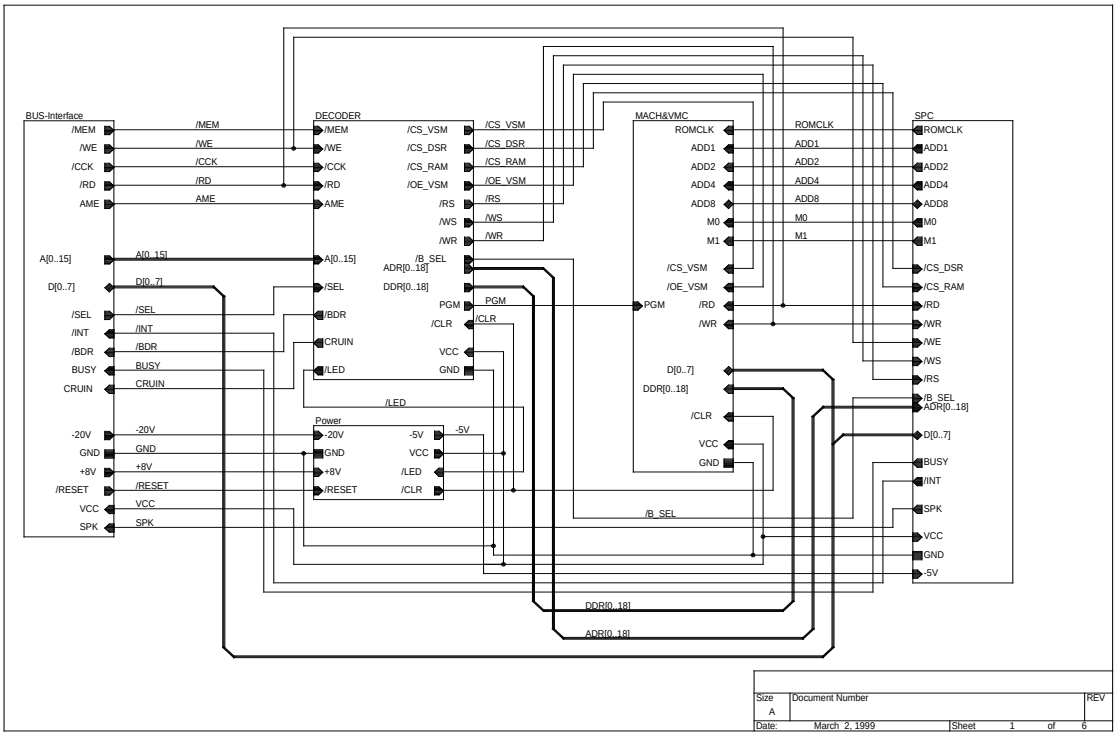
Banking DSR-RAM

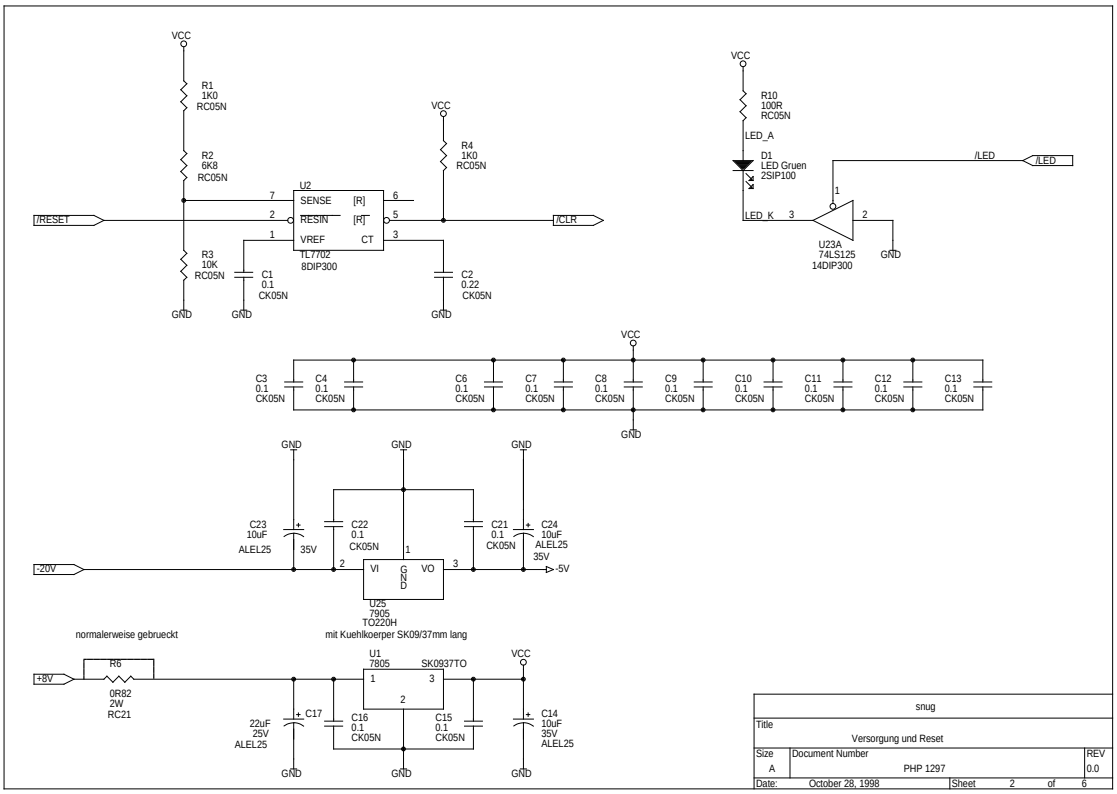
Bank	PRAM12	PRAM13	PRAM14	MM 3.0	Address in RAM	Use
0	0	0	0	>0xxx	>0000 - >0FFF	DSR
1	1	0	0	>1xxx	>1000 - >1FFF	DSR
2	0	1	0	>2xxx	>2000 - >2FFF	Free
3	1	1	0	>3xxx	>3000 - >3FFF	Free
4	0	0	1	>4xxx	>4000 - >4FFF	Free
5	1	0	1	>5xxx	>5000 - >5FFF	Free
6	0	1	1	>6xxx	>6000 - >6FFF	Free
7	1	1	1	>7xxx	>7000 - >7FFF	Free

