DOC. NO. : RM18-PS-016
REV. : 2
DATE : 11 July, 1995

MEPHISTO PC MODULE GENERAL PRODUCT SPECIFICATIONS

A. Operating voltage : 4.5 ~ 5.5 Volts

B. Current consumption : Operating voltage = 5V
25mA Typical
50mA max

C. Power consumption : 250mW max

D. System clock frequency : 30MHz or 33MHz ±1%(Crystal or Oscillator)
(Operating Voltage = 5.0V)
Philips : 87C51CYN40, 33MHz,
Intel : 87C51-24, 30MHz,
Dallas : DS87C520, 33MHz

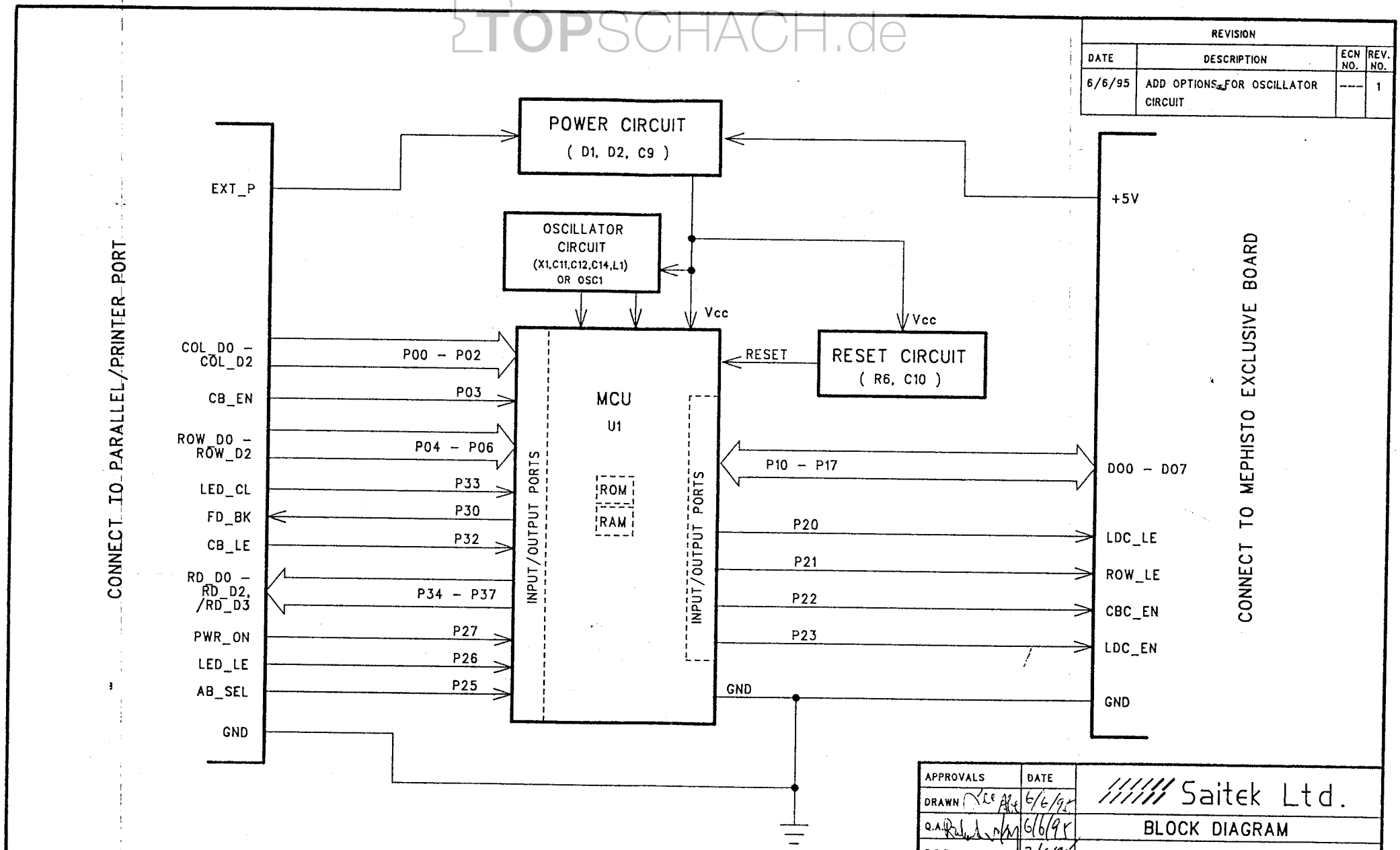
PREPARED BY : K. H. Au

APPROVED BY : BDM

DIST : BDM, QAM, SEE, SEA, IEM, PE

Filename : RM18_PS.DOC

REVISION			
DATE	DESCRIPTION	ECN NO.	REV. NO.
6/6/95	ADD OPTIONS FOR OSCILLATOR CIRCUIT	----	1



APPROVALS	DATE
DRAWN	6/6/95
Q.A.	6/6/95
B.D.D.	7/6/95

Saitek Ltd.

