Saitek™

RW9m

PROJECT : Mephisto Exclusive (RW9)
DOC. NO. : RW9-PS-040
REV. : 1
DATE : 12 September, 1995

MEPHISTO EXCLUSIVE GENERAL PRODUCT SPECIFICATIONS

A.	Operating voltage	:	9.0 +/- 2.0 volts
B.	Current consumption	:	Operating voltage = 9V 26mA Typical 40mA max
C.	Power consumption	:	360mW max

Remark : Above current and power consumption are measured together with the Diagnostic Tester.

PREPARED BY : _____ APPROVED BY : _____
K. H. AU

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

Filename : RW9_PS.DOC

PROJECT : Mephisto MMVI Module (RM19)
DOC. NO. : RM19-PG-009
REV. : 0
DATE : 22 May, 1996

GENERAL PRODUCT SPECIFICATIONS FOR MEPHISTO MM VI MODUL

A.	Operating voltage	:	8 ~ 11 volts
B.	Current consumption	:	Operating voltage = 9V 35mA Typical 61mA max. (with the RW9)
C.	Power consumption	:	550mW max
D.	System clock frequency	:	20MHz ±5% (Operating Voltage = 9.0V) (Resonator)

PREPARED BY : K. H. AU

APPROVED BY :

DIST : BDM, QAM, SED, PE

Filename : RM19_PS.DOC

PROJECT : Mephisto LCD Modul 6. Generation (RD2)
DOC. NO. : RD2-PG-009
REV. : 0
DATE : 20 August, 1996

GENERAL PRODUCT SPECIFICATIONS FOR MEPHISTO LCD MODUL 6. GENERATION

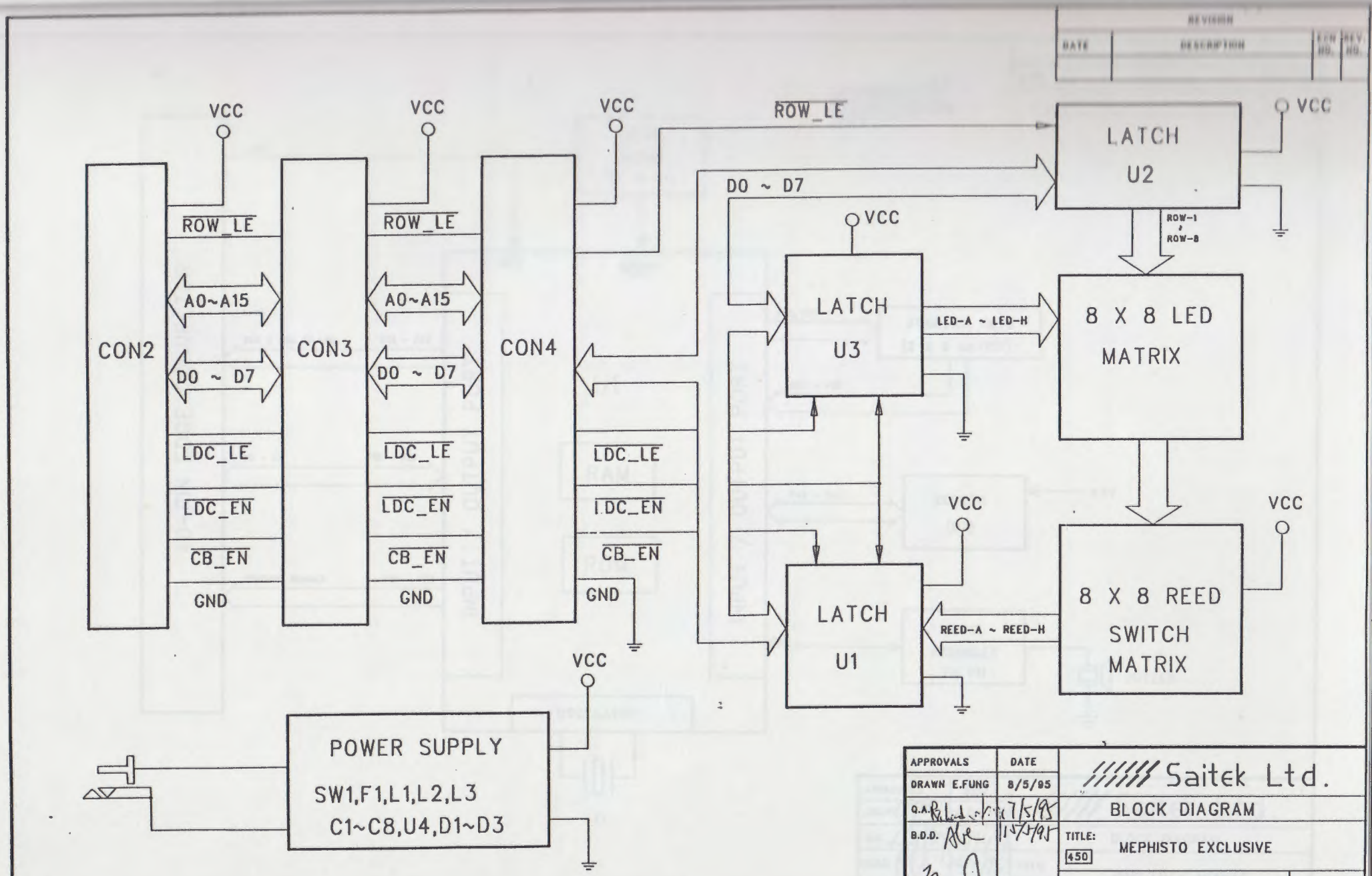
A.	Operating voltage	:	4.5 - 5.5 volts
B.	Current consumption	:	Operating voltage = 5V 4 µA Typical 30 µA max
C.	Power consumption	:	150 µW max

PREPARED BY : _____ APPROVED BY : _____

K. H. AU

DIST : BDM, QAM, SED, PE

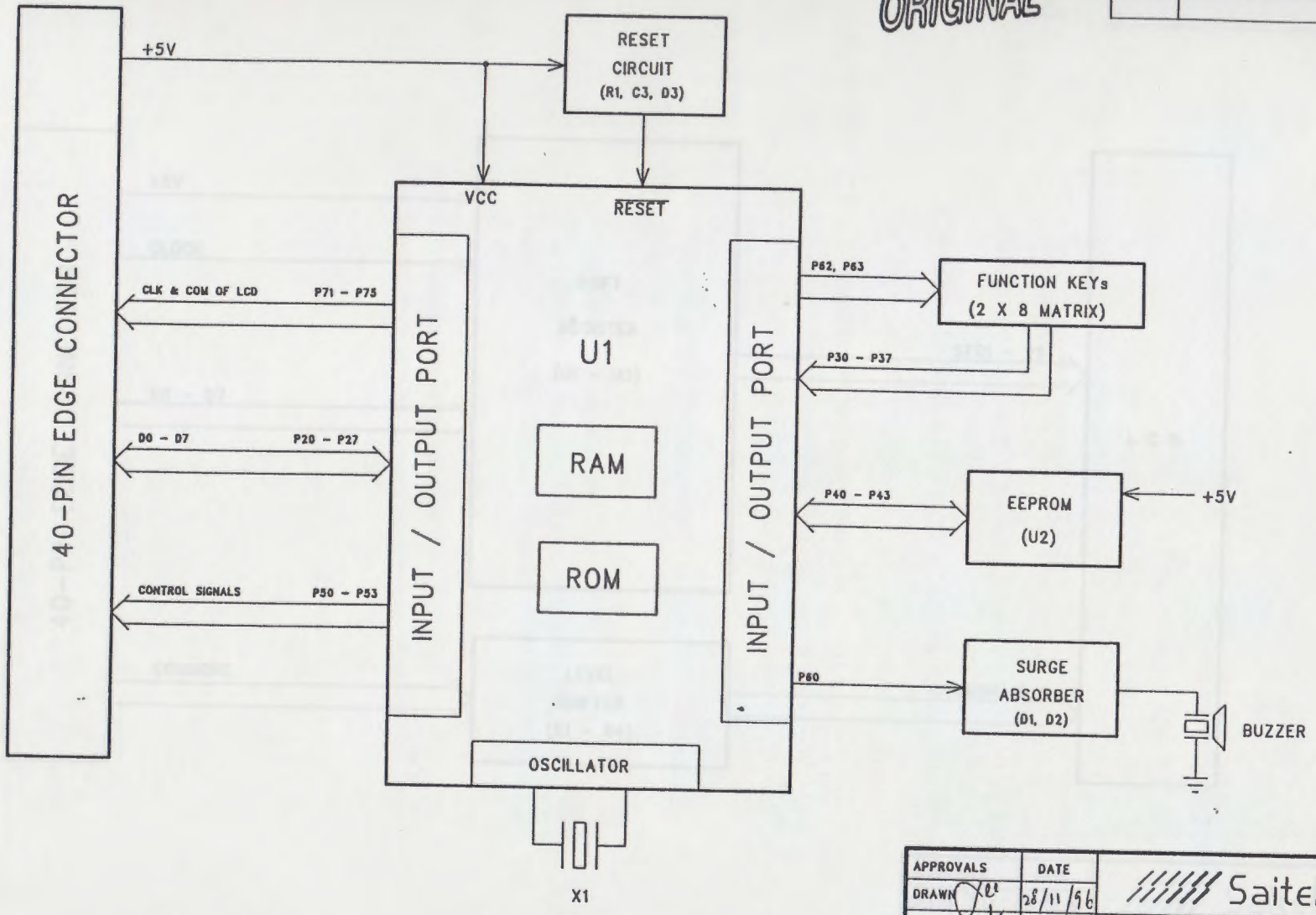
Filename : RD2_PS.DOC



Dist. SEE. SEA. ZEN. BDM1. BDM2. ZQC. PE

ORIGINAL

REVISION			
DATE	DESCRIPTION	ECN NO.	REV. NO.

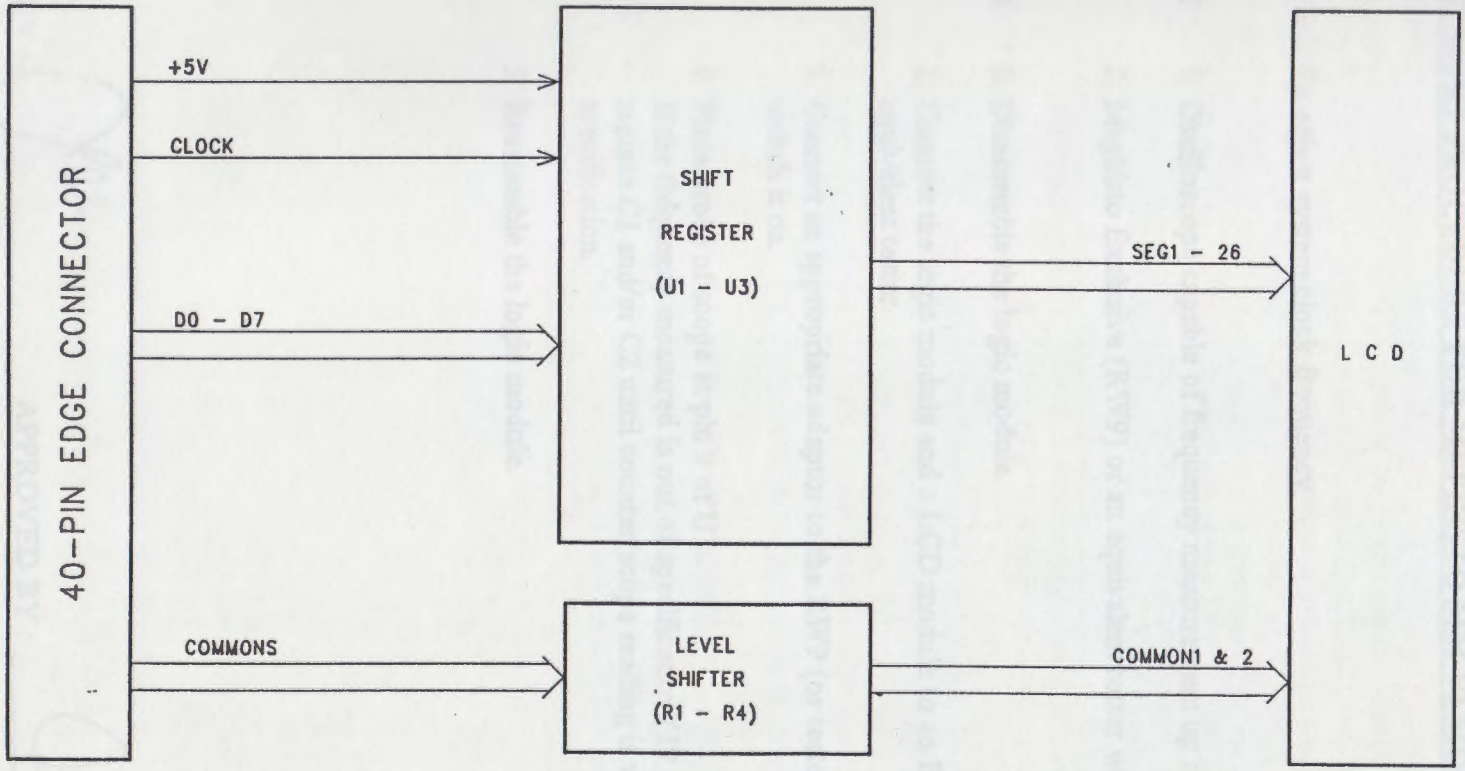


APPROVALS	DATE	Saitek Ltd.
DRAWN	28/11/96	
Q.A.	28/11/96	BLOCK DIAGRAM
B.D.D.	28/11/96	TITLE: 472 MMVI LOGIC MODULE
		DWG. NO. RM19 – PE –003 REV. 0

Dist: BDM, QAM, SED, PE

ORIGINAL

REVISION			
DATE	DESCRIPTION	ECN NO.	REV. NO.



APPROVALS	DATE
DRAWN	28/11/96
Q.A.	28/11/96
B.D.D.	28/11/96

Saitek Ltd.

BLOCK DIAGRAM

TITLE: 473 LCD MODULE 6. GENERATION

DWG. NO. RD2 - PE - 010 REV. 0

Dist: BDM, QAM, SED, IE

PROJECT : Mephisto MM VI Module (RM19)
DOC. NO. : RM19-PG-011
REV. : 0
DATE : 6-Dec-96

ADJUSTMENT PROCEDURE FOR MEPHISTO MM VI MODULE

OBJECTIVE : To adjust system clock frequency.

EQUIPMENT :
1. Oscilloscope capable of frequency measurement up to 40MHz,
2. Mephisto Exclusive (RW9) or an equivalent tester with adaptor.

PROCEDURE:
1. Disassemble the logic module.
2. Connect the logic module and a LCD module to an RW9 or an equivalent tester.
3. Connect an appropriate adaptor to the RW9 (or tester) and switch it on.
4. Place probe of scope at pin 9 of U1.
   If the frequency measured is out of specification (19 - 21 MHz), replace C1 and/or C2 until counter/scope reading is within specification.
5. Reassemble the logic module.