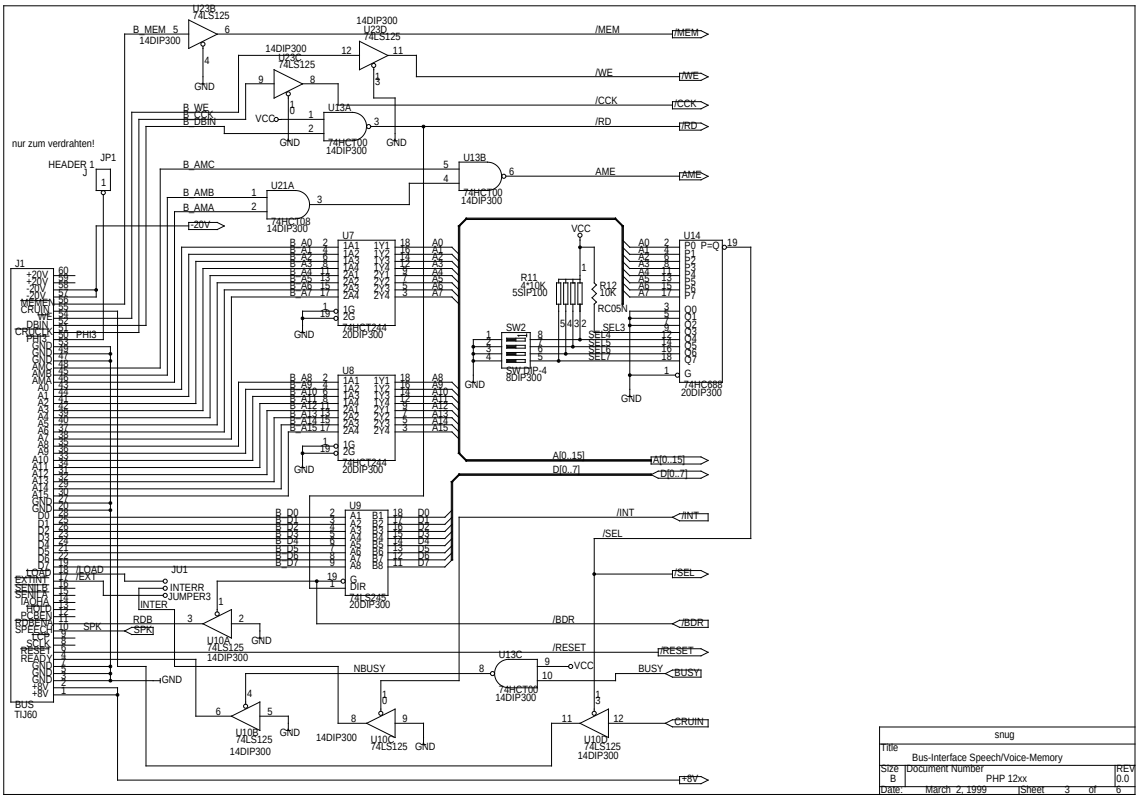
Banking VSM-ROM

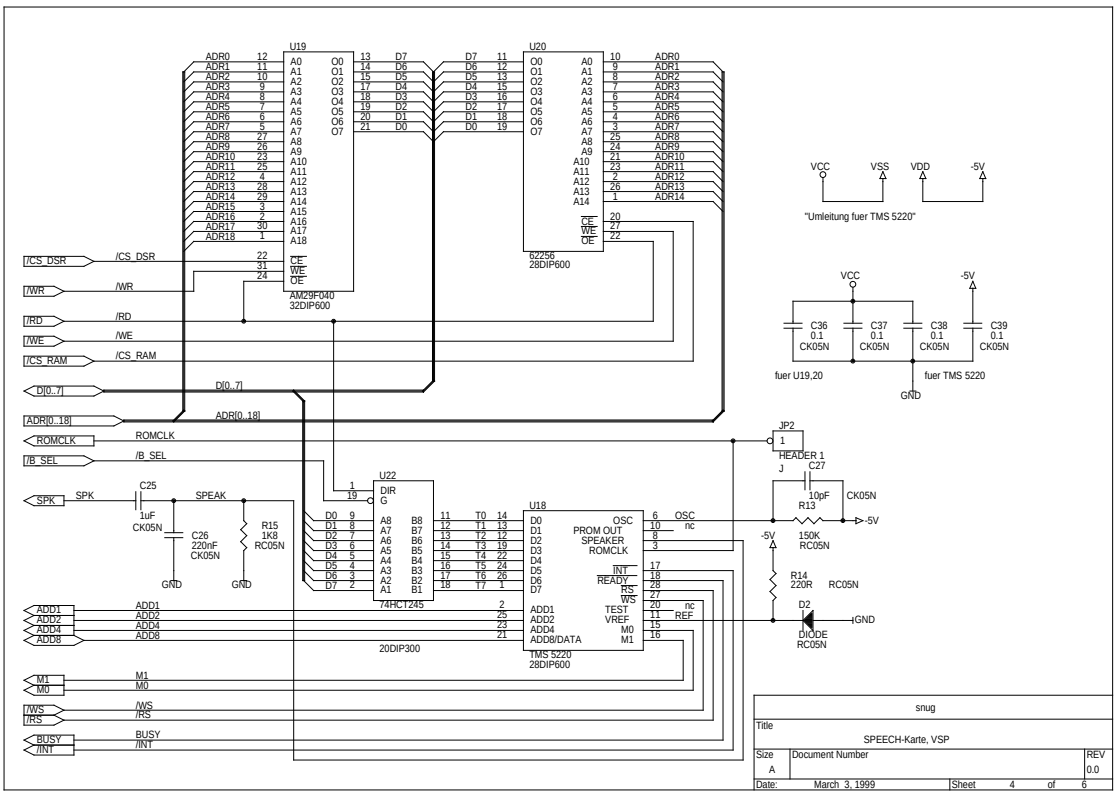
Bank	VSMPG0	VSMPG1	VSMPG2	MM 3.0	Address in ROM	Use
0	0	0	0	>xx0x	>00000 - >0FFFF	VSM0
1	1	0	0	>xx1x	>10000 - >1FFFF	VSM1
2	0	1	0	>xx2x	>20000 - >2FFFF	VSM2
3	1	1	0	>xx3x	>30000 - >3FFFF	VSM3
4	0	0	1	>xx4x	>40000 - >4FFFF	VSM4
5	1	0	1	>xx5x	>50000 - >5FFFF	VSM5
6	0	1	1	>xx6x	>60000 - >6FFFF	VSM6
7	1	1	1	>xx7x	>70000 - >7FFFF	VSM7