BLOCK DIAGRAM

TITLE: 461 MEPHISTO PC MODUL

DWG. NO. RM18 – PE – 004 REV. 1

Dist: SEE, SEA, IEM, BOM1, BOM, IQC, PE

PROJECT : Mephisto PC Modul (RM18)
DOC. NO. : RM18-PS-018
REV. : 1.1
DATE : 14 August, 1995

ADJUSTMENT PROCEDURE FOR MEPHISTO PC MODUL

OBJECTIVE : To adjust system clock frequency.

EQUIPMENT :
1. Frequency counter measurement up to 1MHz,
2. RM18 tester and 9V centre positive power adaptor.

PROCEDURE:
1. Connect the 25-pin D-connector of the unit to the RM18 tester.
2. Connect the adaptor to the RM18 tester.
3. Place probe of frequency counter at test point of tester. The reading at the frequency counter should be 20kHz +/-1% if 30MHz +/-1% crystal is used and should be 22kHz +/-1% if 33MHz +/-1% crystal is used. Replace capacitors C11 and C12 until the reading is within specification.

[Freq. read on frequency counter = Frequency of crystal / 1500]

PREPARED BY : K. H. LEE

APPROVED BY :

Dist : BDM, QAM, IEM, SEE, SEA, PE

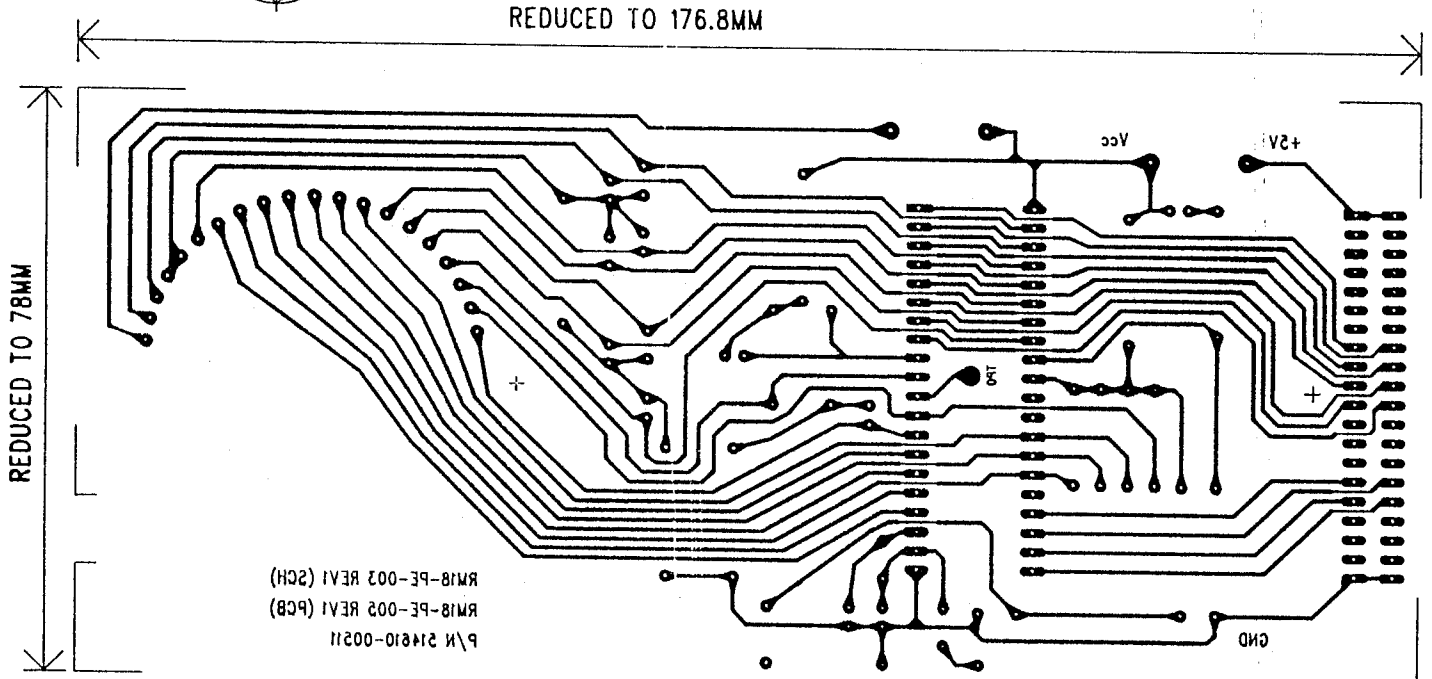
Filename : RM18_AP1.DOC

Mephisto PC Modul Trouble Shooting Chart

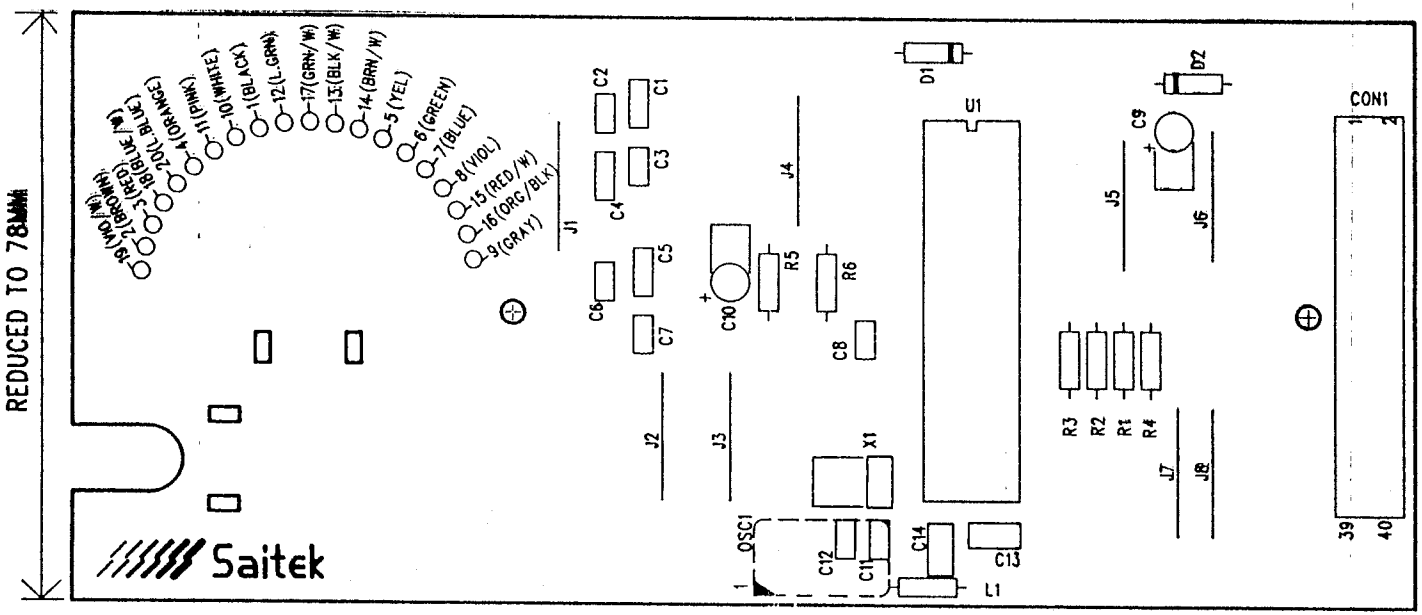
SYMPTOMS		POSSIBLE CAUSES
Unit cannot be detected by software	1.	Check if Vcc is 4.5V to 5.5V.
	2.	Check for short/open circuit on PCB.
	3.	Check for broken wiring in the DB-25 connector cable.
	4.	Check if the 40-pin connector is bad contact or contaminated.
	5.	Check if X1 is oscillating at frequency specified in specification (30MHz or 33MHz +/- 1%).
	6.	Check if R6 and C10 are functionally good.
LED missing or turn on when it should not	1.	Check for short/open circuit on PCB.
	2.	Check for broken wiring in the DB-25 connector cable.
	3.	Check if the 40-pin connector is bad contact or contaminated.
	4.	Check if X1 is oscillating at frequency specified in specification (30MHz or 33MHz +/- 1%).
Chesspiece cannot be detected or detected wrongly	1.	Check for short/open circuit on PCB.
	2.	Check for broken wiring in the DB-25 connector cable.
	3.	Check if the 40-pin connector is bad contact or contaminated.
	4.	Check if X1 is oscillating at frequency specified in specification (30MHz or 33MHz +/- 1%).
Excessive current drain Current > 50mA	1.	Check for short circuit on PCB.

