BASIC 52

8052 MICROCONTROLLER BASIC

QUICK REFERENCE

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BASIC 52 Edition 3.00 *Rel. 11 January 1999*

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MCS BASIC 52 is a powerfull software tool , capable of managing a BASIC high level programmation of all Intel 51 family based cards. It is a "romated" software that generates "romable" software in an easy to use enviroment; it also reduces the necessity of external hardware (in circuit emulator, EPROM programmer, etc;) and at the same time it speeds up debugging phase of the User application program.
MCS BASIC 52 is referred to generic software tools, but each cards has a specific version of software associated to their hardware features; so for each card the name **MCS BASIC 52** become **BASIC** followed by the **card final name**.

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IMPORTANT

Although all the information contained herein have been carefully verified, **Grifo**® assumes no responsibility for errors that might appear in this document, or for damage to things or persons resulting from technical errors, omission and improper use of this manual and of the related software and hardware.
Grifo® reservs the right to change the contents and form of this document, as well as the features and specification of its products at any time, without prior notice, to obtain always the best product.
For specific informations on the components mounted on the card, please refer to the Data Book of the builder or second sources.

SYMBOLS DESCRIPTION

In the manual could appear the following symbols:

⚠ Attention: Generic danger

⚡ Attention: High voltage

Trade marks

GENERAL INDEX

FIGURE INDEX

QUICK REFERENCE TO MCS BASIC 52

This quick reference to the BASIC 52 programming language lists the keywords alphabetically, along with brief descriptions of function and use.

CONVENTIONS

The reference uses the following typographic conventions:

KEYWORDS (boldface uppercase)
BASIC 52 keywords

placeholders (italics)
Variables, expressions, constants, or other information that you must supply

[*optional items*] (enclosed in square brackets)
Items that are not required

repeating elements... (followed by ellipsis (three dots))
You may add more items with the same form as the preceding item.

OPERATOR LIST

C = command mode
R = run mode

variable = *expression* C,R
Assigns a value to a variable

expression = *expression* C,R
Equivalence test (relational operator)

expression + *expression* C,R
Add

expression **-** *expression* C,R
Subtract

expression ***** *expression* C,R
Multiply
expression / *expression* C,R
Divide

expression ****** *expression* C,R
Raises first expression to value of second expression (exponent)

expression <> *expression* C,R
Inequality test (relational operator)

expression < *expression* C,R
Less than test (relational operator)

expression > *expression* C,R
Greater than test (relational operator)

expression <= *expression* C,R
Less than or equal test (relational operator)

expression >= *expression* C,R
Greater than or equal test (relational operator)

INSTRUCTIONS LIST

?
Same as PRINT

ABS (*expression*) C,R
Returns the absolute value of expression

expression **.AND.** *expression* C,R
Logical AND

ASC(*character*) C,R
Returns the value of ASCII character

ATN(*expression*) C,R
Returns the arctangent of expression

BAUD *expression* C,R
Sets the baud rate for LPT (pin 8). For proper operation, XTAL must match the system's crystal frequency.

CALL *integer* C,R
Calls an assembly-language routine at the specified address in program memory.

CBY(*expression*) C,R
Retrieves the value at *expression* in program, or code, memory.

CHR(*expression*) C,R
Converts *expression* to its ASCII character.

CLEAR C,R
Sets all variables to 0, resets all stacks and interrupts evoked by BASIC.

CLEARI C,R
Clears all interrupts evoked by BASIC. Disables ONTIME, ONEX1.

CLEARS C,R
Resets BASIC 52’s stacks. Sets control stack = 0FEh, argument stack = 1FEh, internal stack = value in 3Eh in internal RAM.

CLOCK0 C,R
Disables the real-time clock.

CLOCK1 C,R
Enables the real-time clock.

CONT C
Continues executing program after STOP or CONTROL+C.

COS(expression) C,R
Returns the cosine of *expression*

CR
PRINT option. Causes a carriage return, but no line feed, on the host display.

DATA *expression* [,...,*expression*] R
Specifies *expressions* to be retrieved by a READ statement.

DBY(*expression*) C,R
Retrieves or assigns a value at *expression* in internal data memory.

DIM *array name* [(*size*)] [,...*array name*(*size*)] C,R
Reserves storage for an array. Default size is 11 (0-10). Size limits are 0-254.

DO: [*program statements*]**: UNTIL** *relational expression* R
Executes all statements between DO and UNTIL until relational *expression* is true.

DO: [*program statements*]**: WHILE** *relational expression* R
Executes all statements between DO and WHILE until relational *expression* is false.

END R
Terminates program execution.

EXP (*expression*) C,R
Raises e (2.7182818) to the power of *expression*

FOR *counter variable* **=** *start-count expression* C,R
  TO *end-count expression* **[**
  STEP *count-increment expression*]**: [***program statements*]**:**
  NEXT [*counter variable*]
Executes all statements between FOR and NEXT the number of times specified by the counter and step *expressions*.

FPROG, **FPROG1-FPROG6** C
Like PROG, PROG1-PROG6, but using Intelligent programming algorithm.

FREE C,R
Returns the number of bytes of unused external data RAM.

GET R
Contains the ASCII code of a character received from the host computer's keyboard. After a program reads the value of GET (For example, G=GET), GET returns to 0 until a new character arrives.

GOSUB *line number* R
Causes BASIC 52 to transfer program control to a subroutine beginning at *line number*. A RETURN statement returns control to the line number following the GOSUB statement.

GOTO *line number* C,R
Causes BASIC 52 to jump to *line number* in the current program.

IDLE R
Forces BASIC 52 to wait for ONTIME or ONEX1 interrupt.

IE C,R
Retrieves or assigns a value to the 8052's special function register IE.

IF *relational expression* R
    THEN *program statements*
    [**ELSE**] [*program statements*]
If relational *expression* is true, executes program statements following THEN. If relational *expression* is false, executes program statements following ELSE, if used.