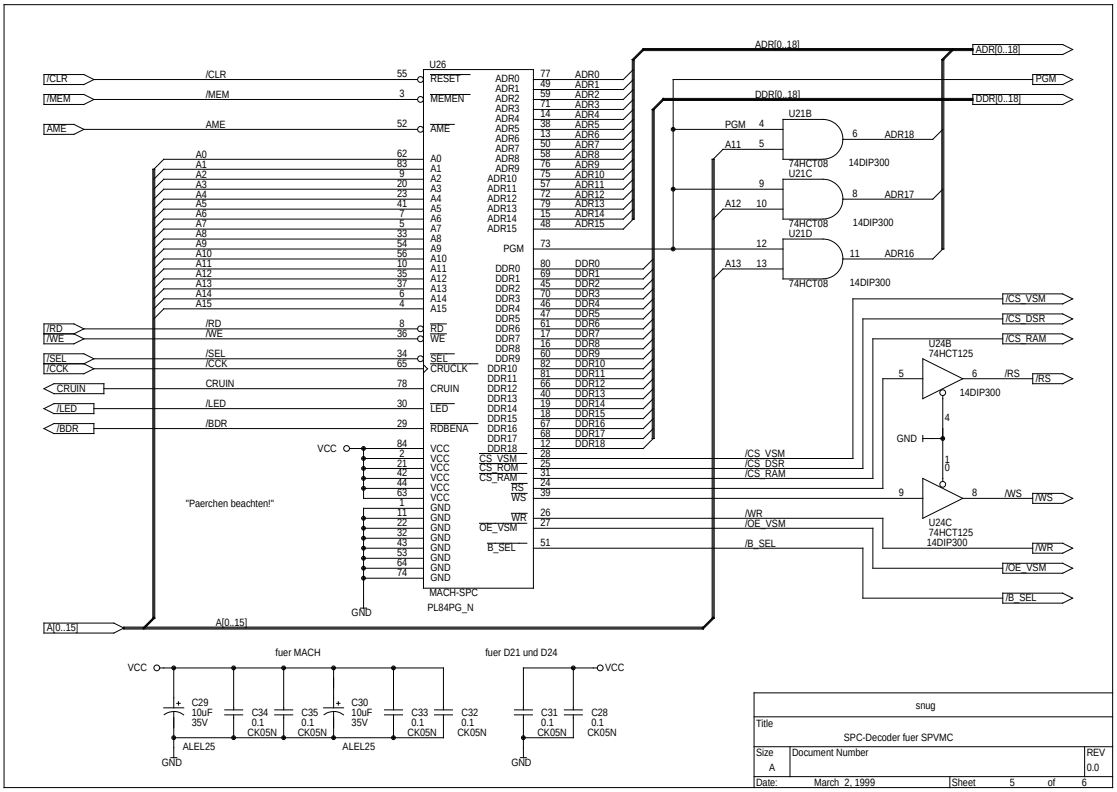
Connection Diagrams

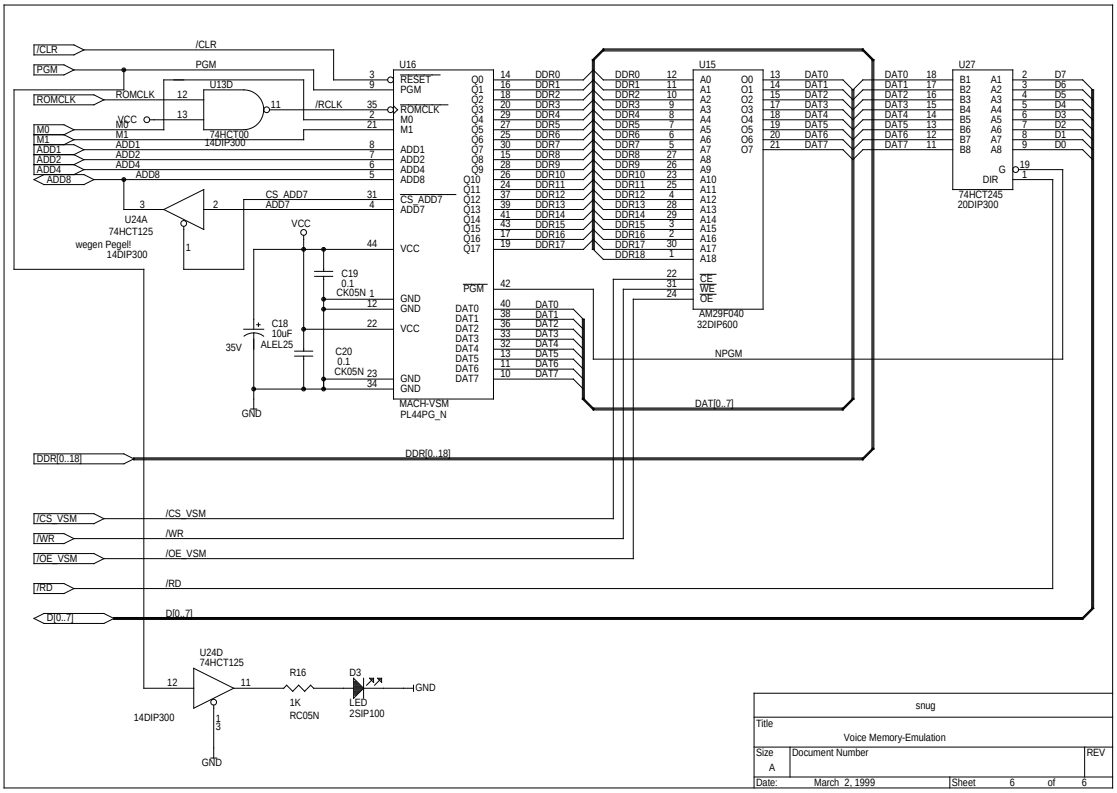





nur zum verdrahten!
HEADER 1
B_MEM_5
B_WE
B_CCK
B_DBIN
B_AMC
B_AMB
B_AMA
+20V
/MEM
/WE
/CCK
/RD
AME
/INT
/SEL
/BDR
/RESET
BUSY
CRUIN
+8V
NBUSY
INTERR
JUMPER3
SPK
/LOAD
/EXT
BUS
TIJ60
snug
Bus-Interface Speech/Voice-Memory
PHP 12xx
Date: March 2, 1999
Sheet 3 of 6


/CS_DSR
/WR
/RD
/WE
/CS_RAM
D[0..7]
ADR[0..18]
ROMCLK
/B_SEL
SPK
SPEAK
ADD1
ADD2
ADD4
ADD8
M1
M0
/WS
/RS
BUSY
/INT
"Umleitung fuer TMS 5220"
fuer U19,20
fuer TMS 5220
snug
SPEECH-Karte, VSP
Date: March 3, 1999
Sheet 4 of 6


U26
MACH-SPC
PL84PG_N
"Paerchen beachten!"
U21B
U21C
U21D
74HCT08
14DIP300
U24B
74HCT125
U24C
fuer MACH
fuer D21 und D24
ALEL25
snug
SPC-Decoder fuer SPVMC
Size A
Document Number
REV 0.0
Date: March 2, 1999
Sheet 5 of 6


U16
MACH-VSM
PL44PG_N
U15
AM29F040
32DIP600
U27
74HCT245
20DIP300
U24A
74HCT125
wegen Pegel!
14DIP300
U24D
74HCT125
14DIP300
R16
1K
RC05N
D3
LED
2SIP100
snug
Voice Memory-Emulation
Size A
Document Number
REV
Date: March 2, 1999
Sheet 6 of 6