PREPARED BY : _____ K. H. LEE

APPROVED BY : _____

DIST : BDM, QAM, SED, PE

Filename : RM19_PS.DOC

Mephisto Exclusive Trouble Shooting Chart

SYMPTOMS		POSSIBLE CAUSES
Unit does not function after the module is connected	1.	Make sure the module connected is functionally good.
	2.	Check if the proper adapter is used with the module in use as specified.
	3.	Check if the fuse is blown.
	4.	Check for no broken wiring between PCBs.
	5.	Check if Vcc is between 4.75V to 5.25V.
	6.	Check if connectors CON2, CON3 and CON4 are good contact or not contaminated.
	7.	Check if U1, U2 are U3 are functionally good.
LED missing or turn on when it should not	1.	Check if the corresponding LEDs are defective.
	2.	Check for no broken wiring connection between PCBs.
	3.	Check for short/open circuit on PCBs.
	4.	Check if U2 and U3 are functionally good.
Chess piece cannot be detected	1.	Check if the corresponding reed switches and diodes are not defective.
	2.	Check for no broken wiring connection between PCBs.
	3.	Check for short/open circuit on PCBs.
	4.	Check if U1 and U2 are functionally good.
Excessive current drain Current > 25mA	1.	Check for short circuit on PCBs.
	2.	Check if U4, D1, D2 and D3 are functionally good.

Dist : BDM1, QAM, PE

Project : Mephisto MMVI Logic Module (RM19)
Doc. No. : RM19-PS-012
Rev. : 0
Date : 11 December, 1996

Trouble Shooting Chart For Mephisto MMVI Logic Module

SYMPTOMS		POSSIBLE CAUSES
Unit does not function	1.	Check if Vcc is 4.5 V to 5.5 V.
	2.	Check if the 40-pin connectors are bad contact or contaminated.
	3.	Check pin9 of U1 in logic module for 20 MHz +/- 5%.
	4.	Check for short/open circuit on PCB.
	5.	Check if pin8 of U1 (RESET) is logic 'HIGH'.
	6.	Check if U1 is functionally good.
LCD on display module malfunction	1.	Use a known working LCD module for the tests.
	2.	Check if the 40-pin connectors are bad contact or contaminated.
	3.	Check for short/open circuit on PCB.
	4.	Check if clock pulses or square waves are generated at pin32 - pin36 of U1.
	5.	Check if U1 is functionally good.
Improper response to function keys	1.	Check for short/open circuit on PCB.
	2.	Check if pin3 and pin4 of U1 are logic 'HIGH' when no key is pressed.
	3.	Check if low pulses are issued at pin57 to pin64 of U1.
	4.	Check if U1 is functionally good.
Improper response at chessboard	1.	Use a known working Exclusive board for the tests.
	2.	Check for short/open circuit on PCB.
	3.	Check if U1 is functionally good.
No sound	1.	Check for short/open circuit on PCB.
	2.	Check if buzzer, D1 and D2 are functionally good.
	3.	Check if there are pulses output from pin1 of U1 when sound should be issued.
	4.	Check if U1 is functionally good.
No memory	1.	Check for short/open circuit on PCB.
	2.	Check if U1 and U2 are functionally good.
Excessive current drain Current > 50mA	1.	Check for short circuit on PCB.
	2.	Check if U1 is functionally good.

Dist : BDM, QAM, SED, PE

Project : LCD Module 6. Generation (RD2)
Doc. No. : RD2-PS-011
Rev. : 0
Date : 11 December, 1996

Trouble Shooting Chart For LCD Module 6. Generation

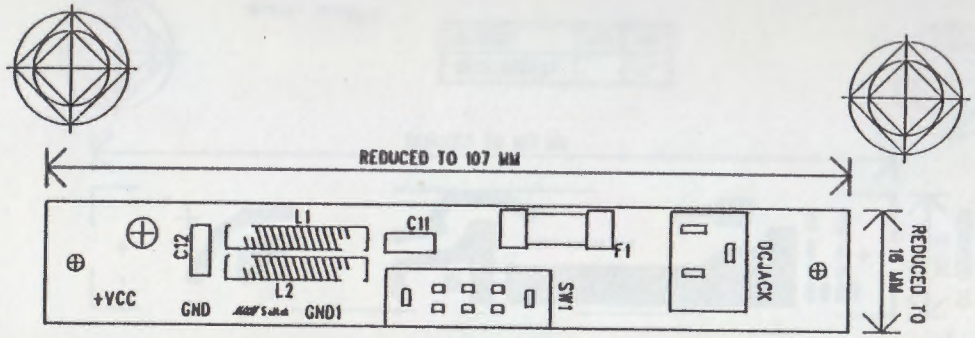
SYMPTOMS		POSSIBLE CAUSES
LCD malfunction or unit does not function	1.	Use known working Logic module and the Exclusive board for tests.
	2.	Check if Vcc is 4.5 V to 5.5 V.
	3.	Check if the 40-pin connector is bad contact or contaminated.
	4.	Check for broken wires between PCBs.
	5.	Check for short/open circuit on PCBs.
	6.	Check if LCD defective or misaligned.
	7.	Check for dust or oxide on gold fingers of PCB.
	8.	Check if there are square waves at pin2-5 and pin10-13 of U1, U2 and U3.
Excessive current drain Current > 30 μA	1.	Check for short circuit on PCB.
	2.	Check if the voltage level of a logic 'HIGH' at pin2-5 and pin10-13 of U1, U2 and U3 are within 4.5 V to 5.5 V.
	3.	Check for leakage on C1 to C4.

Dist : BDM, QAM, SED, PE

240.00 MM

340.00 MM
Sattel

E-TEST REQUIRED		
	23V	ON



UNLESS OTHERWISE SPECIFIED:			
DIMENSIONS ARE IN MILLIMETERS	SIGNATURE		DATE
TOLERANCES	DRAWN BY	K.H LEE	7/7/95
DIM ANGLE	CHECK BY	AGC	7/7/95
SCALE 2:1 UNIT MM	ENGNG AUTH		
QUANTITY	Q A APPD		10.7.95
SHEET 1 OF 4	MOD APPD		7/7/95

REV	ITEM	WAS	IS	DATE	DRAWN	CHECK	MOD	QA
		DESCRIPTION OF CHANGE					APPROVED	

Saltek

TITLE EXCLUSIVE POWER SUPPLY PCB SILKSCREEN (REV.1)

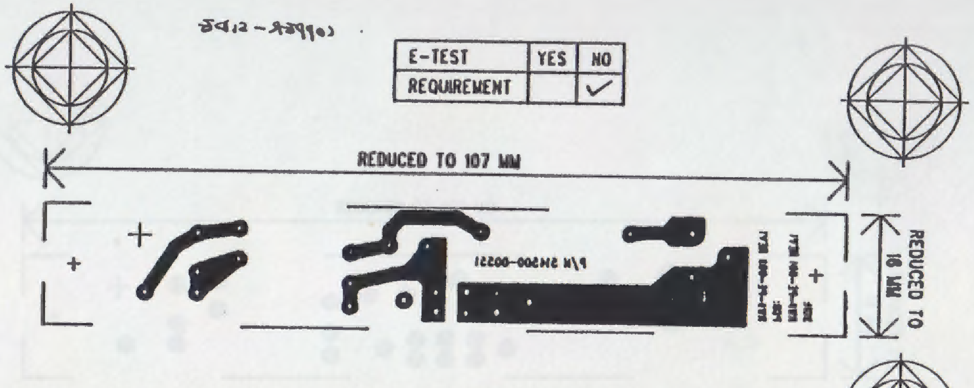
DWG NO RW9-PE-00155 REV PROJECT RW9

P/N 14.1.4.5.0.0.1-0.0.5.5.1

MATERIAL FINISH

5412-789901

E-TEST REQUIREMENT	YES	NO
		✓



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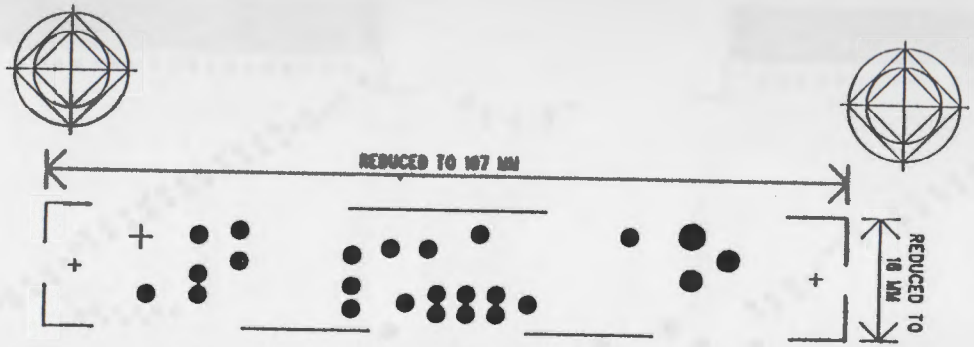
TOLERANCES		DRAWN BY	K.H.LEE	7/7/95	DESCRIPTION OF CHANGE							APPROVED	
DIM	ANGLE	CHECK BY		7/7/95	Saltek		TITLE EXCLUSIVE POWER SUPPLY PCB COPPER TRACE (REV1)						
SCALE 2:1	UNIT MM	ENGRG AUTH			DWG NO RW9-PE-005CT 1				PROJECT RW9				
QUANTITY		QA APPD		10.7.95	P/N 514500-00551								
SHEET 2	OF 4	BOO APPD		7/7/95	MATERIAL 1.6mm PAPER PHENOLIC				FINISH BARE COPPER				



3RD ANGLE PROJECTION	SIGNATURE		DATE
TOLERANCES	DRAWN BY	K.H.LEE	7/7/95
DIM. ANGLE	CHECK BY		
SCALE 2:1 UNIT MM	ENGNG AUTH		
QUANTITY	Q.A APPD.		18.7.95
SHEET 3 OF 4	BOD APPD		