INPUT [**"***Prompt message***"**][,] *variable* [,*variable*] [,...*variable*] R
Displays a question mark and optional prompt message on the host computer and waits for keyboard input. Stores input in *variable*(s). A comma before the first variable suppresses the question mark.

INT(*expression*) C,R
Returns integer portion of *expression*.

IP C,R
Retrieves or assigns a value to the 8052's special function register IP.

LD@ *expression* C,R
Retrieves a 6-byte floating-point number and places it on the argument stack. *Expression* points to the most significant byte of the number.

LEN C,R
Returns the number of bytes in the current program.

[**LET**] *variable = expression* C,R
Assigns a variable to the value of *expression*. Use of LET is optional.

LIST[*line number*][-*line number*] C,R
Displays the current program on the host computer.

LIST# [*line number*][-*line number*] C,R
Writes the current program to LPT (pin 8).

LIST@ [*line number*][-*line number*] C,R
Writes the current program to a user-written assembly-language output driver at 40C3h. Setting bit 7 of internal data memory location 27H enables the driver.

LOG(*expression*) C,R
Returns natural logarithm of *expression*.

MTOP [=*highest address in RAM program space*] C,R
Assigns or reads the highest address BASIC 52 will use to store variables, strings, and RAM programs. Usually 7FFFh or lower, since EPROM space begins at 8000h.

NEW C
Erases current program in RAM; clears all variables.

NOT (*expression*) C,R
Returns 1's complement (inverse) of *expression*.

NULL [*integer*] C
Sets the number (0-255) of NULL characters (ASCII 00) that BASIC 52 sends automatically after a carriage return. Only very slow printers or terminals need these extra nulls.

ON *expression* **GOSUB** *line number* [,*line number*] [,...,*line number*] R
Transfers program control to a subroutine beginning at one of the line numbers in the list. The value of *expression* matches the position of the line number selected, with the first line number at position 0.

ON *expression* **GOTO** *line number* [,*line number*] [,...,*line number*] R
Transfers program control to one of the line numbers in a list of numbers. The value of *expression* matches the position of the line number selected, with the first line number at position 0.

ONERR *line number* R
Passes control to *line number* following an arithmetic error. Arithmetic errors include ARITH. OVERFLOW, ARITH. UNDERFLOW, DIVIDE BY ZERO, and BAD ARGUMENT.

ONEX1 *line number* R

On interrupt 1 (pin 13), BASIC 52 finishes executing the current statement, and then passes control to an interrupt routine beginning at *line number*. The interrupt routine must end with RETI.

ONTIME *number of seconds, line number* R

When TIME = *number of seconds*, BASIC 52 passes control to an interrupt routine beginning at *line number*. The interrupt routine must end with RETI. CLOCK1 starts the timer.

expression **.OR.** *expression* C,R

Logical OR

P.

Same as PRINT

PCON C,R

Retrieves or assigns a value to the 8052's special function register PCON.

PGM C,R

Programs an EPROM, EEPROM, or NV RAM with data from memory. The following data must be stored in internal data memory in the locations listed:

1Bh,19h	High byte, low byte of first address of data to program
1Ah,18h	High byte, low byte of first address to be programmed - 1
1Fh,1Eh	High byte, low byte indicating number of bytes to program
40h,41h	High byte, low byte indicating width of programming pulse.
	High byte = ((65536 - pulse width in seconds * XTAL/12) / 256.
	Low byte = ((65536 - pulse width in seconds * XTAL/12) .AND. 0FFh.
26h	For Intelligent programming, set bit 3.
	For 50-millisecond programming, clear bit 3.

PH0. C,R

Same as PRINT, but displays values in hexadecimal format. Uses two digits to display values less than 0FFh.

PH0.# C,R

Same as PRINT#, but displays values in PH0. hexadecimal format

PH0.@ C,R

Same as PRINT@, but outputs values in PH0. hexadecimal format.

PH1. C,R

Same as PRINT, but displays values in hexadecimal format. Always displays four digits.

PH1.# C,R

Same as PRINT#, but displays values in PH1. hexadecimal format.

PH1.@ C,R
Same as PRINT@, but outputs values in PH1. hexadecimal format.

PI C,R
Constant equal to 3.1415926.

POP *variable* [,...*variable*] C,R
Assigns the value of the top of the argument stack to *variable*.

PORT1 C,R
Retrieves or assigns a value to PORT1 (pins 1-8).

PRINT [*expression*] [,...*expression*] [,] C,R
Displays the value of *expression(s)* on the host computer. A comma at the end of the statement suppresses the CARRIAGE RETURN/LINEFEED. Values are separated by two spaces. Additional PRINT options are CR, SPC, TAB, USING.

PRINT# C,R
Same as PRINT, but outputs to LPT (pin 8). BAUD and XTAL values affect the PRINT# rate.

PRINT@ C,R
Same as PRINT, but outputs to a user-defined output driver. Requires an assembly language output routine at 403Ch in external program memory. Setting bit 7 of internal data memory location 24h enables the output routine.

PROG C
Stores the current RAM program in the EPROM space.

PROG1 C
Saves the serial-port baud rate. On power-up or reset, BASIC 52 boots without having to receive a space character. The terminal's baud rate must match the stored value.

PROG2 C
Like PROG1, but on power-up or reset, BASIC 52 also begins executing the first program in the EPROM space.

PROG3 C
Like PROG1, but also saves MTOP. On power-up or reset, BASIC 52 clears memory only to MTOP.

PROG4 C
Like PROG2, but also saves MTOP. On power-up or reset, BASIC 52 clears memory only to MTOP.

PROG5 C
Like PROG3, but also reads 5Fh in external data memory on power-up or reset. If 5Fh contains 0A5h, BASIC 52 doesn’t clear external data memory. If data memory location 5Eh contains 34h, BASIC 52 will automatically begin execut-ing a program in external data memory.