Dist : BDM1, QAM

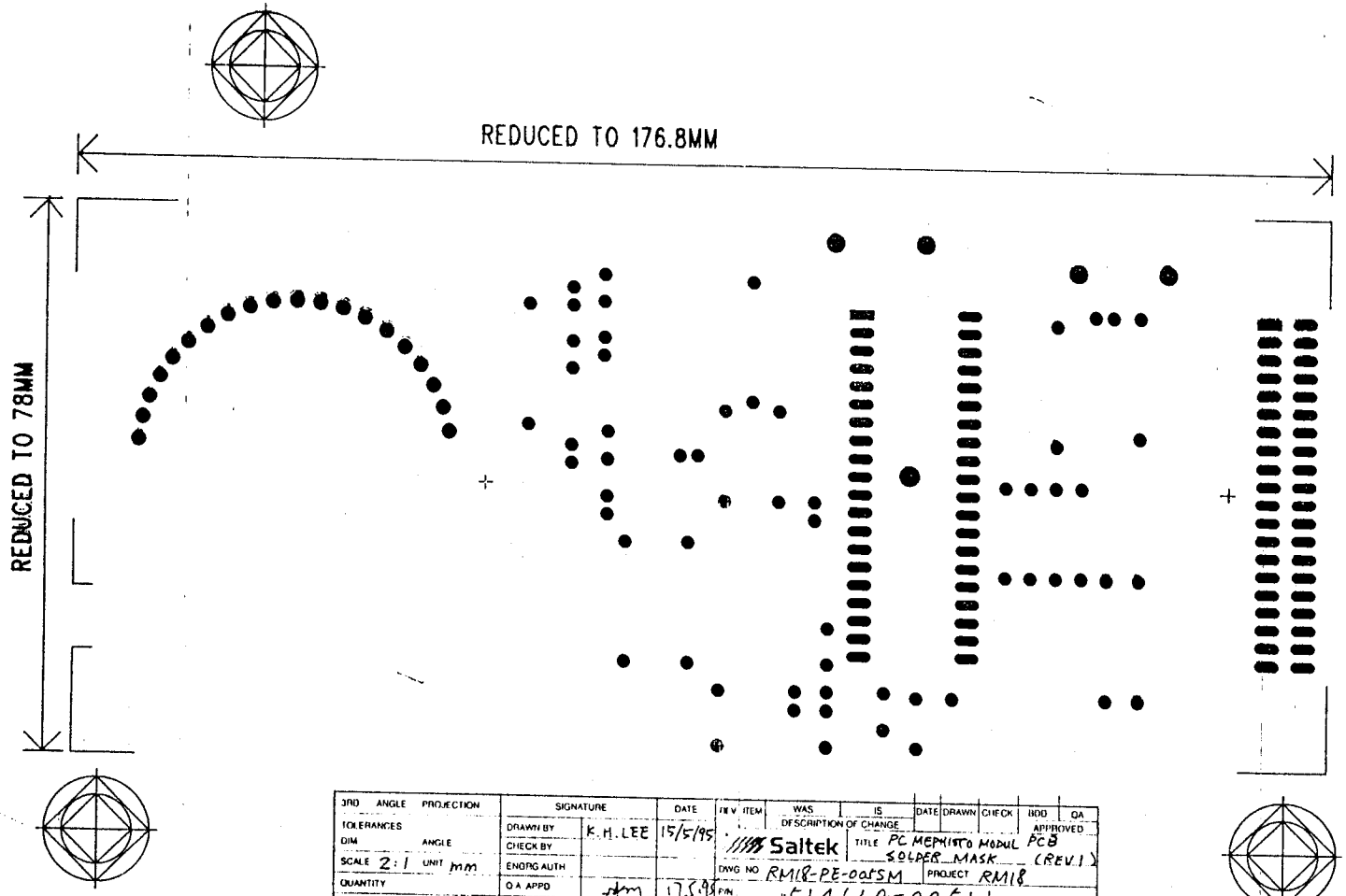
	YES	NO
E-TEST REQUIRED		✓



ANGLE PROJECTION	SIGNATURE	DATE	REV ITEM	WAS	IS	DATE DRAWN CHECK	BOD	QA
SHEET SIZE	DRAWN BY	K.H.LEE 15/5/95		DESCRIPTION OF CHANGE				APPROVED
2:1 UNIT MM	CHECK BY			Saitek	TITLE PC MEPHISTO MODUL PCB COPPER TRACE (REV1)			
SHEET 2 OF 4	ENGRG AUTH			DWG NO RM18-PE-005CT	PROJECT RM18			
	Q A APPD			P/N 51461O-0051.1				
	BOD APPD	15/5/95		MATERIAL 1.6mm PP	FINISH			