REV	ITEM	WAS	IS	DATE	DRAWN	CHECK	BOD	QA
		DESCRIPTION OF CHANGE					APPROVED	

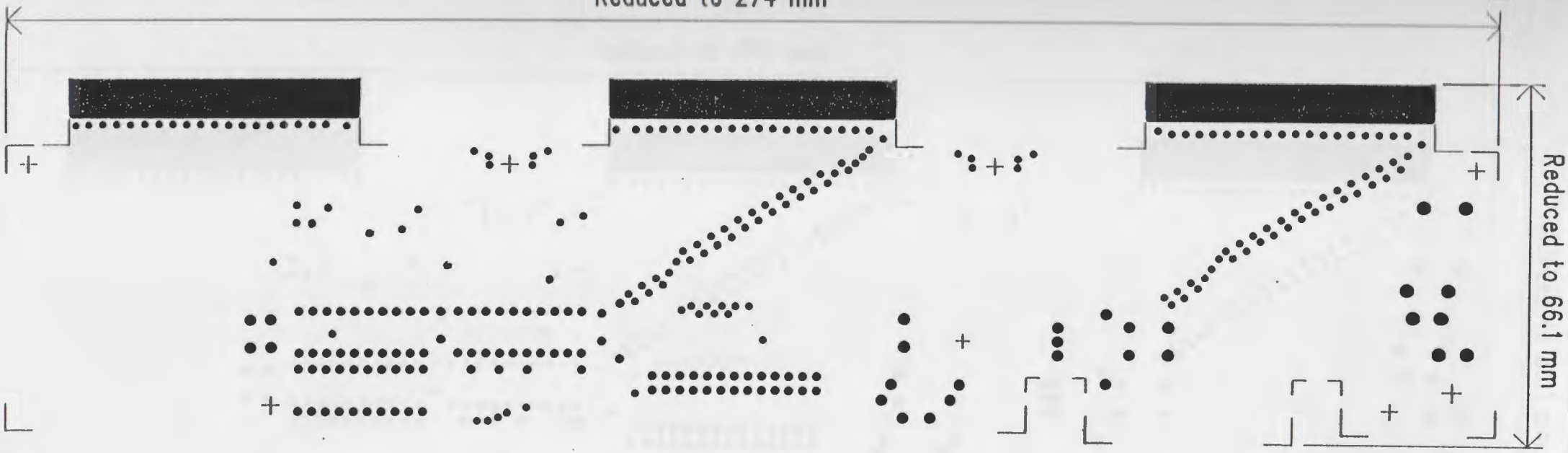
Saltek

TITLE EXCLUSIVE POWER SUPPLY PCB SOLDER MASK REV.1

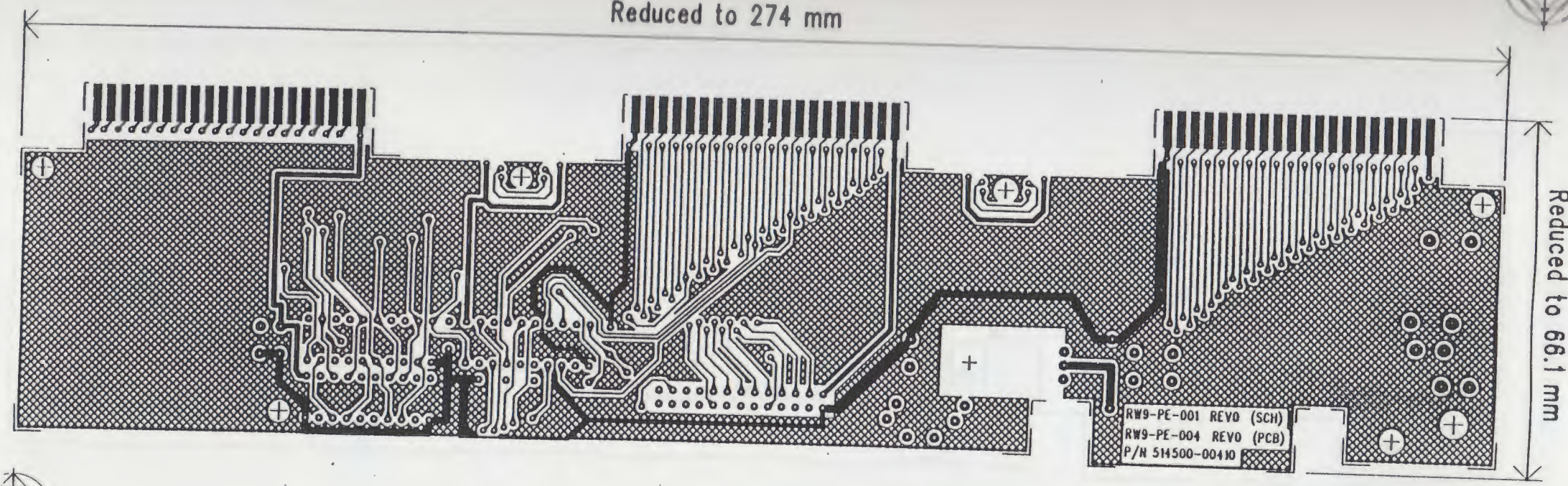
DWG. NO RM9-PB-005SM REV 1 PROJECT RM9

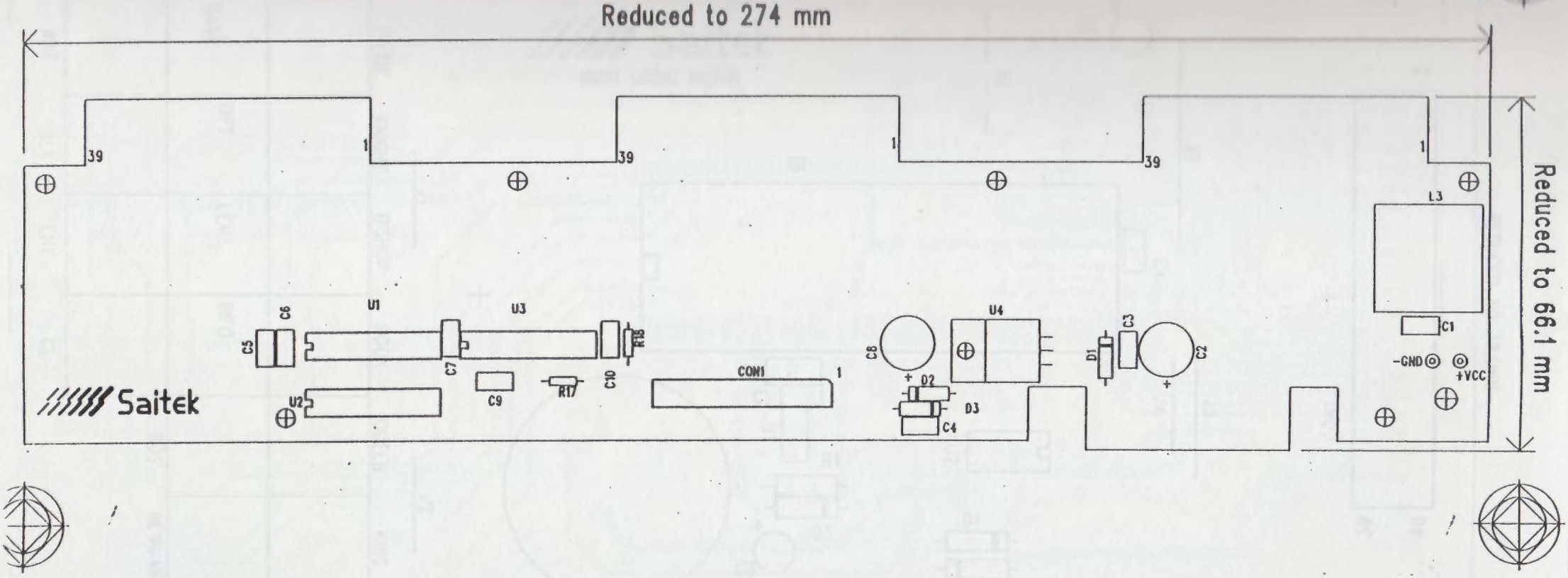
P/N NT1.4.5.0.01-0.0.5.5.1.1

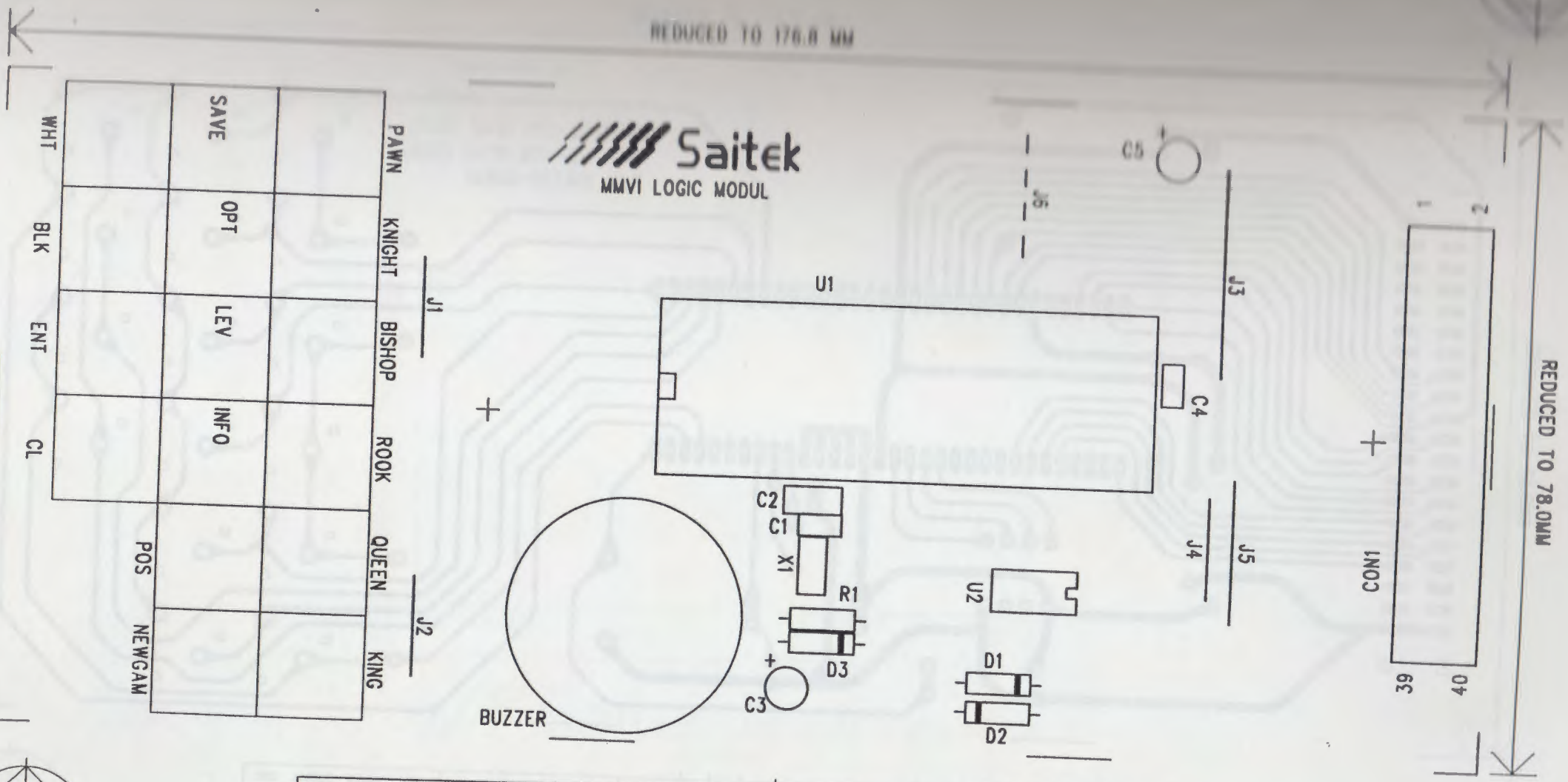
MATERIAL FINISH


Reduced to 274 mm
Reduced to 66.1 mm

MEPHISTO
EXCLUSIVE
BOARD
Reduced to 274 mm
E-TESTER
YES
NO


Reduced to 274 mm
Reduced to 66.1 mm
RW9-PE-001 REV0 (SCH)
RW9-PE-004 REV0 (PCB)
P/N 514500-00410

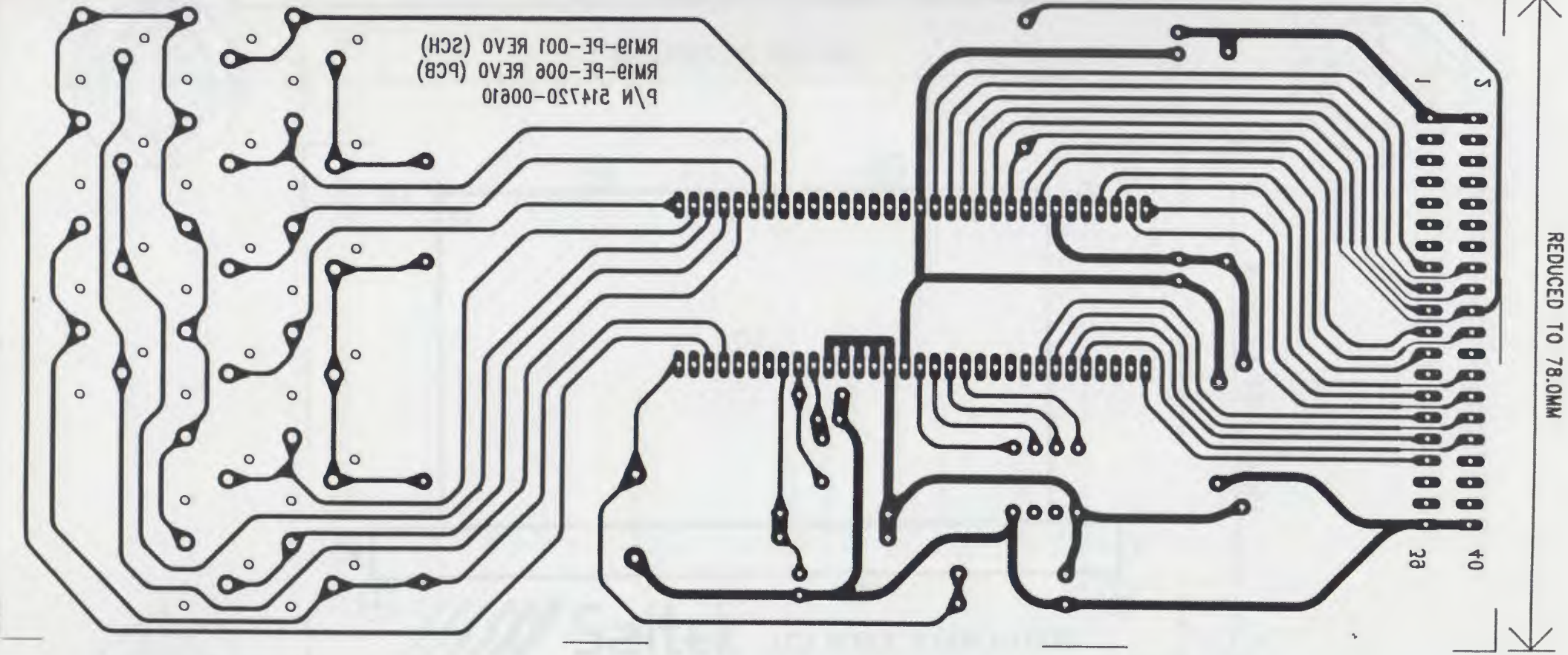

Reduced to 274 mm
Reduced to 66.1 mm
39
1
39
1
39
1
L3
C1
-GND
+VCC
U1
U3
U4
C6
C5
C7
C9
R17
C10
R18
U2
CON1
C8
D2
D3
C4
D1
C3
C2
Saitek



3RD ANGLE PROJECTION	SIGNATURE		DATE	REV.	ITEM	WAS / IS DESCRIPTION OF CHANGE	DATE	DRAWN	CHECK	BDD	QA
TOLERANCES	DRAWN BY:									APPROVED	
DIM.: ANGLE:	CHECK BY:	Abe	22/12/95	Saitek		TITLE: LOGIC PCB (S.S.)					
SCALE: 2:1 UNIT: mm	ENGRG AUTH			DWG. NO.: RM19-PE-006			PROJECT: RM19				
QUANTITY:	Q.A. APPD.		22/12/95	P/N.:		1.1.4.7.2.0.0.0.6.1.0					
SHEET 3 OF 4	BDD. APPD.		22/12/95	MATERIAL Paper Phenolic			FINISH Bare Copper				

REQUIREMENT		

REDUCED TO 176.8 MM



3RD ANGLE PROJECTION	SIGNATURE		DATE
TOLERANCES	DRAWN BY:		
DIM. : ANGLE:	CHECK BY:		
SCALE: 2:1 UNIT: mm	ENGRG AUTH		
QUANTITY :	Q.A. APPD.		
SHEET 1 OF 4	R.D. APPD.		

REV.	ITEM	WAS / IS DESCRIPTION OF CHANGE	DATE	DRAWN	CHECK	ED	QA	RD
						APPROVED		

Saitek

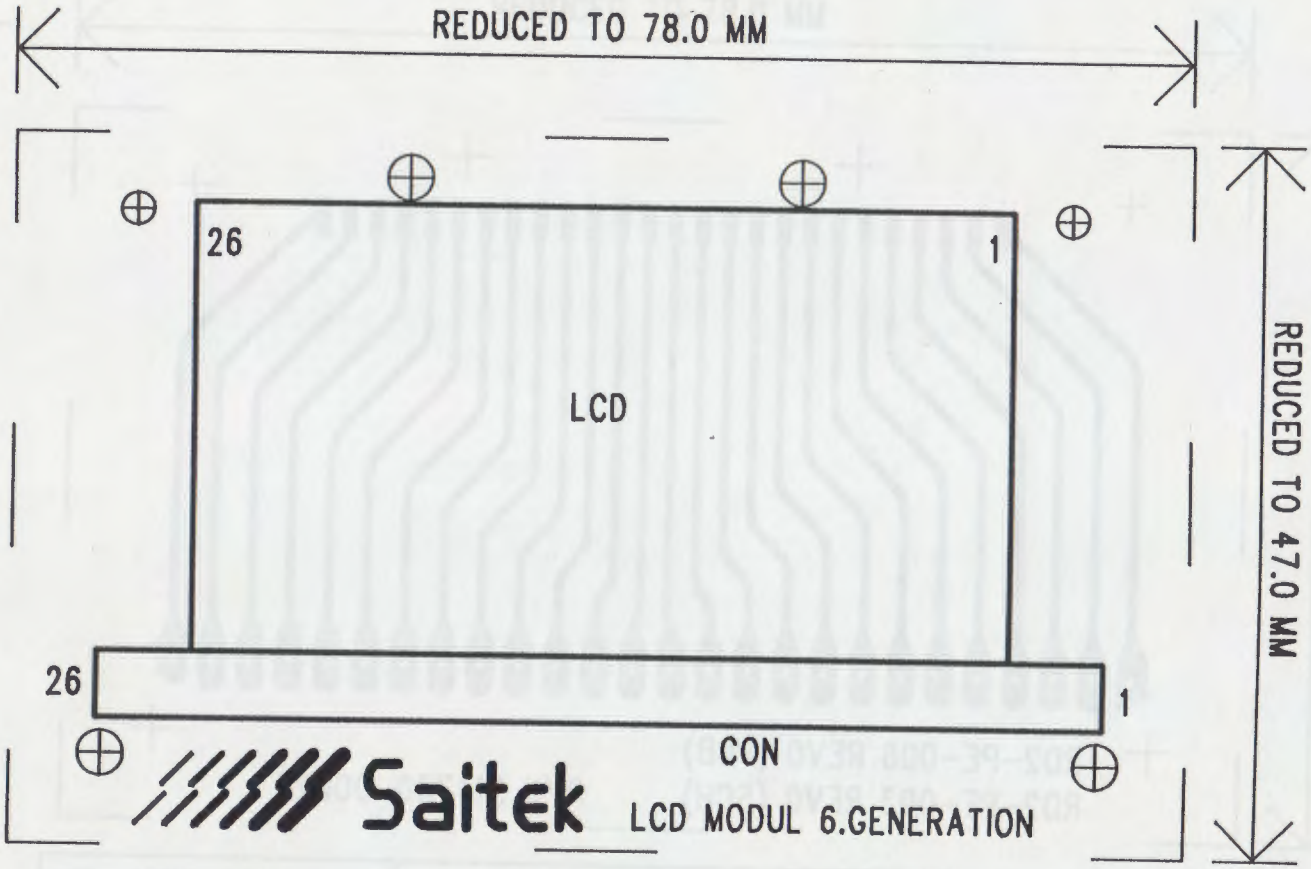
TITLE: LOGIC PCB (Artwork)