PROG6 C
Like PROG5, but if external data memory location contains 5Fh, BASIC 52 calls a user-written assembly-language reset routine beginning at program memory 4039h.

PUSH *expression* [,...*expression*] C,R
Places the values of *expression*(s) sequentially on BASIC 52’s argument stack.

PWM *expression1*, *expression2*, *expression3* C,R
Outputs a pulse-width modulated (PWM) sequence of pulses on pin 3. *Expression1* is the width of each high pulse, expressed in clock cycles. *Expression2* is the width of each low pulse, expressed in clock cycles. *Expression3* is the number of PWM cycles output. One clock cycle = 12/XTAL. One PWM cycle = one high pulse plus one low pulse. *Expression1* and *Expression2* must each be at least 25. Maximum for each Expression is 65535.

RAM C
Selects the current program in the RAM space.

RCAP2 C,R
Retrieves or assigns a value to the 8052’s special function registers RCAP2H and RCAP2L.

READ *variable* [,...,*variable*] R
Retrieves the expressions in a DATA statement and assigns each expression to a variable.

REM C,R
Introduces a comment, or remark. BASIC 52 ignores all text after REM in a program line.

RESTORE R
Resets READ pointer to the first expression in the DATA statement.

RETI R
Returns program control to the line number following the most recently executed ONEX1 or ONTIME statement.

RETURN R
Returns program control to the line number following the most recently executed GOSUB statement.

RND C,R
Returns a pseudo-random number between 0 and 1 inclusive.

ROM [*program number*] C
Selects a program in the EPROM space (beginning at 8000h). Default program number is 1.

RROM [*program number*] C,R
Changes to ROM mode and runs the specified program. Default program number is 1.

RUN R
Executes the current program. Clears all variables.

SGN (*expression*) C,R
Returns +1 if *expression* >=0, zero if expression = 0, and -1 if *expression* <0.

SIN(*expression*) C,R
Returns the sine of *expression*

SPC (*expression*)
PRINT option. Causes the display to place *expression* additional spaces (besides the minimum two) between values in a PRINT statement.

SQR(*expression*) C,R
Returns square root of expression.

ST@ *expression* C,R
Copies a 6-byte floating-point number from the argument stack to external data memory. *Expression* points to the most significant byte of the number.

STOP
Halts program execution.

STRING *expressions, expression2* C,R
Allocates memory for strings (variables each consisting of a series of text characters).
Expression1 = (*Expression2* * number of strings) + 1.
Expression2 = maximum number of bytes (characters) per string + 1. Executing STRING clears all variables. Maximum number of strings is 255.

T2CON C,R
Retrieves or assigns a value to the 8052's special function register T2CON.

TAB(*expression*)
PRINT option. Specifies the position (number of spaces) to begin displaying the next value in the PRINT statement.

TAN(*expression*) C,R
Returns the tangent of *expression*.

TCON C,R
Retrieves or assigns a value to the 8052’s special function register TCON.

TIME C,R
Retrieves or assigns a value, in seconds, to BASIC 52’s real-time clock.

TIMER0 C,R
Retrieves or assigns a value to the 8052’s special function registers TH0 and TL0.

TIMER1 C,R
Retrieves or assigns a value to the 8052’s special function registers TH1 and TL1.

TIMER2 C,R
Retrieves or assigns a value to the 8052’s special function registers TH2 and TL2.

TMOD C,R
Retrieves or assigns a value to the 8052’s special function register TMOD.

U.
PRINT option. Same as USING.

UI0 C,R
Restores BASIC 52’s console input driver after using UI1.

UI1 C,R
Allows a user-provided assembly-language console (host computer) input routine to replace BASIC 52’s console input driver. External program memory location 4033h must contain a jump to the user’s routine.

UO0 C,R
Restores BASIC 52’s console output driver after using UI1.

UO1 C,R
Allows a user-provided assembly-language console (host computer) output routine to replace BASIC 52’s console output driver. External program memory location 4030h must contain a jump to the user’s routine.

USING (**F***N*)
PRINT option. Causes BASIC 52 to output numbers in exponential format with N significant digits. BASIC 52 always outputs at least 3 significant digits. Maximum *expression* is 8.

USING(0)
PRINT option. Causes BASIC 52 to output numbers from ±.99999999 to ±0.1 as decimal fractions. Numbers outside this range display in USING (FN) format. USING(0) is the default format.

USING (#[...#][.]#[...#])
PRINT option. Causes BASIC 52 to output numbers using decimal fractions, with # representing the number of significant digits before and after the decimal point. Up to eight # characters are allowed.

XBY(*expression*) C,R
Retrieves or assigns a value in external data memory.

XFER C
Copies the current program from the EPROM space (beginning at 8010h for program 1) to RAM (beginning at 200h), and selects RAM mode.

expression **.XOR.** *expression* C,R
Logical exclusive OR

XTAL C,R
Assigns a value equal to the system's crystal frequency, for use by BASIC 52 in timing calculations.

BASIC 52 MODIFICATIONS FOR GRIFO®'S CARDS

Here follows a brief description of MCS BASIC 52 variation=**BASIC xxx**, performed by **grifo®** to satisfy all user's requests.

REMOVED COMMANDS, INSTRUCTIONS, OPERATORS

Removed commands	**Removed instruction**	**Removed operators**
LIST#	BAUD	None
FPROG	PRINT#	
FPROG1	PH0.#	
FPROG2	PH1.#	
FPROG3	PWM	
FPROG4		
FPROG5		
FPROG6		

ADDED COMMANDS

ERASE -> Deletes EEPROM content removing all the application program saved in with command PROG,PROG1,...PROG6.

ADDED OPERATORS

None.

ADDED INSTRUCTIONS

Here a summary of the differences between original MCS BASIC 52 and BASIC for GRIFO's cards. This additions are really interesting to manage on board hardware resources with high level intrunctions. With these instructions the development of the application program is really faster and easier, even for first time users.