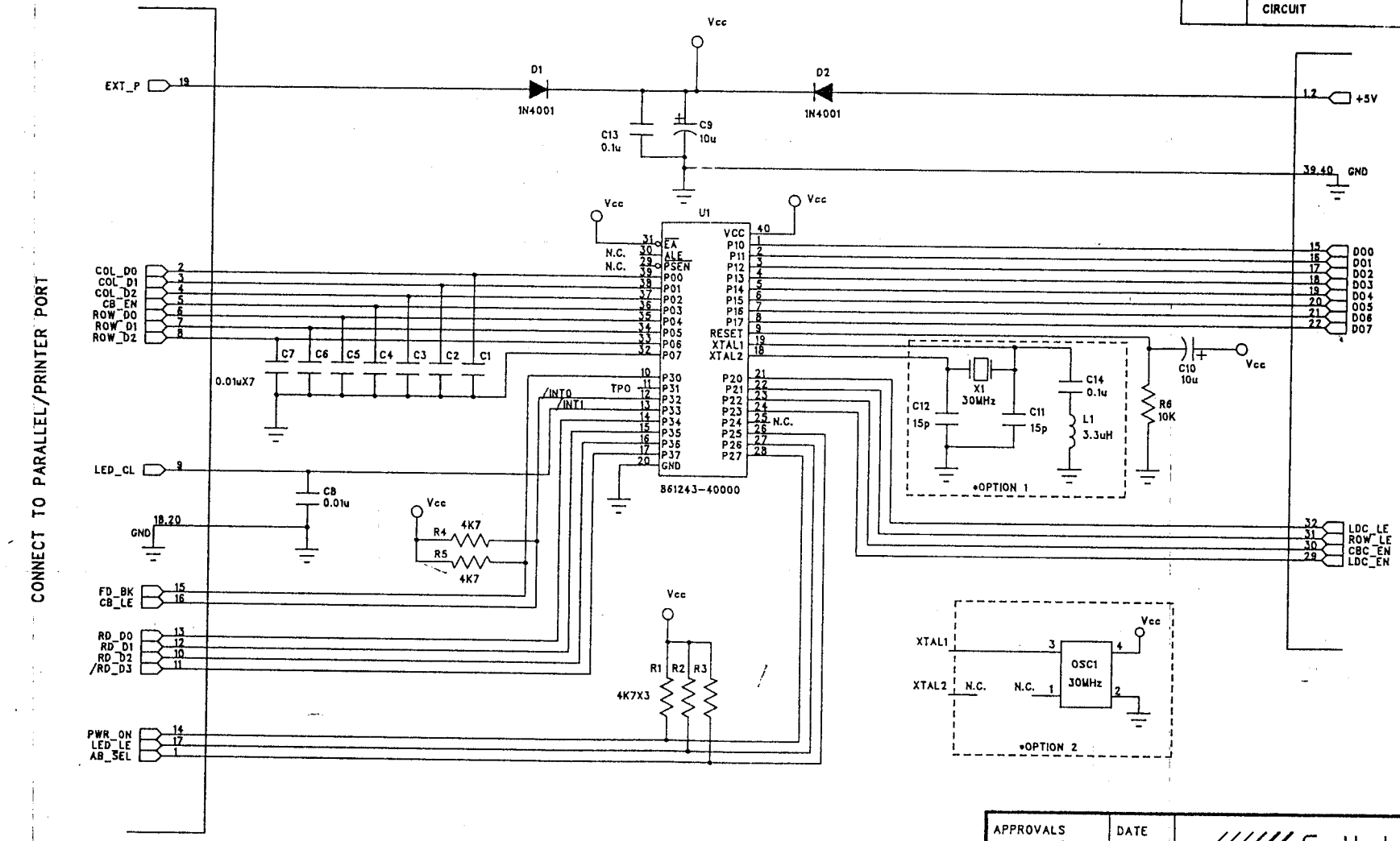


3RD ANGLE PROJECTION	SIGNATURE		DATE	REV	ITEM	WAS	IS	DATE	DRAWN	CHECK	BDD	QA
TOLERANCES	DRAWN BY	K. H. LEE	15/5/95			DESCRIPTION OF CHANGE					APPROVED	
DIM ANGLE	CHECK BY			Saitek		TITLE PC MEPHISTO MODULE PCB SILKSCREEN (REV.1)						
SCALE 2:1 UNIT MM	ENGRG AUTH			DWG NO RM18-PE-00555			PROJECT RM18					
QUANTITY	QA APPD		17.5.95	P/N		F.14.6.1.0.1-00.F.1.1						
SHEET 1 OF 4	BDD APPD		15/5/95	MATERIAL			FINISH					