DWG. NO.: RM19-PE-006 PROJECT: RM19

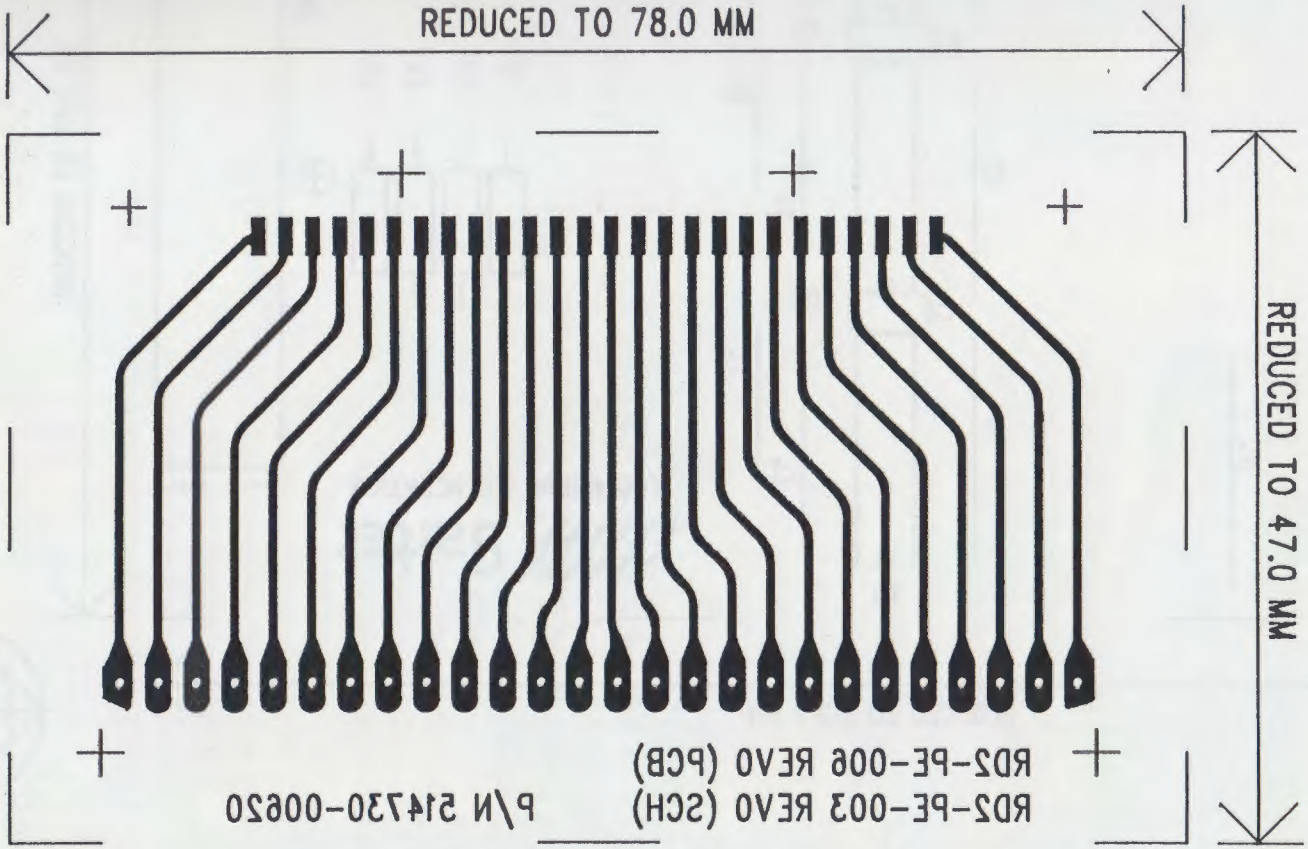
P/N.: 514720,00610

MATERIAL Paper Pheonlic FINISH Bare Copper

TOLERANCES DIM: ANGLE:	DRAWN BY:	K.H.LEE	27/12/95	Saitek	TITLE: RD2 LCD PCB SILKSCREEN
SCALE: 2 : 1 UNIT: MM	CHECK BY:	ACL	28/12/95	DWG. NO.: RD2-PE-00655	PROJECT: RD2
QUANTITY:	ENGRG AUTH			P/N.: N,1,4,7,3,0,1-,0,0,6,2,0	
SHEET 1 OF 4	Q.A. APPD.		29.12	MATERIAL Paper Phenolic	FINISH Flash Gold Plate
	BDD . APPD.		28/12/95		



E-TEST REQUIREMENT	YES	NO
		✓



3RD ANGLE PROJECTION	SIGNATURE		DATE
TOLERANCES	DRAWN BY:	K.H.LEE	27/12/05
DIM.: ANGLE:	CHECK BY:		28/12/05
SCALE: 2:1 UNIT: MM	ENGRG AUTH		
QUANTITY:	Q.A. APPD.		28/12/05
SHEET 2 OF 4	BDD . APPD.		28/12/05

REV.	ITEM	WAS / DESCRIPTION OF CHANGE	IS	DATE	DRAWN	CHECK	BDD / APPROVED	QA

Saitek

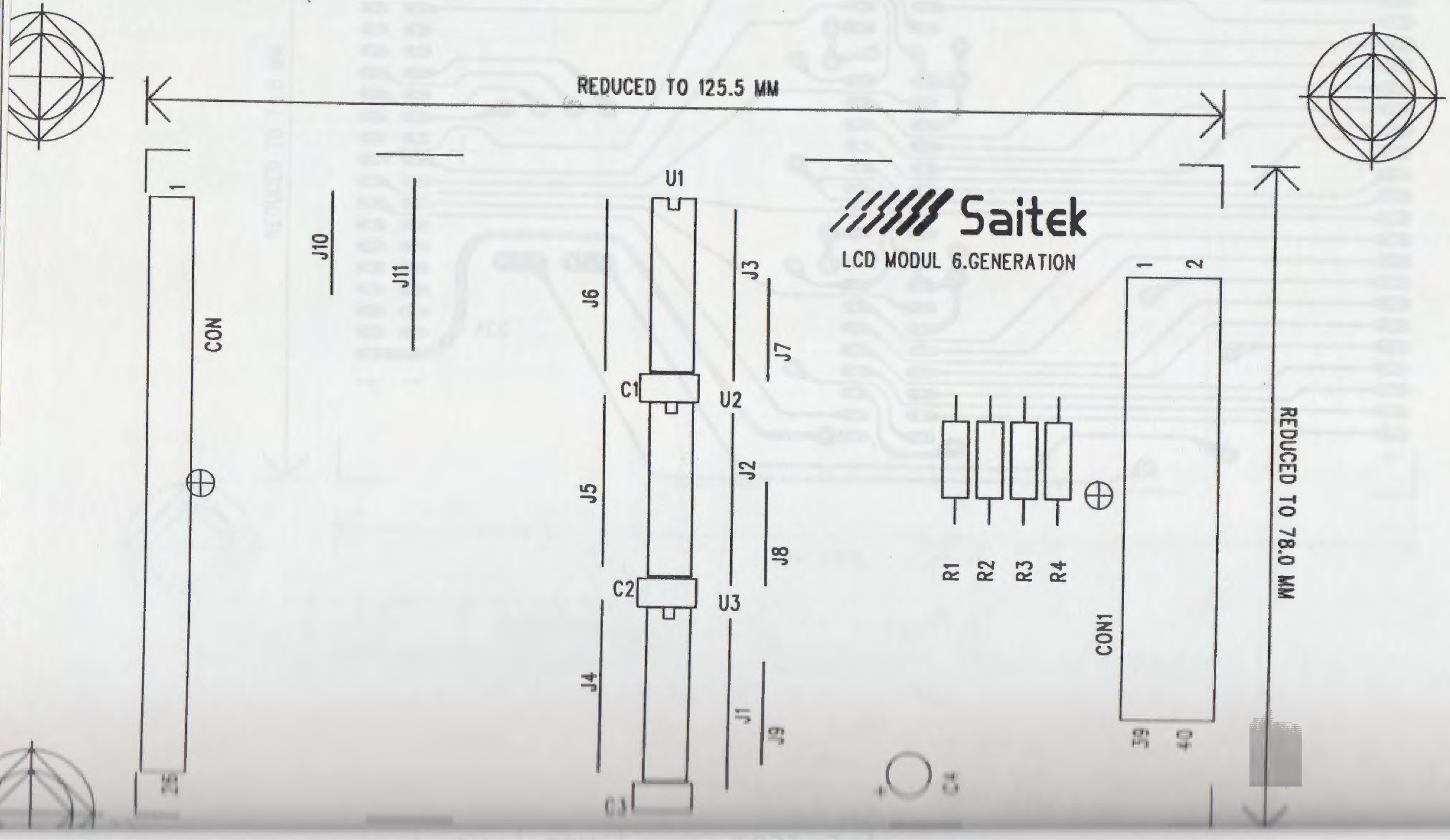
TITLE: RD2 LCD PCB COPPER SIDE

DWG. NO.: RD2-PE-006CS PROJECT: RD2

P/N.: 514730-0062 10

MATERIAL 1.6MM PAPER PHENOLIC FINISH FLASH GOLD PLATE

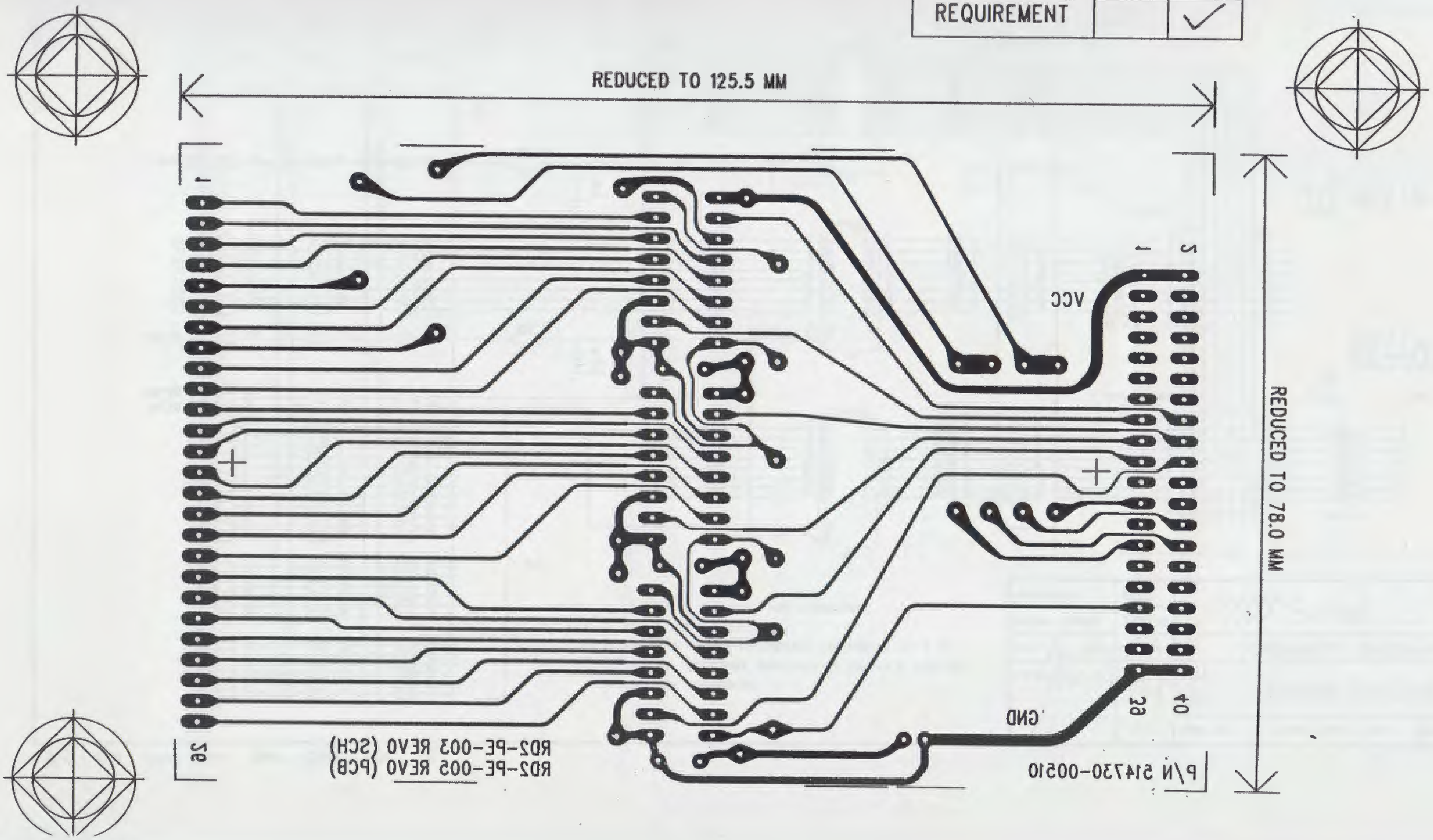
3RD ANGLE PROJECTION		SIGNATURE		DATE	REV.	ITEM	WAS	IS	DATE	DRAWN	CHECK	BDD	QA
							DESCRIPTION OF CHANGE					APPROVED	
TOLERANCES DIM.:	ANGLE:	DRAWN BY:	K.H.LEE	27/12/95	Saitek		TITLE: RD2 LOGIC PCB SILKSCREEN						
SCALE: 2:1	UNIT: MM	CHECK BY:		27/12/95									
QUANTITY:		ENGRG AUTH			DWG. NO.: RD2-PE-00555				PROJECT: RD2				
		Q.A. APPD.		29/12/95	P/N.: 1.1.4.7.3.01-0.0.5.1.0								
SHEET 1 OF 4		BDD. APPD.		27/12/95	MATERIAL 1.6MM PAPER PHEONLIC				FINISH Base Copper				