	BASIC 52 FOR								
Commands and instructions	GPC® F2	GPC® 51	GPC® 552	GPC® 553	GPC® 554	GPC® 323	GPC® 324	GPC® R63	GPC® T63
ERASE	•	•	•	•	•	•	•	•	•
A_D			•	•	•	•			
ALARM			•	•		•			
BL_EE BL_EE2			•	•	•	•	•		
BY_EE			•	•	•	•	•		
COM2			•	•	•	•	•		
DISPLAY			•	•	•	•	•		
GES_RTC			•	•		•			
KEYB			•	•	•	•	•		
P82C55			•			•	•		
RW_SFR			•	•	•	•	•		
SET_PWM			•	•	•				

FIGURE 1: ADDED INSTRUCTION TABLE

SECOND SERIAL MANAGEMENT (SOFTWARE SERIAL LINE)

COM2 (expression)
This procedure manages all the operation on the software serial line. for the trasmission on this line the user must use the PRINT@... instruction, while for the reception, there is a buffer allocated in EXTERNAL RAM. If the software serial line management is active, the user can't use the TIMER 0 instruction because this timer is used as baud rate generator.

(expression) --> 0 = It disables the software serial line
1 = It disables the software serial line at 1200 BAUD
2 = It disables the software serial line at 2400 BAUD
3 = It disables the software serial line at 4800 BAUD
4 = It reads the characters number already saved in the reception buffer
5 = It resets the reception buffer

A/D CONVERTER MANAGEMENT

A_D (*expression*)
It performs an A/D conversion of an analog input.The conversion is made on the request channel and the result is returned to the main program.

(expression) --> Channel number (0 to 7)

REAL TIME CLOCK INTERRUPT MANAGEMENT

ALARM (*expression1*),(*expression2*),(*expression3*),(*expression4*),
(*expression5*),(*expression6*),(*expression7*),(*expression8*)

It enables the interrupt of RTC so it can generate time based and to manage the allarm.

(*expr1*)	-->	0	= It enables NO CLOCK ALARM (ALARM MODE)
		1	= It enables DAILY ALARM (ALARM MODE)
		2	= It enables WEEKDAY ALARM (ALARM MODE)
		3	= It enables DATED ALARM (ALARM MODE)
		4	= It enables TIMER (TIMER MODE)
		5	= Reset flag of ALARM

TIMER MODE

(*expr2*)	-->	0 to 99	= Count byte
(*expr3*)	-->	0	= No timer
		1	= It counts "CENTS OF SECOND"
		2	= It counts "SECONDS"
		3	= It counts "MINUTES"
		4	= It counts "HOURS"
		5	= It counts "DAYS"

ALARM MODE

(*expr2*)	-->	Byte with HOURS value (0 to 23).
(*expr3*)	-->	Byte with MINUTES value (0 to 59)
(*expr4*)	-->	Byte with SECONDS value (0 to 59)
(*expr5*)	-->	Byte with DAY OF WEEK value (0 to 59)
(*expr6*)	-->	Byte with DAY OF MONTH value(1 to 31)
(*expr7*)	-->	Byte with MONTH value (1 to 12)
(*expr8*)	-->	Byte with YEAR value (0 to 3)

BLOCK READ/WRITE ON SERIAL EEPROM AND RAM RTC

BL_EE (*expression1*),(*expression2*),(*expression3*)

It performs a data block read or write operation at a specified address, on serial EEPROM.The W/R data buffer is located in EXTERNAL RAM address.

(expression1)	-->	0 = Reading of a data block 1 = Writing of a data block
(expression2)	-->	Initial location address (0 to last device address)
(expression3)	-->	Number of bytes to write or read (1 to 255)

BYTE READ/WRITE ON SERIAL EEPROM AND RAM RTC

BY_EE (expression1),(expression2),(expression3)

It performs a byte read or write operation at a specified address, on serial EEPROM.The user must remember that in read procedure the (*expression3*) parameter must be given even if it has no meaning.

(expression1)	-->	0 = Reading of byte 1 = Writing a byte
(expression2)	-->	Location address (0 to last device address)
(expression3)	-->	Byte to write (0 to 255)

OPERATOR KEYBOARD MANAGEMENT

KEYB (*expression*)
It enables or disables the matrix keyboard scanning and reads the possible key pressed code. This procedure can start or stop a periodic keyboard scanning, with a debouncing on the pressed key, or it can return the pressed key code (0 if no key is pressed) through the stack.

(*expression*) --> 0 = Keyboard scanning OFF.
1 = Keyboard scanning ON.
2 = Return the pressed key code (0 if no key is pressed) through the stack.The keyboard scanning is enabled if it was OFF.

OPERATOR DISPLAY SELECTION AND INITIALIZATION

DISPLAY (*expression*)
It inizializes the selected display.Remember that the user must call this new instruction before using the output ridirection (UO1) instruction.

(*expression*) --> 0 = FUTABA 20x2
1 = FUTABA 40x1
2 = FUTABA 40x2
3 = FUTABA 40x4
4 = LCD 20x2
5 = LCD 20x4
6 = LCD 40x2
7 = LCD 40x4

82C55 INITIALIZATION FOR CONSOLE REDIRECTION MANAGEMENT

P8255 (*expression*)
It initializes PPI 82c55 so it can manage a user pannell. It is necessary to call it only once before to use the other user pannell instruction (KEYB,DISPLAY,UO1).