3RD ANGLE PROJECTION	SIGNATURE		DATE	REV	ITEM	WAS	IS	DATE	DRAWN	CHECK	BDD	QA
TOLERANCES	DRAWN BY	K.H.LEE	15/5/95			DESCRIPTION OF CHANGE					APPROVED	
DIM ANGLE	CHECK BY			Saltek		TITLE PC MEPHISTO MODUL PCB SOLDER MASK (REV.1)						
SCALE 2:1 UNIT mm	ENGRG AUTH			DWG NO RM18-PE-00fSM				PROJECT RM18				
QUANTITY	Q A APPD		15.5.95	P/N N.1.4.6.1.01-0.0.5.1.1								
SHEET 3 OF 4	BDD APPD		15/5/95	MATERIAL				FINISH				

REVISION			
DATE	DESCRIPTION	ECN NO.	REV. NO.
6/6/95	ADD OPTIONS FOR OSCILLATOR CIRCUIT	----	1



APPROVALS	DATE	
DRAWN	6/6/95	Saitek Ltd.
Q.A.	6/6/95	SCHEMATIC DIAGRAM
B.D.D.	7/6/95	TITLE: MEPHISTO PC MODUL
		461
		DWG. NO. RM1B - PE - 003 REV. 1

Dist : SEE, SEA, IEm, BDM1, QBM, IQC, PE

SAITEK

BILL OF MATERIALS

PROJECT : RM18 (Mephisto PC Modul)

ART.NO. : 461

SHIP VER. : EV

REVISION : 1

REVISION HISTORY

REVISION	DATE	BY	DESCRIPTION OF CHANGES
P1	10/2/95	K.H. AU	Preliminary BOM.
1	5/6/95	K.H. AU	Changed and added components