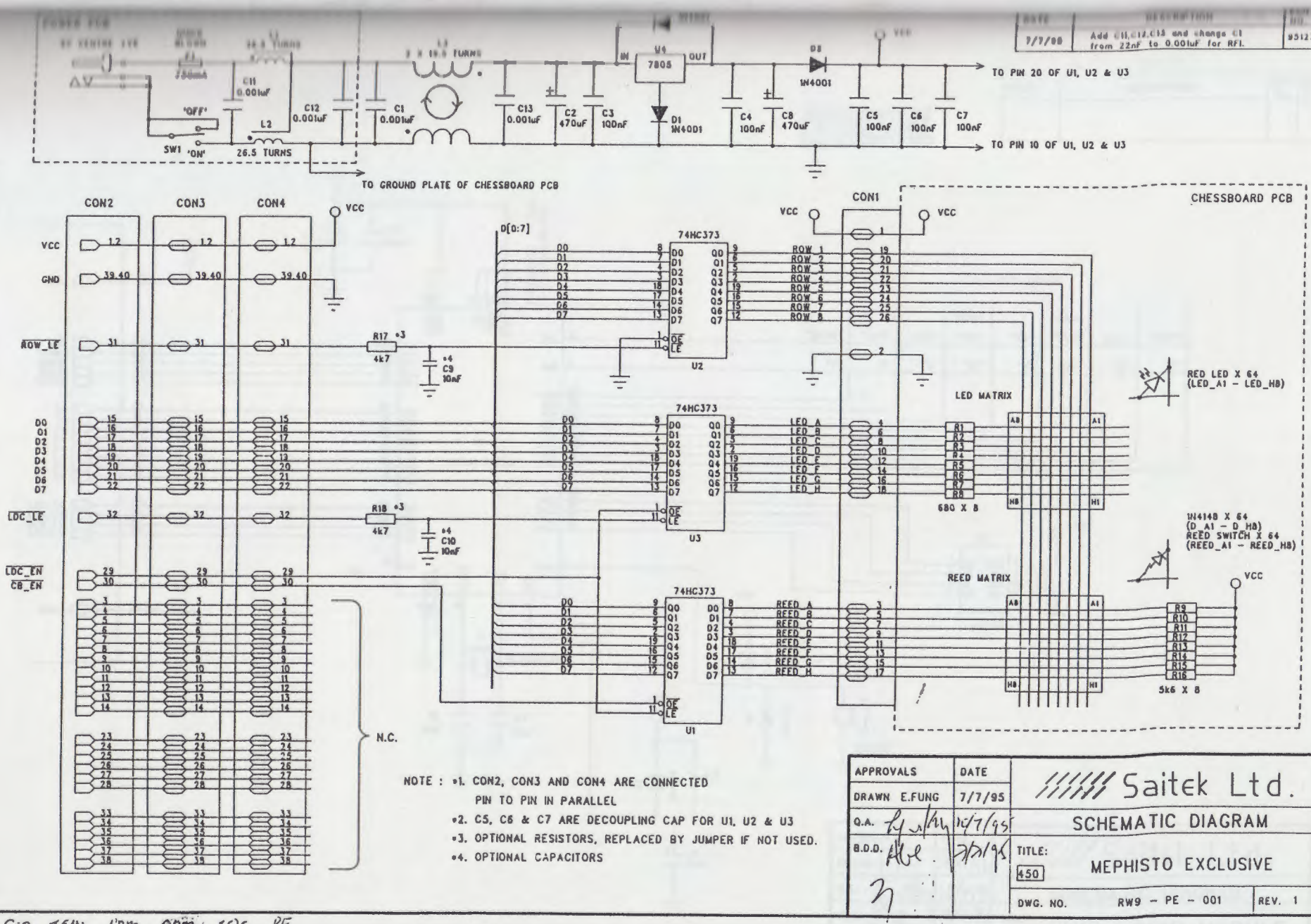


SHEET 2 OF 4

MATERIAL 1.6mm PAPER PHENOLIC | FINISH Bare Copper

E-TEST REQUIREMENT	YES	NO
		✓



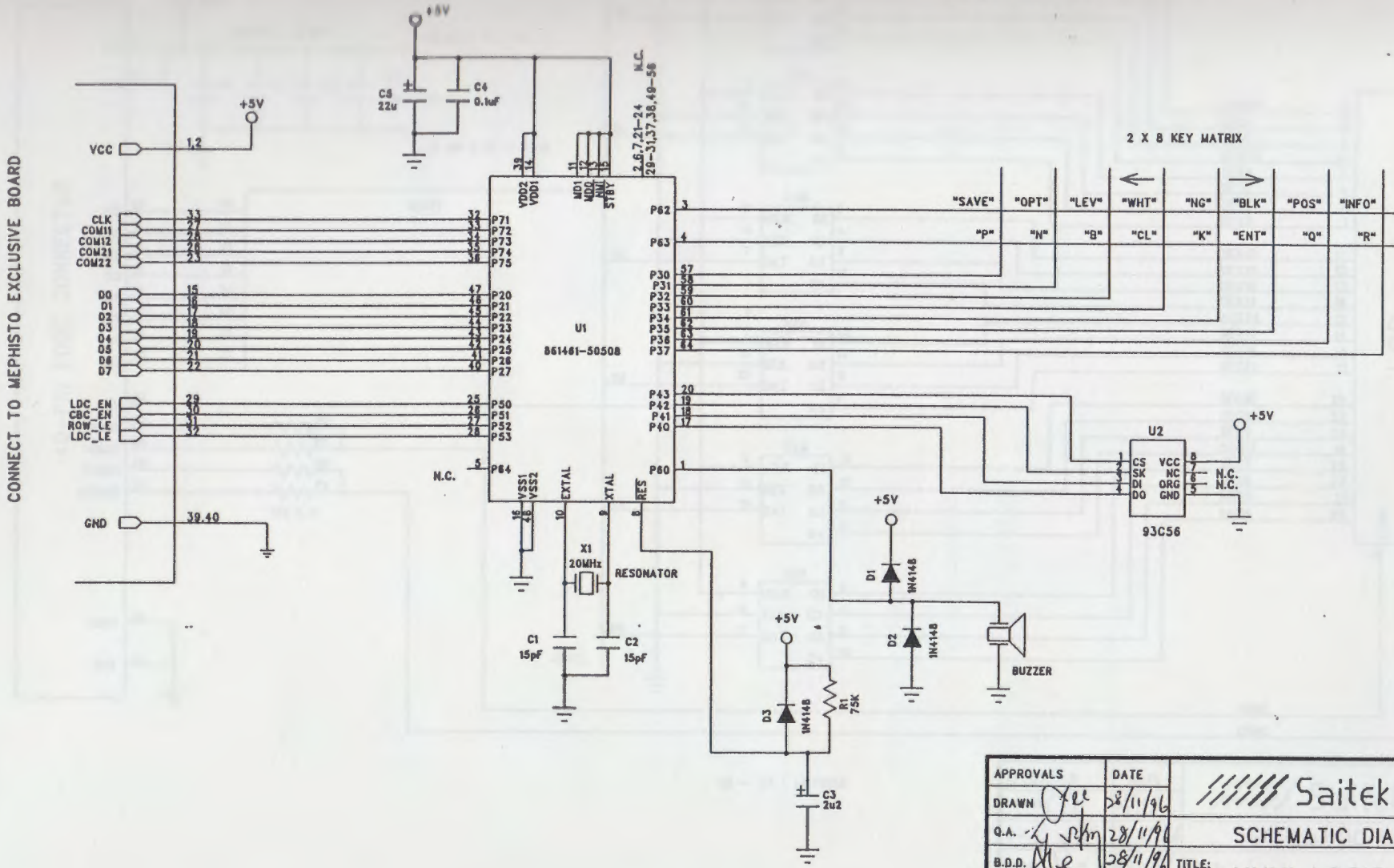


NOTE : *1. CON2, CON3 AND CON4 ARE CONNECTED PIN TO PIN IN PARALLEL
*2. C5, C6 & C7 ARE DECOUPLING CAP FOR U1, U2 & U3
*3. OPTIONAL RESISTORS, REPLACED BY JUMPER IF NOT USED.
*4. OPTIONAL CAPACITORS

APPROVALS	DATE	Saitek Ltd.
DRAWN E.FUNG	7/7/95	
Q.A.	14/7/95	SCHEMATIC DIAGRAM
B.D.D.	7/7/95	TITLE: 450 MEPHISTO EXCLUSIVE
		DWG. NO. RW9 - PE - 001 REV. 1

Dist : SEE, SEN, TEM, EDM, QAM, IQC, PE

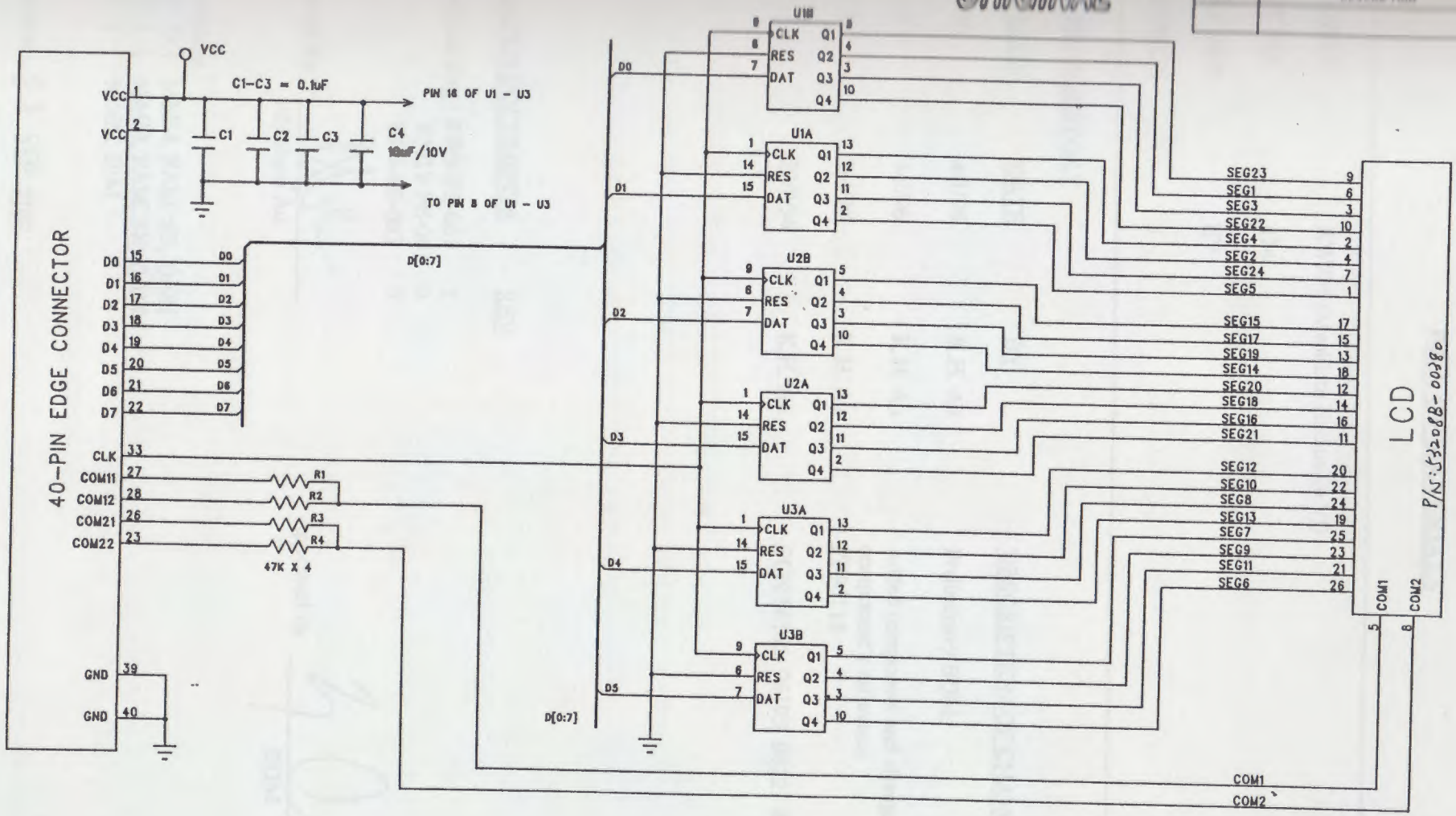
ORIGINAL



APPROVALS	DATE	Saitek Ltd.
DRAWN	28/11/96	SCHEMATIC DIAGRAM
Q.A.	28/11/96	TITLE: MMVI LOGIC MODULE
B.D.D.	28/11/96	472
		DWG. NO. RM19 – PE – 001 REV. 0

Dist: BDM, QAM, SED, PE

ORIGINAL



U1 - U3 : CD4015B

APPROVALS	DATE
DRAWN	28/11/96
Q.A.	29.11.96
B.D.D	28/11/96

Saitek Ltd.

SCHEMATIC DIAGRAM

TITLE: 473 LCD MODUL 6.GENERATION

DWG. NO. RD2 - PE - 003 REV. 0

Dist : BDM, QAM, SED, PE

SAITEK

BILL OF MATERIALS

PROJECT : RW9M (Mephisto Exclusive VI)

ART NO. : 474

SHIP VER. : EV

REVISION : 3

REVISION HISTORY

REVISION	DATE	BY	DESCRIPTION OF CHANGES
P1	4/1/96	K.H. Au	Preliminary BOM.
1	5/2/96	K.H. Au	Added componets and changed component's reference
2	3/4/96	K.H. Au	PI-96113
3	20/9/96	K.H. Au	ECN:96162, 96195, 96221 & 96228

RELATED DOCUMENTS REV

Schematic dwg : RW9-PE-001 1
RM19-PE-001 0
RD2-PE-003 0

Prepared By : Abraham Au

Approved by : BDM

Distribution :
+1.00 [X] MMM, FAM, SE, QAM
+0.10 [ ] MMM, FAM, SE, QAM
+0.01 [ ] MMM, IEM

Date issue : 23 SEP 1996

+=new component; *=desc/PN/Ref changed +/-=cost up/down; C/NC=consigned/non-consigned; +/-Q=QTY up/down