(expression) --> 0 = PORT in INPUT
1 = PORT in OUTPUT

SFR (SPECIAL FUNCTION REGISTER) READ/WRITE

RW_SFR (*expression1*),(*expression2*),(*expression3*)
It performs a special function register (SFR) read or write operations.
The user must remember that in "read procedure" the (*expression3*) parameter must be given even if it has no meaning. The SFR identification byte is a numeric code, with the following meaning:

SFR NAME	SFR CODE	SFR NAME	SFR CODE
	for **GPC® 552,553,554**		for **GPC® 323,324**
CTCON	0	DPL1	0
CTH3	1	DPH1	1
CTH2	2	DPS	2
CTH1	3	CKCON	3
CTH0	4	EXIF	4
CMH2	5	SCON1	5
CMH1	6	SBUF1	6
CMH0	7	TA	7
CTL3	8	WDCON	8
CTL2	9	EIE	9
CTL1	10	EIP	10
CTL0	11		
CML2	12		
CML1	13		
CML0	14		
IEN1	15		
IP1	16		
RTE	17		
S1ADR	18		
S1DAT	19		
S1STA	20		
S1CON	21		
STE	22		
TMH2	23		
TML2	24		
TM2CON	25		
TM2IR	26		
T3	27		
P4	28		
P5	29 (it is read only)		

(*expression1*) --> 0 to 1 = R/W selection byte (0=Reading; 1=Writing).
(*expression2*) --> 0 to 29 = SFR identification byte.
(*expression3*) --> 0 to 255 = Byte to write.

REAL TIME CLOCK MANAGEMENT

GES_RTC (*expression1*),(*expression2*),(*expression3*),(*expression4*),
(*expression5*),(*expression6*),(*expression7*),(*expression8*)

It initializes the RTC or return date or its time .The user must remember that in read procedure all parameters must be given even if they have no meaning.

(*expr1*) --> 0 = Readinf of HOUR,MINUTE,SECOND.
--> 1 = Reading of DAY of WEEK, DAY, MONTH, YEAR.
--> 2 = It inizializes of the RTC.
(*expr2*) --> Byte to write hours (0 to 23)
(*expr3*) --> Byte to write minutes (0 to 59)
(*expr4*) --> Byte to write seconds (0 to 59)
(*expr5*) --> Byte to write the day of week (0 to 6)
(*expr6*) --> Byte to write the day of month (1 to 31)
(*expr7*) --> Byte to write month (1 to 12)
(*expr8*) --> Byte to write year (0 to 3)

PWM LINES MANAGEMENT

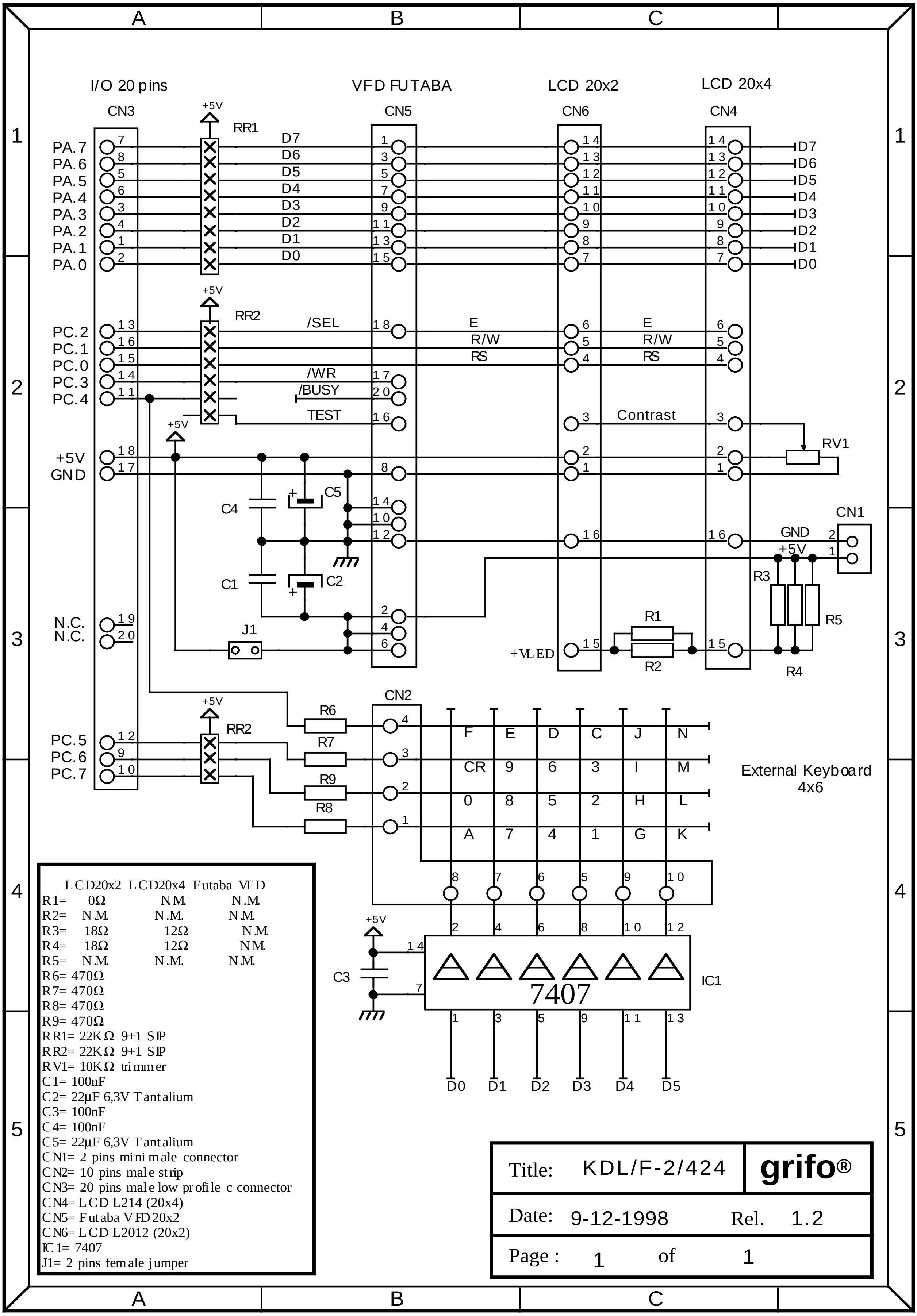
SET_PWM (*expression1*),(*expression2*),(*expression3*)

It generates PWM signals on CPU line.
(*expression1*) --> PWM line selection
(*expression2*) --> Frequency
(*expression3*) --> Duty_Cycle (0 to 100%)

If (*expression2*) and (*expression3*) are both set to 0 the PWM line is set and maintened at "0" logic value.