RELATED DOCUMENTS REV

Schematic dwg : RM18-PE-003 1

Prepared By : Abraham Au

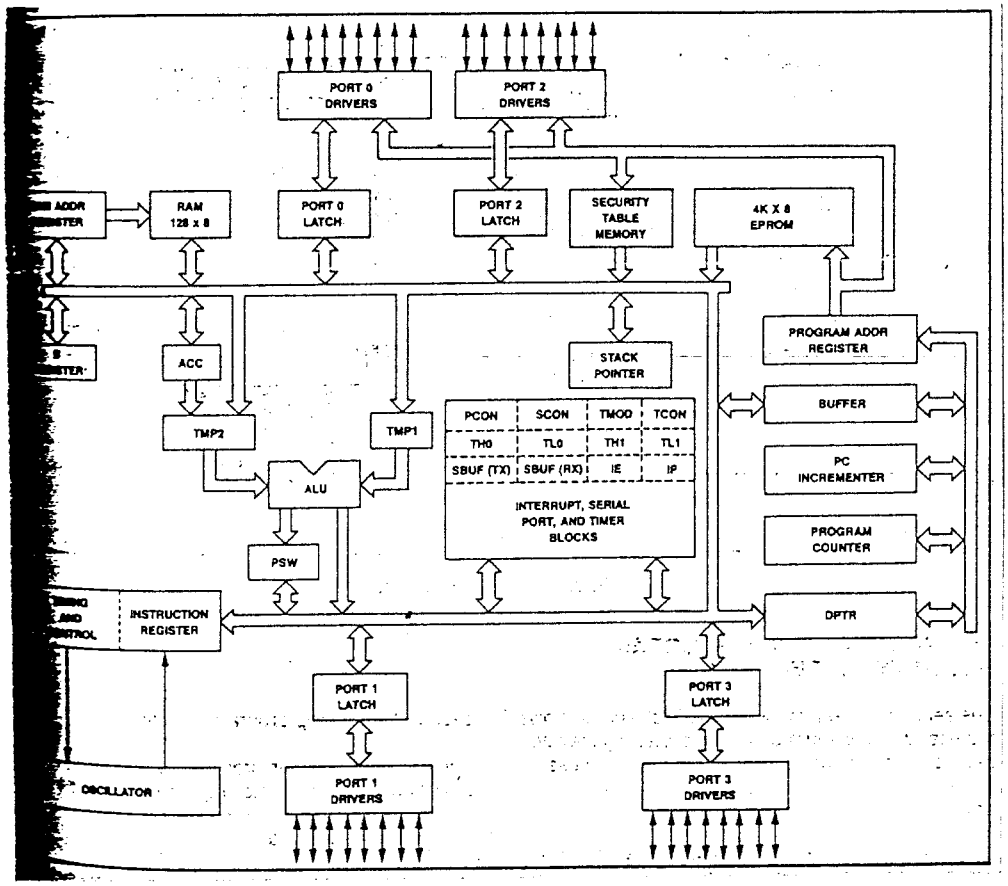
Approved by : BDM1

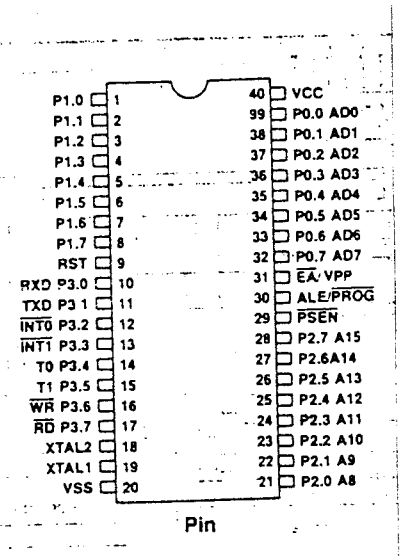
Distribution :
+1.00 [X] MMM, FAM, IEM, SEE, QAM,SEM,SEC
+0.10 [ ] MMM, FAM, IEM, SEE, QAM
+0.01 [ ] MMM, IEM

Date issue : 8 JUN 1995

984610 - RM18, MEPHISTO PC MODUL Rev : 1

Level	Item	Chg	Stock Code	Rev	Cons	Description		Qty Per	Reference
1			984610-00000	1		UNIT ASSEMBLY, FOR RM18		1.000	
2			914610-00001	1		GUT ASSEMBLY - LOGIC, FOR RM18		1.000	
2	1		514610-00511			PCB, LOGIC, S.S., 1.6MM, PAPER PHENOLIC	✓	1.000	PCB1
2	2		861243-40000		RC	MICROPROCESSOR, 87C51-3, 24MHZ, DIP, OTP	✓	1.000	U1
2	3		654001-20000			DIODE,RECTIFIER,1N4001	✓	2.000	D1,D2
2	4		62103M-01611			CAPACITOR,C-CAP,0.01UF,+/-20%,16V	✓	8.000	C1 TO C8
2	5	✳	62150J-05014			CAPACITOR,C-CAP,NPO,15PF,+/-5%,50V	✓	2.000	C11,12:CRYSTAL
2	6	NW	62104M-01611			CAPACITOR,C-CAP,0.1UF,+/-20%,16V	✓	1.000	C14:CRYSTAL
2	7	NW	630025-20000		RC	INDUCTOR,RFI,COIL,3.3UH		1.000	L1 : CRYSTAL
2	8		62106M-01615			CAPACITOR,E-CAP,10UF,+/-20%,16V	✓	2.000	C9,C10
2	9		62104M-01611			CAPACITOR,C-CAP,0.1UF,+/-20%,16V	✓	1.000	C13
2	10		611035-31102			RESISTOR,FIXED C-FILM,10K,5%,1/4W	✓	1.000	R6
2	11		614725-31102			RESISTOR,FIXED C-FILM,4K7,5%,1/4W	✓	5.000	R1 TO R5
2	12		000051-70155			JUMPER,L=17MM,LL=15MM,D=0.5MM		8.000	J1 TO J8
2	13		000190-00027			CONNECTOR, EDGE, 40PIN, BENDED LEADS		1.000	CON1
2	14		595730-00211		RC	CABLE,20 CORE,L=1.5M,WHITE,WITH DB25-CON		1.000	
2	15	NW	595730-00210		RC	CABLE,20 CORE,L=1.5M,WHITE,W/O-SUB CONN		.000	OPTION
2	16	⊣	000150-00001			CABLE TIE,100X2.5X20MM		2.000	
2	17	✳	643000-03130		RC	CRYSTAL,30MHZ,TOLERANCE < 1%		1.000	X1
2	18	NW	643000-03250		RC	CRYSTAL,OSCILLATOR,30MHZ,TOLERANCE < 1%		.000	OPTION
2			964610-00000	1		CASING ASSEMBLY, FOR RM18		1.000	
2	19		214610-00100		RC	PLASTIC, T.CABINET, ABS, BLACK, RM18		1.000	
2	20		214610-00200		RC	PLASTIC, B.CABINET, ABS, BLACK, RM18		1.000	
2	21	NW	000071-40110			SCREW M/S CSK HD M2 X 5MM BLACK		2.000	FOR FIX B.CAB..
2	22	NW	364610-01300		RC	LABEL,FOR RM18,"MEPHISTO",GOLD ON BLACK		1.000	
2	23		354610-00600		RC	INLAY, FOR RM18, "PC MODUL", PVC		1.000	
2			944610-10000	1		PACKING ASSEMBLY, FOR RM18		1.000	
2	24		454610-00900			CARTON, FOR RM18, 30PCS/CTN		.033	
2	25		000122-80130			POLYBAG, 280X130X0.045MM		1.000	FOR CABINET
2	26		360000-00200			LABEL,FOR SERIAL NO, ADHESIVE		1.000	
2	27		370000-XXXXX		RC	LABEL,COMMON,CUSTOMER LABELS		1.000	
2	28	NW	454660-01600			INSERT,FOR RM20,CORRUGATED PAPER		1.000	
2			974610-00000	1		OPTIONS ASSEMBLY, FOR RM18		1.000	
2	29		414610-61100		RC	MANUAL, FOR RM18, G/F/E/D/I/S		1.000	
2	30		424610-61100		RC	GIFTBOX, FOR RM18, G/F/E/D/I/S		1.000	
1	31		40AMC			ASSEMBLER MATERIAL CHARGE			
1	32		40ALC			ASSEMBLER LABOUR CHARGE			