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per	Reference
1			984740-00000	1		UNIT ASSEMBLY, FOR RW9M	1.000	
2			914500-00001	1		GUTS ASSEMBLY, -LOGIC, FOR RW9	1.000	
3	1		514500-00410		RC	PCB, LOGIC, DS, 1.6MM, FR-4	1.000	
3	2		74173X-40373		RC	TTL,-40373B,8 BIT LATCH WITH 3-STATE,DIP	1.000	U3
3	3		741723-00373		RC	TTL,-373, 8 BIT LATCH, HC, DIP20	2.000	U1,2
3	4		690010-07805		RC	ELECT,REGULATOR,5V,7805	1.000	U4
3	5		62477Z-01615		RC	CAPACITOR,E-CAP,470UF,+80-20%,16V	2.000	C8,C2
3	6		654001-20000		RC	DIODE,RECTIFIER,1N4001	3.000	D1,2,3
3	7		62104M-01611		RC	CAPACITOR,C-CAP,0.1UF,+/-20%,16V	5.000	C3-7
3	8		62102M-01611		RC	CAPACITOR,C-CAP,0.001UF,+/-20%,16V	2.000	C1,C13
3	9		62103M-01611		RC	CAPACITOR,C-CAP,0.01UF,+/-20%,16V	.000	C9&10,OPTIONAL
3	10		614725-31102		RC	RESISTOR,FIXED C-FILM,4K7,5%,1/4W	.000	R17&18,OPTIONAL
3	11		630027-10000		RC	INDUCTOR, TOROID, 0.75MH	1.000	L3
3	12		000190-00028		RC	CONNECTOR,LATCHED HEADER,891477,26PINS	1.000	CON1
3	13		000051-20155		RC	JUMPER,L=12MM,LL=15MM,D=0.5MM	2.000	REPLACE R18 R17
3	14		000071-20524		RC	SCREW,M/S,+PAN,M3.0XP0.5X6MM,FLAT	1.000	FOR U4 IN LOGIC
3	15		000110-00050		RC	NUT,M3.0XP0.5X1.8MM,MILD STEEL	1.000	FOR U4 IN LOGIC
3	16		000073-21534		RC	SCREW,S/T,+PAN,M3.0X8MM,A	6.000	FOR LOGIC PCB
2			914500-00002	1		GUTS ASSEMBLY, -LED, FOR RW9	1.000	
3	17		514500-00321		RC	PCB, LED, SS, 1.6MM, PAPER PHENOLIC	1.000	
3	18		660001-11003		RC	LED,RED,DOME,D=3MM,TOSHIBA,TLR124	64.000	
3	19		525120-00530		RC	SWITCH, REED, FOR SW7, ORD9215	64.000	
3	20		654148-10000		RC	DIODE,SWITCHING,1N4148	64.000	
3	21		000051-20155		RC	JUMPER,L=12MM,LL=15MM,D=0.5MM	71.000	J1-J64,J66-J72
3	22		615625-31102		RC	RESISTOR,FIXED C-FILM,5K6,5%,1/4W	8.000	R9-16
3	23		616815-31102		RC	RESISTOR,FIXED C-FILM,680,5%,1/4W	8.000	R1-8
2			914500-00005	1		GUTS ASSEMBLY, -POWER SUPPLY, FOR RW9	1.000	
3	24		514500-00551		RC	PCB, POWER SUPPLIER, SS, 1.6MM, PAPER	1.000	
3	25		526200-00030		RC	SWITCH,2P2T,FOR B3,SK-22F03-G9	1.000	SW1
3	26		000220-00003		RC	SOCKET,DC POWER JACK,DC 208	1.000	
3	27		690023-00001		RC	ELECT,FUSE,750MA,120V,SLOW BLOW, BEL	1.000	F1
3	28		630028-20000		RC	INDUCTOR, CHOCK, 4.3UH	2.000	L1,L2
3	29		62102M-01611		RC	CAPACITOR,C-CAP,0.001UF,+/-20%,16V	2.000	C11, C12
2			964740-00000	1		CASING ASSEMBLY, FOR RW9M	1.000	
3	30		234500-00601		RC	WOOD,TOP CABINET WITH SILKSCREEN,RW9	1.000	
3	31		234500-00701		RC	WOOD,LEFT BAR,WHITE WOOD,RW9	1.000	
3	32		234500-00801		RC	WOOD,RIGHT BAR,WHITE WOOD,RW9	1.000	
3	33		214500-01500		RC	PLASTIC,B.CAB,ABS,BLACK,FOR RW9	1.000	
3	34		000062-2004C		RC	STRAND WIRE,RED,L=200MM,E=3.5MM,SWG#28	1.000	
3	35		000060-2004C		RC	STRAND WIRE,BLACK,L=200MM,E=3.5MM,SWG#28	1.000	
3	36		000065-20043		RC	STRAND WIRE,GREEN,L=200MM,E=3.5MM,AWG28	1.000	
3	37		234500-01300		RC	WOOD,FRONT BAR, FOR RW9	1.000	
3	38		214500-02800		RC	PLASTIC,HANDLE,LEFT,ABS,BLACK,RW9	1.000	
3	39		214500-02900		RC	PLASTIC,HANDLE,RIGHT,ABS,BLACK,RW9	1.000	
3	40		224500-02000		RC	METAL,LOCKING PLATE,FOR RW9	2.000	
3	41		224500-01700		RC	METAL,SPACER,FOR RW9	4.000	BOTTOM CABINET
3	42		224500-03400		RC	METAL,DRAWER KNOB,FOR RW9	1.000	

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per	Reference
3	43		000073-11784		RC	SCREW,S/T,+BIND,M4X18MM,A	4.000	L & R BARS
3	44		000022-00080		RC	RUBBER FT,3M/MIC.FREE,20.5SQX7.6MM,TAPER	4.000	
3	45		594500-00410		RC	CABLE ASSEMBLY,26PIN HEADERX2,23CM CABLE	1.000	
3	46		334500-03800		RC	RATING PLATE, FOR RW9,FOIL PAPER	1.000	
3	47		000040-30040		RC	EYELET ID=3 X H=4 MM	4.000	ECN:96221
3	48		594500-00392		RC	INSULATION PLATE,0.8MM,WITH AL PAPER,EMC	1.000	
3	49		224500-03500		RC	METAL,MOUNTING PLATE,FOR RW9	4.000	
3	50		000073-11224		RC	SCREW,S/T,+BIND,M2.3X6MM,A	2.000	DC JACK PCB
3	51		000073-11434		RC	SCREW,S/T,+BIND,M2.6X8MM,A	25.000	FOR LED PCB
3	52		000073-11414		RC	SCREW,S/T,+BIND,M2.6X5MM,A	4.000	MOUNTING PLATE
3	53		000073-11414		RC	SCREW,S/T,+BIND,M2.6X5MM,A	4.000	LOCKING PLATE
3	54		224500-01900		RC	METAL,PUSH,FOR RW9	4.000	ENCLOSED SPACER
3	55		000071-10K74		RC	SCREW,M/C,+BIND,M3.5X15MM,FLAT	4.000	FOR SPACER
3	56		000071-30950		RC	SCREW,M/S,+TRUSS HEAD,#4X12MM,BLACK	1.000	FOR DRAWER KNOB
3	57		000073-11434		RC	SCREW,S/T,+BIND,M2.6X8MM,A	2.000	L & R HANDLES
3	58		294570-03400		RC	CABLE PROTECT PLATE #1,SMALL	2.000	ECN:96221
3	59		000080-00070		RC	WASHER,COPPER,ID=4.3MM,OD=11.5MM,T=0.9MM	.000	
3	60		000080-00250		RC	WASHER,OD=5,ID=1.9,T=0.5	.000	
3	61		594500-00520		RC	SHIELDING PLATE, FOR RW9 LOGIC PCB,EMC	1.000	
3	62		222990-04500		RC	METAL,DIA 15X4MM,COPPER SPACER	4.000	SHIELDING PLATE
3	63		000110-00040		RC	NUT,M2.6XP0.45X1.6MM,MILD STEEL	4.000	FOR SPACER
3	64		000090-00290		RC	FOAM PAD,QC1/2, 9X8X4.5MM ADHESIVE	4.000	ECN:96162
3	65		214500-00900		RC	PLASTIC DUMMY TOP COVER, FOR RW9	1.000	ECN:96228
3	66		214500-01000		RC	PLASTIC,DUMMY BOTTOM CABINET, FOR RW9	1.000	ECN:96228
2			914720-00001	1		GUTS ASSEMBLY, -LOGIC,FOR RM19	1.000	
3	67		514720-00610		RC	PCB,LOGIC,S.S.,1.6MM,PAPER PHEONLIC,RM19	1.000	
3	68		000140-08254		RC	IC SOCKET, 8 PIN,P=2.54MM	1.000	ECN:96221
3	69		750034-93C56		RC	IC,MEMORY,EEPROM,2K BIT,93C56	1.000	U2
3	70		000090-00290		RC	FOAM PAD,QC1/2, 9X8X4.5MM ADHESIVE	.500	EEPROM,ECN96221
3	71		861461-50508		RC	MICROPROCESSOR, RM19, DIP, 64PIN	1.000	U1,ECN:96221
3	72		654148-10000		RC	DIODE,SWITCHING,1N4148	3.000	D1-3
3	73		642000-03130		RC	CRYSTAL,20MHZ,30PPM	1.000	X1,ECN:96195
3	74		617535-21102		RC	RESISTOR,FIXED C-FILM,75K,5%,1/8W	1.000	R1
3	75		62150J-05014		RC	CAPACITOR,C-CAP,NPO,15PF,+/-5%,50V	2.000	C1,2
3	76		62225Z-01615		RC	CAPACITOR,E-CAP,2.2UF,+80-20%,16V	1.000	C3
3	77		62226Z-01615		RC	CAPACITOR,E-CAP,22UF,+80-20%,16V	1.000	C5
3	78		62104M-01611		RC	CAPACITOR,C-CAP,0.1UF,+/-20%,16V	1.000	C4
3	79		000132-00200		RC	BUZZER,20MM WITH CABINET	1.000	BZ1
3	80		000190-00027		RC	CONNECTOR, EDGE, 40PIN, BENDED LEADS	1.000	CON1
3	81		000051-20155		RC	JUMPER,L=12MM,LL=15MM,D=0.5MM	3.000	J1,2,4
3	82		000051-70155		RC	JUMPER,L=17MM,LL=15MM,D=0.5MM	1.000	J5
3	83		000052-50155		RC	JUMPER,L=25MM,LL=15MM,D=0.5MM	1.000	J3
3	84		000051-50155		RC	JUMPER,L=15MM,LL=15MM,D=0.5MM	.000	J6,OPTION
2			964720-00000	1		CASING ASSEMBLY,FOR RM19	1.000	
3	85		214610-00102		RC	PLASTIC,T.CAB,ABS,BLACK,WITH SILK'N,RM19	1.000	
3	86		214610-00200		RC	PLASTIC, B.CABINET, ABS, BLACK, RM18	1.000	
3			520000-00001	1		SWITCH ASSEMBLY,FOR RM19	1.000	

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per Reference
4			524720-00880	1		SWITCH,TACT,RM19,PAWN,320 E1-1	1.000
5	87		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00890	1		SWITCH,TACT,RM19,KNIGHT,320 E1-1	1.000
5	88		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00900	1		SWITCH,TACT,RM19,BISHOP,320 E1-1	1.000
5	89		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00910	1		SWITCH,TACT,RM19,ROOK,320 E1-1	1.000
5	90		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00920	1		SWITCH,TACT,RM19,QUEEN,320 E1-1	1.000
5	91		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00930	1		SWITCH,TACT,RM19,KING,320 E1-1	1.000
5	92		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00940	1		SWITCH,TACT,RM19,"SAVE",320 E1-1	1.000
5	93		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00950	1		SWITCH,TACT,RM19,"OPT",320 E1-1	1.000
5	94		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00960	1		SWITCH,TACT,RM19,"LEV",320 E1-1	1.000
5	95		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00970	1		SWITCH,TACT,RM19,"INFO",320 E1-1	1.000
5	96		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00980	1		SWITCH,TACT,RM19,"POS",320 E1-1	1.000
5	97		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-00990	1		SWITCH,TACT,RM19,"NEW GAME",320 E1-1	1.000
5	98		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-01000	1		SWITCH,TACT,RM19,ARROW LEFT,320 E1-1	1.000
5	99		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-01010	1		SWITCH,TACT,RM19,ARROW RIGHT,320 E1-1	1.000
5	100		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-01020	1		SWITCH,TACT,RM19,"ENT",320 E1-1	1.000
5	101		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4			524720-01030	1		SWITCH,TACT,RM19,"CL",320 E1-1	1.000
5	102		524660-00830		RC	SWITCH,KEY,FOR RM20,BLANK,BLACK	1.000
4	103		520000-00001C			SWITCH SILKSCREENING CHARGE PER SET	1.000
3	104		334720-00700		RC	RATING PLATE,FOR RM19,SILVER GRAY PAPER	1.000

Level	Item	Chg	Stock Code	Key	Cons	Description	Qty Per	Reference
2			914730-00001	1		GUTS ASSEMBLY, -LOGIC,FOR RD2	1.000	
3	105		514730-00510		RC	PCB,LOGIC,S.S.,1.6MM,PAPER PHEONLIC,RD2	1.000	
3	106		750008-04015		RC	IC,DUAL 4-BIT SHIFT REGISTER,	3.000	U1-U3
3	107		62104M-01611		RC	CAPACITOR,C-CAP,0.1UF,+/-20%,16V	3.000	C1-3
3	108		62106Z-0161X		RC	CAPACITOR,E-CAP,10UF,+80%/-20%,16V,MINI	1.000	C4
3	109		000190-00027		RC	CONNECTOR, EDGE, 40PIN, BENDED LEADS	1.000	CON1
3	110		614735-21102		RC	RESISTOR,FIXED,C-FILM,47K,5%,1/8W	4.000	R1-4
3	111		000051-20155		RC	JUMPER,L=12MM,LL=15MM,D=0.5MM	4.000	J7-10
3	112		000052-00155		RC	JUMPER,L=20MM,LL=15MM,D=0.5MM	7.000	J1-6,11
2			914730-00003	1		GUTS ASSEMBLY, -LCD, FOR RD2	1.000	
3	113		514730-00620		RC	PCB,LCD,S.S.,1.6MM,PAPER PHEONLIC,RD2	1.000	
3	114		000030-01400		RC	CONN ARRAY,N=11,L=40MM,P=2.54MM,E=3.5MM	3.000	
2			964730-00000	1		CASING ASSEMBLY, FOR RD2	1.000	
3			954730-00000	1		CABINET SET,FOR RD2	1.000	
4	115		214610-00103		RC	PLASTIC,T.CAB,ABS,BLACK,W/SILKSCREEN,RD2	1.000	
4	116		214610-00200		RC	PLASTIC, B.CABINET, ABS, BLACK, RM18	1.000	
3	117		53208B-00380		RC	LCD,FOR ST12B	1.000	
3	118		250000-00524		RC	ZEBRA CONNECTOR,SQ,52X2.2X4.7,P=0.18MM	1.000	
3	119		212080-01100		RC	PLASTIC,SUPPORT FRAME,HIPS	1.000	
3	120		000073-11424		RC	SCREW,S/T,+BIND,M2.6X6MM,A	4.000	
1			944740-10000	1		PACKING ASSEMBLY, FOR RW9M	1.000	
2	121		454500-04400		RC	POLYFOAM, FOR RW9, ROD SHAPE	1.000	
2	122		454500-02701		RC	POLYFOAM, FOR RW9	4.000	
2	123		000125-00500		RC	POLYBAG,500X500X0.045MM	1.000	FOR CHESSBOARD
2	124		000122-50160		RC	POLYBAG,250X160X0.045MM	2.000	FOR CHESSMEN
2	125		454500-03601		RC	INSERT,FOR RW9,PAPER,CHESSPIECE	2.000	FOR CHESSMEN
2			244500-26700	1		CHESSMEN SET,RW9,70MM,BLITZ	1.000	
3			244500-26810	1		CHESSMEN SUBSET,RW9,70MM,BLITZ,BROWN	1.000	
4			244500-270K0	1		CHESSMEN,RW9,KING,BROWN,D13X4,BLITZ	1.000	
5	126		234500-02100		RC	WOOD,KING,DEEP BROWN, WITHOUT MAGNET	1.000	
5	127		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000	
5	128		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000	
4			244500-271Q0	1		CHESSMEN,RW9,QUEEN,BROWN,D13X4,BLITZ	1.000	
5	129		234500-02200		RC	WOOD,QUEEN,DEEP BROWN, WITHOUT MAGNET	1.000	
5	130		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000	
5	131		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000	
4			244500-272R0	1		CHESSMEN,RW9,ROOK,BROWN,D13X4,BLITZ	2.000	
5	132		234500-02300		RC	WOOD,ROOK,DEEP BROWN, WITHOUT MAGNET	1.000	
5	133		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000	
5	134		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000	
4			244500-273N0	1		CHESSMEN,RW9,KNIGHT,BROWN,D13X4,BLITZ	2.000	