If (*expression2*) and (*expression3*) are both set to 1 the PWM line is set and maintened at "1" logic value.

APPENDIX A: OPERATOR INTERFACE ELECTRIC DIAGRAM



	LCD20x2	LCD20x4	Futaba VFD
R1=	0Ω	N.M.	N.M.
R2=	N.M.	N.M.	N.M.
R3=	18Ω	12Ω	N.M.
R4=	18Ω	12Ω	N.M.
R5=	N.M.	N.M.	N.M.

R6= 470Ω
R7= 470Ω
R8= 470Ω
R9= 470Ω
RR1= 22KΩ 9+1 SIP
RR2= 22KΩ 9+1 SIP
RV1= 10KΩ trimmer
C1= 100nF
C2= 22μF 6,3V Tantalium
C3= 100nF
C4= 100nF
C5= 22μF 6,3V Tantalium
CN1= 2 pins mini male connector
CN2= 10 pins male strip
CN3= 20 pins male low profile c connector
CN4= LCD L214 (20x4)
CN5= Futaba VFD 20x2
CN6= LCD L2012 (20x2)
IC1= 7407
J1= 2 pins female jumper

Title:	KDL/F-2/424		grifo®
Date:	9-12-1998	Rel.	1.2
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FIGURE A-1: KDX x24 ELECTRIC DIAGRAM