Pin

3 FUNCTIONAL TEST PROCEDURE FOR RM18

Make sure the PC and the chessboard are turned OFF before any connection is done. Then plug the DB-25 connector to the printer port of the PC. Plug the module into the unit. Turn on the power of PC. Plug the DC adapter into the Chessboard power socket and then switch it on. After the PC self-diagnostic test, C:\> (or A:\>) is shown on the monitor. (Make sure that no chesspieces are placed on the chessboard)

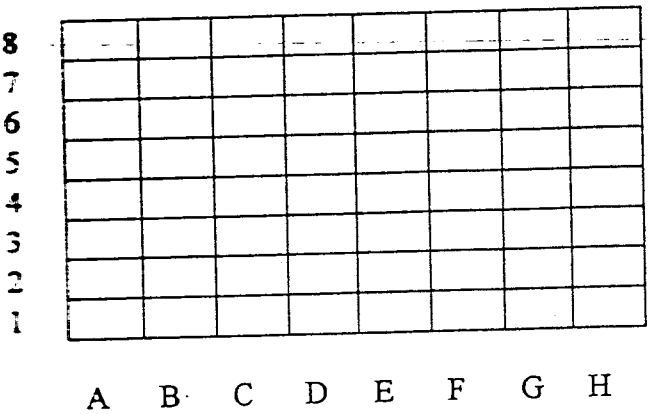
Purpose	Procedure	Observation
1. LED test	- Type "WCB4B" on the keyboard	- "A:\>WCB4B_ "
	- Press ENTER	- The display shown on monitor, see figure 1.
		- LEDs start scanning from A1, A2 . . . A7, A8, B8, B7 . . . B2, B1, C1, C2 . . . C7, C8, D8, D7 . . . D2, D1, E1, E2 . . . E7, E8, F8, F7 . . . F2, F1, G1, G2 . . . G7, G8, H8, H7 . . . H2, H1, then in reverse order respectively. (Remarks: make sure that the LED scanning is performed at least one cycle before next step.)
	- Place a RW9 chesspieces on one of the square	- LEDs scanning stopped.
		- "*" is located on the monitor where the chesspiece is placed on the chessboard.

Purpose	Procedure	Observation
2. Chessboard square test	- Put a testing chessman on 64 squares in sequences (Remarks: the testing chessmen should rest on the square for at least 1 second).	- The display shown on monitor same as figure one, except "*" is located on the square with chess pieces. (make sure that only one LED is turned on and "*" symbol is shown on corresponding square on monitor)
3. Test finished	- Press ESC	- "You can disconnect power adapter and cable now."
		- "Try another sample (Y/N)?"
	- Switch off the chessboard.	
	- Remove the module from chessboard and the D-connector from PC.	
	- Connect another module to PC and chessboard.	
	- Switch on the chessboard.	
	- Type "Y" on keyboard to continue testing, otherwise type "N"	- Repeat step 1 to step 3.

Remarks:
If either the D-connector or adapter doesn't connect properly, then the testing is terminated with following message shown on monitor.
"Error: Please make sure that all connections are correct."

Figure 1

PC-Chessboard testing program - - Version 4.0 Copyright 1995 SAITEK LTD.
written by K.H. LEE on 06 June 1995.
Reed-switch Chessboard is connected to LPT2 *.



Press <ESC> key to quit

* Note: LPT1 / LPT2 / LPT3 will be shown depending on the printer port of the PC installed.