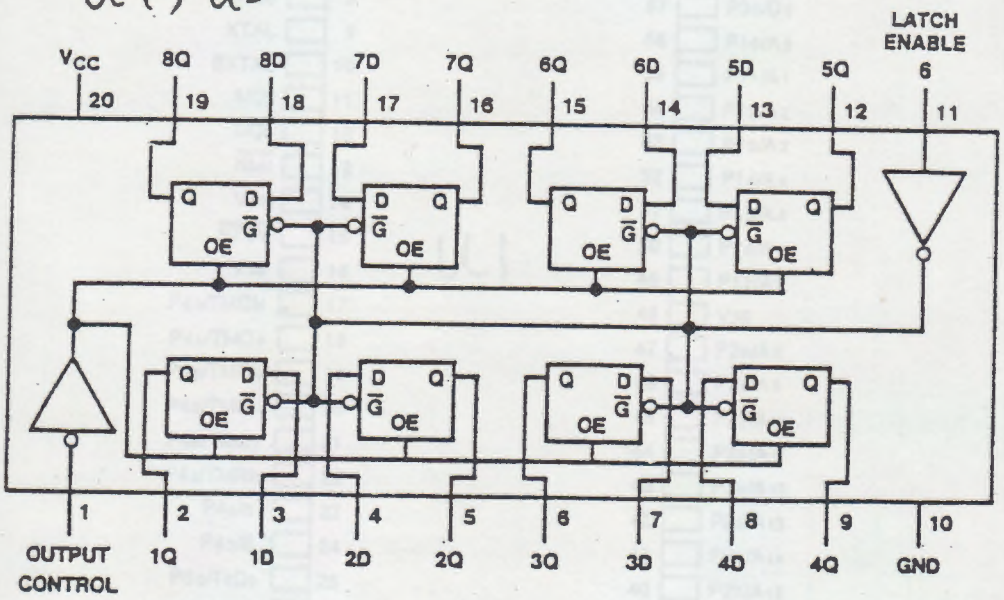
Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per Reference
5	135		234500-02400		RC	WOOD,KNIGHT,DEEP BROWN, WITHOUT MAGNET	1.000
5	136		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	137		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
4			244500-274R0	1		CHESSMEN,RW9,BISHOP,BROWN,D13X4,BLITZ	2.000
5	138		234500-02500		RC	WOOD,BISHOP,DEEP BROWN, WITHOUT MAGNET	1.000
5	139		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	140		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
4			244500-275P0	1		CHESSMEN,RW9,PAWN,BROWN,D13X4,BLITZ	8.000
5	141		234500-02600		RC	WOOD,PAWN,DEEP BROWN, WITHOUT MAGNET	1.000
5	142		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	143		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
3			244500-26910	1		CHESSMEN SUBSET,RW9,70MM,BLITZ,BEIGE	1.000
4			244500-276K0	1		CHESSMEN,RW9,KING,BEIGE,D13X4,BLITZ	1.000
5	144		234500-02110		RC	WOOD,KING,BEIGE, WITHOUT MAGNET	1.000
5	145		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	146		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
4			244500-277Q0	1		CHESSMEN,RW9,QUEEN,BEIGE,D13X4,BLITZ	1.000
5	147		234500-02210		RC	WOOD,QUEEN,BEIGE, WITHOUT MAGNET	1.000
5	148		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	149		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
4			244500-278R0	1		CHESSMEN,RW9,ROOK,BEIGE,D13X4,BLITZ	2.000
5	150		234500-02310		RC	WOOD,ROOK,BEIGE, WITHOUT MAGNET	1.000
5	151		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	152		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
4			244500-279N0	1		CHESSMEN,RW9,KNIGHT,BEIGE,D13X4,BLITZ	2.000
5	153		234500-02410		RC	WOOD,KNIGHT,BEIGE, WITHOUT MAGNET	1.000
5	154		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	155		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
4			244500-280B0	1		CHESSMEN,RW9,BISHOP,BEIGE,D13X4,BLITZ	2.000
5	156		234500-02510		RC	WOOD,BISHOP,BEIGE, WITHOUT MAGNET	1.000
5	157		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	158		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
4			244500-281P0	1		CHESSMEN,RW9,PAWN,BEIGE,D13X4,BLITZ	8.000
5	159		234500-02610		RC	WOOD,PAWN,BEIGE, WITHOUT MAGNET	1.000
5	160		000161-00150		RC	MAGNET,ISO,FERRITE,D13X4	1.000
5	161		295100-08211		RC	FELT,DIA 20MM,BLK,W ADHESIVE	1.000
3	162		242990-19400C			CHESSMEN SET,SW19,ALC	1.000
2	163		370000-00000			LABEL ASSEMBLY	1.000
2	164		360000-00220		RC	LABEL,FOR SERIAL NO,ADHESIVE PAPER,STD.	1.000
2	165		454740-00100		RC	CARTON,FOR RW9M,3PCS/CTN	.330

994740 - RW9M, MEPHISTO EXCLUSIVE VI Rev : 3

Level	Item	Chg	Stock Code	Rev	Cons	Description	Qty Per	Reference
2	166		434500-61000		RC	ADDENDUM,REMOVE,POLYFOAM ROD,G/F/E/D/I/S	1.000	
2	167		364740-00200		RC	STICKER,FOR RW9M GIFTBOX,PAPER	1.000	
2	168		364740-00300		RC	STICKER,FOR RW9M ARTICAL NO,,PAPER	1.000	
2	169		000123-30230		RC	POLYBAG,330X230X0.045MM	1.000	ECN:96228
1			974740-00000	1		OPTIONS ASSEMBLY,FOR RW9M	1.000	
2	170		424500-61100		RC	GIFTBOX,FOR RW9,G/F/E/D/I/S	1.000	
2	171		414500-61100		RC	MANUAL,FOR RW9, F/G/E/D/I/S	1.000	
2	172		414720-61200		RC	MANUAL,FOR RM19,G/F/E/D/I/S	.000	
2	173		414720-22100		RC	MANUAL,FOR RM19,G/E	1.000	

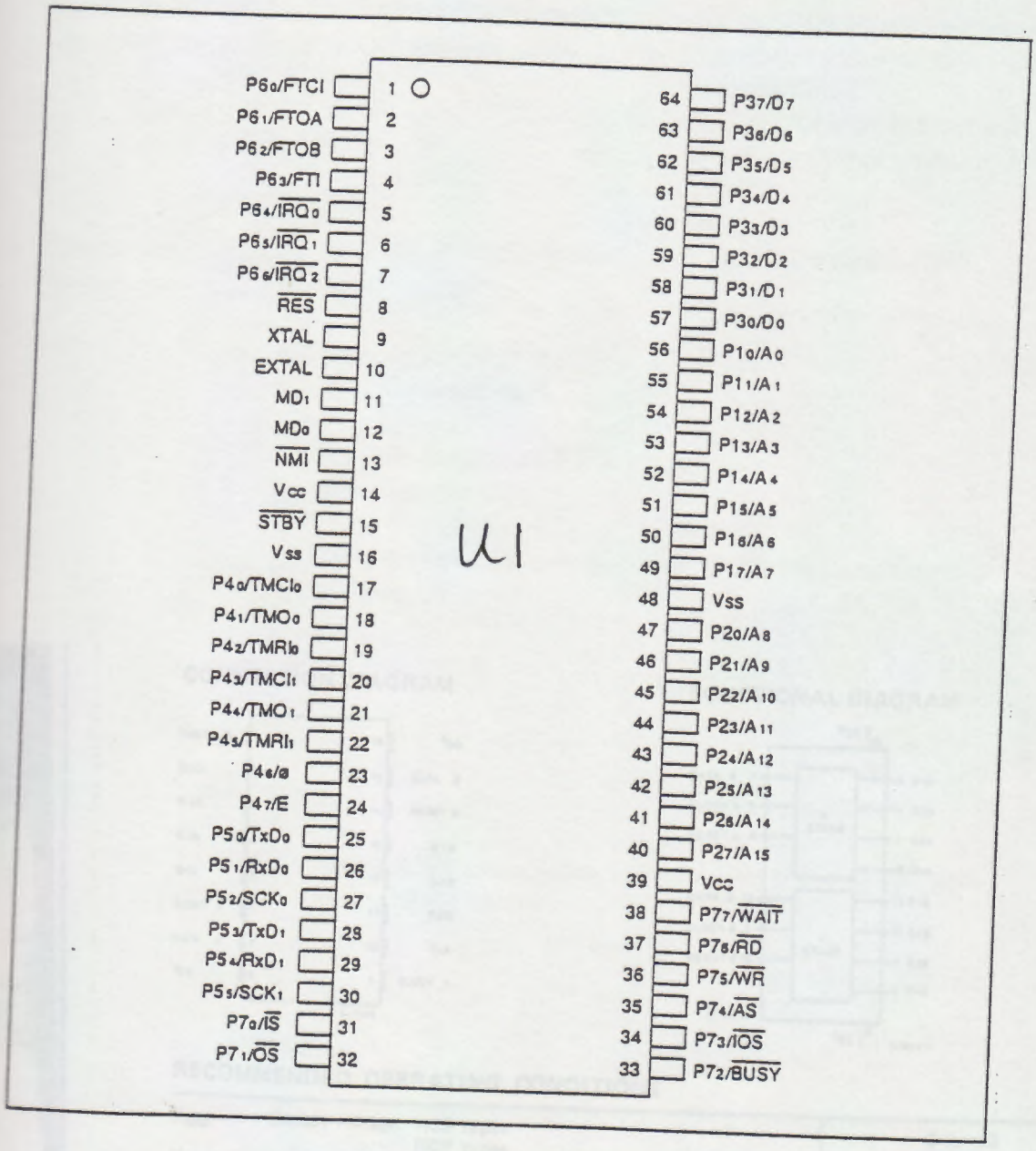
U1, U2

Dual-In-Line Package

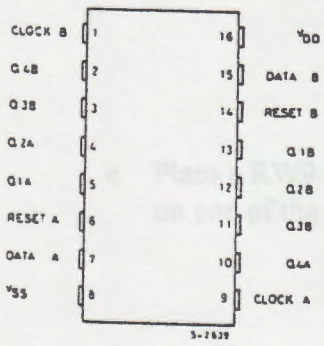


Top View

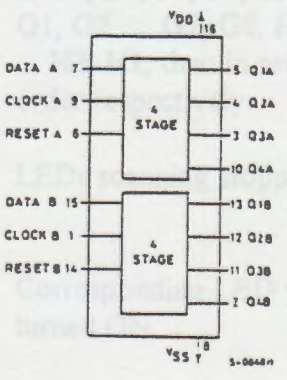
RM19


P60/FTCI 1
P61/FTOA 2
P62/FTOB 3
P63/FTI 4
P64/IRQ0 5
P65/IRQ1 6
P66/IRQ2 7
RES 8
XTAL 9
EXTAL 10
MD1 11
MD0 12
NMI 13
Vcc 14
STBY 15
Vss 16
P40/TMCI0 17
P41/TMO0 18
P42/TMRI0 19
P43/TMCI1 20
P44/TMO1 21
P45/TMRI1 22
P46/ø 23
P47/E 24
P50/TxD0 25
P51/RxD0 26
P52/SCK0 27
P53/TxD1 28
P54/RxD1 29
P55/SCK1 30
P70/IS 31
P71/OS 32
U1
64 P37/D7
63 P36/D6
62 P35/D5
61 P34/D4
60 P33/D3
59 P32/D2
58 P31/D1
57 P30/D0
56 P10/A0
55 P11/A1
54 P12/A2
53 P13/A3
52 P14/A4
51 P15/A5
50 P16/A6
49 P17/A7
48 Vss
47 P20/A8
46 P21/A9
45 P22/A10
44 P23/A11
43 P24/A12
42 P25/A13
41 P26/A14
40 P27/A15
39 Vcc
38 P77/WAIT
37 P76/RD
36 P75/WR
35 P74/AS
34 P73/IOS
33 P72/BUSY

CONNECTION DIAGRAM



FUNCTIONAL DIAGRAM



RECOMMENDED OPERATING CONDITIONS

V_{DD}	Supply voltage: HCC types	3 to 18	V
	HCF types	3 to 15	V
V_I	Input voltage	0 to V_{DD}	V
T_{op}	Operating temperature: HCC types	-55 to 125	°C
	HCF types	-40 to 85	°C

FUNCTIONAL TEST PROCEDURE FOR RW9

Make sure that the ON/OFF switch of RW9 is at OFF position before any module is inserted into the unit. Plug the RW9 logic tester module and RW9 tester LED modules into the slots. Then insert the energized adapter into DC socket.

Purpose	Procedure	Observation
1. Open / short test of logic PCB	a. Slide the ON/OFF switch to ON position	- The LEDs on the two LED modules will scan according to the Table 1. (The LEDs on chessboard will not turned on during the test).
2. Chessboard square test	a. Slide the ON/OFF switch to OFF position	- All LEDs turned OFF
	b. Remove all tester module from the chessboard.	
	c. Plug the chessboard LED tester into the unit.	
	d. Slide the ON/OFF switch to ON position	- 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.
	e. Place a RW9 chesspieces on one of the square	- LEDs scanning stopped
		- Corresponding LED will be turned ON.

Purpose	Procedure	Observation
	f. Short the reed switches of column A with magnets. After the chessboard LED turns on steadily, put a testing chessman on squares labeled with 1 on Table 2 (H1, G2, F3, ... B7, B8)	- Corresponding LED will turned ON steadily.
	g. Repeat the above step for column B, C, D, E, F, G, H and put a testing chessman on square labeled with 2, 3, 4, 5, 6, 7, 8 respectively on Table 2.	Corresponding LED will turned ON steadily.
3. Test finished	a. Slide the ON/OFF switch to OFF position	- All LEDs are OFF
	b. Remove the testers from the unit.	
	c. Unplug the adapter from the unit.	