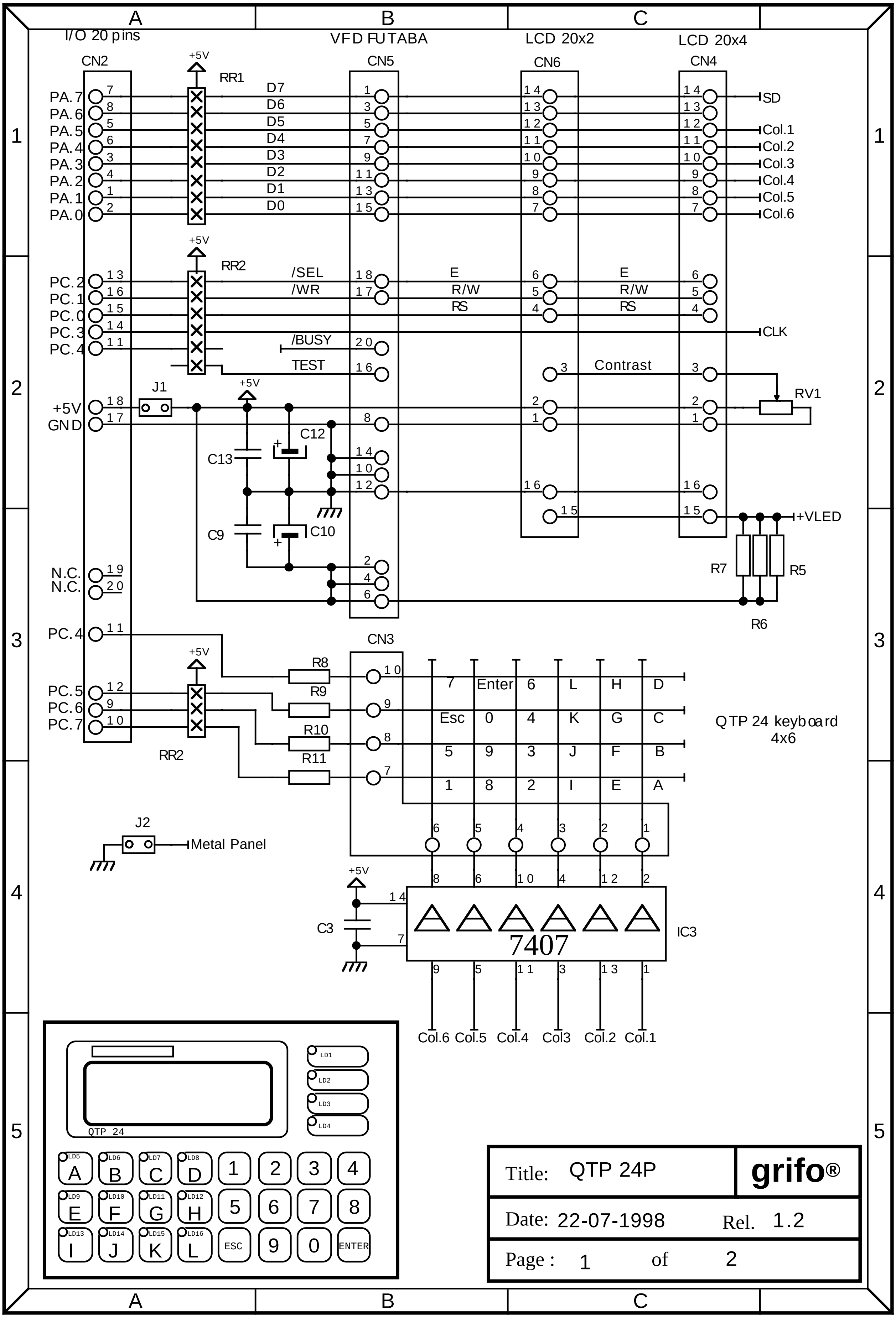


FIGURE A-2: QTP 24P ELECTRIC DIAGRAM PART 1

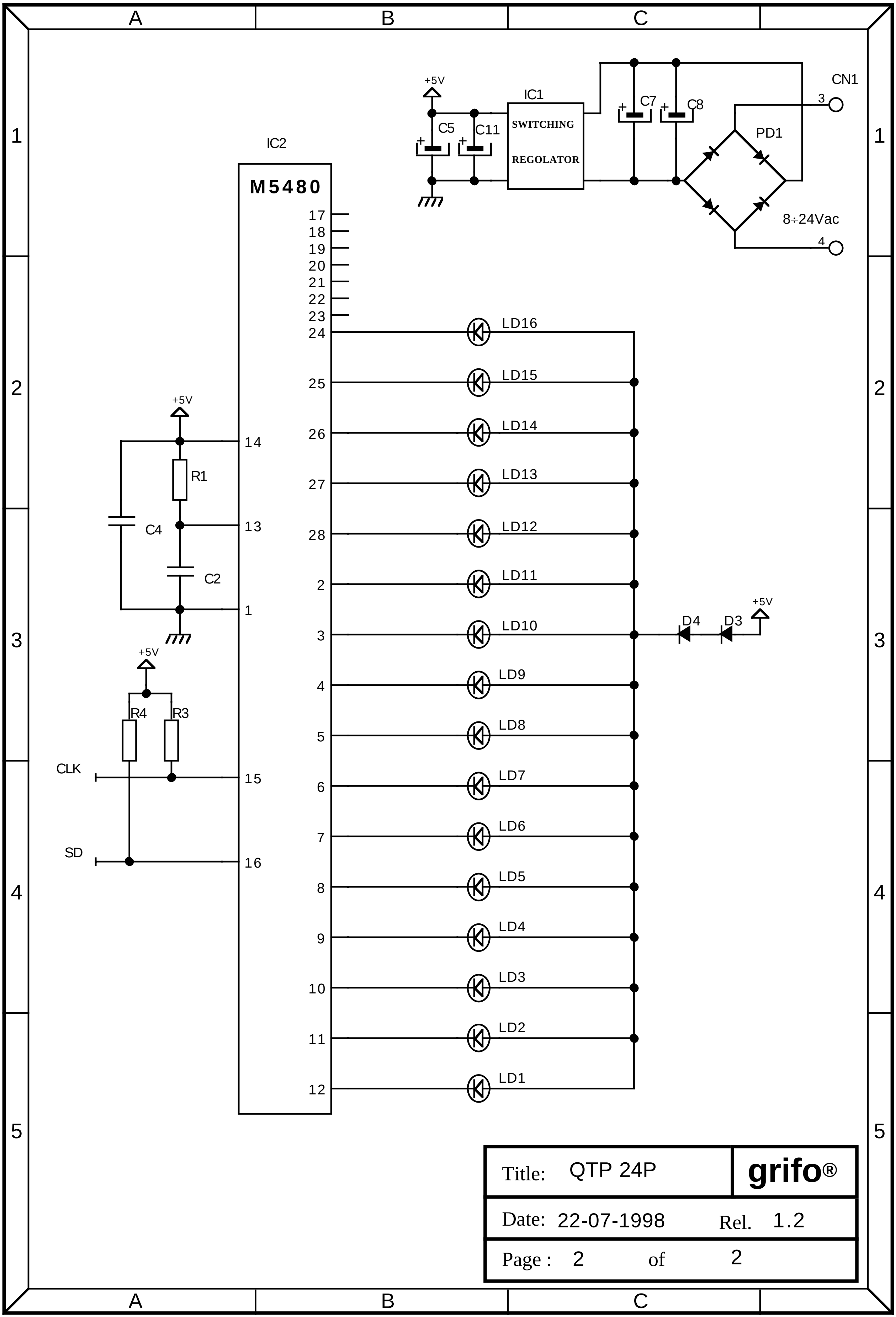
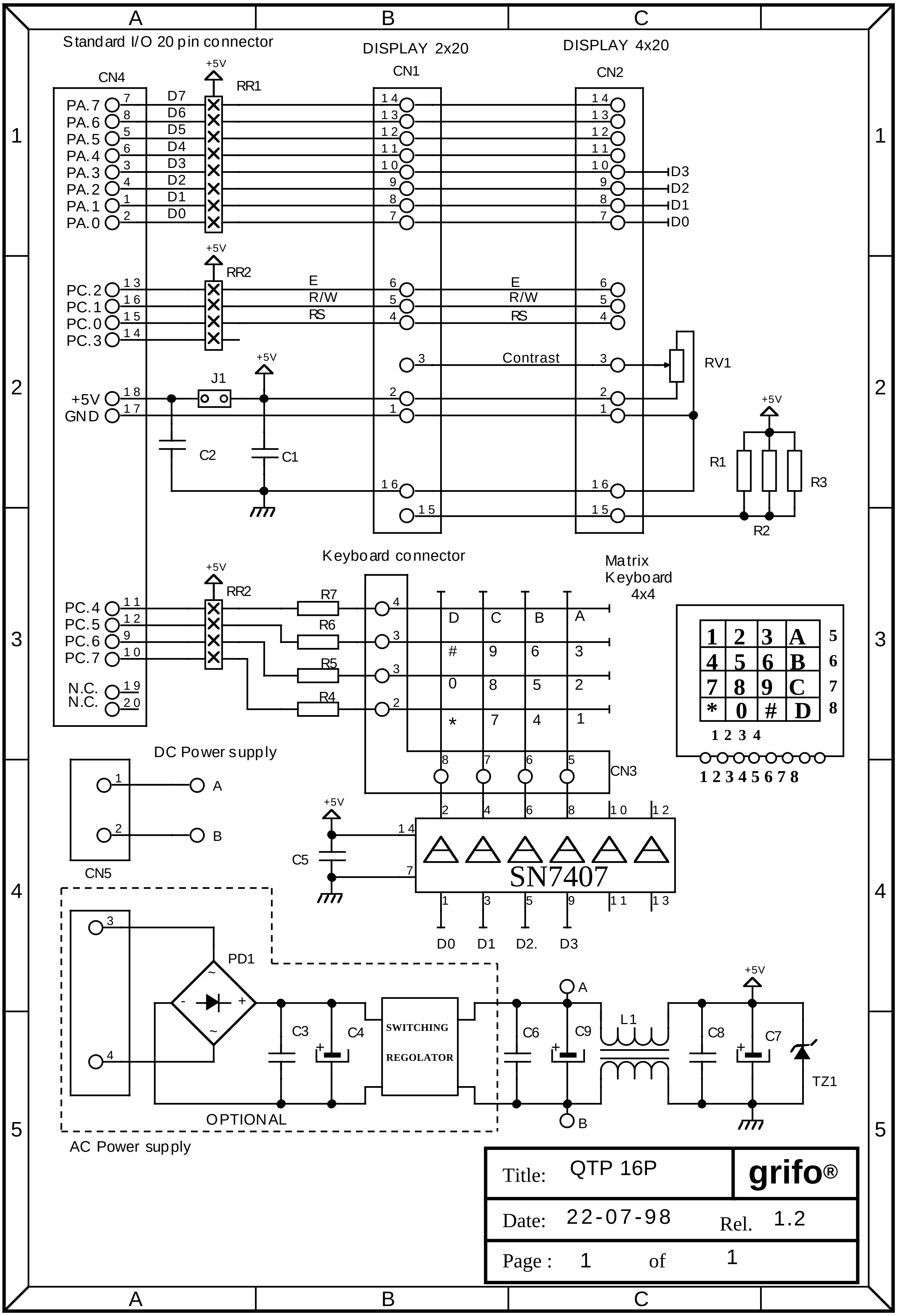


FIGURE A-3: QTP 24P ELECTRIC DIAGRAM PART 2



Title: QTP 16P	grifo®
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Page : 1 of 1	

FIGURE A-4: QTP 16P ELECTRIC DIAGRAM

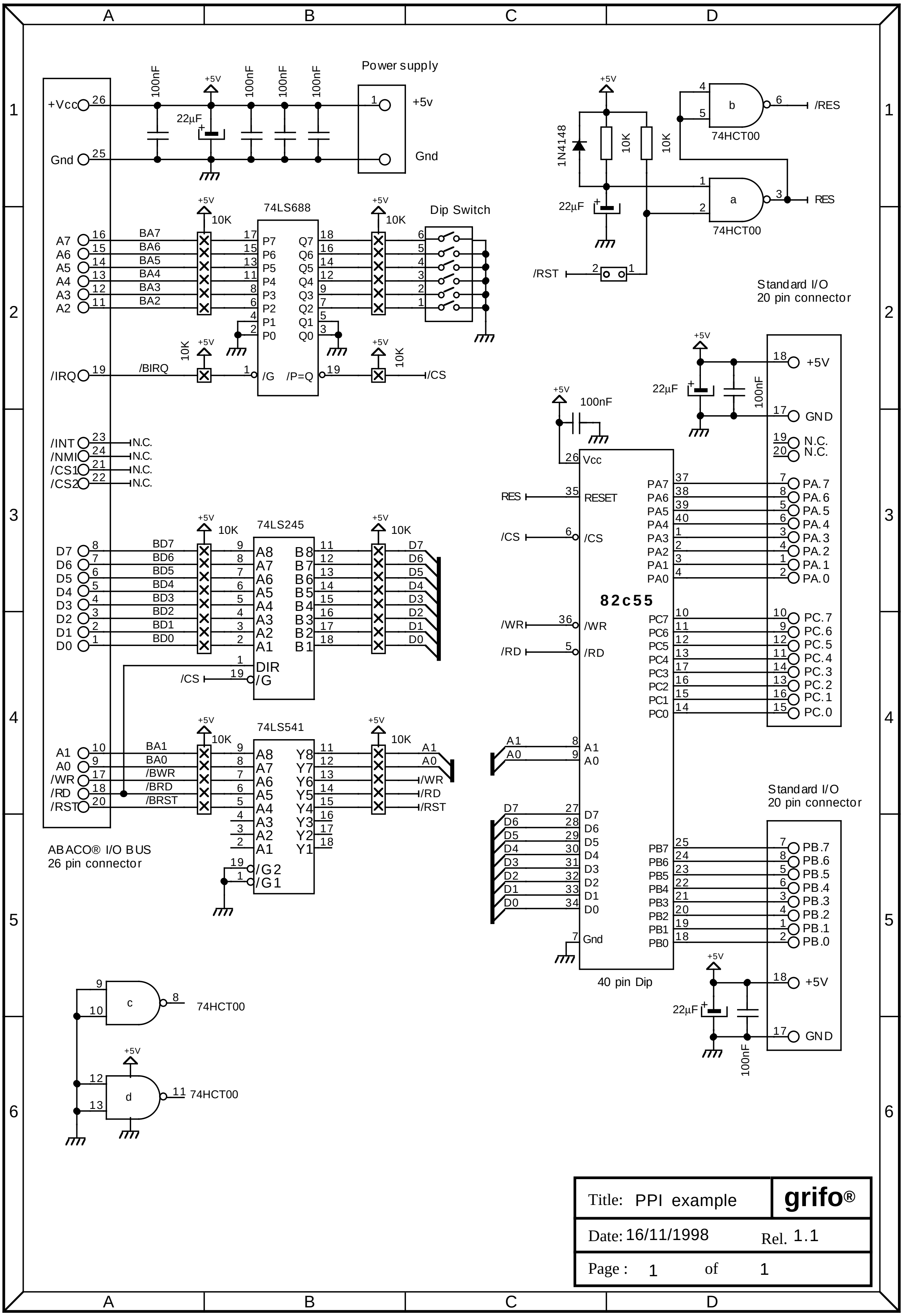

FIGURE A-5: PPI 82C55 ELECTRIC DIAGRAM