Table 1

Scanning sequences of LED modules tester.

Sequences	Observation
1	All LEDs OFF
2	The eight red LEDs of first row will turn on.
3	The eight red LEDs of second row will turn on.
4	The eight red LEDs of third row will turn on.
5	The eight red LEDs of forth row will turn on.
6	The four red LEDs of the first column will turn on.
7	The four red LEDs of the second column will turn on.
8	The four red LEDs of the third column will turn on.
9	The four red LEDs of the forth column will turn on.
10	The four red LEDs of the fifth column will turn on.
11	The four red LEDs of the sixth column will turn on.
12	The four red LEDs of the seventh column will turn on.
13	The four red LEDs of the eighth column will turn on.
14	The first green LED of last column will turn on.
15	The second green LED of last column will turn on.
16	The third green LED of last column will turn on.
17	The forth green LED of last column will turn on.
18	Repeat the step 1 to 17

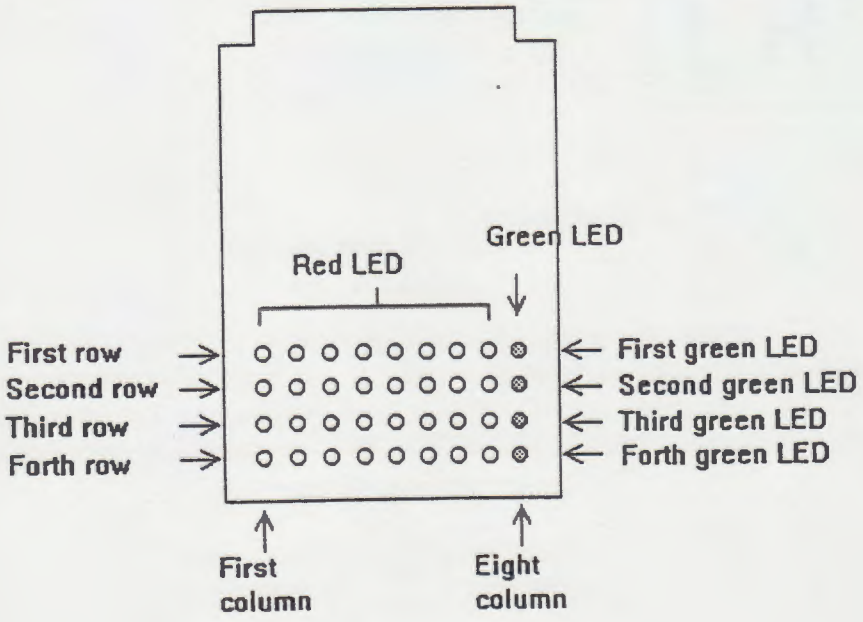


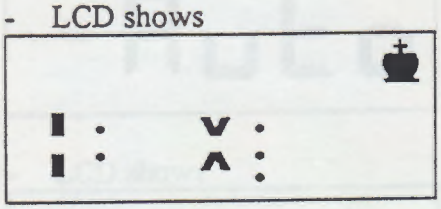
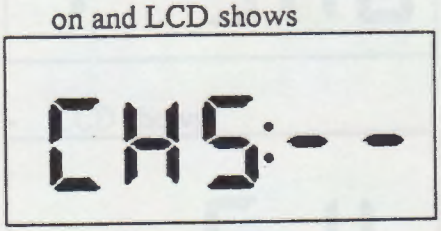
Table 2

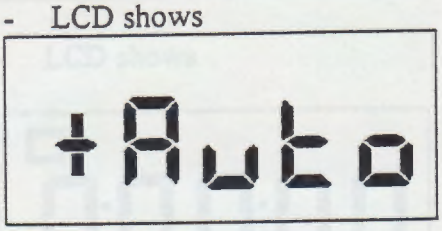
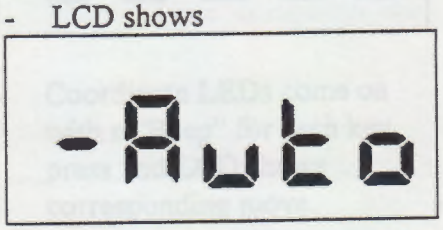
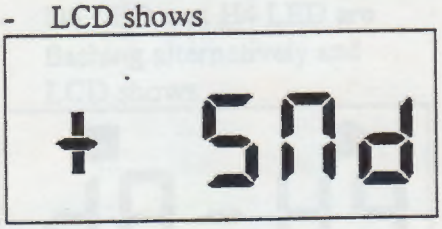
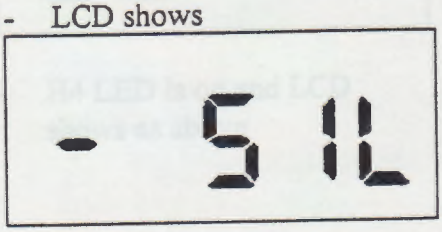
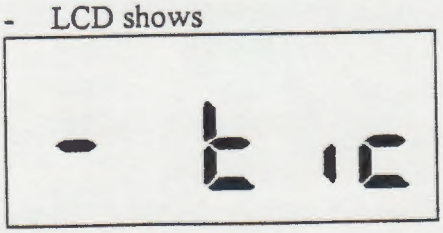
8	8	1	2	3	4	5	6	7
7	8	1	2	3	4	5	6	7
6	7	8	1	2	3	4	5	6
5	6	7	8	1	2	3	4	5
4	5	6	7	8	1	2	3	4
3	4	5	6	7	8	1	2	3
2	3	4	5	6	7	8	1	2
1	2	3	4	5	6	7	8	1
	A	B	C	D	E	F	G	H

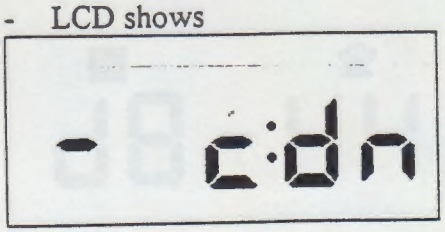
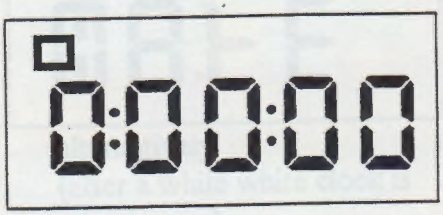
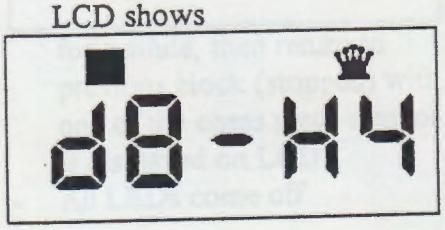
Note : The testing chessman should rest on the square for at least 1 second.

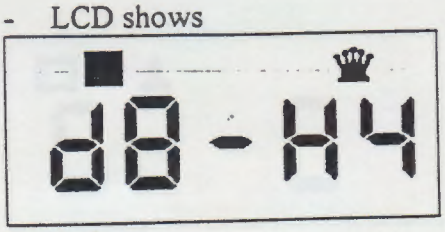
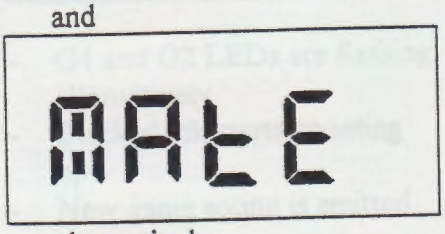
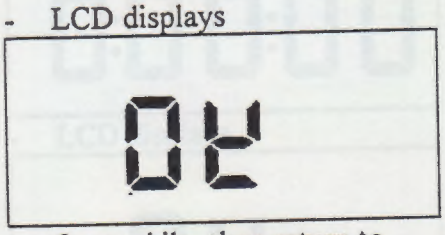
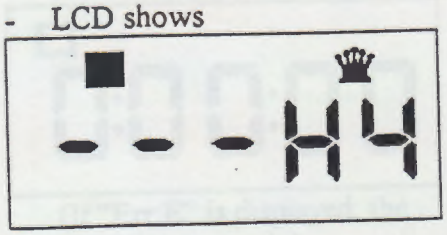
9. FUNCTIONAL TEST PROCEDURE FOR RM19 WITH RD2

Make sure that the ON/OFF switch of RW9 is at OFF position before any module is inserted into the unit, then insert the MMVI Module (RM19 logic unit) and LCD Module (RD2-Mephisto 6. GENERATION LCD MODUL) into the slots. Hence insert the energized adapter into DC socket.

Purpose	Procedure	Observation
1. QC mode (make sure that no chesspiece is located on the chessboard)	- Slide the ON/OFF switch to ON position while pressing □/← and ■/→ key at the same time for 2 seconds.	- LCD and LEDs scanning (see Table 3)
	- Press ♟ key	- LCD and LEDs scanning as Table 3 without sequence 9, 10. - LCD shows 
	- Place a RW9 chesspieces on square A1 to H8 sequentially (make sure to remove all chesspiece before testing the function keys on next step)	- Corresponding square LED is on and LCD shows  where -- is the coordinate of the square
	- Press function keys as shows in Table 4	- See Table 4

Purpose	Procedure	Observation
2. Newgame and set options	- Press **NEWGAME**	- LCD and LED scanning, see Table 3 without step 9 and 10 (If "Err: E" is shown on LCD, refer to section 7.3)
	- Setup pieces at Newgame position	- Newgame sound
	- Press **OPT**	- LCD shows 
	- Press **ENT**	- LCD shows 
	- Press ■/➔ (if "-Snd" is displayed instead, then press **ENT** once to modify the display)	- LCD shows 
	- Press ■/➔ (if "+SiL" is displayed instead, then press **ENT** once to modify the display)	- LCD shows 
	- Press ■/➔ twice (if "+tic" is displayed instead, then press **ENT** once to modify the display)	- LCD shows 

Purpose	Procedure	Observation
	- Press ■/➔ (if "+c:dn" is displayed instead, then press **ENT** once to modify the display)	- LCD shows 
	- Press **CL**	- LCD shows 
3. Multimove	- Move F2, F4, E7, E5, G2, G4 in sequence	- Coordinate LEDs come on with a "Beep" for each key press and LCD shows corresponding move.
	- Press **ENT**	- D8 LED and H4 LED are flashing alternatively and LCD shows 
	- Pick up the piece on square D8	- H4 LED is on and LCD shows as above

Purpose	Procedure	Observation
	- Place the piece on square H4	- LCD shows  and  alternatively (after a while white clock is counting up)
	- Press **CL**	- white clock counting up
5. Check memory	- Press **SAVE**	- LCD displays  for a while, then return to previous clock (stopped) with one of the chess piece symbol is displayed on LCD
	- Slide the **ON/OFF** switch to **OFF** position	- All LEDs come off
	- Press **NEWGAME** twice	- LCD blank
	- Slide the **ON/OFF** switch to **ON** position	- No response - LCD and LEDs scanning as Table 3 (without step 9, 10)
	- Pick up the Black Queen on H4	- LCD display as before without the chess piece symbol - H4 LEDs are on and - LCD shows 

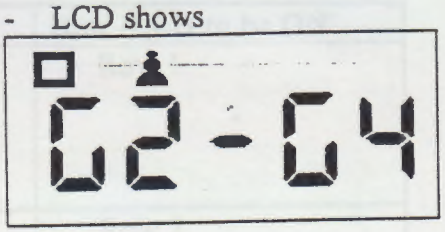
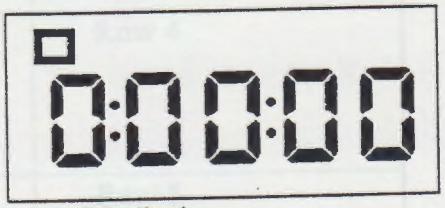
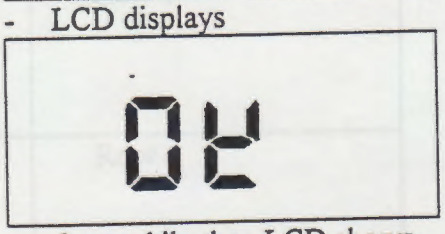
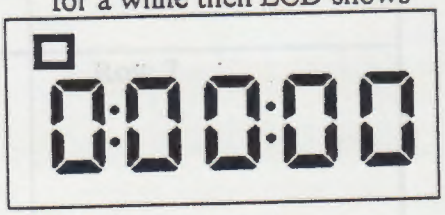
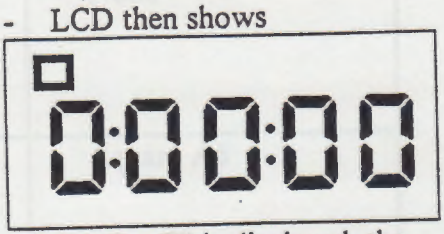
Purpose	Procedure	Observation
	- Put down the Black Queen on D8	- LCD shows 
		- G4 and G2 LEDs are flashing alternatively
	- Press **CL**	- Black clock starts counting up
	- Press **NEWGAME**	- New game sound is emitted
		- LCD shows 
	- Press **SAVE**	- LCD displays  for a while then LCD shows 
6. Power off	- Slide the ON/OFF switch to OFF position - Slide the ON/OFF switch to ON position	- All LEDs come off - LCD blanks - LCD and LED scanning as Table 3 (without step 9 and 10) - LCD then shows  (If "Err:E" is displayed, the EEPROM or unit is defective)

Table 3

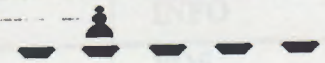
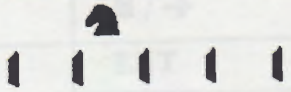
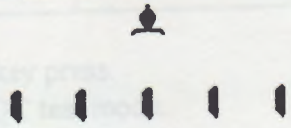
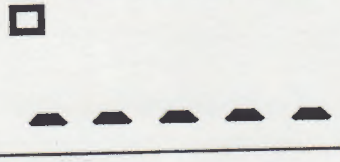
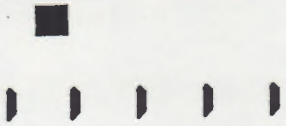
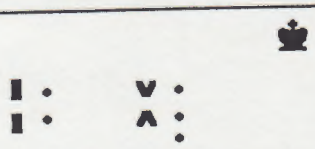
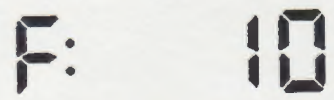
Sequence	LCD shows	Row /LED to be ON
1		Row 1
2		Row 2
3		Row 3
4		Row 4
5		Row 5
6		Row 6
7		Row 7
8		Row 8
9		None
10		Square A6

Table 4

Function Key Press	LCD displays	Function Key Press	LCD displays
♟	11	LEV	6
♞	12	INFO	5
♝	13	POS	8
♜	14	□ / ←	2
♛	15	■ / →	1
♚	16	ENT	10
SAVE	4	CL	9
OPT	7		

- A beep sound is given out for each key press.
- Pressing **<NEWGAME>** will exit QC test mode.